

# Work Smart

Question 1 of 109

A 65-year-old man is admitted with renal failure and is diagnosed with acute tubular necrosis (ATN).

Which of the following is least likely to be the cause of acute tubular necrosis?

(Please select 1 option)

<input type="checkbox"/>	Corticosteroid therapy <input checked="" type="checkbox"/> Correct
<input type="checkbox"/>	Hypertension
<input type="checkbox"/>	Hypovolaemia
<input type="checkbox"/>	Paracetamol poisoning
<input type="checkbox"/>	Rhabdomyolysis

Renal failure from ATN occurs in 25% of patients with severe hepatic damage.

Accelerated hypertension can cause small vessel obstruction with proliferative endarteritis of intralobular arteries and fibrinoid necrosis of afferent arterioles and glomerular capillary tuft.

Corticosteroid therapy has not been associated with ATN.

Other causes of ATN include:

- hypotension
- hepatic failure
- eclampsia, and
- drugs such as aminoglycosides, cephalosporins, cisplatin, amphotericin.

# Work Smart

Question 1 of 100

In which of the following circumstances would the treatment of anaemia with erythropoetin still be expected to be effective?

(Please select 1 option)

<input type="checkbox"/>	Aluminium toxicity
<input type="checkbox"/>	Folate deficiency
<input checked="" type="checkbox"/>	Hyperkalaemia <span style="color: green;">Correct</span>
<input type="checkbox"/>	Infection
<input type="checkbox"/>	Iron deficiency

Epoetin (recombinant human erythropoetin) is used:

- in chronic renal failure
- to shorten the period of anaemia in those receiving platinum-based chemotherapy, and
- prevention of anaemia in premature babies with low birth weight.

Its efficacy may be impaired in certain circumstances particularly with iron deficiency but also with aluminium toxicity, folate deficiency and infection. In the latter, the switch to the acute phase proteins impairs its function.

Its efficacy is unimpaired in hyperkalaemia.

# Work Smart

Question 2 of 100

A patient with end stage renal disease is receiving haemodialysis and erythropoietin.

Which of the following does erythropoietin therapy cause?

(Please select 1 option)

<input type="checkbox"/>	Hypotension
<input type="checkbox"/>	Idiopathic intracranial hypertension
<input type="checkbox"/>	Myositis
<input checked="" type="checkbox"/>	Osteoporosis <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Seizures <span style="color: green;">This is the correct answer</span>

Hypertension is a frequent problem associated with [erythropoietin](#) and may induce seizures.

A particular symptom is the onset of sudden stabbing migraine-like headache and should raise awareness to the possibility of hypertensive crisis.

Other adverse effects of treatment with erythropoietin include:

- Hyperkalaemia in uraemic patients
- Increased PCV (especially with misuse by normal individuals)
- Thrombocythaemia
- Shunt thrombosis
- Induction of iron deficiency
- Skin rashes

# Work Smart

Question 3 of 100

Which of the following is true with regard to anti-neutrophilic cytoplasmic autoantibodies?

(Please select 1 option)

<input type="checkbox"/>	ANCA positive glomerulonephritis characteristically causes nephrotic syndrome
<input type="checkbox"/>	They are increased in systemic lupus erythematosus (SLE)
<input type="checkbox"/>	They are positive only in Wegener's syndrome associated with renal disease
<input checked="" type="checkbox"/>	They are present in inflammatory bowel disease <span style="color: green;">Correct</span>
<input type="checkbox"/>	They cause neutropenia in SLE

Eighty-five percent of untreated subjects with Wegener's will have circulating anti-neutrophil cytoplasmic antibody (cANCA) and those with limited disease are less likely to have positive serology.

Perinuclear anti-neutrophil cytoplasmic antibody (pANCA) is present in approximately 70% with ulcerative colitis and less than 20% of Crohn's patients.

Neither p nor c-ANCA is typical of SLE.

Initial renal damage causes proteinuria (focal proliferative glomerulonephritis) but renal function can deteriorate rapidly with development of acute focal necrotising glomerulonephritis.

# Work Smart

Question 2 of 109

A 63-year-old male recently admitted with sepsis is noted to have a urine output of approximately 20 ml per hour.

The oliguria is more likely to be due to prerenal failure than intrinsic renal failure if which of the following is correct?

(Please select 1 option)

<input type="checkbox"/>	A blood pressure of 150/90 and good tissue perfusion
<input checked="" type="checkbox"/>	A urine free of red blood cells or casts <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	A urine:plasma urea ratio <3
<input type="checkbox"/>	Urine osmolality <350 mOsm/l
<input type="checkbox"/>	Urinary sodium >10 mmol/l <span style="color: red;">Incorrect answer selected</span>

Oliguria is defined as <400 ml urine/day.

Red cell casts present in:

- acute glomerulonephritis
- renal vasculitis
- accelerated hypertension, and
- interstitial nephritis.

Pre-renal failure is renal dysfunction due to hypoperfusion (urinary sodium <20, urine osmolality

>500, urine/plasma urea ratio >8, and urine/plasma creatinine >40).

Acute tubular necrosis is acute renal failure due to circulatory compromise and/or nephrotoxins (urinary sodium >40, urine osmolality <350, urine/plasma ratio urea <3, and urine/plasma creatinine <20).

## Answer Statistics



Times answered: 8977

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 50%

Total Answered: 2

# Work Smart

Question 4 of 100

Which of the following is true concerning metastatic calcification in chronic renal failure (CRF)?

(Please select 1 option)

<input type="checkbox"/>	Characteristically caused by calcium oxalate deposition	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Decreased by vitamin D	
<input type="checkbox"/>	Increased prevalence with time on haemodialysis	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Rapidly reversed in all sites after parathyroidectomy	
<input type="checkbox"/>	Unaffected by time on CAPD	

CRF is associated with

- Low serum calcium
- Hyperphosphataemia
- Increased parathyroid hormone (PTH)
- Reduced intestinal calcium absorption and
- Raised alkaline phosphatase.

Parathyroidectomy improves extraskeletal calcification, but vascular calcification improves less than periarticular calcification.

Metastatic calcification is due mainly to calcium phosphate deposition, although CRF managed with dialysis is the commonest cause of secondary oxalosis (acute arthritis of small joints with digital calcific deposits). Prolonged treatment with vitamin D (hence hypercalcaemia and

hyperphosphataemia) increases extraskeletal calcification.

## Answer Statistics

1		19%
2		14%
3		49%
4		9%
5		8%

Times answered: 7700

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 50%

Total Answered: 4

## Feedback

# Work Smart

Question 5 of 100

Which of the following is correct regarding chronic kidney disease (CKD)?

(Please select 1 option)

<input type="checkbox"/>	Serum alkaline phosphatase (ALP) is raised due to liver dysfunction
<input checked="" type="checkbox"/>	Serum calcium is often low, secondary to reduced levels of 1,25(OH) <sub>2</sub> vitamin D <span style="color: green;">Correct</span>
<input type="checkbox"/>	Serum phosphate is reduced in the early stages of chronic kidney disease, at GFR of 45 ml/min/1.73 m <sup>2</sup>
<input type="checkbox"/>	There is an increase in the tubular excretion of urate
<input type="checkbox"/>	There is usually a reduction in blood pressure

Hypocalcaemia is common in chronic kidney disease. It is mainly caused by failure of the 1 $\alpha$ -hydroxylation of vitamin D to form 1,25 dihydroxycholecalciferol, a step that usually occurs in renal tubular cells. This results in reduced calcium absorption from the gut, which is often exacerbated by poor oral intake of calcium in patients with CKD.

Together with hyperphosphataemia, hypocalcaemia drives increased release of parathyroid hormone (secondary hyperparathyroidism), which in turns contributes to renal osteodystrophy.

Hypertension is both a cause and consequence of chronic kidney disease. The pathogenesis of hypertension caused by CKD is complex and multifactorial. It is caused by:

- Increased intravascular volume (due to reduced glomerular filtration)
- Excessive activity of the renin angiotensin system
- Increased activity of the sympathetic nervous system

- Endothelial dysfunction, and
- Other neural and humoral factors.

Hypertension can then result in progression of CKD, again via complex mechanisms which include loss of renal autoregulation with elevation of intraglomerular capillary pressure and hyperfiltration-mediated injury.

Serum alkaline phosphatase is raised when renal osteodystrophy develops, specifically the bone isoenzyme rather than the liver form.

Abnormalities in PO(4) metabolism occur early in CKD. Reduced glomerular filtration rate results in reduced phosphate excretion. In the early stages of CKD there are compensatory changes in renal phosphate handling which can maintain a normal serum level, but as the disease progresses hyperphosphataemia develops. Together with hypocalcaemia, this contributes to the development of secondary hyperparathyroidism.

Patients who are acidotic due to renal failure have reduced tubular secretion of urate due to competition with other organic acids at tubular receptors.

## Answer Statistics

1		6%
2		50%
3		31%
4		7%
5		6%

Times answered: 9456

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 3 of 109

Which of the following is not a complication of nephrotic syndrome?

(Please select 1 option)

<input checked="" type="checkbox"/>	Accelerated hypertension	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Acute renal failure	
<input type="checkbox"/>	Hypocalcaemia	
<input type="checkbox"/>	Pneumococcal infection	
<input type="checkbox"/>	Venous thrombosis	<input type="checkbox"/> Incorrect answer selected

Complications also include hyperlipidaemia, protein malnutrition and loss of binding proteins in urine.

Acute renal failure may be seen due to the underlying condition, but can also be directly due to the nephrotic syndrome possibly due to a reduction in the ultrafiltration coefficient within the kidney.

Hypocalcaemia is seen due to loss of vitamin-D binding protein in the urine.

Susceptibility to infection, in particular, pneumococcal infections, is thought to be due to increased IgG excretion in the urine, reduced complement function and decreased splanchnic blood flow.

Venous thrombosis risk is increased due to the loss of antithrombin III in the urine.

# Work Smart

Question 6 of 100

What is the most likely outcome of minimal change nephropathy with onset at 12 years of age?

(Please select 1 option)

<input type="checkbox"/>	Frequent relapse
<input checked="" type="checkbox"/>	Full renal recovery <b>Correct</b>
<input type="checkbox"/>	Permanent renal impairment
<input type="checkbox"/>	Persistent hypertension
<input type="checkbox"/>	Persistent proteinuria

Thirty to forty percent of children achieve spontaneous remission and 90% achieve remission following eight weeks treatment with high dose steroids.

The disease is less common in adults, but over 80% of adults also achieve remission following treatment with oral glucocorticoids.

## Answer Statistics



14%

# Work Smart

Question 4 of 109

A 70-year-old female is admitted 12 hours after taking an overdose of aspirin.

Investigations revealed:

Serum sodium	138 mmol/L	(137-144)
Serum potassium	5.9 mmol/L	(3.5-4.9)
Serum bicarbonate	14 mmol/L	(20-28)
Serum urea	18.1 mmol/L	(2.5-7.5)
Serum creatinine	238 mol/L	(60-110)
Serum salicylate	1120 mg/L	(8)

Which option is the most appropriate treatment of this patient?

(Please select 1 option)

Haemodialysis	<input checked="" type="checkbox"/> This is the correct answer
Haemofiltration	<input type="checkbox"/>
Intravenous sodium bicarbonate	<input type="checkbox"/>
Peritoneal dialysis	<input type="checkbox"/>
Urine alkalinisation	<input type="checkbox"/> Incorrect answer selected

This patient is at major risk of aspirin toxicity as reflected by the excessive aspirin concentration and appears to have developed acute renal failure - she is acidotic with an elevated potassium.

Bicarbonate is recommended as a supportive therapy but in this patient haemodialysis is the treatment of choice. The latter is advised when the plasma-salicylate concentration is greater than 700 mg/litre (5.1 mmol/litre) or in the presence of severe metabolic acidosis as recommended within the [British National Formulary \(BNF\)](#) poisons section.

There is nothing wrong with haemofiltration; it just removes the toxin more slowly.

### Answer Statistics

1		57%
2		14%
3		17%
4		1%
5		12%

Times answered: 9699

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 7 of 100

A 30-year-old man had a blood pressure of 150/100 mmHg.

Clinical examination was normal.

Which one of the following would suggest secondary hypertension?

(Please select 1 option)

<input checked="" type="checkbox"/>	24 hour urinary protein excretion of 1.6 g (<0.2) <span style="color: green;">Correct</span>
<input type="checkbox"/>	A creatinine clearance of 90 mL/min (70-140)
<input type="checkbox"/>	Left ventricular hypertrophy (LVH) criteria on the ECG
<input type="checkbox"/>	Serum potassium of 3.9 mmol/L (3.5-4.9)
<input type="checkbox"/>	The presence of arteriovenous (AV) nipping on fundoscopy.

It is rather young for a 30-year-old to be hypertensive but the presence of such a degree of urinary protein would suggest that the lesion is of renal; origin polyarteritis nodosa etc.

The potassium concentration is normal and although it does not exclude Conn's it is certainly not suggestive.

LVH would be found with sustained hypertension of any aetiology, as would av nipping.

The creatinine clearance is normal.

# Work Smart

Question 8 of 100

A 33-year-old male who is receiving regular haemodialysis is noted to have a plasma potassium of 6.9 mmol/L (3.5-4.9) before a dialysis session. Usually his potassium is less than 5.5 mmol/L.

Which food combination from the dietary history would be most likely to cause the high potassium concentration?

(Please select 1 option)

<input type="checkbox"/>	Cereal, toast, biscuits.
<input type="checkbox"/>	Filter coffee, tea, boiled potatoes.
<input type="checkbox"/>	Milk, butter, plain yoghurt
<input type="checkbox"/>	Milk, ham, chicken.
<input checked="" type="checkbox"/>	Tomato, potato crisps, banana. <span style="color: green;">Correct</span>

In particular tomato and banana have high potassium content and patients should be advised to avoid such foods.

## Answer Statistics

# Work Smart

Question 9 of 100

Which of the following features would be expected in acute tubular necrosis?

(Please select 1 option)

<input type="checkbox"/>	Creatinine clearance would be expected to be normal one year after the initial insult
<input type="checkbox"/>	Heavy proteinuria on urinalysis
<input type="checkbox"/>	Red cell casts on urinalysis
<input checked="" type="checkbox"/>	Urine plasma osmolality ratio is more than 1:1 <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Urine sodium concentration greater than 30 mmol/L <span style="color: green;">This is the correct answer</span>

Red cell casts suggest nephritis and normalisation of the creatinine clearance occurs in only 40% of cases one year later.

Proteinuria, usually mild, is common with granular casts found on urinalysis.

The urine sodium concentration is typically above 30 mmol/L and osmolality ratio <1:1.

Further Reading:

Medscape. [Acute Tubular Necrosis](#).

# Work Smart

Question 10 of 100

Which of the following is a feature of pseudohypoparathyroidism?

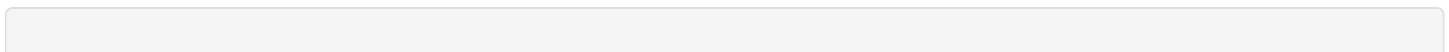
(Please select 1 option)

<input type="checkbox"/>	Increased urinary phosphate and cAMP with PTH infusion
<input checked="" type="checkbox"/>	Low serum calcium and high serum phosphate <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Low serum calcium and low serum phosphate
<input type="checkbox"/>	Low serum PTH
<input type="checkbox"/>	Shortened second and third metacarpals <span style="color: red;">Incorrect answer selected</span>

The biochemistry shows a hypocalcaemia with hyperphosphataemia being usual but elevated PTH due to resistance to parathormone (PTH).

This is due to mutation of the PTH receptor with abnormality of the Gs alpha subunit with reduced cyclic adenosine monophosphate (cAMP) production following a PTH infusion.

There are associated phenotypic signs including short stature, low IQ, and shortened fourth and fifth metacarpals.



# Work Smart

Question 11 of 100

Which one of the following is true concerning antidiuretic hormone (ADH)?

(Please select 1 option)

<input checked="" type="checkbox"/> Carbamazepine potentiates its release <input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Ethanol potentiates its release
<input type="checkbox"/> It circulates in the blood bound to neurohypophysis
<input type="checkbox"/> It is a cyclic octapeptide <input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> It is synthesised in the posterior pituitary

ADH is a nonapeptide manufactured in the paraventricular and supra-optic nuclei of the hypothalamus and released from the posterior pituitary.

It acts on the collecting ducts improving water permeability and hence water retention.

Carbamazepine, as well as other agents such as thiazides and selective serotonin reuptake inhibitors (SSRIs), may potentiate its release.

Ethanol usually inhibits release.

## Work Smart

Question 12 of 100

Which of the following concerning renal blood flow is true?

(Please select 1 option)

<input checked="" type="checkbox"/>	Can be measured using the Fick principle <span style="color: green;">Correct</span>
<input type="checkbox"/>	Is 40% of the cardiac output at rest
<input type="checkbox"/>	Is decreased in response to hypoxia
<input type="checkbox"/>	Is higher in the medulla than the cortex
<input type="checkbox"/>	Is increased when renal nerves are stimulated

Renal blood flow (RBF) is approximately 25% of cardiac output.

The 'Fick principle' can be used to estimate RBF through clearance.

RBF is higher in the cortex than medulla as one might expect with the increasing glomeruli in this region.

Sympathetic stimuli produce vasoconstriction and RBF should be increased in response to hypoxia.

# Work Smart

Question 5 of 109

Which of the following concerning the pH of urine is correct?

(Please select 1 option)

<input type="checkbox"/>	Is a useful indicator of the acid/base balance of the blood
<input type="checkbox"/>	Is determined by the concentration of ammonium
<input type="checkbox"/>	Is lower than 5.5 in renal tubular acidosis (RTA)
<input checked="" type="checkbox"/>	Rises on a vegetarian diet <b>This is the correct answer</b>
<input type="checkbox"/>	Would be above 7.0 after prolonged and severe vomiting <b>Incorrect answer selected</b>

Urine pH is affected by diet, with vegetarians having more alkaline urine when compared with omnivores.

Animal proteins contained in meat, eggs and cheese are often converted into acidic products (for example, amino acids) during digestion, absorption or metabolism. This provides a daily increase in the body's acid content, which has to be excreted by the kidneys. For people eating a vegetarian diet, consumption of foods rich in citrate or carbonated drinks raise the urine pH.

Other situations can interfere with this balance, such as tubular function or bacterial infection, which often promotes an alkaline urine pH due to the presence of bacterial enzymes converting urea to ammonia.

Urine pH has variable effects upon stone formation. The solubility of uric acid is markedly decreased in an acidic solution so uric acid stones are more likely to form. However, calcium phosphate

becomes less soluble at pH >6; hence calcium phosphate stones are more likely to form in an alkaline urine. Therefore dietary advice needs to be tailored to the clinical scenario.

Excretion of ammonium occurs when an acid urine is produced but the pH of urine is of course determined by the concentration of H<sup>+</sup> ions.

Unable to lower the pH to less than 5.5 in type 1 RTA.

A pH of above 7.0 after prolonged and severe vomiting would be expected in an attempt to compensate for the loss of acid; however, when there is extracellular fluid depletion the retention of sodium takes priority.

Instead of bicarbonate being excreted it is reabsorbed in the proximal and distal nephron and this perpetuates the metabolic alkalosis until the fluid balance is restored with intravenous (IV) fluids.

Reference:

Grases F, et al. [Renal lithiasis and nutrition](#). *Nutr J*. 2006;5:23.

## Answer Statistics



Times answered: 9505

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Exam Themes September 2000

Question 6 of 109

Which of the following is correct with regard to hyperuricaemia?

(Please select 1 option)

<input type="checkbox"/>	Can be reduced with low dose aspirin therapy	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Can be treated with uricosuric drugs even in renal failure	
<input type="checkbox"/>	In primary gout is inherited in an autosomal dominant manner	
<input type="checkbox"/>	Is usually due to an excess purine consumption	
<input type="checkbox"/>	Occurs in association with acute lymphoblastic leukaemia	<input checked="" type="checkbox"/> This is the correct answer

Hyperuricaemia may be due to increased purine intake, urate production or reduced urate clearance, and is most commonly due to the latter.

Therefore it can occur in association with enhanced cell destruction, particularly leukaemias.

Primary gout has no obvious mode of inheritance, but familial juvenile gouty nephropathy is an autosomal dominantly inherited disorder.

Low dose aspirin may exacerbate gout but high dose aspirin is uricosuric.

Many of the uricosuric drugs may be detrimental in renal failure and may not be effective.

# Work Smart

Question 13 of 100

Which of the following is a recognised cause of acute renal failure in childhood?

(Please select 1 option)

<input type="checkbox"/>	Alport syndrome
<input checked="" type="checkbox"/>	Burns <b>Correct</b>
<input type="checkbox"/>	Dermatomyositis
<input type="checkbox"/>	Duchenne muscular dystrophy
<input type="checkbox"/>	Hypothyroidism

Causes of acute renal failure can be divided into pre-renal, renal and post-renal.

Pre-renal:

- Hypovolaemia (gastroenteritis, burns, sepsis, haemorrhage, nephrotic syndrome)
- Circulatory failure.

Renal:

- Vascular - HUS, vasculitis, embolus, renal vein thrombosis
- Tubular - acute tubular necrosis, ischaemic, toxic, obstructive
- Glomerular - glomerulonephritis
- Interstitial - interstitial nephritis, pyelonephritis
- Acute chronic renal failure.

Post-renal:

- Obstruction, either congenital or acquired.

Although Alport syndrome is associated with end stage renal failure, this usually progresses gradually so that it occurs in adult life.

Many drugs cause interstitial nephritis.

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## Answer Statistics

1		44%
2		49%
3		2%
4		3%
5		3%

Times answered: 8347

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 14 of 100

In chronic untreated renal failure which of the following findings is characteristic?

(Please select 1 option)

<input checked="" type="checkbox"/>	Anaemia <span style="color: green;">Correct</span>
<input type="checkbox"/>	Hypercalcaemia
<input type="checkbox"/>	Hypokalaemia
<input type="checkbox"/>	Hypotension
<input type="checkbox"/>	Metabolic alkalosis

Chronic kidney disease is classically associated with anaemia. The major cause is reduced circulating erythropoietin, but other factors contribute:

- Reduced dietary intake of iron
- Toxic effects of uraemia on the bone marrow
- Reduced red cell survival

Hypocalcaemia is typically seen due to reduced 1-alpha-hydroxylation of vitamin D and hyperphosphataemia.

Hypertension is seen due to sodium and water overload and direct renal effects secondary to the underlying renal disease.

Hyperkalaemia is a classical finding due to metabolic acidosis and decreased glomerular filtration

rate.

Metabolic acidosis is a result of bicarbonate wasting and reduced ammonia and acid excretion.

There are a number of other abnormalities associated with chronic renal failure:

- Accumulation of nitrogenous waste products
- Acidosis: bicarbonate wasting, decreased ammonia secretion, decreased acid excretion
- Sodium wasting: solute diuresis, tubular damage
- Sodium retention: nephrotic syndrome, CCF, anuria, excess sodium intake
- Urinary concentrating defect: nephron loss, solute diuresis
- Hyperkalaemia: decreased glomerular filtration rate (GFR), acidosis, hyperaldosteronism
- Renal osteodystrophy: decreased intestinal calcium absorption, impaired 12-dihydroxy vitamin D production, secondary hyperparathyroidism
- Growth retardation: protein calorie deficiency, renal osteodystrophy, acidosis, anaemia
- Anaemia: decreased erythropoietin production, low-grade haemolysis, inadequate intake
- Bleeding tendency: thrombocytopenia, decreased platelet function
- Infection: defective granulocyte function
- Neurology: uraemia, aluminium toxicity results in fatigue, poor concentration, headache, memory loss, slurred speech, muscle weakness and cramps, seizures and coma
- GI ulceration: gastric acid hypersecretion
- Hypertension: sodium and water overload, hyperammonaemia
- Hypertriglyceridaemia: decreased plasma lipoprotein lipase activity
- Pericarditis and cardiomyopathy: cause unknown
- Glucose intolerance: tissue insulin resistance.

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## Answer Statistics

1		68%
2		16%
3		2%
4		9%
5		5%

Times answered: 8493

## Test Analysis

# Work Smart

Question 7 of 109

Which of the following is a feature of cystinuria?

(Please select 1 option)

<input type="checkbox"/>	A useful response to acidification of urine	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Accumulation of cystine in the kidney	
<input type="checkbox"/>	Autosomal dominant inheritance	
<input checked="" type="checkbox"/>	Excessive urinary arginine excretion	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Radiolucent urinary calculi	

Cystinuria is the commonest inborn error of amino acid transport.

Amino acids excreted in urine are cystine, ornithine, arginine and lysine (mnemonic - COAL).

The renal stones are radio-opaque due to the presence of sulphur. On plain film, which is not used as much in the UK anymore, they are radiolucent. On CT, as with almost all stones, cysteine stones are radio-opaque.

It is inherited as an autosomal recessive condition.

Management includes alkalinisation along with high fluid intake (>4 L/day); d-penicillamine may also be used.

It is cystinosis that leads to accumulation of cystine in the kidney.

# Work Smart

Question 8 of 109

Acute renal failure may be distinguished from chronic renal failure by which of the following?

(Please select 1 option)

<input type="checkbox"/>	An increased urinary Na excretion
<input type="checkbox"/>	Hyperkalaemia
<input type="checkbox"/>	Hypophosphataemia
<input type="checkbox"/>	Left ventricular hypertrophy (LVH) on the ECG
<input checked="" type="checkbox"/>	Renal size on ultrasound scan (USS) <span style="color: green;">Correct</span>

Small kidneys on USS suggest chronic renal failure but the following causes of chronic renal failure can present with normal/enlarged kidneys:

- Amyloidosis
- Polycystic kidney disease
- Diabetic glomerulosclerosis
- Scleroderma
- Rapidly progressive glomerulonephritis.

Decreased fractional Na clearance, hyperphosphataemia and hyperkalaemia are features of acute or chronic renal failure.

LVH is probably more likely to be seen in chronic renal failure but is not reliable.

# Work Smart

Question 9 of 109

Which of the following statements regarding idiopathic membranous nephropathy is correct?

(Please select 1 option)

<input type="checkbox"/>	Immune complex deposits are typically seen in the glomerular mesangium	<input type="checkbox"/> <b>Incorrect</b>
<input checked="" type="checkbox"/>	answer selected	
<input type="checkbox"/>	It characteristically presents in the first decade of life	
<input type="checkbox"/>	Males are twice as commonly affected as females	<input type="checkbox"/> <b>This is the correct answer</b>
<input type="checkbox"/>	Progression to end-stage renal failure is rapid	
<input type="checkbox"/>	The nephritic syndrome is a characteristic presentation	

Membranous nephropathy is characterised by thickened basement membranes and monotonous granular deposits of IgG and C3 distributed in the epimembranous space of virtually all glomerular capillaries. The mesangium may be involved at a later stage of the disease and is more typical of secondary disease.

It is typically seen in the over 40 age group with a male predominance of 2 to 1 and is associated with a variable prognosis with 25% developing ESRF over 10 years and 25% going into remission. There is a higher rate of remission for the idiopathic form.

The majority of patients manifest with a pure nephrotic syndrome. A nephritic presentation is rare.

# Work Smart

Question 15 of 100

Which one of the following statements is correct?

(Please select 1 option)

<input type="checkbox"/>	Adult polycystic renal disease is inherited as an autosomal recessive trait
<input type="checkbox"/>	Alport's syndrome affects females more severely than males
<input checked="" type="checkbox"/>	Medullary sponge kidney is typically not inherited but is a congenital condition <b>This is the correct answer</b>
<input type="checkbox"/>	Nephrogenic diabetes insipidus (DI) is inherited as an autosomal dominant trait <b>Incorrect answer selected</b>
<input type="checkbox"/>	Reflux nephropathy is inherited as an autosomal recessive trait

Medullary sponge kidney is a disorder which can affect part, one, or both kidneys, resulting in ectatic and cystic changes of the medullary and papillary collecting ducts. It is often associated with calculi, which can result in pyelonephritis and renal tract obstruction.

The aetiology is uncertain, but it is thought to be a developmental abnormality, possibly resulting from tubular or collecting duct obstruction at any early age. The majority of cases are sporadic, although a rare autosomal dominant familial form exists with onset in adulthood, and a juvenile autosomal recessive form is also recognised. Recent research has identified a possible defect in the development of the proton pump mechanism in the kidney.

Polycystic kidney disease (PKD) is usually autosomal dominant although the infantile form is autosomal recessive.

Nephrogenic DI is usually X linked.

Features of Alport's syndrome (hereditary nephritis, haematuria, progressive renal failure, and high-frequency nerve deafness) are usually more marked in males.

Reflux nephropathy was originally thought to be an acquired abnormality, but genetic factors are increasingly being recognised. It is thought inheritance may be dominant, although the gene has not yet been identified and it is thought that environmental factors also have a significant role.

### Answer Statistics



Times answered: 8976

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 60%

# Work Smart

Exam Themes May 2001

Question 10 of 109

Which one of the following statements regarding renal function is correct?

(Please select 1 option)

<input checked="" type="checkbox"/>	A ten minute period of hyperventilation will normally be expected to lead to an increased rate of bicarbonate excretion in urine <span style="color: green;">□ This is the correct answer</span>
<input type="checkbox"/>	Sodium reabsorption in the tubules is mainly controlled by aldosterone
<input type="checkbox"/>	The daily solute excretion will lie between 75 and 300 mosmol
<input type="checkbox"/>	The permeability of the proximal nephron to water increases in the presence of vasopressin
<input type="checkbox"/>	The rate of ammonium excretion in urine is inversely related to the rate of urinary hydrogen ion excretion <span style="color: red;">□ Incorrect answer selected</span>

Arginine vasopressin (AVP) acts on the collecting ducts increasing permeability to water.

The total solute excretion is approximately 700 mosmol/d.

Sodium reabsorption is mostly through active transport in the loop of Henle with only a modest reabsorption facilitated by aldosterone.

A ten minute period of hyperventilation would cause a respiratory alkalosis leading to an increased secretion of bicarbonate and retention of hydrogen ions.

The rate of ammonium excretion is proportional to the rate of hydrogen ion excretion.

# Work Smart

Question 11 of 109

A 15-year-old girl was seen by her family physician because of increasing lethargy.

She had a recent history of the "flu".

Biochemistry tests show that she has renal impairment.

Serum sodium	140 mmol/L	(137-144)
Serum potassium	4.2 mmol/L	(3.5-4.9)
Serum urea	28 mmol/L	(2.5-7.5)
Serum creatinine	280 µmol/L	(60-110)

Her condition does not improve after several weeks on corticosteroid therapy, so a renal biopsy is performed.

The biopsy demonstrates the presence of segmental sclerosis of three of 10 glomeruli identified in the biopsy specimen. Immunofluorescence studies and electron microscopy do not reveal evidence for immune deposits.

Which of the following statements is most accurate regarding her condition?

(Please select 1 option)

<input type="checkbox"/> She has an underlying malignancy	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> She may require a renal transplant in 10 years	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/> She will improve if she loses weight	
<input type="checkbox"/> She will likely develop a restrictive lung disease	

She will probably improve with additional corticosteroid therapy

The findings in this case point to focal segmental glomerulosclerosis (FSGS), which leads to chronic renal failure in half of cases. This accounts for approximately 20% of cases of nephrotic syndrome in children and 40% in adults. It is one of the most common primary glomerular disorders causing end-stage renal failure.

Proteinuria is the classic clinical feature, and is typically accompanied by hypoalbuminaemia, hypercholesterolaemia, and peripheral oedema. The cardinal feature on renal biopsy is progressive glomerular scarring. Early in the disease course, glomerulosclerosis involves a minority of glomeruli (focal) and only a portion of the glomerular globe (segmental). As the disease progresses, more widespread glomerulosclerosis develops. This is due to podocyte injury which leads to effacement of the podocyte foot processes.

80% of causes of FSGS are idiopathic; thought to be mediated by circulating permeability factors. Secondary forms can be familial (due to mutations in specific podocyte genes), viral (HIV-1, parovirus B19, CMV, EBV), drug-induced (heroin, IFN, lithium, pamidronate, anabolic steroids, calcineurin inhibitors), or adaptive (unilateral renal agenesis, hypertension, sickle cell anaemia, vaso-occlusion).

Treatment is aimed at preserving renal function, and inducing remission of proteinuria. Secondary causes should be excluded as treatment should be targeted at the underlying condition in these cases. Idiopathic cases are treated with renin-angiotensin blockade and dietary sodium restriction initially. If nephrotic syndrome is present, high-dose glucocorticoid therapy should be initiated and slowly tapered over a period of 3-6 months if a response is seen. If FSGS is glucocorticoid resistant, therapy is with a calcineurin inhibitor.

A significant number of patients with FSGS go on to end-stage renal failure (ESRF). Unfortunately, FSGS recurs in 40% of renal transplants. Risk factors for recurrence include age 6-15 years, Caucasian, rapid course to ESRF (<3 years), heavy proteinuria prior to transplantation, and previous allograft loss. Plasmapheresis has been shown to lead to remission if used early in the course of recurrence.

Reference:

D'Agati VD, Kaskel FJ, Falk RJ. [Focal segmental glomerulosclerosis](#). *N Engl J Med*. 2011;365:2398-411.

# Work Smart

Question 16 of 100

A 60-year old man with a history of non-small cell lung cancer was treated with a right lower lobectomy 12 months ago.

He had an chest and abdominal CT scan one month ago which revealed hepatic mass lesions and hilar lymphadenopathy. He now presents with malaise and fatigue.

His results show:

Urinalysis	Protein +++	-
24 hour urine protein	2.7 g/24hr	-
Serum urea	30 mmol/L	(2.5-7.5)
Serum creatinine	450 µmol/L	(60-110)

A renal biopsy shows focal deposition of IgG and C3 with a granular pattern.

What is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Goodpasture's syndrome
<input checked="" type="checkbox"/> Membranous glomerulonephritis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/> Minimal change glomerulonephritis
<input type="checkbox"/> Nodular glomerulosclerosis
<input type="checkbox"/> Rapidly progressive glomerulonephritis <span style="color: red;">Incorrect answer selected</span>

Membranous GN is associated with:

- Malignancy
- Elderly patients, male more than female
- Medications: penicillamine, GOLD, captopril, and heavy metals: mercury and cadmium
- Basement membrane thickening
- Rheumatoid arthritis
- Autoimmune disease: systemic lupus erythematosus (SLE), thyroid
- Nephrotic syndrome is the main presentation
- Hepatitis B
- Odd infections - like syphilis, leprosy, HIV, schistosomiasis, malaria
- Immune complex deposition with IgG and C3
- Sickle cell disease.

Forty per cent remit without treatment, 30% develop endstage renal failure (ESRF).

### Answer Statistics



Times answered: 9731

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 12 of 109

A 49-year-old woman has been an inpatient for the past 10 days for treatment of a bronchopneumonia. She has developed the onset of chills, fever, and skin rash over the past two days.

A peripheral blood film reveals eosinophilia. On urinalysis she has ++ proteinuria. There is no past history of renal disease. Her HbA<sub>1c</sub> is normal.

Which of the following diagnoses would be most strongly suggested by these findings?

(Please select 1 option)

<input type="checkbox"/>	Acute serum sickness
<input type="checkbox"/>	Acute tubular necrosis
<input checked="" type="checkbox"/>	Drug-induced interstitial nephritis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	IgA nephropathy
<input type="checkbox"/>	Post-streptococcal glomerulonephritis (GN) <span style="color: red;">Incorrect answer selected</span>

The findings are typical of a drug-induced acute interstitial nephritis.

Acute interstitial nephritis is characterised by interstitial inflammation and oedema. Left untreated this results in interstitial fibrosis. A definitive diagnosis is established by renal biopsy, although eosinophiluria and gallium 67 scanning are also suggestive.

60-70% of cases of acute interstitial nephritis are induced by exposure to drugs. The mechanism is via a delayed T-cell hypersensitivity or cytotoxic T-cell reaction. This is not typically dose-dependent.

Multiple medications have been implicated, and the presentation and laboratory findings vary according to the class of drug involved.

Agents which are commonly implicated are:

- beta-lactam antibiotics (especially methicillin)
- sulphonamides
- NSAIDs
- diuretics (thiazides, furosemide)
- antivirals (aciclovir, foscarnet)
- allopurinol, and
- cyclosporin.

Classic presenting features include fever, maculopapular rash, and arthralgia. Mild eosinophilia is common, and eosinophiuria is pathognomonic.

Cessation of the causative agent is critical in the treatment of acute interstitial nephritis.

Corticosteroids can have a beneficial effect, especially if initiated early.

In general, the prognosis of drug-induced acute interstitial nephritis is good, and partial or complete recovery of renal function is normally seen.

Post-streptococcal GN appears weeks after the acute infection.

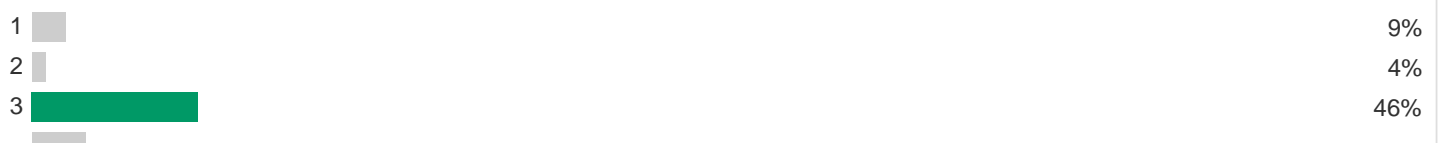
Berger's disease (IgA nephropathy) is characterised by haematuria and often follows a 'flu-like' illness.

Serum sickness is a possibility, but it is much less common than interstitial nephritis.

Reference:

1. Perazella MA, Markowitz GS. [Drug-induced acute interstitial nephritis](#). *Nat Rev Nephrol*. 2010;6(8):461-70.
2. Rossert J. [Drug-induced acute interstitial nephritis](#). *Kidney Int*. 2001;60(2):804-17.

## Answer Statistics



# Work Smart

Question 13 of 109

A 25-year-old man developed bilateral loin pain and frank haematuria.

His symptoms had started 24 hours after developing a sore throat. His blood pressure was 138/88 mmHg. Urinalysis was positive for blood (4+) and protein (2+).

What is the most likely diagnosis?

(Please select 1 option)

<input checked="" type="checkbox"/> IgA nephropathy <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/> Microscopic polyangiitis
<input type="checkbox"/> Nephrolithiasis
<input type="checkbox"/> Post-streptococcal glomerulonephritis <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/> Septicaemia

The acute onset of the disease is suggestive of IgA nephropathy which characteristically occurs in young males in their 20s and 30s.

Haematuria occurs within 12-24 hours of pharyngitis, accompanied also by loin pain, muscle pain and fever. Prognosis is usually good, especially in children. In adults, between 25-50% may develop end-stage renal failure. No specific treatment is available.

Classically, the patient has streptococcal infection one to three weeks before the onset of acute nephritic syndrome (post-strep GN).

There is a long prodromal systemic illness lasting months or years in microscopic polyangiitis which

differs from Wegener's granulomatosis in its absence of respiratory tract granulomatous inflammation.

## Answer Statistics



Times answered: 8251

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.38%

Total Answered: 13

## Feedback

# Work Smart

Question 17 of 100

A 50-year-old man is admitted with cardiogenic shock due to an acute myocardial infarction.

His urine output drops over the next few days. His serum urea increases to 18 mmol/L (2.5-7.5), with creatinine of 300 µmol/L (60-110). Urinalysis reveals no protein or glucose, a trace blood, and numerous hyaline casts.

Several days later he develops polyuria and his serum urea and creatinine fall.

Which of the following pathologic findings is most likely to be seen in his kidneys?

(Please select 1 option)

<input type="checkbox"/>	Fusion of podocyte foot processes
<input type="checkbox"/>	Glomerular crescents
<input type="checkbox"/>	Hyperplastic arteriolosclerosis
<input type="checkbox"/>	Mesangial immune complex deposition
<input checked="" type="checkbox"/>	Patchy tubular necrosis <span style="color: green;">Correct</span>

He would have findings of ischaemic acute tubular necrosis from cardiogenic shock.

Fusion of podocyte foot processes is seen in minimal change glomerulonephritis.

Glomerular crescents can complicate any glomerulopathy but, along with mesangial immune complex deposition, is usually an immune-mediated process.

Hyperplastic arteriolosclerosis is the 'onion skin' appearance of arterioles in malignant hypertension.

# Work Smart

Question 18 of 100

In which of the following situations would a percutaneous needle biopsy of the kidney be most helpful and appropriate?

(Please select 1 option)

<input type="checkbox"/>	Fever with suspected acute pyelonephritis
<input type="checkbox"/>	Premature neonate with suspected polycystic kidney disease
<input type="checkbox"/>	Prostatic hyperplasia with suspected hydronephrosis
<input checked="" type="checkbox"/>	Suspected renal cyst <span style="color: red;">❌ Incorrect answer selected</span>
<input type="checkbox"/>	Systemic lupus erythematosus (SLE) and acute renal failure <span style="color: green;">✅ This is the correct answer</span>

The renal manifestations of SLE are highly variable, ranging from mild asymptomatic proteinuria and/or haematuria to rapidly progressive uraemia. The various presentations are difficult to classify into clinical syndromes and histological classes. Although lupus nephritis affects a third of patients early in the disease it is frequently unrecognised until nephritic and/or nephrotic syndrome with renal failure occur.

Histologically, a number of different types of renal disease are recognised in SLE, with immune-complex mediated glomerular disease being the most common. The up to date International Society of Nephrology/Renal Pathology Society 2003 classification divides these into six different patterns:

- I - minimal mesangial
- II - mesangial proliferative
- III - focal

- IV - diffuse
- V - membranous
- VI - advanced sclerosis

Glomeruli appear normal by light microscopy in minimal mesangial lupus nephritis, but immunofluorescence demonstrates mesangial immune deposits.

Mesangial proliferative nephritis presents clinically as microscopic haematuria and/or proteinuria. Hypertension is uncommon and nephrotic syndrome and renal impairment are very rarely seen. Biopsy demonstrates segmental areas of increased mesangial matrix and cellularity, with mesangial immune deposits. A few isolated subepithelial or subendothelial deposits may be visible by immunofluorescence. The prognosis is good and specific treatment is only indicated if the disease progresses.

Focal disease is more advanced, but still affects less than 50% of glomeruli. Haematuria and proteinuria is almost always seen, and nephrotic syndrome, hypertension and elevated creatinine may be present. Biopsy demonstrates active or inactive focal, segmental or global endo- or extracapillary glomerulonephritis involving less than 50% of glomeruli, typically with focal subendothelial immune deposits, with or without mesangial alterations. It is further subdivided:

- A: Active lesions: focal proliferative lupus nephritis
- A/C: Active and chronic lesions: focal proliferative and sclerosing lupus nephritis
- C: Chronic inactive lesions with glomerular scars: focal sclerosing lupus nephritis

Prognosis is variable.

Diffuse glomerulonephritis is the most common and severe form of lupus nephritis. Haematuria and proteinuria are almost always present, and nephrotic syndrome, hypertension and renal impairment common. Biopsies demonstrate active or inactive diffuse, segmental or global endo- or extracapillary glomerulonephritis involving more than 50% of all glomeruli, typically with diffuse subendothelial immune deposits, with or without mesangial alterations. This class is divided into diffuse segmental (IV-S) when more than 50% of the involved glomeruli have segmental lesions, and diffuse global (IV-G) when more than 50% of involved glomeruli have global lesions. Segmental is defined as a glomerular lesions that involves less than half of the glomerular tuft.

- IV-S (A): Active lesions, diffuse segmental proliferative lupus nephritis
- IV-G (A): Active lesions, diffuse global proliferative
- IV-S (A/C): Active and chronic lesions, diffuse segmental proliferative and sclerosing lupus nephritis
- IV-S (C): Chronic inactive lesions with scars, diffuse segmental sclerosing lupus nephritis
- IV-G (C): Chronic inactive lesions with scars: diffuse global sclerosing lupus nephritis

Immunosuppressive therapy is required in these cases to prevent progressive to end-stage renal

failure.

Patients with membranous lupus nephritis tend to present with nephrotic syndrome. Microscopic haematuria and hypertension may also be seen. Biopsies show global or segmental subepithelial immune deposits or their morphologic sequelae, with or without mesangial alterations. It may occur in combination with class III or IV, in which case both are diagnosed. Progression is variable, and immunosuppression is not always needed.

In advanced sclerosis, more than 90% of glomeruli are globally sclerosed without residual activity.

Features associated with a poorer prognosis, and increased risk of progression to end stage renal failure include:

- young age (<23)
- increased serum creatinine
- diffuse proliferative lesions (WHO classification class IV), and
- a high chronicity index on renal histologic analysis.

With regard to the management of lupus nephritis a biopsy is indicated in those patients with abnormal urinalysis and/or reduced renal function. This can provide a histological classification as well as information regarding activity, chronicity and prognosis. Cyclophosphamide, mycophenolate mofetil and azathioprine reduce mortality in proliferative forms of lupus glomerulonephritis.

The diagnosis of pyelonephritis is made on the basis of clinical presentation and positive urine culture, with or without ultrasound findings. Renal biopsy is rarely required.

Polycystic kidney disease is usually diagnosed with characteristic appearances on ultrasound.

Hydronephrosis associated with prostatic disease can be diagnosed on ultrasound, and biopsy is not indicated.

Renal cysts are usually found on ultrasound and CT. Tissue may be needed to differentiate between malignant and benign cysts, but this is obtained via aspiration rather than renal parenchymal biopsy.

Reference:

1. Contreras G et al. [Lupus nephritis: a clinical review for practicing nephrologists](#). *Clin Nephrol*. 2002;57:95-107.
  2. Molino C et al. [Clinical approach to lupus nephritis: recent advances](#). *Eur J Intern Med*. 2009;20:447-53.
-

# Work Smart

Question 14 of 109

A 43-year-old man has had vague malaise for three weeks.

Physical examination is normal, except for a blood pressure of 150/95 mmHg and pitting oedema of the legs to the knees.

Dipstick urinalysis shows 2+ protein but no glucose, blood, ketones, nitrite, or urobilinogen; and the microscopic urinalysis reveals no RBC/hpf and only 1 WBC/hpf.

Additional laboratory testing reveals a 24 hour urine protein of 4.1 gm. His serum creatinine is 350 µmol/L (60-110) with urea of 30 mmol/L (2.5-7.5). His hepatitis B surface antigen is positive.

Which of the following conditions is he most likely to have?

(Please select 1 option)

<input type="checkbox"/>	Acute tubular necrosis
<input type="checkbox"/>	Diabetic nephropathy
<input checked="" type="checkbox"/>	Membranous glomerulonephritis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Post-streptococcal glomerulonephritis
<input type="checkbox"/>	Systemic lupus erythematosus <span style="color: red;">Incorrect answer selected</span>

[Membranous glomerulonephritis](#) is an antibody mediated disease in which the immune complexes localise to the subepithelial aspect of the capillary loop. That is, between the outer aspect of the basement membrane and the podocyte (epithelial cell).

The immune complexes develop in situ or, less likely, by the deposition of circulating immune

complexes. The antibody may bind to an intrinsic glomerular antigen or to an exogenous antigen planted on the capillary wall.

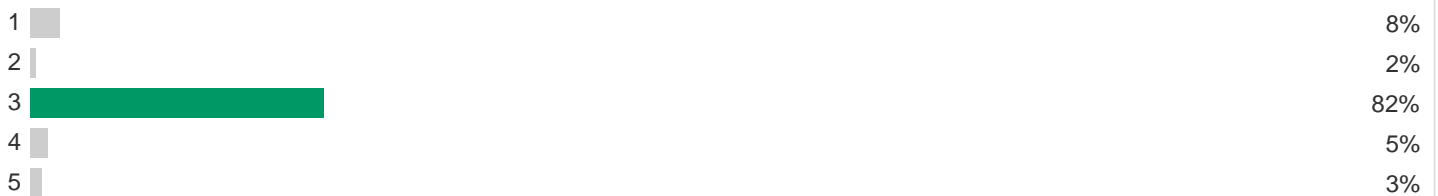
Approximately 25 to 30% of cases are secondary. Common associations include:

- systemic lupus erythematosus and other connective tissue disorders
- drugs (gold, penicillamine, non-steroidal anti-inflammatory agents)
- hepatitis B, syphilis, quartan malaria, leprosy, schistosomiasis, and
- carcinoma, melanoma, leukaemia, non-Hodgkin's lymphomas.

Membranous glomerulonephritis is more common in adults and most patients are older than 30 years at diagnosis. Membranous glomerulonephritis accounts for 35-50% of cases of adult nephrotic syndrome.

Most patients present with heavy proteinuria, most commonly in the nephrotic range, that is insidious in onset. A few patients have accompanying microscopic haematuria.

## Answer Statistics



Times answered: 9828

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 14 of 109

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Physical examination is normal, except for a blood pressure of 150/95 mmHg and pitting oedema of the legs to the knees.

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Additional laboratory testing reveals a 24 hour urine protein of 4.1 gm. His serum creatinine is 350 µmol/L (60-110) with urea of 30 mmol/L (2.5-7.5). His hepatitis B surface antigen is positive.

Which of the following conditions is he most likely to have?

(Please select 1 option)

<input type="checkbox"/>	Acute tubular necrosis
<input type="checkbox"/>	Diabetic nephropathy
<input type="checkbox"/>	Membranous glomerulonephritis
<input type="checkbox"/>	Post-streptococcal glomerulonephritis
<input type="checkbox"/>	Systemic lupus erythematosus

Skip question

# Work Smart

Question 15 of 109

A 58-year-old man with long-standing hypertension was found to have a serum creatinine concentration of 275  $\mu\text{mol/L}$  (60-110).

Urinalysis showed blood ++ and protein >1 g/L. Renal ultrasound showed the left kidney to be 9.2 cm long, the right to be 8.9 cm long (normal range for both kidneys 10-12 cm), and neither kidney was obstructed.

What is the best investigation to diagnose the cause of the renal impairment?

(Please select 1 option)

<input type="checkbox"/>	Intravenous urography
<input type="checkbox"/>	Isotope renography
<input checked="" type="checkbox"/>	Renal arteriography <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Renal biopsy <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Retrograde pyelography

The presence of long standing hypertension, haematuria, significant non-nephrotic proteinuria is highly suspicious of glomerular pathology, such as IgA nephropathy which is best characterised by a renal biopsy.

In the absence of obstruction on ultrasound, intravenous urography, retrograde pyelography, and isotope renography are not appropriate.

Renal size asymmetry in the presence of hypertension and renal impairment might prompt the search

for renovascular disease. However in this case of kidneys are of similar and good size.

## Answer Statistics



Times answered: 7652

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 13.33%

Total Answered: 15

## Feedback

# Work Smart

Question 16 of 109

A 60-year-old man wishes to act as a kidney donor to his 37-year-old wife. She has end stage renal failure from polycystic kidney disease and is maintained on peritoneal dialysis.

The couple has two teenage daughters, neither of whom have renal cysts on recent ultrasound scans.

Which one of the following statements is correct?

(Please select 1 option)

<input type="checkbox"/>	Living related donation from one of the daughters would be preferable to donation from the husband
<input type="checkbox"/>	Living unrelated donation is not recommended in cases of inherited renal disease
<input type="checkbox"/>	The age difference between husband and wife is a relative contraindication to transplantation
<input checked="" type="checkbox"/>	The husband should not be accepted for kidney donation until all siblings have been considered <b>Correct</b>
<input type="checkbox"/>	The results of living unrelated kidney donation are sufficiently poor that organ donation should not proceed

Providing there is a sibling who is proven not to have polycystic kidney disease, living related donation should be considered as this would ensure a better match and better graft survival. Siblings are close genetically, and therefore usually are a better match than spouses. The age difference is not, however, a contraindication to kidney donation.

As polycystic kidney disease is inherited as an autosomal dominant condition, there is a significant

(50%) risk that this lady's daughters have been affected. Obviously, if affected they are not suitable to act as renal transplant donors. Cysts usually develop during teenage years, so one cannot be confident a child has not been affected until they are at least 20: a normal ultrasound scan at 20 years of age means you can be 90% confident they are not affected, a normal scan at 30 increases the confidence level to 98%. Therefore this lady's siblings (who presumably are all adults) should be considered prior to her children, as those siblings affected by the condition should already be showing the phenotype.

Living unrelated kidney donation could also be considered, and is increasing in use in the UK. In patients with polycystic kidney disease, or for other inherited diseases, a graft from an unrelated donor would not necessarily succumb to the same disease process. Results are usually excellent if a good match is found. This is usually organised by being on the transplant waiting list, therefore receiving a kidney from a family member is often quicker.

As polycystic kidney disease is inherited as an autosomal dominant condition, there is a significant (50%) risk that this lady's daughters have been affected. Obviously, if affected they are not suitable to act as renal transplant donors. Cysts usually develop during teenage years, so one cannot be confident a child has not been affected until they are at least 20: a normal ultrasound scan at 20 years of age means you can be 90% confident they are not affected, a normal scan at 30 increases the confidence level to 98%. Therefore this lady's siblings (who presumably are all adults) should be considered prior to her children, as those siblings affected by the condition should already be showing the phenotype.

Reference:

Kalra PA. *Essential Revision Notes for MRCP*. 3rd ed. Knutsford: Pastest; 2009.

## Answer Statistics

1		36%
2		7%
3		17%
4		33%
5		6%

Times answered: 9025

## Test Analysis

# Work Smart

Question 19 of 100

A 30-year-old woman presented with hypertension (160/110 mmHg), elevated titres of antibodies to double-stranded DNA, and proteinuria (1 g per 24 hours).

A renal biopsy demonstrated WHO class II lupus nephritis (mesangial disease).

What is the most appropriate single treatment for this patient?

(Please select 1 option)

<input checked="" type="checkbox"/>	Antihypertensive medication <span style="color: green;">Correct</span>
<input type="checkbox"/>	High-dose corticosteroids
<input type="checkbox"/>	Intravenous cyclophosphamide
<input type="checkbox"/>	Oral cyclophosphamide
<input type="checkbox"/>	Plasma exchange

The renal manifestations of SLE are highly variable, ranging from mild asymptomatic proteinuria and/or haematuria to rapidly progressive uraemia. The various presentations are difficult to classify into clinical syndromes and histological classes. Although lupus nephritis affects a third of patients early in the disease it is frequently unrecognised until nephritic and/or nephrotic syndrome with renal failure occur.

Histologically, a number of different types of renal disease are recognised in SLE, with immune-complex mediated glomerular disease being the most common. The up to date International Society of Nephrology/Renal Pathology Society 2003 classification divides these into six different patterns:

- I - minimal mesangial
- II - mesangial proliferative
- III - focal
- IV - diffuse
- V - membranous
- VI - advanced sclerosis

Glomeruli appear normal by light microscopy in minimal mesangial lupus nephritis, but immunofluorescence demonstrates mesangial immune deposits.

Mesangial proliferative nephritis presents clinically as microscopic haematuria and/or proteinuria. Hypertension is uncommon and nephrotic syndrome and renal impairment are very rarely seen. Biopsy demonstrates segmental areas of increased mesangial matrix and cellularity, with mesangial immune deposits. A few isolated subepithelial or subendothelial deposits may be visible by immunofluorescence. The prognosis is good and specific treatment is only indicated if the disease progresses.

Focal disease is more advanced, but still affects less than 50% of glomeruli. Haematuria and proteinuria is almost always seen, and nephrotic syndrome, hypertension and elevated creatinine may be present. Biopsy demonstrates active or inactive focal, segmental or global endo- or extra-capillary glomerulonephritis involving less than 50% of glomeruli, typically with focal subendothelial immune deposits, with or without mesangial alterations. It is further subdivided:

- A: Active lesions: focal proliferative lupus nephritis
- A/C: Active and chronic lesions: focal proliferative and sclerosing lupus nephritis
- C: Chronic inactive lesions with glomerular scars: focal sclerosing lupus nephritis

Prognosis is variable.

Diffuse glomerulonephritis is the most common and severe form of lupus nephritis. Haematuria and proteinuria are almost always present, and nephrotic syndrome, hypertension and renal impairment common. Biopsies demonstrate active or inactive diffuse, segmental or global endo- or extra-capillary glomerulonephritis involving more than 50% of all glomeruli, typically with diffuse subendothelial immune deposits, with or without mesangial alterations. This class is divided into diffuse segmental (IV-S) when more than 50% of the involved glomeruli have segmental lesions, and diffuse global (IV-G) when more than 50% of involved glomeruli have global lesions. Segmental is defined as a glomerular lesion that involves less than half of the glomerular tuft.

- IV-S (A): Active lesions, diffuse segmental proliferative lupus nephritis
- IV-G (A): Active lesions, diffuse global proliferative
- IV-S (A/C): Active and chronic lesions, diffuse segmental proliferative and sclerosing lupus nephritis
- IV-S (C): Chronic inactive lesions with scars, diffuse segmental sclerosing lupus nephritis
-

#### IV-G (C): Chronic inactive lesions with scars: diffuse global sclerosing lupus nephritis

Immunosuppressive therapy is required in these cases to prevent progressive to end-stage renal failure.

Patients with membranous lupus nephritis tend to present with nephrotic syndrome. Microscopic haematuria and hypertension may also be seen. Biopsies show global or segmental subepithelial immune deposits or their morphologic sequelae, with or without mesangial alterations. It may occur in combination with class III or IV, in which case both are diagnosed. Progression is variable, and immunosuppression is not always needed.

In advanced sclerosis, more than 90% of glomeruli are globally sclerosed without residual activity.

With regard to the management of lupus nephritis, a biopsy is indicated in those patients with abnormal urinalysis and/or reduced renal function. This can provide a histological classification as well as information regarding activity, chronicity and prognosis. Cyclophosphamide, mycophenolate mofetil and azathioprine reduce mortality in proliferative forms of lupus glomerulonephritis.

IgA nephropathy is a form of glomerulonephritis characterised by the deposition of IgA in the glomeruli. It is a very rare lesion in SLE.

AA amyloidosis is a systemic disorder characterised by extracellular tissue deposition of fibrils that are composed of amyloid A protein (an acute-phase protein produced by hepatocytes). It occurs in the course of chronic inflammatory disease, but an association with SLE is very unusual.

Focal segmental glomerulosclerosis is one of the most common glomerular diseases to result in end stage renal failure. It may occur as a primary condition, or in association with a number of vasculitic disorders (rarely SLE).

Minimal change nephropathy is classically a diagnosis of childhood. There is diffuse loss of podocyte foot processes, which results in nephrotic syndrome but not usually the other features described above.

Reference:

1. Contreras G, et al. [Lupus nephritis: a clinical review for practicing nephrologists](#). *Clin Nephrol*. 2002;57:95-107.
2. Molino C, et al. [Clinical approach to lupus nephritis: recent advances](#). *Eur J Intern Med*. 2009;20:447-53.

# Work Smart

Question 20 of 100

A 45-year-old man had recurrent nephrolithiasis.

Renal function tests and serum calcium measurements were normal.

A 24-hour urine collection revealed:

Volume	3 L	
Calcium	15 mmol/24 hours	(2.5-7.5)
Oxalate	200 mmol/24 hours	(90-450)
Uric acid	3 mmol/24 hours	(1.48-4.45)
Citrate	2 mmol/24 hours	(0.3-3.4)

What is the most useful therapy to reduce stone formation?

(Please select 1 option)

<input type="checkbox"/> Allopurinol
<input type="checkbox"/> Dietary calcium restriction
<input type="checkbox"/> Penicillamine
<input checked="" type="checkbox"/> Potassium citrate <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/> Thiazide diuretic <span style="color: red;">Incorrect answer selected</span>

It is likely this patient has absorptive hypercalciuria, which predisposes to stone formation.

A combination of treatments is usually required to reduce the chance of stone formation, including dietary calcium restriction and pharmacological management.

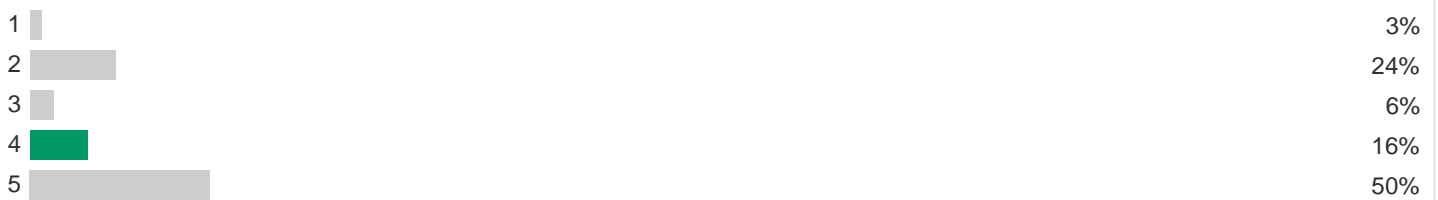
Both thiazide diuretics and potassium citrate can be used to reduce urinary excretion of calcium. Potassium citrate is generally preferred as it has fewer side effects, and is, therefore, better tolerated.

Dietary calcium restriction alone has minimal effect on calciuria, given the large amount of calcium that can be mobilised from bone.

Allopurinol is indicated if there is hyperuricosuria.

Pencillamine is used in the management of hypercalciuria associated with Wilson's disease.

## Answer Statistics



Times answered: 7853

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 21 of 100

A 45-year-old man on regular haemodialysis complained of weakness and exertional fatigue. On examination, his blood pressure was 170/105 mmHg (pre-dialysis) and 160/95 mmHg (post-dialysis).

Investigations pre-dialysis revealed:

Haemoglobin	90 g/L	(130-180)
Serum potassium	6.9 mmol/L	(3.5-4.9)
Serum creatinine	1250 µmol/L	(60-110)
Serum corrected calcium	2.1 mmol/L	(2.2-2.6)

Which intervention is most likely to improve his symptoms?

(Please select 1 option)

<input type="checkbox"/> Correct hypocalcaemia with alfacalcidol
<input type="checkbox"/> Improve blood pressure control with ramipril
<input checked="" type="checkbox"/> Increase haemoglobin with epoetin <b>This is the correct answer</b>
<input type="checkbox"/> Increase the length of each dialysis session
<input type="checkbox"/> Lower the potassium in the dialysate <b>Incorrect answer selected</b>

This is a tough question with many possible answers. But importantly, this question asks how to improve his symptoms. Changing the question around, such as how to improve blood pressure or

how to improve prognosis, alters the answer.

There are several deficiencies in the management of this patient with end stage renal failure. The symptoms described are more in keeping with his anaemia.

A mild hypocalcaemia and hyperkalaemia would not give rise to his symptoms. This also applies to his uncontrolled hypertension. The combination of high pre- and post-dialysis blood pressure, and high pre-dialysis potassium indicate that this patient is receiving inadequate dialysis. Both procedural issues (insufficient blood flow rate, dialysis time and frequency and needle size) and access issues should be addressed. However, this is unlikely to drastically improve his symptoms and therefore correcting his anaemia remains the correct option here.

Bearing in mind the above the question specifically asks what intervention would improve his symptoms. As his symptoms are likely caused by anaemia, one would have to elect EPO irrespective of blood pressure, calcium, etc.

The causes of anaemia in haemodialysis patients are numerous. Firstly, there is insufficient production of erythropoietin (EPO) and, secondly, iron deficiency is present in most. The tubing of dialysis equipment causes continued low-level blood loss, there may be chronic inflammation any other vitamin deficiencies (or folic acid) and gastrointestinal absorption of iron is often reduced. In addition, uraemic toxins can inhibit erythropoiesis, and it appears there is shortened red cell survival in chronic renal failure (possibly due to haemolysis).

If left untreated, the anaemia of chronic kidney disease is associated with deterioration in cardiac function, increased risk of stroke, decreased cognition and mental acuity and fatigues. Treating anaemia in these patients markedly improves quality of life, and decreases morbidity and mortality. The Kidney Disease Outcomes Quality Initiative (KDOQI) and European Revised Evidence-Based Practice 2004 Guidelines recommend maintaining a haemoglobin >110 g/L with a haematocrit <33%.

Ideally, before starting EPO in renal patients you should get their haematinics (iron, B12, folate) to ensure they are replete of all. If any are found to be low they should be replaced. However, there is not an option to check and replace these and therefore EPO is the most correct answer here.

Reference:

Renal Association Guidelines. [Haemodialysis](#).

## Answer Statistics

1	5%
2	3%

# Work Smart

Question 22 of 100

An 81-year-old man was admitted with renal failure due to benign prostatic hypertrophy.

His bladder was drained with an urethral catheter followed by a diuresis of more than 3L per day. After two days he became progressively drowsy.

What is the most likely cause for his reduced level of consciousness?

(Please select 1 option)

<input type="checkbox"/>	Hyperglycaemia
<input type="checkbox"/>	Hypocalcaemia
<input type="checkbox"/>	Hypomagnesaemia
<input checked="" type="checkbox"/>	Hyponatraemia <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Metabolic acidosis <span style="color: red;">Incorrect answer selected</span>

Amelioration of urinary obstruction and subsequent recovery initially results in a large electrolyte and water loss.

Osmotic cerebral changes precipitated by urinary sodium loss, the major intravascular cation, is the cause of drowsiness.

Hypocalcaemia and hypomagnesaemia may occur as tubular reabsorption is suboptimal in the early stages of recovery, but is unlikely to affect conscious level. Acid-base status should improve after relief of the obstruction.

Hyperglycaemia is not a common complication of recovery from obstructive uropathy.

# Work Smart

Question 17 of 109

Which one of the following cytokines is strongly implicated in renal scarring?

(Please select 1 option)

<input type="checkbox"/>	Interferon alpha
<input checked="" type="checkbox"/>	Interleukin-10 <span style="color: red;">❌ Incorrect answer selected</span>
<input type="checkbox"/>	Granulocyte colony stimulating factor
<input checked="" type="checkbox"/>	Transforming growth factor-beta <span style="color: green;">✅ This is the correct answer</span>
<input type="checkbox"/>	Tumour necrosis factor alpha

Renal scarring is a serious complication of chronic pyelonephritis that occurs due to vesicoureteric reflux. It is mediated by cytokines, chemokines and their receptors, complement, adhesion molecules and extracellular matrix proteins. The cytokines which seem to play the largest role are interleukin (IL)-1beta, transforming growth factor (TGF)-beta and IL-3. TGF-beta in particular seems to be pro-fibrotic by recruiting fibroblasts, and a genotype where its production is limited has been shown to be less likely to develop renal scarring.

Interferon-alpha is produced by leucocytes, and is mainly involved in innate immune responses against viral infection. It is also made synthetically as medication, used for the treatment of hepatitis C, for example.

Interleukin-10 is an anti-inflammatory cytokine which acts to inhibit the synthesis of other cytokines. It also enhances B-cell survival, proliferation and antibody production.

Granulocyte colony-stimulating factor (G-CSF) is produced by a number of different tissues to stimulate the bone marrow to produce granulocytes, and release them into the blood. It also stimulates the survival, proliferation, differentiation and function of neutrophil precursors and mature neutrophils. It is used therapeutically in patients with neutropenia secondary to chemotherapy, particularly in cases of neutropenic sepsis.

Tumour necrosis factor (TNF)-alpha is one of the cytokines that can stimulate the acute phase reaction. The majority is produced by activated macrophages, and it acts to regulate immune cells, induce fever and sepsis, initiate cell apoptosis and inhibit tumourgenesis and viral replication.

Reference:

1. Cotton SA, et al. [Role of TGF-beta1 in renal parenchymal scarring following childhood urinary tract infection.](#) *Kidney Int.* 2002;61:61-7.
2. Ichino M, et al. [Global gene expression profiling of renal scarring in a rat model of pyelonephritis.](#) *Pediatr Nephrol.* 2008;23:1059-71.

## Answer Statistics



Times answered: 8652

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 18 of 109

Which of the following is a known risk factor for the development of chronic rejection of kidney transplantation?

(Please select 1 option)

<input type="checkbox"/>	Age	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Anti-smooth muscle antibodies	
<input type="checkbox"/>	Presence of anti-HLA antibodies	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Smoking	
<input type="checkbox"/>	Toxoplasma infection	

Chronic rejection is characterised by fibrosis of normal organ structures. The pathogenesis of chronic rejection is not clear; some prefer the term "chronic allograft dysfunction" since both immunological (antigen-dependent and antigen-independent) and non-immunological factors have been identified.

Cell-mediated and humoral immune mechanisms have been implicated in this form of graft rejection. It has also been suggested that rejection is a response to chronic ischaemia caused by injury to endothelial cells. Proliferation of intimal smooth muscle is observed leading to vascular occlusion.

The fact that chronic rejection is rare in transplants between HLA-identical siblings suggests that HLA-antigen dependent immunological factors are important.

Risk factors include:

- number of previous acute rejection episodes

- presence of anti-HLA antibodies
- anti-endothelial antibodies
- CMV infection
- dyslipidaemia
- hypertension
- functional mass of the donor kidney, and
- delayed graft function (a clinical manifestation of ischaemia/reperfusion injury).

### Answer Statistics



Times answered: 8291

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.67%

# Work Smart

Question 19 of 109

A 72-year-old male presented to his GP with depression after the death of his wife.

His notes also reveal that he has a two-year history of urinary hesitancy and poor stream.

His GP prescribed him some medication and the following day he developed acute urinary retention.

Which of the following drugs is most likely to have precipitated the urinary retention?

(Please select 1 option)

<input checked="" type="checkbox"/> Amitriptyline	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Diazepam	
<input type="checkbox"/> Fluoxetine	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Venlafaxine	
<input type="checkbox"/> Zopiclone	

Amitriptyline has anticholinergic effects being associated with tachycardia, dry mouth and urinary retention.

These features are not typical of selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine or serotonin and noradrenaline reuptake inhibitors (SNRIs) such as venlafaxine with urinary retention and dry mouth rarely reported.

Diazepam, a benzodiazepine does not have anticholinergic effects. It has been associated with urinary retention, but this is much less common than with anticholinergics.

Zopiclone is a benzodiazepine-like agent the side effects of which side effects include daytime drowsiness. It is not commonly associated with urinary retention.

## Answer Statistics



Times answered: 8275

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.79%

Total Answered: 19

## Feedback

# Work Smart

Question 20 of 109

A 68-year-old male is referred by his general practitioner with deteriorating hypertension and renal function.

Investigations show:

Serum creatinine	250 $\mu\text{mol/L}$	(60-110)
Urinalysis	+ protein	

Renal ultrasound scan:

- Left kidney 9 cm long
- Right kidney 7 cm, no obstruction (10-12 cm)

Which of the following would be the most appropriate investigation for this patient?

(Please select 1 option)

<input type="checkbox"/>	Intravenous renography
<input type="checkbox"/>	Isotope renography
<input checked="" type="checkbox"/>	MR angiography <span style="color: green;">Correct</span>
<input type="checkbox"/>	Renal biopsy
<input type="checkbox"/>	Retrograde pyelography

The diagnosis is likely to be atherosclerotic renal artery stenosis (RAS) as suggested by the asymmetric

reduction in renal size, with mild proteinuria quite common in the condition.

Investigations include captopril renography, magnetic resonance (MR) angiography which is virtually as good as renal arteriography.

None of the other investigations are appropriate for RAS.

## Answer Statistics



Times answered: 8761

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 20%

Total Answered: 20

# Work Smart

Question 21 of 109

A 46-year-old man was seen for an insurance medical examination.

He was entirely asymptomatic, but his serum urate concentration was noted to be 0.5 mmol/L (0.23-0.46).

What is the most appropriate management for this patient?

(Please select 1 option)

<input type="checkbox"/>	Allopurinol
<input type="checkbox"/>	Colchicine
<input type="checkbox"/>	Ibuprofen
<input checked="" type="checkbox"/>	Lifestyle intervention <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Sulphinpyrazone <span style="color: red;">Incorrect answer selected</span>

Uric acid is the major product of the catabolism of purines, adenosine monophosphate (AMP) and guanosine monophosphate (GMP) from nucleic acids.

GMP and AMP are catabolised by a series of enzymes which remove a single phosphate group and the ribose sugar, eventually forming xanthine. Xanthine is then converted to uric acid by the enzyme xanthine oxidase. Uric acid can then be excreted by the kidneys.

When uric acid levels are high, there is a risk of developing gout, which causes monoarticular inflammation, gouty arthropathy and tophaceous deformity. Xanthine oxidase inhibitors are used in the treatment of gout, to reduce the amount of uric acid formed.

The patient above requires lifestyle advice about reducing intake of substances containing high purines (including some alcohol and red meat). Should he become symptomatic, treatment would be advisable. In acute gout, treatment is with NSAIDs or other anti-inflammatories such as colchicine.

A xanthine oxidase inhibitor such as allopurinol should be started after the acute attack to reduce the risk of recurrence.

Causes of hyperuricaemia include:

Increased formation of uric acid:

Primary:

- Idiopathic and inherited metabolic disease

Secondary:

- Alcohol
- Psoriasis
- Increased nucleic acid turnover: leukaemia and myeloma
- Tissue hypoxia
- Excess dietary purine intake.

Decreased excretion of uric acid:

Primary:

- Idiopathic

Secondary:

- Acute or chronic renal disease
- Organic acidosis: lactate, ketones
- Lead poisoning
- Drugs: aspirin and thiazides
- Down's syndrome.

Answer Statistics



# Work Smart

Question 22 of 109

A 40-year-old man presents with acute weakness and palpitations.

Investigations reveal:

Sodium	143 mmol/L	(137-144)
Potassium	8.0 mmol/L	(3.5-4.9)
Urea	35 mmol/L	(2.5-7.5)
Creatinine	450 µmol/L	(60-110)
Bicarbonate	5 mmol/L	(20-28)

Which of the following is the best immediate therapy?


(Please select 1 option)

<input checked="" type="checkbox"/> Intravenous calcium gluconate <input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Intravenous dextrose and insulin
<input type="checkbox"/> Intravenous sodium bicarbonate
<input type="checkbox"/> Nebulised salbutamol
<input type="checkbox"/> Rectal calcium resonium <input type="checkbox"/> Incorrect answer selected

This patient appears to have acute renal failure with severe acidosis, hyperkalaemia, and palpitations.

The patient should be rehydrated, treated with insulin, and given bicarbonate, but the immediate treatment, particularly in the context of a life threatening arrhythmia, would be calcium gluconate.

## Answer Statistics

1		84%
2		9%
3		5%
4		1%
5		1%

Times answered: 8804

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 18.18%

Total Answered: 22

## Feedback

# Work Smart

Question 23 of 109

A 70-year-old female presents for investigation of fatigue and weight loss.

Investigations reveal:

Haemoglobin	90 g/L	(115-165)
White cell count	$2.0 \times 10^9/L$	(4-11)
Platelet count	$250 \times 10^9/L$	(150-400)
Total protein	74 g/L	(61-76)
Albumin	28 g/L	(37-49)
Urea	16 mmol/L	(2.5-7.5)
Creatinine	250 $\mu\text{mol/L}$	(60-110)
Plasma glucose	6.5 mmol/L	(3.0-6.0)
Urine dipstick analysis	Protein+	
	Blood+	
Renal ultrasound	Normal	

Which one of the following investigations would be most appropriate for this patient?

(Please select 1 option)

<input type="checkbox"/>	24-hour urinary protein estimation
--------------------------	------------------------------------

Measurement of anti-glomerular basement membrane (anti-GBM) antibodies	
Measurement of anti-neutrophil cytoplasmic antibodies (ANCA)	<input type="checkbox"/> Incorrect answer selected
Plasma protein electrophoresis	<input checked="" type="checkbox"/> This is the correct answer
Renal angiography	

This patient may well have myeloma as reflected by the anaemia, leucopenia, and elevated non-albumin protein concentration.

Thus plasma protein electrophoresis would be the investigation of choice in this patient.

### Answer Statistics



Times answered: 8910

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 23 of 100

A 68-year-old male diagnosed with nephrotic syndrome receives steroid therapy without benefit. His investigations show an albumin of 20 g/L (37-49), total cholesterol of 12 mmol/L (<5.2), dipstick urinalysis reveals +++ protein and a renal biopsy shows focal segmental glomerulosclerosis.

Which one of the following is most likely to preserve renal function?

(Please select 1 option)

<input type="checkbox"/>	Dietary salt restriction
<input type="checkbox"/>	Low dietary protein intake
<input checked="" type="checkbox"/>	Ramipril <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Simvastatin <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Warfarin

Approximately 50% of subjects with focal segmental glomerulosclerosis (FSGS) do not respond to steroid therapy but angiotensin-converting enzyme (ACE) inhibitors are a recognised strategy to slow the progression of renal disease.

This patient is clearly at high risk of cardiovascular disease with a very high cholesterol but the question specifically asks about renal disease.

# Work Smart

Question 24 of 109

A 45-year-old lady presents with fatigue and lethargy, and has established end stage renal failure. She has been on haemodialysis for the past three years and receives dialysis for three hours three times a week at a regional haemodialysis centre.

At one of her regular visits for haemodialysis her blood pressure is 170/95 mmHg. Further investigations reveal:

Serum K <sup>+</sup>	5.2 mmol/L	(3.5-4.9)
Serum corrected calcium	2.15 mmol/L	(2.2-2.6)
Haemoglobin	90 g/L	(115-165)
Creatinine	1300 µmol/L	(60-110)

Post-dialysis her blood pressure is recorded as 160/95 mmHg.

Which of the following is the best option for management of this lady's symptoms?

(Please select 1 option)

<input type="checkbox"/>	Increase dialysis hours
<input checked="" type="checkbox"/>	Treat anaemia with erythropoietin <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Treat hyperkalaemia
<input type="checkbox"/>	Treat hypocalcaemia
<input type="checkbox"/>	Treat hypertension with ramipril <span style="color: red;">Incorrect answer selected</span>

This patient's main complaint is of fatigue. Treating her with erythropoietin would therefore be the most appropriate therapy particularly with her anaemia. There are multiple potential causes of fatigue in patients on renal dialysis. Treating her anaemia is a good first step to improving her symptoms.

Her potassium is a little high, but would be considered acceptable pre-dialysis. Increasing dialysis time is unlikely to be acceptable to most patients and renal units though this is an option some patients would choose, especially those on 'home haemodialysis'. This can certainly improve fatigue due to uraemia.

As with many patients on dialysis, this lady has a low calcium. This is due to inadequate 1-hydroxylation of 25-hydroxy vitamin D. PTH is usually elevated in an attempt to maintain reasonable serum calcium concentrations. Calcium can also be lost in the dialysate and the use of high-calcium dialysis bags can help reduce this. This calcium level is acceptable.

Vascular disease is an important cause of death in dialysis patients and this lady may very well need additional treatment of blood pressure.

#### Further Reading:

1. Locatelli F, et al. [Revised European best practice guidelines for the management of anaemia in patients with chronic renal failure](#). *Nephrol Dial Transplant*. 2004;19(Suppl 2):ii1-47.
2. NICE. [Anaemia management in people with chronic kidney disease \(NG8\)](#).

### Answer Statistics



Times answered: 6311

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 25 of 109

A 63-year-old woman presents following a visit to the well woman clinic where she is noted to be hypertensive.

She has a history of hip osteoarthritis for which she has taken regular paracetamol.

On examination she is obese with a BMI of 35 (<25), has a blood pressure of 180/100 mmHg and glycosuria is noted.

Her investigations show:

Fasting plasma glucose	18.3 mmol/L	(3.0-6.0)
Serum urea	9.8 mmol/L	(2.5-7.5)
Serum creatinine	129 µmol/L	(60-110)
24 hour urine protein concentration	1.8 g/d	(<0.2)

The ultrasonic appearance of both kidneys is normal.

Which of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Analgesic nephropathy <input checked="" type="checkbox"/> <b>Incorrect answer selected</b>
<input type="checkbox"/> Chronic glomerulonephritis
<input type="checkbox"/> Diabetic nephropathy <input checked="" type="checkbox"/> <b>This is the correct answer</b>
<input type="checkbox"/> Hypertensive nephropathy

This patient is diabetic and has proteinuria. Although diabetic nephropathy usually takes five or more years to evolve, this patient is likely to have had the condition for many years prior to it now being diagnosed. In the early stages of diabetic nephropathy, the kidneys can be enlarged due to hyperfiltration. However, with time sclerosis results in reduction in the size. Normal or small kidneys can therefore be consistent with diabetic nephropathy.

Ischaemic nephropathy due to renal artery stenosis is unlikely in the presence of a normal renal ultrasound.

Analgesic nephropathy would be a consequence of non-steroidal anti-inflammatory drugs (NSAIDs) not paracetamol.

Hypertensive nephropathy is a possibility but is less likely in the context of her proteinuria and moderately elevated BP.

Chronic glomerulonephritis is much less common than diabetic nephropathy, and would not explain the glycosuria. Often the kidneys are reduced in volume on the ultrasound scan.

## Answer Statistics

1		9%
2		3%
3		72%
4		14%
5		2%

Times answered: 8829

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 24 of 100

A 55-year-old man who has received haemodialysis for many years presents with deteriorating discomfort in both shoulders. Past medical history included bilateral carpal tunnel decompression.

His investigations reveal:

Haemoglobin	100 g/L	(130-180)
ESR	30 mm/1 <sup>st</sup> hr	(1-10)
C reactive protein	12 mg/L	(<10)
Urate	0.58 mmol/L	(<0.45)

What is the most likely diagnosis?

(Please select 1 option)

<input checked="" type="checkbox"/> $\beta$ 2 microglobulin amyloidosis	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Gout	
<input type="checkbox"/> Osteoarthritis	
<input type="checkbox"/> Polymyalgia rheumatica	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Pseudogout	

The features of shoulder pain associated with a past history of carpal tunnel syndrome in a patient

receiving haemodialysis suggests a diagnosis of  $\beta_2$  microglobulin amyloidosis.

Amyloid deposits composed of  $\beta_2$  microglobulin as the major constituent protein are mainly localised in joints and periarticular bone and lead to destructive arthropathy which tends to develop five to ten years after the initiation of dialysis.

Death from amyloidosis of gut and heart may occur after 20 years of dialysis.

## Answer Statistics



Times answered: 8216

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 45.83%

Total Answered: 24

# Work Smart

Question 26 of 109

A 60-year-old man presents with right foot drop, left foot and left hand numbness, fever, malaise, weight loss, polymyalgia and polyarthralgia of approximately one month duration.

On examination, he appears ill, with a temperature of 38.5°C and blood pressure of 180/100 mmHg.

Investigations reveal:

Haemoglobin	80 g/L	(130-180)
Erythrocyte sedimentation rate	100 mm/hr	(0-20)
Serum creatinine	180 µmol/L	(60-110)
Urine analysis	Blood ++	
Urine microscopy	White cells and red cell casts	

Which one of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Antiphospholipid syndrome	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Giant cell arteritis	
<input type="checkbox"/> Paraneoplastic syndrome	
<input type="checkbox"/> POEMS syndrome	
<input type="checkbox"/>	

This patient has a mononeuritis multiplex, fever, hypertension, and nephritic renal involvement which is most consistent with a diagnosis of polyarteritis nodosa.

PAN is a systemic transmural necrotising vasculitis that usually affects medium-sized arteries. Signs and symptoms are primarily attributable to diffuse vascular inflammation and ischaemia of the affected organs. In adults it most commonly presents in men between 40 and 50-years-old, and may be associated with hepatitis B. Virtually any organ with the exception of the lung can be affected, with peripheral neuropathy and symptoms from osteoarticular, renal artery and gastrointestinal tract involvement being the most frequent clinical manifestations.

The diagnostic criteria used are based on the American College of Rheumatology (ACR) and Chapel Hill Consensus criteria:

Symptoms/signs must be compatible with a diagnosis of ANCA-associated vasculitis or PAN, plus one of:

- Histological proof of vasculitis and/or granuloma formation
- Positive ANCA serology
- Specific investigations strongly suggestive of vasculitis and/or granuloma
- Eosinophilia (>10%, no other potential diagnosis to explain the signs and symptoms)
- Malignancy
- Infection (HBV, HCV, HIV, TB, subacute bacterial endocarditis)
- Drugs (hydralazine, propylthiouracil, cocaine, allopurinol)
- Secondary vasculitis (resulting from rheumatoid arthritis, SLE, Sjogren's)
- Sarcoidosis or other vasculitic conditions
- Vasculitis mimicking diseases (e.g. cholesterol emboli, antiphospholipid)

Hepatitis B surface antigen is positive in 30%, and p-ANCA is usually positive. Angiography demonstrates microaneurysms in affected organs, and biopsy shows necrotising inflammation.

PAN can be further classified into systemic vs limited (cutaneous) and idiopathic vs hepatitis B, and this is important due to differences in pathogenesis and therefore treatment and prognosis.

The mainstay of treatment for idiopathic PAN is currently corticosteroids and cyclophosphamide, whereas for hepatitis B related disease plasmapheresis and antiviral agents should be used. Azathioprine can be used as maintenance therapy, and typically has fewer side effects than cyclophosphamide.

Antiphospholipid syndrome is a thrombotic disorder that manifests clinically as recurrent venous or arterial thrombosis and/or foetal loss. It is not usually associated with a polyneuropathy.

POEMS is a rare systemic disorder which consists of polyneuropathy, organomegaly, endocrinopathy

monoclonal gammopathy and skin changes, of which a few features are absent; and nephritic syndrome is not a feature.

Giant cell arteritis affects large and medium sized arteries, most commonly branches of the external carotid artery. It typically presents with unilateral headache and threatened sight, which does not fit with the clinical scenario above.

Vasculitis can be a paraneoplastic syndrome, but this is rare and you would expect symptoms from the primary tumour. In a recent case series it most commonly presented with features of a cutaneous vasculitis.

Reference:

1. Colmegna I, Maldonado-Cocco JA. [Polyarteritis nodosa revisited](#). *Curr Rheumatol Rep.* 2005;7:288-296
2. Pettigrew HD et al. [Polyarteritis nodosa](#). *Compr Ther.* 2007;33:144-149

## Answer Statistics



Times answered: 9581

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 27 of 109

A 70-year-old man underwent emergency surgery for an acute abdomen.

Following surgery, he was noted to have become oliguric.

Investigations revealed the following:

Sodium	121 mmol/L	(137-144)
Potassium	6.6 mmol/L	(3.5-4.9)
Chloride	92 mmol/L	(95-107)
Urea	17.2 mmol/L	(2.5-7.5)
Creatinine	250 µmol/L	(60-110)
pH	7.16	(7.36-7.44)
Standard bicarbonate	15.6 mmol/L	(20-28)

Which of the following is the calculated anion gap for this patient?

(Please select 1 option)

<input type="checkbox"/> 5 mmol/L	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> 10 mmol/L	
<input type="checkbox"/> 15 mmol/L	
<input type="checkbox"/> 20 mmol/L	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	

25 mmol/L

Anion gap is calculated as  $(\text{Na} + \text{K}) - (\text{Cl} + \text{HCO}_3)$ .

Therefore in this patient, the calculated value is 20 mmol/L.

The normal anion gap is between 8-16 mmol/l. The excessive value here reflects the presence of other acidic anions, and in this case with the metabolic acidosis, the constituents may be lactate, etc.

### Answer Statistics



Times answered: 9644

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Exam Themes September 2006

Question 25 of 100

You are called to the Emergency Department to assess a 21-year-old student who has presented with bloody diarrhoea.

The diarrhoea started two weeks previously and was associated with increasing nausea and malaise and mild swelling of the lower limbs. She was having difficulty passing urine. She had eaten steak from the local butcher at a friend's barbeque the day before developing diarrhoea.

On examination, she was pale with evidence of petechiae over her legs. Her face appeared puffy. Blood pressure was 160/95 mmHg. She was afebrile but had a tachycardia and crackles on inspiration at both lung bases. There was an old appendicectomy scar in the right iliac fossa.

Investigations showed:

Haemoglobin	85 g/L	(115-165)
White cell count	13.2 ×10 <sup>9</sup> /L	(4-11)
Neutrophils	9.5 ×10 <sup>9</sup> /L	(1.5-7)
Platelets	35 ×10 <sup>9</sup> /L	(150-400)
PT	12 s	(11.5-15.5)
APTT	34 s	(30-40)
Fibrinogen	4 g/L	(1.8-5.4)
Serum sodium	139 mmol/L	(137-144)
Serum potassium	6.1 mmol/L	(3.5-4.9)
Serum urea	40 mmol/L	(2.5-7.5)

Serum creatinine	411 µmol/L	(60-110)
Serum albumin	27 g/L	(37-49)
Dipstick urine	Blood ++ Protein +	

What is the single most important next investigation to determine the diagnosis?

(Please select 1 option)

<input type="checkbox"/>	ASO titres
<input checked="" type="checkbox"/>	Blood film analysis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Renal tract ultrasound
<input type="checkbox"/>	Transthoracic echocardiogram
<input type="checkbox"/>	Urine microscopy <span style="color: red;">Incorrect answer selected</span>

This patient has haemolytic uraemic syndrome (HUS).

It typically presents with a triad of:

- acute renal failure (ARF)
- microangiopathic haemolytic anaemia, and
- thrombocytopenia with normal clotting.

HUS is a complication of infection with verocytotoxin producing *Escherichia coli* usually of the serotype 0157:H7.

Toxins produced in the intestine enter the blood and bind to endothelial cells in target organs. Endothelial cell damage leads to platelet and fibrin deposition with resultant fragmentation of circulating red blood cells and microvascular occlusion.

The syndrome has also been reported after infections with coxsackie, echovirus and *Shigella*.

HUS is characterised by the sudden onset of haemolytic anaemia with fragmentation of red blood cells, thrombocytopenia and acute renal failure after a prodromal illness of acute gastroenteritis often with bloody diarrhoea.

Clinical signs include increasing pallor, haematuria, oliguria and purpura. Jaundice is occasionally seen. Hypertension may be present.

Typical results show an anaemia, thrombocytopenia, and often a neutrophilia. Blood film shows fragmented erythrocytes.

Urea and electrolytes are typical of acute renal failure. There is normal coagulation and fibrinogen.

Neurological complications include:

- stroke, seizure and coma occur in 25% of patients
- rarely pancreatitis, and
- pleural and pericardial effusions.

Approximately 5% of patients will develop end-stage renal failure.

Long-term renal sequelae range from proteinuria to chronic renal failure.

Therapy is supportive with:

- correction of anaemia
- correction of uraemia by early dialysis
- strict fluid balance, and
- treatment of hypertension.

Major differential diagnosis is:

1. Sepsis with DIC - presents with abnormalities of clotting parameters.
2. TTP - thrombotic thrombocytopenic purpura presents with microangiopathic haemolytic anaemia, thrombocytopenic purpura, neurologic abnormalities, fever, and renal disease.

Renal abnormalities tend to be more severe in HUS.

Although once considered variants of a single syndrome, recent evidence suggests that the pathogenesis of TTP and HUS is different. Patients with TTP lack a plasma protease that is responsible for the breakdown of von Willebrand factor (vWF) multimers and these accumulate in the plasma. The activity of this protease is normal in patients with HUS.

Until the test for vWF protease activity becomes available, differentiation between HUS and TTP is based on the presence of central nervous system involvement in TTP and the more severe renal involvement in HUS.

In HUS 90% of patients are children and a history of prodromal diarrhoeal illness is more common.

The therapy of choice for TTP is plasma exchange with fresh frozen plasma.

# Work Smart

Exam Themes January 2006

Question 26 of 100

A 42-year-old female with a recent diagnosis of systemic sclerosis is referred to hospital with a complaint of headaches and blurred vision. She has a medical history of asthma.

On examination, her blood pressure is 230/120 mmHg and there is bilateral papilloedema.

Which of the following medications should be prescribed immediately?

(Please select 1 option)

<input type="checkbox"/>	IV furosemide
<input type="checkbox"/>	IV labetalol
<input type="checkbox"/>	IV sodium nitroprusside
<input checked="" type="checkbox"/>	Oral enalapril <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Sublingual nimodipine <span style="color: red;">Incorrect answer selected</span>

Systemic sclerosis is a systemic disorder characterised by skin thickening due to the deposition of collagen in the dermis. Adverse prognostic features are renal, cardiac or pulmonary involvement.

A major complication is the development of scleroderma renal crisis. This is characterised by the abrupt onset of severe hypertension, usually with retinopathy, together with rapid deterioration of renal function and heart failure.

In addition, patients may present with headaches, fever and malaise. It develops in 5-10% of patients with diffuse systemic sclerosis especially associated with diffuse cutaneous or rapidly progressive forms of systemic sclerosis, and patients in whom a high dose of corticosteroid has been started.

Renal crisis is linked with a positive ANA speckled pattern, anti-RNA polymerase I and II antibodies and absence of anti-centromere antibodies<sup>1</sup>.

It usually presents early, within four years of diagnosis. The pathogenic mechanisms leading to renal damage are not completely understood but they involve endothelial cell damage and intimal thickening of the renal arteries, resulting in hyperplasia of the juxtaglomerular apparatus and increased renin release<sup>1</sup>. Renal biopsy is not necessary for patients presenting with classical features of renal crisis<sup>2</sup>.

The clinical presentation is typically with the symptoms of malignant hypertension:

- Headaches
- Hypertensive retinopathy associated with visual disturbances
- Seizures
- Heart failure and pulmonary oedema.

Renal function is impaired and usually rapidly deteriorates. The hypertension is almost always severe with a diastolic BP over 100 mmHg in 90% of patients. There is hypertensive retinopathy in about 85% of patients with exudates and haemorrhages and if severe, papilloedema. There may also be microangiopathic haemolytic anaemia, thrombocytopenia and raised renin levels.

Scleroderma renal crisis is a medical emergency. Aggressive treatment is required to prevent the occurrence of irreversible vascular injury. First line treatment is a gradual reduction in blood pressure (10-15 mmHg per day) with an ACE inhibitor until the diastolic pressure reaches 85-90 mmHg. This approach leads to a response in 90% of patients by reversing the angiotensin-II mediated vasoconstriction.

An abrupt fall in blood pressure should be avoided as it can further diminish renal perfusion and increase the risk of acute tubular necrosis. Therefore, parenteral antihypertensive agents (for example, intravenous nitroprusside or labetalol) should be avoided.

Calcium channel blockers, usually nifedipine, may be added where there is inadequate reduction of blood pressure with ACE inhibitors alone. Additional oral hypotensive agents (for example, labetalol) can be used if required, and if pulmonary oedema is present a nitrate infusion may be indicated. There is anecdotal evidence that intravenous prostacyclin helps the microvascular lesion without precipitating hypotension, and this is used in some UK centres.

Deterioration in renal function can be rapid, with gross pulmonary oedema; therefore patients with scleroderma renal crisis should be managed in hospitals with facilities for dialysis.

Early aggressive treatment with ACE inhibitors has improved prognosis in renal crisis, although 40% of patients will require dialysis and mortality at five years is 30-40%<sup>1</sup>. Median time to recovery is one year, and typically occurs within three years<sup>1</sup>. Prognosis is worse for males<sup>1</sup>. Patients who need dialysis for more than two years can be considered for renal transplantation<sup>2</sup>. The recurrence rate has been estimated to be approximately 20%.

Care should be taken not to confuse scleroderma renal crisis with malignant hypertension. Malignant hypertension is a clinical syndrome characterised by marked elevation of blood pressure, with widespread acute arteriolar injury<sup>4</sup>. It has a number of different causes and treatment differs depending on the underlying condition. The pathogenesis overlaps, but idiopathic malignant hypertension tends to involve the smaller vessels than in scleroderma renal crisis.

Reference:

1. Denton CP, et al. [Renal complications and scleroderma renal crisis](#). *Rheumatology (Oxford)*. 2009;48:iii32-5.
2. Mouthon L, et al. [Scleroderma renal crisis: a rare but severe complication of systemic sclerosis](#). *Clin Rev Allergy Immunol*. 2011;40:84-91.
3. Teixeira L, et al. [Scleroderma renal crisis, still a life-threatening complication](#). *Ann N Y Acad Sci*. 2007;1108:249-58.
4. Nolan CR. Hypertensive Crisis. In: Wilcox, CS. (ed.) *Atlas of Diseases of the Kidney*. Philadelphia: Current Medicine, Inc; 1999.

### Answer Statistics



Times answered: 10146

### Test Analysis

CorrectIncorrectPartially Correct

# Work Smart

Question 27 of 100

A 70-year-old man is admitted to hospital complaining of a twelve-day history of loin pain, fevers and occasional rigors. On examination, his temperature is 37.9°C. The renal function is normal.

Urinalysis of a mid stream urine shows:

White cell count	>100/mm <sup>3</sup>
Red cell count	>50/mm <sup>3</sup>

No organisms seen, with no growth.

Which would be your first investigation of choice?

(Please select 1 option)

<input type="checkbox"/>	CT abdomen and pelvis
<input type="checkbox"/>	Intravenous urogram (IVU)
<input type="checkbox"/>	Prostatic specific antigen (PSA) measurement
<input type="checkbox"/>	Transthoracic echocardiogram
<input checked="" type="checkbox"/>	Ultrasound scan renal tract <b>Correct</b>

Renal cell carcinomas may present in a variety of ways, with only a minority being diagnosed with the classical triad of:

- Haematuria

- Loin pain
- A palpable mass.

Relatively common presentations include:

- Anaemia
- Hypertension
- Pyrexia of unknown origin
- Fatigue
- Increased plasma viscosity.

Less common presentations include:

- Hypercalcaemia
- Polycythaemia
- Liver dysfunction
- Enteropathy
- Myopathy.

Urinalysis may show sterile pyuria, as here.

Other causes of sterile pyuria are:

- Partially treated urinary tract infections
- Tuberculosis of the renal tract
- Urethritis and sexually transmitted diseases
- Acute glomerulonephritis
- Tubulo-interstitial diseases
- Adult polycystic kidney disease
- Renal stones.

Ultrasound scan of the renal tract would be the first investigation of choice, as it is able to pick up 95% of renal cell carcinomas greater than 1 cm in diameter. It would also exclude infective or inflammatory collections within the renal tract.

If required, a computerised tomography (CT) +/- guided biopsy could be obtained to prove the diagnosis.

An intravenous urogram (IVU) was considered the investigation of choice before the advent of ultrasound.

A chest x ray and bone scan would be required to complete the basic investigations.

# Work Smart

Question 28 of 109

A 30-year-old woman receives a cadaveric renal transplantation after having had chronic end-stage renal failure. Of note in her medical history is that she has a neuropathic bladder for which she performs intermittent self-catheterisation.

Six months after transplantation she presents with acute pain in the region of the transplanted kidney.

Which one of the following is the most likely reason for the pain?

(Please select 1 option)

<input type="checkbox"/>	Acute retention of urine
<input type="checkbox"/>	Allograft rejection
<input checked="" type="checkbox"/>	Pyelonephritis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Renal calculi
<input type="checkbox"/>	Renal infarction <span style="color: red;">Incorrect answer selected</span>

Acute urinary retention would not commonly cause pain overlying a transplanted kidney, and as this lady self-catheterises, it would be an unlikely occurrence.

Due to the elapsed time between the transplant and this episode, allograft rejection can be discounted. This is because chronic rejection (more than three months post transplant) is a painless process, with difficult to control hypertension, proteinuria and slowly rising serum creatinine.

Accelerated rejection (one to five days post transplant) can present with fever, an acutely tender swollen graft, and rapidly rising serum creatinine. Acute rejection (five days to three months) is

clinically silent in the majority, but can present with a swollen, tender kidney. Both of these can be discounted as it has been 6 months since the patient's transplant.

Renal infarction can also be discounted. This can be a surgical complication of renal transplantation, but it presents early with a calyceal fistula and urinary leak.

Renal stones could cause acute pain in the region of a transplanted kidney, but would be less likely in this patient than infection.

The answer in this case is acute pyelonephritis.

This patient is in the intermediate stage of the post-transplantation immunosuppression, when the patient is most immunocompromised (three to six months post-transplant).

She is at high risk of an acute episode of pyelonephritis in the transplanted kidney, due to the immunosuppression, the neuropathic bladder and self-catheterisation. This would present like an acute rejection episode, with a tender swollen graft, low-grade pyrexia, and deteriorating graft function.

This would be commonly associated with septicaemia in this patient, and requires parenteral antibiotics.

If this lady were to be managed as a transplant rejection, with high dose intravenous steroids, the result could be catastrophic.

## Answer Statistics



Times answered: 8465

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 29 of 109

A 65-year-old female is referred with a long history of hypertension and episodic urinary tract infections.

Dipstick analysis of the urine shows blood +++ together with protein +++. Her urea is 20 mmol/L (2.5-7.5) and creatinine is 280 µmol/L (60-110).

An ultrasound of abdomen is requested and shows left and right kidneys of 9 cm in size (10-12) without evidence of obstruction.

Which one of the following is the best investigation to diagnose the cause of her renal failure?

(Please select 1 option)

<input type="checkbox"/>	Isotope renography
<input type="checkbox"/>	IV urography
<input type="checkbox"/>	Renal angiography
<input checked="" type="checkbox"/>	Renal biopsy <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Retrograde pyelography <span style="color: red;">Incorrect answer selected</span>

This patient has impaired renal function with hypertension and significant proteinuria and haematuria (glomerulonephritis). The kidneys are smaller than expected with no evidence of obstruction.

Intravenous urography is not the investigation of choice in a patient with impaired renal function.

Isotope renography would provide information about the relative function of each kidney and would show areas of scarring due to renal stone disease, infection, or vascular disease. It would also

exclude congenital malformations of the kidneys. Although useful it would not provide information on the cause of the haematuria and proteinuria.

Renal angiography is the gold standard for assessing renovascular disease. It is an invasive procedure with potential complications. This investigation would not exclude causes of proteinuria and haematuria.

Retrograde pyelography would be useful if there were any evidence of obstruction.

The best investigation is a renal biopsy. This would show any changes of glomerulonephritis along with renal scarring from longstanding hypertension or urinary tract infections.

## Answer Statistics



Times answered: 8572

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 30 of 109

A 25-year-old woman who is 20 weeks pregnant is diagnosed with pyelonephritis.

She had suffered recurrent urinary infections since childhood and her family history reveals that her mother had a history of hypertension and had been told she had a kidney problem.

Examination was normal and urea and creatinine were both normal.

What is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Autosomal dominant polycystic kidney disease
<input checked="" type="checkbox"/>	Bladder outlet obstruction <b>Incorrect answer selected</b>
<input type="checkbox"/>	Normal physiological urinary stasis of pregnancy
<input type="checkbox"/>	Reflux nephropathy <b>This is the correct answer</b>
<input type="checkbox"/>	Renal stone disease

This lady has had recurrent urinary tract infections since childhood and now presents with pyelonephritis. Pyelonephritis is an uncommon infection in pregnancy and requires aggressive treatment with antibiotics. It is associated with preterm labour in 4% and may lead to fetal distress.

The answer is not autosomal dominant polycystic kidney disease (ADPKD) as symptoms do not tend to occur before the age of 40.

Bladder outlet obstruction should not occur in pregnancy and would cause hydronephrosis and worsening renal function.

Normal physiological urinary stasis of pregnancy is incorrect as this should not cause pyelonephritis.

Renal stone disease does predispose to developing urinary tract infections but is less likely than reflux nephropathy.

The correct answer is reflux nephropathy. This lady has a long history of urinary tract infections with probable underlying reflux scarring and this would predispose her to developing pyelonephritis in pregnancy.

### Answer Statistics



Times answered: 8500

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 13.33%

# Work Smart

Question 28 of 100

A 21-year-old female presents with joint pains and rash. On examination her blood pressure was 140/100 mmHg.

Investigations reveal:

Creatinine	90 µmol/l	(60-110)
Anti dsDNA antibodies	Strongly positive	(0-73)
24 hour urinary protein excretion	1.7 g	(<0.2)
Renal biopsy	Membranous nephropathy	

What is the most appropriate next treatment for her nephropathy?

(Please select 1 option)

<input checked="" type="checkbox"/> ACE inhibitor for blood pressure control <input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Cyclophosphamide
<input type="checkbox"/> NSAIDs for arthralgia
<input type="checkbox"/> Prednisolone for immunosuppression <input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Warfarin anticoagulation

This patient has systemic lupus erythematosus with the disease affecting her kidneys.

The renal manifestations of SLE are highly variable, ranging from mild asymptomatic proteinuria

and/or haematuria to rapidly progressive uraemia. The various presentations are difficult to classify into clinical syndromes and histological classes. Although lupus nephritis affects a third of patients early in the disease it is frequently unrecognised until nephritic and/or nephrotic syndrome with renal failure occur.

Histologically, a number of different types of renal disease are recognised in SLE, with immune-complex mediated glomerular disease being the most common. The up to date International Society of Nephrology/Renal Pathology Society 2003 classification divides these into six different patterns:

- minimal mesangial
- mesangial proliferative
- focal
- diffuse
- membranous, and
- advanced sclerosis.

Patients with membranous lupus nephritis tend to present with nephrotic syndrome. Microscopic haematuria and hypertension may also be seen. Biopsies show global or segmental subepithelial immune deposits or their morphologic sequelae, with or without mesangial alterations. It may occur in combination with class III or IV, in which case both are diagnosed. Progression is variable, and immunosuppression is not always needed. Cyclophosphamide, mycophenolate mofetil and azathioprine reduce mortality in proliferative forms of lupus glomerulonephritis, but the benefit is not clear in membranous forms.

More important to this patient's renal disease in this patient is aggressive blood pressure control. An angiotensin-converting enzyme (ACE) inhibitor would be first line, as it has been shown to reduce proteinuria independently of its effect on blood pressure.

Warfarin is not considered an appropriate treatment as this lady has not exhibited any prothrombotic tendencies.

Non-steroidal anti-inflammatory medication would treat her arthralgia but would have no effect on the prognosis of the disease.

Therefore the correct answer should be ACE inhibitor for blood pressure control, but immunosuppression may well be required to manage her extra-renal disease.

Reference:

1. Contreras G et al. [Lupus nephritis: a clinical review for practicing nephrologists](#). *Clin Nephrol*. 2002;57:95-107.
2. Molino C et al. [Clinical approach to lupus nephritis: recent advances](#). *Eur J Intern Med*. 2009;20:447-53.

# Work Smart

Question 31 of 109

A 45-year-old male presents with a longstanding history of hypertension.

Investigations show a urea of 10.2 mmol/L (2.5-7.5) and a creatinine of 150 µmol/L (60-110).

Which one of the following would suggest a diagnosis of acute glomerulonephritis?

(Please select 1 option)

<input type="checkbox"/>	24 hour urinary protein excretion of 0.8 g
<input type="checkbox"/>	Dyslipidaemia
<input checked="" type="checkbox"/>	RBC casts in urinary sediment <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Shrunken glomeruli on renal biopsy
<input type="checkbox"/>	Unilaterally smaller kidney <span style="color: red;">Incorrect answer selected</span>

Casts containing erythrocytes (red cell casts) are an indication of renal bleeding and are typically found when there is acute glomerular inflammation caused by glomerulonephritis or vasculitis.

The other answer options are non-specific and do not suggest an acute glomerulonephritis.

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## Work Smart

Question 31 of 109

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Which one of the following would suggest a diagnosis of acute glomerulonephritis?

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<input type="checkbox"/>	Dyslipidaemia
<input type="checkbox"/>	RBC casts in urinary sediment
<input type="checkbox"/>	Shrunken glomeruli on renal biopsy
<input type="checkbox"/>	Unilaterally smaller kidney

Skip question

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 29 of 100

A 16-year-old female presents with ankle swelling four days after having had a sore throat. On examination, she had a blood pressure of 125/80 mmHg and ankle oedema.

Investigations reveal:

Creatinine	90 µmol/L	(60-110)
Albumin	25 g/L	(37-49)
24 hour urinary protein	9 g	(<0.2)

What is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Idiopathic membranous nephropathy
<input checked="" type="checkbox"/> IgA nephropathy <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/> Membranoproliferative glomerulonephritis
<input type="checkbox"/> Minimal change nephropathy
<input type="checkbox"/> Post-streptococcal glomerulonephritis <span style="color: red;">Incorrect answer selected</span>

Idiopathic membranous nephropathy accounts for 2-5% of cases of nephrotic syndrome in children, and 20-30% of cases in adults.

The immune mechanism that leads to the development of membranous nephropathy is unknown. Histologically,

it is characterised by diffuse thickening of the glomerular basement membrane (GBM) on light microscopy. On immunofluorescence, the thickening is caused by immune deposits of IgG and C3, on the subepithelial surface of the GBM.

When not idiopathic, it is associated with:

- AI diseases - SLE, rheumatoid arthritis, thyroid disease
- drugs - gold, penicillamine, captopril
- malignancy - bronchus, breast, stomach, colon, prostate
- infections - hep B, syphilis, leprosy, filariasis, and
- diabetes mellitus.

Membranoproliferative (or mesangiocapillary) glomerulonephritis can be classed into three types (I, II, and III) depending on which complement pathway is activated. It is associated with SLE, cryoglobulinaemia with or without hep C, chronic infections (SBE) or with neoplasms. It is not associated acutely with upper respiratory tract infections.

Minimal change nephropathy is the most common form of nephrotic syndrome in children (peak incidence 2-3 years of age). The histological findings on light microscopy are normal or small looking glomeruli. On electron microscopy there is effacement of the epithelial cell foot processes over the outer surface of the GBM. It tends to be steroid responsive in children, but over 60% of children will have further relapses. In adults, it is associated with Hodgkin's lymphoma, and other carcinomas.

Post-streptococcal GN, as the name implies, occurs 10-14 days after an acute infection. The typical case occurs following infection with group A Lancefield streptococci ( $\beta$ -haemolytic strep, *S. pyogenes*) either causing pharyngitis or skin infections. It is more common in the developing world. The histology shows diffuse proliferative GN, with infiltration by neutrophil polymorphs. The main treatment is eradication of the infection (10/7 course of penicillin) and symptomatic relief of the acute nephritis. The need for dialysis is uncommon, and complete recovery of renal function should occur.

The correct answer is IgA nephritis, in this case presenting with nephrotic syndrome. IgA nephritis is most common during the second and third decade of life. It commonly occurs within two days of an onset of an upper respiratory tract infection, or less commonly, infection of other mucous membranes (e.g. GI, bladder, breast). It should be diagnosed by a renal biopsy, where IgA is seen deposited in the mesangium.

The treatment of IgA nephritis is variable. In a patient with haematuria only, the treatment is conservative. When there is nephrotic range proteinuria ( $>3$  g/day - as in this case) an 8-12 week course of prednisolone should be prescribed. If the proteinuria is  $<3$  g/day an ACE inhibitor can be used. In all patients, careful control of blood pressure should be achieved, by using ACE inhibitors in the first instance, and regular follow-up of renal function and urinalysis.

30% of children will have a spontaneous remission within 10 years, but 25% will go on to develop ESRF within 20 years.

# Work Smart

Question 30 of 100

A 42-year-old female is admitted following an overdose of diazepam and alcohol.

On examination, she was unconscious with a core temperature of 34.5°C and a blood pressure of 110/80 mmHg.

Investigations reveal:

Creatinine	242 µmol/L	(60-100)
AST	500 U/L	(0-40)
Gamma GT	35 U/L	(<50)
Urine microscopy	No cells or organisms	
Urine dipstick	blood+++	
Ultrasound abdomen	Normal	

Which one of the following is the most likely cause of these findings?

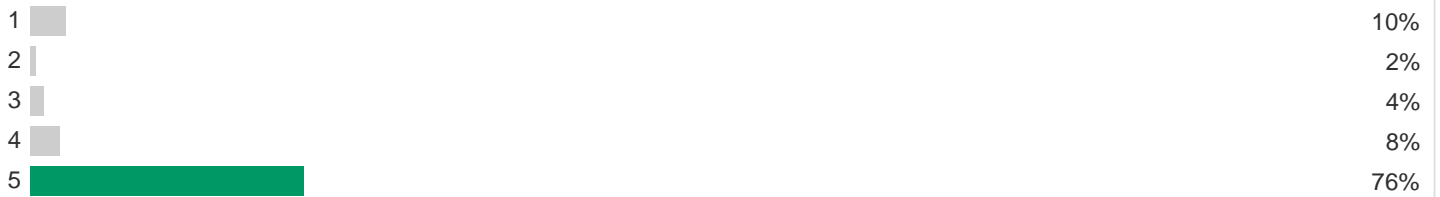
(Please select 1 option)

<input type="checkbox"/>	Associated paracetamol poisoning
<input type="checkbox"/>	Chronic renal failure
<input type="checkbox"/>	Dehydration
<input type="checkbox"/>	Hypothermia
<input type="checkbox"/>	

This patient has taken an overdose of diazepam and has collapsed for an indeterminate period. She is now seen with renal impairment.

The features together with the elevated amino transferase (AST) (from muscle) suggest a diagnosis of rhabdomyolysis.

### Answer Statistics



Times answered: 9268

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 43.33%

# Work Smart

Question 30 of 100

A 42-year-old female is admitted following an overdose of diazepam and alcohol.

On examination, she was unconscious with a core temperature of 34.5°C and a blood pressure of 110/80 mmHg.

Investigations reveal:

Creatinine	242 µmol/L	(60-100)
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Urine microscopy	No cells or organisms	
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Ultrasound abdomen	Normal	

Which one of the following is the most likely cause of these findings?

(Please select 1 option)

<input type="checkbox"/>	Associated paracetamol poisoning
<input type="checkbox"/>	Chronic renal failure
<input type="checkbox"/>	Dehydration
<input type="checkbox"/>	Hypothermia
<input type="checkbox"/>	Rhabdomyolysis

# Work Smart

Question 32 of 109

Which of the following is least true regarding IgA nephropathy?

(Please select 1 option)

<input type="checkbox"/>	Commonly follows a sore throat
<input type="checkbox"/>	Is the most common glomerulonephritis in the world <span style="color: red;">❑ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	Light chains may be found in the urine <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	May be associated with a rash and arthritis
<input type="checkbox"/>	Predominantly affects young men

IgA nephropathy (Berger's disease) is the most common glomerulonephritis worldwide and characteristically affects young males, presenting with frank haematuria after an episode of pharyngitis. However, it may also present with proteinuria, microscopic haematuria, renal failure, or hypertension.

It is most common during the second and third decade of life. It commonly occurs within two days of an onset of an upper respiratory tract infection, or less commonly, an infection of other mucous membranes (e.g. GI, bladder, breast). It should be diagnosed by a renal biopsy, where IgA is seen deposited in the mesangium. It is probably part of a spectrum of disease with Henoch-Schönlein purpura, which presents with arthritis, rash, abdominal pain, and nephritis and also has mesangial IgA deposits in the kidney.

The treatment of IgA nephritis is variable. In a patient with haematuria only, the treatment is conservative. When there is nephrotic range proteinuria (>3 g/day - as in this case) an 8-12 week

course of prednisolone should be prescribed. If the proteinuria is  $<3$  g/day an ACE inhibitor can be used. In all patients, careful control of blood pressure should be achieved, by using ACE inhibitors in the first instance, and regular follow-up of renal function and urinalysis.

Whilst there can be light chains in the urine of patients with IgA nephropathy it is not seen in all patients, and it is not clearly linked to disease activity. Therefore, of the options listed above, this is the one which is the least correct.

### Answer Statistics



Times answered: 9111

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 12.5%

Total Answered: 32

# Work Smart

Question 31 of 100

A 17-year-old girl is admitted with a two-day history of rigors due to a urinary tract infection.

On examination she appears unwell, has a body mass index (BMI) of 31 kg/m<sup>2</sup>, a temperature of 39°C; examination is otherwise normal.

Initial biochemistry revealed:

Potassium	4 mmol/L	(3.5-4.9)
Urea	7 mmol/L	(2.5-7.5)
Glucose	33 mmol/L	(3.0-6.0)
pH	7.3	(7.36-7.44)
Standard bicarbonate	14 mmol/L	(20-28)
Base deficit	-10 mmol/L	

Urinalysis negative for ketones.

Which one of the following is the best initial treatment for her hyperglycaemia?

(Please select 1 option)

<input type="checkbox"/> Fixed rate IV insulin infusion
<input checked="" type="checkbox"/> Metformin <b>Incorrect answer selected</b>
<input type="checkbox"/> Metformin plus gliclazide
<input type="checkbox"/> Subcutaneous insulin mixture

Variable rate IV insulin infusion

This is the correct answer

This patient has a metabolic acidosis with pH of 7.3 and low bicarbonate, this is most likely due to sepsis.

She is likely to have type 2 diabetes given the BMI with uncontrolled hyperglycaemia but does not have diabetic ketoacidosis because the urine is negative for ketones, so would not require fixed rate insulin infusion.

It is important that her glycaemia is controlled to promote recovery from the sepsis. This is best achieved with intravenous insulin initially.

### Answer Statistics

1		12%
2		3%
3		1%
4		6%
5		78%

Times answered: 9331

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 32 of 100

A 70-year-old woman was referred with a six-week history of painless macroscopic haematuria. Her only medications were IM sodium aurothiomalate and oral ibuprofen, which she took for rheumatoid arthritis.

Investigations:

Serum creatinine	92 µmol/L (60-110)
Urine dipstick	Blood++++
Protein	+

- Abdominal plain x ray normal
- Ultrasound kidneys and renal tract normal

Which one of the following is the best initial investigation?

(Please select 1 option)

<input checked="" type="checkbox"/> Cystoscopy <span style="color: green;">Correct</span>
<input type="checkbox"/> Intravenous urogram (IVU)
<input type="checkbox"/> Renal biopsy
<input type="checkbox"/> Stop ibuprofen
<input type="checkbox"/> Stop sodium aurothiomalate

This lady has macroscopic haematuria and a trace of protein in the urine. She is taking ibuprofen and IM sodium aurothiomalate (gold). Her renal function is normal, as is the plain abdominal x ray and USS renal tract.

Ibuprofen is a common cause of interstitial nephritis, and this could present with painless haematuria.

Sodium aurothiomalate commonly causes trace proteinuria, and if present on its own is unimportant, but it can also cause membranous glomerulonephritis, which this lady could have.

However, the most important thing to exclude would be a bladder tumour initially before embarking upon a renal biopsy. Therefore cystoscopy is the best initial investigation.

## Answer Statistics

1		51%
2		4%
3		11%
4		20%
5		14%

Times answered: 8130

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 33 of 100

A 62-year-old man with a longstanding history of hypertension is seen in the outpatient clinic.

Investigations show:

Creatinine	280 µmol/L	(60-110)
------------	------------	----------

Urinalysis:

Blood	++
Protein	1.8 g/L

Ultrasound scan of kidneys shows left kidney 8.5 cm; right kidney 8.9 cm.

What is the best investigation to diagnose the cause of his renal impairment?

(Please select 1 option)

<input type="checkbox"/> Intravenous urogram (IVU)
<input type="checkbox"/> Isotope renogram
<input type="checkbox"/> Renal angiogram
<input checked="" type="checkbox"/> Renal biopsy <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/> Retrograde pyelogram <span style="color: red;">Incorrect answer selected</span>

This patient has a long history of hypertension, therefore it should have been appropriately controlled

in the clinic.

The patient now presents with bilaterally shrunken kidneys, renal impairment and evidence of a glomerulonephritis.

In the presence of mild to moderate hypertension, proteinuria indicates either underlying renal disease or renovascular disease.

As this patient has blood and protein in the urine, on the background of impaired renal function and shrunken kidneys, the best investigation would be to perform a renal biopsy (assuming the hypertension was controlled). This would differentiate between renovascular disease and glomerulonephritis, which may be reversible.

If this patient had the above clinical findings without blood and protein in the urine, then the investigation of choice would be a renal angiogram, to diagnose renovascular disease.

## Answer Statistics



Times answered: 8430

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Exam Themes January 2006

Question 34 of 100

A 14-year-old old boy presents with a sore throat and macroscopic haematuria.

What would light microscopy of a kidney biopsy most likely show?

(Please select 1 option)

<input type="checkbox"/>	Collapsed glomeruli
<input type="checkbox"/>	Crescentic glomerulonephritis
<input checked="" type="checkbox"/>	Mesangial hypercellularity <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Normal tissue
<input type="checkbox"/>	Segmental sclerosis <span style="color: red;">Incorrect answer selected</span>

The most common cause of macroscopic haematuria in a child is IgA nephritis.

This usually develops one to two days after a sore throat. It is most common in the second and third decades of life and is three times more common in males.

The urine may be frankly bloody or may be the colour of cola. There are no clots in the urine and the haematuria is generally painless although some patients complain of mild loin pain.

It tends to settle spontaneously within five days although the episodes may be recurrent lasting for one to two years.

Renal biopsy will show mesangial IgA deposition on immunofluorescence and light microscopy will show mesangial hypercellularity and matrix expansion.

# Work Smart

Question 33 of 109

A 45-year-old man with chronic renal failure presents to clinic complaining of increasing fatigue and weakness.

He receives three hours of haemodialysis, thrice weekly. His blood pressure is measured at 176/110 mmHg pre-dialysis and 166/95 mmHg post-dialysis.

Investigations pre-dialysis show:

Hb	95 g/L	(130-180)
Potassium	6.9 mmol/L	(3.5-4.9)
Creatinine	1567 µmol/L	(60-110)
Corrected Calcium	2.1 mmol/L	(2.2-2.6)

Which of the following options is most appropriate initial management for this patient?

(Please select 1 option)

<input type="checkbox"/>	Give alfacalcidol to correct hypocalcaemia
<input checked="" type="checkbox"/>	Increase the duration of each dialysis session <b>This is the correct answer</b>
<input type="checkbox"/>	Reduce the potassium concentration in the dialysate <b>Incorrect answer selected</b>
<input type="checkbox"/>	Start erythropoietin to increase haemoglobin level
<input type="checkbox"/>	Start ramipril to gain better control of his blood pressure

Haemodialysis (HD) is a complex area and one which does not need to be completely understood by a general physician, or one early in the stages of training. This question deals with the complex concept of dialysis adequacy. The prime aim of long-term haemodialysis is to remove nitrogenous metabolic end-products, remove fluid and maintain electrolyte, fluid and acid-base equilibrium. Although toxin removal is critical, the removal of any particular toxin is a poor measure of haemodialysis adequacy because the removal rate depends on the pre-dialysis serum concentration. 'Clearance' is therefore used to indicate dialysis adequacy, and most commonly the clearance of urea is used.

Clearance is the ratio of removal rate to blood concentration. Removal rate can be measured instantaneously by sampling blood on either side of the dialyser and multiplying the difference by the inflow rate. Clearance is the removal rate divided by the inflow concentration. However, this only provides a measure of dialysis at one point in time. The adequacy of an entire haemodialysis session is best measured by the fall in solute concentration from before dialysis to after. This is calculated using complex equations and is expressed as Kt/V. The current recommendation for adequate dialysis for three treatments per week are a Kt/V of 1.2. The details are not needed for MRCP but are described in the references below for those who are interested.

A more crude assessment of the adequacy of dialysis can be obtained by noting the magnitude of the decrease in blood urea concentration (the 'urea reduction ratio').

In addition to assessing the reduction in urea, it is standard practice in the UK to take biochemical and haematological measurements before and after haemodialysis sessions at regular intervals (monthly in hospital HD patients and at least 3 monthly in-home HD patients). Adequate HD is indicated by pre-dialysis serum bicarbonate levels of 18-24 mmol/L, potassium 4.0-6.0 mmol/L, phosphate 1.1-1.7 mmol/L, and calcium and albumin within normal range. It is also recommended that pre-dialysis haemoglobin concentration should be maintained between 100-120 g/L.

Cardiovascular morbidity and mortality remain very high in haemodialysis. Control of blood pressure is central to this, and improving adequacy of dialysis has proven value in overcoming this. Blood pressure varies significantly in HD patients depending on the time taken: pre-dialysis, post-dialysis or inter-dialysis. There is a lack of evidence regarding which value correlates best with long-term outcome. Hypertension pre-dialysis can be used a surrogate marker for inadequate ultrafiltration during haemodialysis. Available evidence indicates that control of a patient's fluid volume influences cardiovascular outcome. Volume and blood pressure are linked and it is, therefore, important to optimise ultrafiltration and dry weight to control blood pressure.

All efforts should be taken to ensure haemodialysis patients are euvolaemic and normotensive, which include counselling on sodium and fluid restriction, adequate ultrafiltration and the use of medication. A high pre-dialysis or inter-dialysis blood pressure may be related to excessive sodium and water ingestion during the inter-dialysis period or a high dialysate sodium level, whereas a high post-dialysis blood pressure may reflect inadequate achievement of dry weight. Weight gain between dialyses of more than 4.8% is associated with increased mortality.

The combination of high pre- and post-dialysis blood pressure, and high pre-dialysis potassium indicate that this patient is receiving inadequate dialysis. Both procedural issues (insufficient blood flow rate, dialysis time and frequency and needle size) and access issues should be addressed. If these fail to improve the situation a different dialysis modality should be considered, such as more frequent or sustained haemodialysis. From the available options, increasing the duration of the dialysis session should be done initially.

His haemoglobin is also below the recommended level for a dialysis patient but you need to measure haematinics prior rather than jumping in with EPO treatment. Many haemodialysis patients are iron deplete, and in these cases, intravenous iron is indicated rather than EPO in the first instance. Anti-hypertensive medication can be considered if adequate ultrafiltration fails to control this patient's blood pressure.

Reference:

1. Charra B. [Improving adequacy improves haemodialysis outcome](#). *EDTNA ERCA J*. 2000;26:6-10, 19.
2. Depner TA. [Hemodialysis adequacy: basic essentials and practical points for the nephrologist in training](#). *Hemodial Int*. 2005;9:241-54.
3. Jindal K, et al. [Hemodialysis clinical practice guidelines for the Canadian Society of Nephrology](#). *J Am Soc Nephrol*. 2006;17:S1-27.
4. Ksiazek P, Ksiazek A. [Adequacy of hemodialysis](#). *Ann Univ Mariae Curie Sklodowska Med*. 2002;57:303-8.
5. National Kidney Foundation. [2006 Updates Clinical Practice Guidelines and Recommendations](#).

## Answer Statistics



Times answered: 8879

## Test Analysis

# Work Smart

Question 35 of 100

A 60-year-old male presents with typical renal colic and one day later passes a small stone.

However, the original x ray of the abdomen revealed no obvious calculi.

What is the most likely composition of his calculus?

(Please select 1 option)

<input type="checkbox"/>	Calcium
<input type="checkbox"/>	Cystine
<input checked="" type="checkbox"/>	Oxalate <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Phosphate
<input type="checkbox"/>	Uric acid <span style="color: green;">This is the correct answer</span>

The main constituent will be uric acid.

Major causes of stone formation:

- Calcium stones (80%) - hypercalciuria (for example, primary hyperparathyroidism), hyperoxaluria (for example, XS intake, ileal disease and bypass)
- Uric acid stones (10%) - high purine intake, high cell turnover
- Cystine stones (2%) - cystinuria ( AR defect in dibasic amino acid transporter)
- Infection stones (5%) - chronic infection with urea splitting organisms causes stones made of magnesium ammonium phosphate and calcium phosphate
- Other stones (3%) - include xanthine stones, rare renal chloride channel mutations can cause

stone formation.

There appears to be a male predominance with a 2:1 ratio.

Calcium and infection stones are radio-opaque, cystine stones are weakly radio-opaque and urate stones are radiolucent.

### Answer Statistics



Times answered: 7869

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 40%

Total Answered: 35

# Work Smart

Exam Themes January 2006

Question 34 of 109

A 25-year-old female wishes to start a family but she is concerned as her 50-year-old mother had adult polycystic kidney disease.

Examination reveals no specific abnormalities.

Which is the most appropriate initial screening test for polycystic kidney disease in this woman?

(Please select 1 option)

<input type="checkbox"/>	Genetic linkage analysis
<input type="checkbox"/>	Intravenous urogram
<input type="checkbox"/>	Isotope renography <span style="color: red;">❑ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	Renal ultrasound <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Urinalysis

The answer lies between renal ultrasound and genetic linkage analysis. Polycystic kidney disease is an autosomal dominant disorder. Mutations in at least three different genes can lead to autosomal dominant polycystic disease (APKD).

1. PKD-1 on chromosome 16: 85% of cases. Polycystin 1 is an integral membrane glycoprotein involved in cell/matrix interactions
2. PKD-2 on chromosome 4: 10% of cases. Polycystin 2 which may associate with polycystin 1 through a common signalling pathway
3. A third gene mutation is known but its exact chromosomal location is not.

Diagnosis is made by multiple bilateral renal cysts and a positive family history.

Genetic linkage studies can exclude or make the diagnosis in younger patients. The studies require blood from at least two affected family members.

Ultrasonography:

- In PKD 1 families, age-related diagnostic criteria are used: two cysts in under 30 years age group.
- At least two cysts in each kidney in 30-59 years. Four cysts in each kidney for over 60 years.

CT is more sensitive than USS and may aid in diagnosis in younger patients.

MR angiography is used to screen for cerebral aneurysms in patients with a family history of an intracranial aneurysm.

## Answer Statistics



Times answered: 8955

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 36 of 100

A 30-year-old male presents with oedema and proteinuria.

On examination, his blood pressure was 120/70 mmHg.

Investigations reveal:

Creatinine	88 µmol/L	(60-110)
Albumin	25 g/L	(37-49)
Urinalysis	No blood	
Protein	++++	
Urinary protein excretion	7g/24hr	(<0.2)

An ultrasound of renal tract shows normal right kidney, absent left kidney.

Which is the most appropriate course of action for this patient?

(Please select 1 option)

<input type="checkbox"/> Albumin transfusion <input checked="" type="checkbox"/> <b>Incorrect answer selected</b>
<input type="checkbox"/> Angiotensin converting enzyme (ACE) inhibitor therapy
<input type="checkbox"/> High protein diet
<input type="checkbox"/> Renal biopsy
<input type="checkbox"/> Trial of steroid therapy <input checked="" type="checkbox"/> <b>This is the correct answer</b>

This patient has nephrotic syndrome, which is a combination of:

- Proteinuria (usually > 3g/24 hrs)
- Hypoalbuminaemia (<35 g/L)
- Oedema
- Hyperlipidaemia.

The most appropriate course of action here would be to undergo a trial of steroid therapy.

Ideally a renal biopsy would be indicated to determine the cause of the nephrotic syndrome, however, as this patient only has one kidney then this would be considered a relative contraindication for such a procedure.

A high protein diet/albumin transfusion would be of little to no benefit - and the latter would need to be salt-poor.

ACE inhibitors reduce proteinuria and slow deterioration in glomerular filtration rate (GFR).

In this case, given the patient's age, he may well have minimal change glomerulonephritis (GN) (commonest in children), which is normally steroid responsive.

In the young adult histological diagnoses are in general: minimal change > mesangiocapillary > FSGS > lupus > membranous > diabetes.

In general, steroids are tried first and then second line agents such as cyclosporine and cyclophosphamide are introduced if needed.

## Answer Statistics



Times answered: 8378

## Test Analysis

CorrectIncorrectPartially

# Work Smart

Question 35 of 109

A 16-year-old girl presented with Henoch-Schönlein purpura and renal involvement.

What is the most likely outcome?

(Please select 1 option)

<input type="checkbox"/>	A high probability of relapse
<input checked="" type="checkbox"/>	Complete renal recovery <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Persistent hypertension <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Persistent proteinuria
<input type="checkbox"/>	Requirement for long-term corticosteroids

Henoch-Schönlein purpura (HSP) is a self-limiting vasculitis which occurs in children and young adults.

It is characterised by:

- non-thrombocytopenic purpura
- arthralgia
- abdominal pain, and
- glomerular nephritis.

It is likely to be an immune complex disease - involving IgA, but no treatment has proven efficacy.

The disease usually settles between four to six weeks without sequelae if kidney involvement is mild.

However, this condition can occasionally relapse.

## Answer Statistics



Times answered: 8641

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 11.43%

Total Answered: 35

## Feedback

# Work Smart

Question 36 of 109

A 17-year-old boy presented with a non-blanching rash over his legs, a swollen knee, and painless frank haematuria.

Investigations revealed:

Serum creatinine	210 µmol/L (60-110)
Urine dipstick analysis: Blood	+++
Urine dipstick analysis: Protein	+
Urine culture	Negative
Ultrasound of the kidneys	Normal

Which glomerular abnormality is most likely to be present at renal biopsy?

(Please select 1 option)

<input type="checkbox"/>	Focal and segmental sclerosis
<input type="checkbox"/>	Foot process fusion
<input type="checkbox"/>	Linear deposition of IgG on the basement membrane
<input checked="" type="checkbox"/>	Mesangial deposition of IgA <span style="color: green;">Correct</span>
<input type="checkbox"/>	Thickening of basement membranes

The likely diagnosis here is Henoch-Schönlein purpura (HSP).

HSP is an inflammatory disorder of unknown cause characterised by IgA-dominant immune complexes in smaller venules, capillaries, and arterioles. It presents with purpura, arthritis (especially ankles and knees), abdominal pains, haematuria, and proteinuria.

HSP is often associated with infectious agents such as group A *Streptococci* and *Mycoplasma*.

If there is progression to renal impairment then renal histopathology may include minimal change to severe glomerulonephritis that is indistinguishable from IgA nephropathy. However, mesangial IgA deposits are the most typical features of HSP on renal biopsy.

## Answer Statistics



Times answered: 9125

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 37 of 100

A 28-year-old man presented with hypertension.

On examination, he had palpable kidneys and abdominal ultrasound shows bilaterally enlarged cystic kidneys.

Which one of the following conditions is most likely to be present in this patient?

(Please select 1 option)

<input type="checkbox"/> Mitral stenosis	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Nail dystrophy	
<input type="checkbox"/> Polycythaemia	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/> Short stature	
<input type="checkbox"/> Testicular atrophy	

The most likely diagnosis here is adult polycystic kidney disease, which is associated with valvular heart abnormalities, incompetence and aneurysms of the cerebral circulation.

It is also associated with excessive erythropoietin production and polycythaemia.


Mitral valve prolapse occurs in 25%, and there is an increased incidence of aortic incompetence.

Hepatic cysts are seen in 70%. These can also involve the pancreas (10%) and spleen.

Cerebral berry aneurysms are present in 5-8%, but there tends to be familial clustering - i.e. if there is a family history >20% of patients will also have an aneurysm.

Diverticular disease is thought to be increased in patients with polycystic kidney disease.

## Answer Statistics

1		25%
2		10%
3		47%
4		8%
5		10%

Times answered: 9636

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 37.84%

Total Answered: 37

## Feedback

# Work Smart

Exam Themes January 2006

Question 38 of 100

A 16-year-old girl developed pulmonary haemorrhage and acute renal failure requiring dialysis.

She has a history of recurrent epistaxis.

Investigations revealed:

Renal biopsy

Crescentic glomerulonephritis

Which one of the following antibodies is most likely to be found in the blood?

(Please select 1 option)

<input type="checkbox"/>	Anticardiolipin
<input type="checkbox"/>	Anticentromere
<input type="checkbox"/>	Antimitochondrial
<input checked="" type="checkbox"/>	Antiproteinase 3 <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Antinuclear <span style="color: red;">Incorrect answer selected</span>

This patient manifests a pulmonary renal syndrome which is most commonly due to an antineutrophil cytoplasmic antibody test (ANCA) positive vasculitis and less commonly due to Goodpasture's syndrome (antiglomerular basement membrane [GBM] antibodies). The history of epistaxis makes Wegener's granulomatosis the more likely diagnosis.

ANCA antibodies are of two types:

1. cANCA which correlates with antiproteinase 3 antibodies (PR3)cANCA and specificity for the PR3 antigen is most specific for Wegener's granulomatosis. Proteinase-3 is a neutral serine proteinase present in azurophil granules of human neutrophils. Antibodies against it may be present in isolation without a cANCA. In Wegener's, the level of PR3 antibody and ANCA titre are related to disease activity and the antibodies typically disappear when the disease is in remission.
2. pANCA and/or antibody to MPO are far less specific than cANCA and can be present in a range of inflammatory conditions such as microscopic polyangiitis, Churg-Strauss syndrome and Goodpasture's syndrome. MPO and pANCA may also be present in systemic lupus erythematosus (SLE), rheumatoid arthritis, Sjögren's syndrome and occasionally in chronic infections. They are positive in 10% of patients with Wegener's granulomatosis and are the most likely antibody to be present in this case, where proteinase-3 is not an option.

Wegener's granulomatosis is a multi-organ autoimmune disease which can be fatal.

The classical triad consists of:

- necrotising granulomatous inflammation of the respiratory tract
- glomerulonephritis, and
- a small-vessel vasculitis.

A prolonged history of epistaxis or sinusitis is commonly found in Wegener's granulomatosis, which in some patients is also associated with an eosinophilia. The detection of antineutrophil cytoplasmic antibodies directed against proteinase-3 is highly specific but is found in only 50% of patients with disease localised to the respiratory tract and 95% with generalised Wegener's.

Standard therapy is with cyclophosphamide and corticosteroids. TNF-alpha blocking agents, antithymocyte globulin and monoclonal anti-T cell antibodies can be used in disease refractory to these agents.

Systemic inflammation and vasculitis contribute to accelerated atherosclerosis in patients with Wegener's and there is, therefore, a significantly increased incidence of stroke, myocardial infarction and occlusive artery disease.

Antimitochondrial antibodies are found in primary biliary cirrhosis.

Anticentromere antibodies are found in CREST/scleroderma syndrome.

Antinuclear (ANA) and anticardiolipin antibodies are found in systemic lupus erythematosus (SLE) which is not a cause of pulmonary renal syndrome.

Reference:

1. Lamprecht P, Gross WL. [Wegener's granulomatosis](#). *Herz* 2004;29:47-56.
2. Schönemarck U, et al. [Prevalence and spectrum of rheumatic diseases associated with proteinase 3-antineutrophil cytoplasmic antibodies \(ANCA\) and myeloperoxidase-ANCA](#).

*Rheumatology (Oxford)*. 2001;40:178-84.

3. Seo P, Stone JH. [The antineutrophil cytoplasmic antibody-associated vasculitides](#). *Am J Med*. 2004;117:39-50.
4. Watorek, E et al. [Wegener's granulomatosis - autoimmunity to neutrophil proteinase 3](#). *Arch Immunol Ther Exp (Warsz)*. 2003;51:157-167.

## Answer Statistics



Times answered: 9784

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 36.84%

Total Answered: 38

# Work Smart

Question 37 of 109

A 63-year-old female with a 12-year history of hypertension and diabetes has been treated with metformin 1 g bd, gliclazide 80 mg bd, rosuvastatin 10 mg daily, ramipril 10 mg daily, aspirin 75 mg daily and amlodipine 10 mg daily for the last two years.

At annual review her blood pressure is 138/82 mmHg, fundi reveal background diabetic retinopathy, foot pulses are normal but she has evidence of a peripheral sensory loss to the ankles in both feet.

Her results show:

HbA <sub>1c</sub>	55 mmol/mol	(20-46)
	7.2%	(3.8-6.4)
Urea	12.5 mmol/L	(2.5-7.5)
Creatinine	176 µmol/L	(60-110)
Cholesterol	4.8 mmol/L	(<5.2)

Which of the following drugs should be withdrawn?

(Please select 1 option)

<input type="checkbox"/>	Aspirin
<input type="checkbox"/>	Gliclazide <span style="color: red;">❌ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	Metformin <span style="color: green;">✅ This is the correct answer</span>
<input type="checkbox"/>	Ramipril

This patient has evidence of chronic renal impairment with elevated creatinine and urea.

Guidelines currently suggest that metformin should be stopped if creatinine is above 150  $\mu\text{mol/L}$ .

The estimated prevalence of life-threatening lactic acidosis is one to five cases per 100,000, with mortality in reported cases up to 50%. Traditionally, this complication has been thought of as secondary to an accumulation of the drug.

Metformin is excreted unchanged in the urine, with the half-life prolonged and renal clearance decreased in proportion to any decrease in creatinine clearance. This may occur chronically in chronic renal impairment, or acutely with dehydration, shock, and intravascular administration of iodinated contrast agents, all of which have the potential to alter renal function.

Tissue hypoxia also has a significant role, and acute or chronic conditions that may predispose to this condition, such as sepsis, acute myocardial infarction, pulmonary embolism, cardiac failure and chronic liver disease, may act as triggers.

As the patient appears to have chronic renal impairment and as she has been on ramipril for a considerable period it is unlikely that she has renal artery stenosis requiring the withdrawal of the ACEi.

### Answer Statistics



Times answered: 9277

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 38 of 109

A 43-year-old male is diagnosed with diabetic nephropathy.

If this patient had type 1 diabetes his chances of progressing to end stage renal disease (ESRD) would be approximately 50%.

What percentage of type 2 diabetics with diabetic nephropathy would be expected to progress to ESRD?

(Please select 1 option)

15%	<input checked="" type="checkbox"/> Correct
30%	<input type="checkbox"/>
45%	<input type="checkbox"/>
50%	<input type="checkbox"/>
55%	<input type="checkbox"/>


The majority of patients with diabetic nephropathy have type 2 diabetes, however this is due to higher prevalence of type 2, rather than higher incidence of nephropathy (as incidence is in fact higher in type 1 DM).

There are a number of stages in the development of nephropathy with glomerular hyperfiltration being an early feature. Nephropathy itself is signalled by the excretion of trace amounts of protein in the urine microalbuminuria.

The progression of the disease may be attenuated by stringent blood pressure control (with an

angiotensin-converting enzyme inhibitor [ACEi]) and strict glycaemic control.

## Answer Statistics

1		19%
2		45%
3		8%
4		13%
5		15%

Times answered: 8992

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.79%

Total Answered: 38

## Feedback

# Work Smart

Question 39 of 100

A 32-year-old male with type 1 diabetes undergoes a 24-hour urine collection.

Which of the following urine albumin concentrations signifies microalbuminuria?

(Please select 1 option)

<input type="checkbox"/>	10 mg/day
<input checked="" type="checkbox"/>	50 mg/day <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	500 mg/day <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	1 g/day
<input type="checkbox"/>	3.5 g/day

**Microalbuminuria** is defined as a urine albumin excretion of between 30-300 mg per 24 hours.

A concentration above 300 mg/24 hours signifies albuminuria and a concentration above 3.5 g/24 hours signifies overt proteinuria.

Microalbuminuria is not just an indicator of early renal involvement but it also identifies increased cardiovascular risk with an approximate twofold cardiovascular risk above the already increased risk in the diabetic population.

A useful surrogate of the total albumin excretion is the albumin: creatinine ratio. The urinary albumin:creatinine ratio is measured using the first morning urine sample where practicable.

Microalbuminuria is indicated where there is an albumin:creatinine ratio  $\geq 2.5$  mg/mmol (men) or 3.5 mg/mmol (women).

Proteinuria is indicated by a ratio of  $\geq 30$  mg/mmol.

## Answer Statistics



Times answered: 9469

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 35.9%

Total Answered: 39

## Feedback

# Work Smart

Core Questions

Question 39 of 109

A 55-year-old homeless male was found stuporous and smelling of alcohol.

Observations in the Emergency Department reveal a core temperature of 34°C, a pulse of 50 bpm and blood pressure of 116/80 mmHg.

Investigations reveal:

Creatinine	320 µmol/L	(60-110)
Gamma GT	40 U/L	(10-40)
AST	550 U/L	(1-40)
LDH	1500 U/L	(10-250)
Dipstick urine	blood +++	

Urine microscopy no cells or organisms.

What is the most likely cause of the raised serum creatinine concentration?

(Please select 1 option)

<input type="checkbox"/>	Chronic renal failure
<input type="checkbox"/>	Dehydration
<input checked="" type="checkbox"/>	Hypothermia <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Paracetamol poisoning
<input type="checkbox"/>	Rhabdomyolysis <span style="color: green;">This is the correct answer</span>

The elevated serum creatinine is most likely due to rhabdomyolysis as the patient was found unconscious, is hypothermic, and is likely to have sustained muscle injury.

The latter is confirmed by an elevated aspartate aminotransferase and lactate dehydrogenase (LDH) but the normal gamma-glutamyl transpeptidase (GGT) argues against these being released from the liver.

Rhabdomyolysis is strongly suggested by the fact that urinalysis is strongly positive for blood, whereas urine microscopy is negative for red blood cells.

The positive urinalysis is caused by myoglobin, a muscle protein released during muscle damage; this appears in the urine and can cause acute renal failure.

### Answer Statistics



Times answered: 8926

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Exam Themes September 2004

Question 40 of 100

A 30-year-old female presents with fevers and a three-month history of malaise.

Results show:

Creatinine	250 µmol/L	(60-110)
Complement C3	23 mg/dL	(65-190)
Urinalysis	Protein +	
	Blood +	

Which of the following is the likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> HIV nephropathy
<input checked="" type="checkbox"/> Infective endocarditis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/> Membranous nephropathy
<input type="checkbox"/> Microscopic polyangiitis
<input type="checkbox"/> Minimal change nephropathy <span style="color: red;">Incorrect answer selected</span>

Hypocomplementaemia is associated with either vasculitides such as systemic lupus erythematosus (SLE) and cryoglobulinaemia but is also associated with a non-vasculitic process such as subacute bacterial endocarditis (SBE).

Subacute bacterial endocarditis more commonly affects the patient with an underlying valve lesions but can affect patients with no known cardiac problems. IV drug use, intravenous lines (such as Hickman), dental procedures, genitourinary procedures, cardiac surgery, colonic neoplasms, and cardiac surgery all increase the risk but patients with no known risk factors can also be affected. The history is often long, with vague symptoms and it is therefore important to have high suspicion where it is a possible diagnosis.

The classic signs of subacute infective endocarditis are: petechiae of the mucous membranes, splinter haemorrhages beneath the nails, Osler's nodes and Janeway lesions of the hands, and Roth spots in the retina. It is also possible to have focal neurological deficit, due to cerebral emboli. The murmur is most commonly regurgitant. Patients usually present with viral-type symptoms, such as fever, sweats, anorexia, arthralgia, malaise, pallor, and non-productive cough.

At least three sets of blood cultures should be taken from separate sites on consecutive days, prior to giving antibiotics (unless the patient is septic). FBC commonly shows a leucocytosis, with normochromic normocytic anaemia and elevated ESR. Urinalysis shows proteinuria and microscopic haematuria. C3 complement is usually decreased, and rheumatoid factor may be possible.

Transthoracic echocardiogram can demonstrate valve vegetations, although transoesophageal (TOE) is more sensitive.

If subacute infective endocarditis is confirmed, the management is with IV antibiotics for 4-6 weeks. These classically start broad spectrum, but you should narrow the cover once an organism is identified (usually from blood cultures). Surgery is indicated in fungal endocarditis, prosthetic valve involvement, persistently positive blood cultures despite therapy, recurrent emboli, valve ring or myocardial abscess, heart failure, and large vegetations.

Antibiotic prophylaxis is controversial, and you should read the most up to date guidelines prior to your exam.

HIV nephropathy usually presents with nephrotic range proteinuria, and is, therefore, less likely in this case where there is only one plus of protein in the urine.

Membranous nephropathy is usually idiopathic but can be secondary to SLE, hepatitis B, malignancy, gold, or penicillamine. Again, it typically presents with nephrotic syndrome making it less likely in this case.

In microscopic polyangiitis, which is classically small vessel, complement would be expected to be normal.

Minimal change nephropathy again presents with nephrotic syndrome.

# Work Smart

Exam Themes May 2002

Question 40 of 109

A 7-year-old boy is admitted with renal colic due to renal calculus.

His mother has a similar history of recurrent calculi.

What is the most likely explanation for recurrent renal calculi in both mother and child?

(Please select 1 option)

<input type="checkbox"/>	Cystinosis
<input type="checkbox"/>	Cystinuria
<input type="checkbox"/>	Hyperoxaluria
<input checked="" type="checkbox"/>	Idiopathic hypercalciuria <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Urate uropathy <span style="color: red;">Incorrect answer selected</span>

Idiopathic hypercalciuria<sup>1</sup> has a familial or sporadic pattern. In the familial pattern an autosomal dominant inheritance is present.

The type of the disease is identical in affected members of the same family and the typical presentation is of recurrent urinary calculi.

Cystinuria, cystinosis, urate uropathy and hyperoxaluria are autosomal recessive conditions.<sup>2</sup>

Reference:

- Nicolaidou P, et al. [Family pattern of idiopathic hypercalciuria and its subtypes.](#) *J Urol.* 1996;155:1042-4.

### Answer Statistics



Times answered: 8484

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15%

Total Answered: 40

### Feedback

# Work Smart

Core Questions

Question 41 of 109

A 32-year-old female is diagnosed with Goodpasture's syndrome.

Which of the following therapies used in conjunction with plasmapheresis and corticosteroids would be expected to improve prognosis associated with the condition?

(Please select 1 option)

<input type="checkbox"/>	Azathioprine
<input checked="" type="checkbox"/>	Cyclophosphamide <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Cyclosporin
<input type="checkbox"/>	Mycophenolate mofetil
<input type="checkbox"/>	Tacrolimus <span style="color: red;">Incorrect answer selected</span>

Studies reveal that without treatment mortality is as high as 90% in association with [Goodpasture's](#).

However the prognosis is drastically improved with the removal of antigen through plasmapheresis, immunosuppression with corticosteroids and cyclophosphamide.

There are some studies revealing the potential of [mycophenolate mofetil](#) but the evidence is rather anecdotal.

# Work Smart

Question 42 of 109

A 28-year-old female is referred with a three-month history of tiredness and weakness.

On examination, pulse is 82 bpm and blood pressure is 128/72 mmHg.

No specific abnormalities are evident on examination of the cardiovascular, respiratory, abdominal, or neurological systems.

Investigations reveal:

Serum sodium	142 mmol/L	(137-144)
Serum potassium	3.0 mmol/L	(3.5-4.9)
Serum urea	4.2 mmol/L	(2.5-7.5)
Serum creatinine	82 µmol/L	(60-110)
Serum chloride	73 mmol/L	(95-107)
Plasma glucose	5.5 mmol/L	(3.0-6.0)
Urinary chloride	60 mmol/L	(20-350)

Which of the following is the likely diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Bartter syndrome
<input type="checkbox"/>	Conn's syndrome
<input checked="" type="checkbox"/>	Drug ingestion <span style="color: green;">This is the correct answer</span>

Liddle's syndrome	
Non-classical congenital adrenal hyperplasia (CAH)	<input type="checkbox"/> Incorrect answer selected

This young woman has hypokalaemia and hypochloraemia.

The normal blood pressure would exclude a diagnosis of Conn's, CAH, or Liddle's syndrome (apparent mineralocorticoid excess).

Similarly, drug ingestion associated with hypokalaemia liquorice/carbenoxolone is again associated with hypertension (and low urinary chloride, less than 20 mmol/L).

Bartter syndrome is a rare, recessive condition associated with weakness, lethargy, and growth retardation and is found in youngsters.

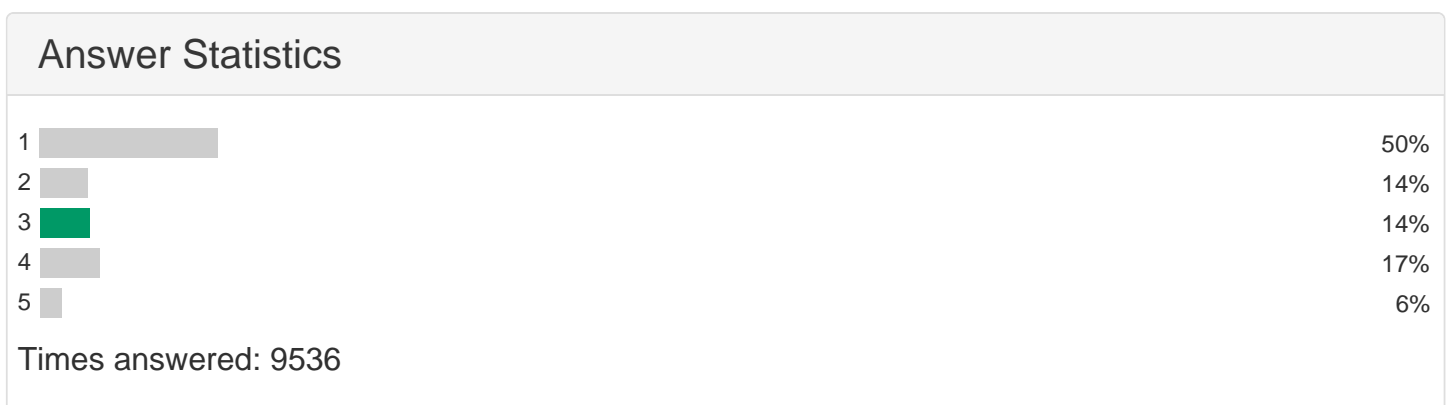
Hypokalaemic hypochloareamic alkalosis is seen in the condition but symptoms would be more apparent at a much younger age than this woman.

If Gitelman's syndrome were offered then that would be a better option.

Therefore the most likely diagnosis is diuretic abuse, as the symptoms have arisen only over the last three months and no other features are apparent on examination.

Further Reading:

1. Devendra D, Rowe PA. [Unexplained hypokalaemia and metabolic alkalosis](#). *Postgrad Med J*. 2001;77:E4.
2. Medscape. [Bartter Syndrome](#).



# Work Smart

Question 41 of 100

If a patient with chronic renal failure is treated with erythropoietin (EPO), which of the following will be expected in this patient?

(Please select 1 option)

<input type="checkbox"/>	Decreased pure red cell aplasia
<input type="checkbox"/>	Decreased risk of hypertension
<input type="checkbox"/>	Decreased risk of thrombosis
<input checked="" type="checkbox"/>	Increased well being <b>Correct</b>
<input type="checkbox"/>	Reduced appetite

Increased viscosity is seen in EPO therapy which may exacerbate hypertension and there is also increased risk of thrombosis.

Pure red cell aplasia is a rare unwanted effect due to stimulation of antibodies by administered EPO which cross reacts with the patient's endogenous EPO.

Improvement in haemoglobin level results in the increased wellbeing and better appetite.

# Work Smart

Exam Themes May 2007

Question 43 of 109

A 35-year-old man presents with left loin pain and haematuria.

He comments that he has had three episodes of similar symptoms in the past. On examination, he is afebrile and has mild pallor.

Investigations show:

Sodium	140 mmol/L	(137-144)
Potassium	3.0 mmol/L	(3.5-4.9)
Chloride	115 mmol/L	(95-107)
Bicarbonate	12 mmol/L	(20-28)
Calcium	2.5 mmol/L	(2.2-2.6)
Urea	19 mmol/L	(2.5-7.5)
Urinalysis	pH 6.5	
	Protein 1+	
	RBC 1+	
	White cell count 1+	

Which of the following is the most likely diagnosis?

(Please select 1 option)

Bartter syndrome  Incorrect answer selected

Conn's syndrome
Renal tubular acidosis type 1 <input checked="" type="checkbox"/> This is the correct answer
Renal tubular acidosis type 2
Renal tubular acidosis type 4

The patient has metabolic acidosis with failure appropriately to acidify the urine, pointing to a diagnosis of renal tubular acidosis (RTA).


Type 1 renal tubular acidosis is characterised by a failure of the alpha-intercalated cells of the distal tubule to excrete hydrogen ions. This results in an inability to acidify the urine, and subsequently serum acidosis (due to build-up of  $H^+$ ) and hypokalaemia (as  $K^+$  reabsorption is linked to  $H^+$  excretion). Alkaline urine increases the risk of calcium deposition, and therefore nephrocalcinosis is a feature of type 1 renal tubular acidosis. Subsequent bone demineralisation results in Rickets in children and osteomalacia in adults.

Type 2 renal tubular acidosis is caused by a failure of proximal tubular cells to resorb bicarbonate from the urine, which also results in serum acidosis. As the distal tubule functions normally, the acidosis is less severe than type 1 RTA, and the urine has a pH of less than 5.3. Rather than being a solitary defect, type 2 renal tubular acidosis is usually associated with a more generalised dysfunction of tubular cells which manifests as Fanconi syndrome (phosphaturia, glycosuria, aminoaciduria, uricosuria, tubular proteinuria). Phosphate wasting results in marked bone demineralisation.

The presence of a urine pH of more than 5.3 here, with symptoms suggestive of a renal tract stone, means that type 1 renal tubular acidosis is the most likely diagnosis.

Bartter and Conn's syndromes are causes of hypokalaemia and metabolic alkalosis, which does not fit with the electrolyte values given above.

### Answer Statistics

1		12%
2		5%
3		42%
		

# Work Smart

Question 44 of 109

A 27-year-old lady presents with generalised oedema of five months duration.

Investigations reveal proteinuria (5.5 g/day), hypoproteinaemia and hypercholesterolaemia, urea 10 mmol/L (2.5-7.5) and creatinine 200 mol/L (60-110). Renal biopsy confirms membranous glomerulonephritis.

What will be the most appropriate management to get remission?

(Please select 1 option)

<input type="checkbox"/>	Azathiaprine
<input checked="" type="checkbox"/>	Cyclophosphamide plus methylprednisolone <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Cyclosporin A
<input type="checkbox"/>	Methylprednisolone
<input type="checkbox"/>	Protein restriction <span style="color: red;">Incorrect answer selected</span>

The twin aims of treating membranous nephropathy are:

- First to induce a remission of the nephrotic syndrome, and
- Second to prevent the development of end stage renal failure.

A meta-analysis of four randomised controlled studies comparing treatments of membranous nephropathy showed that regimes comprising chlorambucil or cyclophosphamide, either alone or with steroids, were more effective than symptomatic treatment or treatment with steroids alone in inducing

remission of the nephrotic syndrome.

A small randomised controlled study of 17 patients with a persistent nephrotic syndrome and declining renal function suggested that ciclosporin A slowed the rate of decline of renal function: this requires confirmation in a larger trial.

## Answer Statistics



Times answered: 7181

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 13.64%

Total Answered: 44

# Work Smart

Exam Themes May 2007

Question 45 of 109

A 37-year-old woman underwent a kidney transplant which never functioned.

A biopsy revealed pathological features consistent with acute rejection associated with anti-HLA antibodies.

Which type of immunoglobulin is expected to account for this process?

(Please select 1 option)

<input type="checkbox"/>	Ig A
<input type="checkbox"/>	Ig D
<input type="checkbox"/>	Ig E
<input checked="" type="checkbox"/>	Ig G <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Ig M <span style="color: red;">Incorrect answer selected</span>

This acute rejection is recognised and due to anti-IgG antibodies to the human leukocyte antigen (HLA) incompatible tissues with primary activation of T cells.

The acute response is treated with immunosuppressants.

# Work Smart

Exam Themes September 2006

Question 42 of 100

A 36-year-old male is referred with chronic renal dysfunction and is discovered to have adult polycystic kidney disease.

Which of the following proteins is associated with the development of APKD?

(Please select 1 option)

<input type="checkbox"/>	Cyst specific binding protein
<input type="checkbox"/>	Matrix metalloproteinase
<input checked="" type="checkbox"/>	Polycystin-1 <b>Correct</b>
<input type="checkbox"/>	Progesterone binding cyst-protein
<input type="checkbox"/>	Type 1 collagen

Autosomal dominant APKD-1 is a relatively common disorder accounting for approximately 8% of cases of end-stage renal disease (ESRD).

Eighty-five percent of cases are due to the defect in PKD-1 locus on chromosome 16p13.3.

PKD-1 encodes a large protein, polycystin, which seems to be involved in cell to cell-matrix interaction.

Reference:

Medscape. [Polycystic Kidney Disease.](#)

# Work Smart

Question 43 of 100

A 39-year-old female presents with polyuria and is passing 4 litres of urine per day. She was recently started on a new medication.

Investigations show:

Serum sodium	144 mmol/L	(137-144)
Plasma osmolality	299 mosmol/L	(275-290)
Urine osmolality	210 mosmol/L	(350-1000)

Which of the following drugs had been prescribed?

(Please select 1 option)

<input type="checkbox"/>	Aspirin
<input type="checkbox"/>	Fluoxetine
<input type="checkbox"/>	Glibenclamide <input type="checkbox"/> Incorrect answer selected
<input checked="" type="checkbox"/>	Lithium <input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Metoprolol

This lady has eunatraemia, hypertonicity (high serum osmolality), and inappropriately dilute urine which is consistent with diabetes insipidus.

Of the drugs listed lithium would be the most likely to cause a nephrogenic DI.

Further Reading:

Medscape. [Lithium Nephropathy](#).

## Answer Statistics



Times answered: 9733

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 37.21%

Total Answered: 43

## Feedback

# Work Smart

Question 46 of 109

A 34-year-old female presents with shortness of breath.

She has been treated for asthma by her GP with an inhaled steroid, but the GP has documented an eosinophilia of  $1.1 \times 10^9/L$  (14%) (normal  $<0.1 \times 10^9/L$ ). Her creatinine has also been found to be  $347 \mu\text{mol/L}$  (60-110).

Which of the following would most support a diagnosis of Churg-Strauss syndrome?

(Please select 1 option)

<input type="checkbox"/>	Extravascular eosinophils on vascular biopsy	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Fixed pulmonary infiltrates on chest radiographs	
<input type="checkbox"/>	Peak flow $<300$ L/min	
<input type="checkbox"/>	Peripheral alveolar filling infiltrate predominantly in the upper lobes on a chest radiograph	
<input type="checkbox"/>	Peripheral 'stocking' neuropathy	<input type="checkbox"/> Incorrect answer selected

A diagnosis of Churg-Strauss syndrome requires four of the following features:

- asthma
- eosinophilia greater than 10%
- mononeuropathy or polyneuropathy
- paranasal sinus abnormality
- non-fixed pulmonary infiltrates visible on chest radiographs, and
- biopsy demonstrating extravascular eosinophils.

Peripheral alveolar filling infiltrates predominantly in the upper lobes on a chest radiograph is typical of chronic eosinophilic pneumonia.

A peripheral 'stocking and glove' neuropathy is not typical of Churg-Strauss syndrome and is more common in type 2 diabetes.

Peak flow <300 L/min is low, but is non-specific, and in isolation would not be suggestive of a diagnosis of Churg-Strauss syndrome.

### Answer Statistics

1		46%
2		16%
3		4%
4		18%
5		16%

Times answered: 8907

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 13.04%

# Work Smart

Question 47 of 109

An 18-year-old female student attends the clinic as her father has just died with end-stage renal failure. He had been diagnosed with autosomal dominant polycystic kidney disease (ADPKD).

She wishes to know what investigations she requires.

Which of the following is an appropriate strategy in her management?

(Please select 1 option)

<input checked="" type="checkbox"/>	Geneticist referral <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Glomerular filtration rate estimation
<input type="checkbox"/>	MRI brain
<input type="checkbox"/>	Ultrasound of the renal tract
<input type="checkbox"/>	Urine dipstick <span style="color: red;">Incorrect answer selected</span>

An ultrasound of the renal tract may not be appropriate at this patient's age, given that cysts may not become apparent until the age of 20.

Gross haematuria in ADPKD carries a poor prognosis however microscopic haematuria may be a complication.

Subarachnoid haemorrhage may be a cause of mortality in 9% of patients with ADPKD, though 8% of patients have an asymptomatic intracranial aneurysm; if the diagnosis is confirmed and there is a strong history of subarachnoid haemorrhage then an MRI would be indicated.

Genetic counselling is most appropriate in this context and genetic linkage analysis may be utilised.

# Work Smart

Question 44 of 100

A 44-year-old woman with type 1 diabetes mellitus has not attended the diabetic clinic for five years.

Examination shows no abnormalities.

Investigations show:

Haemoglobin	90 g/L	(115-165)
MCV	94 fL	(80-96)
Haematocrit	28%	-
HbA <sub>1c</sub>	87 mmol/mol	(20-42)
	10.1%	(3.8-6.4)

A blood smear shows normochromic, normocytic anaemia.

Which of the following is the most likely cause?

(Please select 1 option)

<input type="checkbox"/>	Acute blood loss
<input type="checkbox"/>	Chronic lymphocytic leukaemia (CLL) <span style="color: red;">❌ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	Erythropoietin deficiency <span style="color: green;">✅ This is the correct answer</span>
<input type="checkbox"/>	Microangiopathic haemolysis
<input type="checkbox"/>	Sideroblastic anaemia

The most likely cause is progressive renal failure which leads to reduced release of erythropoietin from the kidneys.

Sideroblastic anaemia (myelodysplasia) is seen in older age groups.

CLL or microangiopathic haemolysis are possible causes but unlikely.

## Answer Statistics



Times answered: 9542

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 36.36%

Total Answered: 44

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## Work Smart

Question 45 of 100

Which is the predominant site of effect of thiazide diuretics?

(Please select 1 option)

<input type="checkbox"/>	Cortical collecting duct
<input checked="" type="checkbox"/>	Early distal tubule <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Late distal tubule <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Proximal tubule
<input type="checkbox"/>	Thick ascending limb, Loop of Henle

Thiazide diuretics act on the cortical diluting segment of the nephron, predominantly in the early distal tubule.

Loop diuretics mainly act on the thick ascending limb of the Loop of Henle.

Potassium-sparing diuretics, for example, amiloride, act on the distal nephron.

References & Further Reading:

[ABC of heart failure: Management: diuretics, ACE inhibitors, and nitrates](#)

# Work Smart

Question 46 of 100

A 52-year-old man has been referred to the outpatient clinic due to deteriorating renal function.

A diagnosis of adult polycystic kidney disease (APKD) is made. His family history reveals that his mother died of a stroke at the age of 50, and that his father is still alive. He is concerned regarding the inheritance of the disorder.

Which of the following is the probability that his son will inherit it?

(Please select 1 option)

<input type="checkbox"/>	0%
<input type="checkbox"/>	25%
<input checked="" type="checkbox"/>	50% <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	75% <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	100%

APKD is an autosomal dominant condition and typically presents between the ages of 30-50.

Patients develop deteriorating renal function and associated hypertension.

As well as renal cysts, they may also have hepatic and berry aneurysms (maternal history may be highly relevant here).

His chance of passing this condition to his son is 50%.

Further Reading:

## Answer Statistics



Times answered: 9508

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 34.78%

Total Answered: 46

## Feedback

# Work Smart

Question 47 of 100

A 65-year-old man presents with renal colic.

The following day he passes a stone in his urine with analysis revealing that it is composed of uric acid.

Which one of the following is the most likely cause of this type of renal stone?

(Please select 1 option)

<input type="checkbox"/>	Allopurinol
<input type="checkbox"/>	Chronic renal failure
<input checked="" type="checkbox"/>	Primary hyperparathyroidism <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Thiazide diuretics <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Secondary polycythaemia

Uric acid stones occur in 5-25% of all cases of nephrolithiasis. They are associated with hyperuricaemia and hyperuricosuria.

Predisposing factors for uric acid stone formation are:

- dehydration
- high purine load (high protein diet)
- as a primary factor in idiopathic gout, and
- associated with high cell turnover (for example, haematological malignancy).

Allopurinol is prescribed to treat gout and prevents uric acid formation - hence it reduces the frequency of uric acid stones.

Chronic renal failure is incorrect as there is hyperuricaemia without hyperuricosuria.

Hyperparathyroidism is associated with calcium stones, not uric acid stones.

The correct answer is thiazide diuretics. Thiazide diuretics cause hyperuricaemia and can predispose to hyperuricosuria and uric acid stone formation. Uric acid stones are also associated with underlying hypertension. Thiazide diuretics are used to treat calcium stones as they increase the reabsorption of calcium from the proximal tubules, preventing hypercalciuria.

Primary polycythaemia would predispose to uric acid stone formation, whereas secondary polycythaemia does not.

## Answer Statistics

1		10%
2		14%
3		4%
4		40%
5		32%

Times answered: 7965

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Exam Themes January 2008

Question 48 of 109

A 29-year-old male smoker presents with a two-week history of cough, fever and haemoptysis. A chest x ray demonstrates diffuse alveolar infiltrates. A urine dipstick demonstrates red cell casts. The full blood count shows:

Hb	108 g/L	(130-180)
WCC	5.1 ×10 <sup>9</sup> /L	(4-11)
Plt	376 ×10 <sup>9</sup> /L	(150-400)

ANCA positive at titre 1 in 3600.

Which of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Alport's syndrome
<input checked="" type="checkbox"/>	Goodpasture's syndrome <b>Correct</b>
<input type="checkbox"/>	Polymyositis
<input type="checkbox"/>	Relapsing polychondritis
<input type="checkbox"/>	Systemic lupus erythematosus

The combination of haemoptysis (with radiological findings consistent with pulmonary haemorrhage)

and red cell casts in the urine (indicating glomerular bleeding) should lead you to consider a diagnosis of Goodpasture's syndrome in this case.

Goodpasture's syndrome is an important, and potentially rapidly fatal, cause of alveolar haemorrhage and rapidly progressive renal failure. It is caused by circulating antiglomerular basement membrane antibodies, and typically causes an acute glomerulonephritis. It usually presents in young men in their twenties and men and women in their sixties. Despite treatment the mortality of Goodpasture's is 11% and it has a high morbidity with 60% of patients becoming dependent on dialysis. Renal impairment is caused by a crescentic glomerulonephritis.

It frequently has an eruptive presentation in the young, with:

- cough
- fever
- haemoptysis
- haematuria
- proteinuria, and
- red cell casts.

The pulmonary haemorrhage and glomerular bleeding can result in a drop in haemoglobin.

The most common antibody associated with Goodpasture's is antiglomerular basement membrane antibodies (anti-GBM). Anti-GBM antibodies are directed against the Goodpasture antigen, which is part of the non-collagenous domain of the alpha-3(4) collagen chain. However, recently it has been shown that in a significant number of patients with Goodpasture's syndrome antineutrophil cytoplasmic antibodies (ANCA) can coexist with anti-GBM antibodies - in one study 30% of patients had positive ANCA serology. In this setting, ANCA is usually specific for p-ANCA and is directed against myeloperoxidase.

In general, both antibodies can be detected at presentation. This seropositivity has been shown to have important clinical and prognostic implications, and these patients may develop extra-renal and extra-pulmonary manifestations. In addition, they are more likely to have recurrent renal or pulmonary disease. Prognosis is debated with some studies saying it is more favourable in patients with positive ANCA and others showing a worse outcome in these patients.

Plasmapheresis and immunosuppression (typically with cyclophosphamide and corticosteroid) are the treatments of choice in Goodpasture's syndrome. This has been shown to reduce anti-GBM antibodies most rapidly, which results in improved morbidity and mortality. Plasmapheresis is typically given daily or on alternate days for two to three weeks. Response is assessed by monitoring symptoms and anti-GBM antibody titres. Cyclophosphamide and prednisolone then continue, typically for six to nine months following remission.

Alport's syndrome is a familial nephritis which presents with haematuria, progressive renal failure, ocular abnormalities and sensorineural deafness. It is caused by a mutation in the type IV collagen

genes. Inheritance is variable, but the majority are X-linked dominant (85%; 15% are autosomal recessive). There is a high spontaneous mutation rate, which means 20% of patients have no family history.

Polymyositis classically presents with relatively painless progressive proximal muscle weakness. Dysphagia is common but the ocular muscles are very rare. Diagnosis of polymyositis is confirmed by elevated muscle enzymes (creatine kinase) and typical EMG and muscle biopsy findings.

Relapsing polychondritis is characterised by recurrent episodes of inflammation of cartilaginous structures (joints, respiratory tract, ear, nose) and connective tissue (heart, eye, blood vessels, inner ear). Antibodies to type II collagen may be present.

Systemic lupus erythematosus (SLE) is a heterogeneous, inflammatory, multisystem autoimmune inflammatory disease, in which antinuclear antibodies occur. Its presentation and course are highly variable, ranging from indolent to fulminant. The triad of fever, arthralgia and rash in a woman of childbearing age should suggest the diagnosis.

Reference:

1. Andrassy M, et al. [The patient with C-ANCA/PR3-ANCA-positive crescentic pauci-immune glomerulonephritis and recurrence of nephritic sediment.](#) *Nephrol Dial Transplant.* 2008;23:2084-7.
2. Ramaswami A, et al. [Goodpasture's syndrome with positive C-ANCA and normal renal function: a case report.](#) *J Med Case Rep.* 2008;2:223.

## Answer Statistics

1		4%
2		89%
3		1%
4		1%
5		5%

Times answered: 10058

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Exam Themes January 2008

Question 48 of 100

A 24-year-old man presents with proteinuria, haematuria, and sensorineural deafness.

Which of the following protein structures is likely to be abnormal?

(Please select 1 option)

<input type="checkbox"/>	Fibrillin
<input type="checkbox"/>	Laminin
<input type="checkbox"/>	Type 1 collagen
<input type="checkbox"/>	Type 3 collagen
<input checked="" type="checkbox"/>	Type 4 collagen <span>Correct</span>

The diagnosis is Alport's syndrome, which is a disorder of type 4 collagen assembly and is inherited as an X-linked disorder in 85% of cases.

Fibrillin gene abnormalities are associated with Marfan's syndrome.

Type 1 collagen disorders are associated with osteogenesis imperfecta; it is the main type of collagen in tendon and bone.

Type 3 collagen is the main component of reticular fibres.

# Work Smart

Question 49 of 100

A 54-year-old man with intermittent claudication was found to have renal impairment.

Investigations revealed:

Serum creatinine	180 umol/L	(60-100)
Urinalysis	Protein++	

Renal ultrasound revealed a right kidney of 7 cms and a left kidney of 10 cms (normal dimensions 10-14 cm).

Which investigation should be requested to establish the diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Cystoscopy
<input type="checkbox"/>	Intravenous urography <span style="color: red;">❌ Incorrect answer selected</span>
<input type="checkbox"/>	Isotope renography
<input checked="" type="checkbox"/>	Renal arteriography <span style="color: green;">✅ This is the correct answer</span>
<input type="checkbox"/>	Renal biopsy

This patient has renovascular disease with a right renal artery stenosis.

The gold standard for establishing the diagnosis of renal artery stenosis is renal arteriography and this is commonly performed with magnetic resonance angiography.

In one-third of cases, the disease is bilateral; 40% may have peripheral vascular disease and there may be proteinuria.

## Answer Statistics



Times answered: 8471

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 34.69%

Total Answered: 49

## Feedback

# Work Smart

Question 50 of 100

A 16-year-old female presents with a three-year history of recurrent colicky loin pain. One year ago she passed a renal calculus.

Twenty-four-hour urine collection showed normal levels of calcium, phosphate and urate, but elevated levels of arginine, cystine, lysine and ornithine.

Which one of the following features is characteristic of this condition?

(Please select 1 option)

<input type="checkbox"/>	Accumulation of cystine in collecting system	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Autosomal dominant inheritance	
<input type="checkbox"/>	Cystine deposits within the Cornea	
<input type="checkbox"/>	Functional defects within the glomeruli	
<input type="checkbox"/>	Radiolucent renal stone formation on CT scan	<input type="checkbox"/> Incorrect answer selected

This condition is typical of cystinuria (nephropathic cystinosis), an autosomal recessive genetic defect in membrane transport for cystine, lysine, ornithine and arginine in epithelial cells. The glomerulus is unable to resorb these amino acids, and they are therefore excreted into the urine. The rBAT gene is responsible, and there are three forms distinguished by the pattern of tubular amino acid transport.

Cystinuria usually presents with recurrent nephrolithiasis in the form of cystine stones (which are often bilateral, multiple, and can form staghorns). These can present as early as the first decade. Renal failure can occur. The stones are radiolucent stones, which may also be seen with uric acid

stones. However, they are usually opaque on a CTKUB. Cystine deposits within the cornea are not classically seen, neither are functional defects within the glomeruli.

Diagnosis of cystinuria can be made by stone analysis; such stones are pale yellow and analysis reveals high cystine levels. It can then be confirmed by an amino acid chromatogram and quantification of cystine excretion.

First-line management is conservative, with encouragement of large volume fluid intake (particularly in the evening, with the aim to pass urine at least once overnight). Urine pH should be regularly monitored (aiming for 7.5-8), with sodium bicarbonate being used if necessary (not in hypertensive patients or those with renal failure).

The aim of such treatment is to reduce the urinary cystine concentration to below 300 mg/L. If this fails, d-penicillamine, alpha-mercaptopropionylglycine or captopril can be used.

Cystine stones are not easily broken by lithotripsy, and therefore percutaneous removal is most often used if they do develop.

## Answer Statistics



Times answered: 9281

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 51 of 100

A 17-year-old woman underwent a renal transplant. She was concerned about the effects of long-term ciclosporin treatment.

Which one of the following is a common adverse effect of this drug?

(Please select 1 option)

<input type="checkbox"/>	Alopecia
<input type="checkbox"/>	Bone marrow depression
<input type="checkbox"/>	Hepatotoxicity
<input checked="" type="checkbox"/>	Nephrotoxicity <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Paraesthesia <span style="color: red;">Incorrect answer selected</span>

Ciclosporin causes hypertrichosis rather than alopecia and the most frequent adverse side effect of this drug is nephrotoxicity.

Post renal transplant, the two most common causes of declining renal function are graft rejection and ciclosporin toxicity.

Hepatotoxicity and paraesthesia are less common side effects of the drug. Hypertension can also be seen.

# Work Smart

Question 49 of 109

A 26-year-old man is referred to the clinic with microscopic haematuria. He also has hypertension, which the GP diagnosed as essential hypertension and commenced him on amlodipine 5 mg daily.

You understand on further questioning that his brother has haematuria and renal impairment and his father died of a stroke at the age of 42. On examination his blood pressure is 152/88 mmHg, he has bilateral ballotable kidneys.

Investigations show:

Haemoglobin	134 g/L	(135-180)
White cell count	$6.0 \times 10^9/L$	(4-10)
Platelets	$242 \times 10^9/L$	(150-400)
Sodium	140 mmol/L	(134-143)
Potassium	4.7 mmol/L	(3.5-5)
Creatinine	162 $\mu\text{mol/L}$	(60-120)
Urine	Blood ++	
	Protein -	

Which of the following is the investigation most appropriate to elucidate the underlying diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Contrast CT abdomen
<input type="checkbox"/>	

Cystoscopy
Intravenous pyelogram (IVP)
Plain abdominal film
Ultrasound abdomen <input checked="" type="checkbox"/> Correct

The fact that his father and brother are both affected is suggestive of an autosomal dominant inherited disorder, probably autosomal dominant polycystic kidney disease (ADPKD).

Given that his father had a stroke at a young age, this raises the possibility of a berry aneurysm and subsequent subarachnoid haemorrhage.

ADPKD affects as many as 1 in 1000 individuals and is responsible for around 10% of the UK dialysis burden.

Polycystic liver disease is seen in 80% of patients but is usually asymptomatic. Abdominal ultrasound has a sensitivity approaching 100% for patients above 20 years of age.

Hypertension should be aggressively managed, with ACE inhibitors the therapy of choice.

### Answer Statistics



Times answered: 6192

### Test Analysis

Correct Incorrect Partially Correct

# Work Smart

Question 50 of 109

A 62-year-old man with a history of type 2 diabetes and renal failure comes to the Emergency Department. He currently uses continuous ambulatory peritoneal dialysis, and has noticed an increase in his insulin requirements over the past 24 hours, dull abdominal pain, and now has a cloudy bag.

On examination he is pyrexial 37.8°C and looks unwell, his blood pressure is 142/88 mmHg, with a pulse of 90. His abdomen is generally tender to palpation.

Investigations show:

Haemoglobin	104 g/L	(135-180)
White cell count	$13.6 \times 10^9/L$	(4-10)
Platelets	$190 \times 10^9/L$	(150-400)
Sodium	137 mmol/L	(134-143)
Potassium	5.3 mmol/L	(3.5-5)
Creatinine	342 $\mu\text{mol/L}$	(60-120)
CRP	88	(<10)
Peritoneal dialysis fluid	>100 white cells/cm <sup>2</sup>	

Which of the following organisms is most likely to be responsible?

(Please select 1 option)

	<i>C. albicans</i>

<i>S. aureus</i>	<input checked="" type="checkbox"/> This is the correct answer
<i>S. faecalis</i>	<input type="checkbox"/> Incorrect answer selected
<i>S. pyogenes</i>	
<i>S. viridians</i>	

*Staphylococcus aureus*, *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, and *Escherichia coli* are the commonest causes of peritonitis in peritoneal dialysis patients. Severe infections may be polymicrobial.

Treatment with intraperitoneal antibiotics is superior to intravenous antibiotics.

Persistent or recurrent peritonitis should prompt catheter removal.

### Answer Statistics



Times answered: 6197

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 51 of 109

A 28-year-old man is referred to you by the practice nurse for hypertension management. She has seen him three times over the past four months and his BP is persistently elevated at around 155/92 mmHg.

Your partner has seen him previously for some non-specific right upper quadrant abdominal pain.

On examination of the abdomen, you can feel bilateral enlarged kidneys and a liver edge.

Investigations show:

Haemoglobin	125 g/L	(135-180)
White cell count	$6.4 \times 10^9/L$	(4-10)
Platelets	$182 \times 10^9/L$	(150-400)
Sodium	139 mmol/L	(134-143)
Potassium	4.8 mmol/L	(3.5-5)
Creatinine	182 $\mu\text{mol/L}$	(60-120)
Glucose	4.5 mmol/L	(<6.0)
Urine	Blood ++	
	Protein -	

Which one of the following is most closely associated with his underlying condition?

(Please select 1 option)

<input type="checkbox"/> Aortic stenosis	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Coarctation of the aorta	
<input type="checkbox"/> Diabetes mellitus	
<input checked="" type="checkbox"/> Mitral valve prolapse	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Tricuspid stenosis	

A young man presenting with renal failure, haematuria and liver and renal masses raises the suspicion of polycystic kidney disease.

Associated liver cysts are found in around 80% of individuals with polycystic kidney disease. Pancreatic cysts are rarer, and may in some cases be associated with recurrent pancreatitis.

Patients are at increased risk of renal stones, but the predominant increase is seen in urate stones, rather than other types.

Up to 25% of patients may have some degree of mitral valve prolapse.

MODY 5 is associated with hepatic and renal cysts and diabetes mellitus, but that is less likely to be the diagnosis here in the presence of a normal glucose.

Polycystic kidney disease carries an autosomal dominant pattern of inheritance but may occur as a de novo mutation in 5%.

### Answer Statistics



Times answered: 6222

### Test Analysis

# Work Smart

Core Questions

## Question 52 of 109

A 12-year-old boy presents to the surgery with peri-orbital and mild ankle oedema which has increased over the past few weeks.

Other history of note is a recent upper respiratory tract infection. He has been feeling increasingly tired and lethargic over the past few weeks.

On examination, his BP is 118/72 mmHg. He has periorbital oedema and pitting ankle oedema.

Investigations show:

Haemoglobin	124 g/L	(135-180)
White cell count	$7.8 \times 10^9/L$	(4-10)
Platelets	$191 \times 10^9/L$	(150-400)
Sodium	141 mmol/L	(134-143)
Potassium	4.6 mmol/L	(3.5-5)
Creatinine	104 $\mu\text{mol/L}$	(60-120)
Serum albumin	28 g/L	(35-50)
Urine	Protein ++	

Which of the following is the most likely cause?

(Please select 1 option)

<input type="checkbox"/>	Alport's syndrome
<input type="checkbox"/>	

IgA nephropathy	
Membranous nephropathy	<input type="checkbox"/> Incorrect answer selected
Minimal change nephropathy	<input checked="" type="checkbox"/> This is the correct answer
Post streptococcal glomerulonephritis	

The history of periorbital oedema, normal blood pressure and creatinine, but proteinuria and low albumin is typical of minimal change disease.

The condition is much more common in this age range than membranous nephropathy, which also causes proteinuria.

The important point about making the diagnosis is that the condition responds to corticosteroid therapy in 90% or more of sufferers in childhood within two weeks, although treatment is usually continued for a period of eight weeks.

The lack of haematuria counts against post-streptococcal glomerulonephritis, and IgA nephropathy.

Alport's syndrome is a familial nephritis associated with haematuria and progressive sensorineural hearing loss.

### Answer Statistics



Times answered: 7006

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 53 of 109

A 7-year-old boy is brought to the surgery by his mother. He has become unwell with severe diarrhoea which is now mixed with blood.

History of note is a visit to a model farm a few days earlier. He is nauseated, has a severe headache, and feels very unwell.

On examination he is pyrexial 38.2°C, his BP is 142/88 mmHg. He has a soft, diffusely tender abdomen.

Investigations show:

Haemoglobin	92 g/L	(135-180)
White cell count	11.9 ×10 <sup>9</sup> /L	(4-10)
Platelets	76 ×10 <sup>9</sup> /L	(150-400)
Sodium	141 mmol/L	(134-143)
Potassium	4.9 mmol/L	(3.5-5)
Creatinine	192 µmol/L	(60-120)
Bilirubin	92 µmol/L	(<17)
Urine	Blood++	
	Protein ++	

Which of the following is the most likely diagnosis?

(Please select 1 option)

<i>Brucella</i> infection	
<i>Campylobacter</i> infection	
<i>Escherichia coli</i> infection	<input checked="" type="checkbox"/> This is the correct answer
<i>Salmonella</i> infection	<input type="checkbox"/> Incorrect answer selected
<i>Shigella</i> infection	

The symptoms, signs and investigations are typical of *Escherichia coli* 157 infection, leading to haemolytic-uraemic syndrome (HUS).

The syndrome is characterised by:

- microangiopathic haemolytic anaemia
- thrombocytopenia, and
- acute renal failure.

The most likely route of infection is his trip to the model farm.

Unfortunately, antibiotics confer no benefit and may increase the risk of neurological complications associated with HUS.

This patient should be referred urgently to the hospital for management of his fluid and electrolyte balance.

Unfortunately, fatality rates from HUS remain high, at between 5 and 10%.

## Answer Statistics



Times answered: 6187

## Test Analysis

# Work Smart

Question 52 of 100

A 51-year-old male comes to the surgery complaining of nausea and fatigue. You have previously seen him with symptoms of sinusitis, and a saddle nose deformity.

Most recently he has begun to complain of shortness of breath and a chronic cough.

On examination, he is hypertensive at 160/92 mmHg. There are bilateral inspiratory crackles on auscultation of the chest.

Investigations show:

Haemoglobin	118 g/L	(135-180)
White cell count	$10.1 \times 10^9/L$	(4-10)
Platelets	$182 \times 10^9/L$	(150-400)
Sodium	141 mmol/L	(134-143)
Potassium	5.5 mmol/L	(3.5-5)
Creatinine	230 $\mu\text{mol/L}$	(60-120)
ESR	72	(<10)
Urine	Blood++	
	Protein ++	

Which of the following is the most likely diagnosis?

(Please select 1 option)

Goodpasture's syndrome
IgA nephropathy
Membranous nephropathy
Minimal change disease
Wegener's granulomatosis <input type="checkbox"/> Correct

Wegener's granulomatosis is a multi-system disorder characterised by necrotising granulomas of medium and small blood vessels. Patients have constitutional symptoms such as fever, lethargy and weight loss.

Organ-specific involvement includes:


- eyes
- upper airway
- lung
- renal
- nervous system
- skin, and
- joints.

Men are affected slightly more often than women and typically present in the fourth or fifth decade. Patients often present with ocular or ENT symptoms for some time before a diagnosis is made.

The autoimmune profile is likely to reveal a positive circulating antineutrophil cytoplasmic antibody (cANCA), and renal biopsy is the usual way to obtain a tissue diagnosis.

Treatment is with high dose steroids and cyclophosphamide, which has revolutionised this disease which is otherwise rapidly fatal.

### Answer Statistics

1		13%
2		2%
3		2%

# Work Smart

Question 54 of 109

In which of the following patients is an ACE inhibitor contraindicated?

(Please select 1 option)

<input type="checkbox"/>	A 24-year-old woman with type 1 diabetes and microalbuminuria, who wants to start a family <b><input checked="" type="checkbox"/> This is the correct answer</b>
<input type="checkbox"/>	A 28-year-old woman with reflux nephropathy and hypertension
<input type="checkbox"/>	A 34-year-old man with essential hypertension and a BMI of 32
<input type="checkbox"/>	A 34-year-old woman with hypertension and a horseshoe kidney
<input type="checkbox"/>	A 62-year-old type 2 diabetes patient who has microalbuminuria and a stable creatinine of 210 <b><input checked="" type="checkbox"/> Incorrect answer selected</b>

ACE inhibitors are contraindicated in pregnancy. There is an increase in congenital cardiac and neurological abnormalities<sup>1</sup> and despite the fact this woman has microalbuminuria, use of an ACE inhibitor is not recommended.

In patients with elevated creatinine and microalbuminuria, use of an ACE inhibitor is still a reasonable option, as it has been proven to delay both further deterioration of creatinine and worsening albuminuria.

With respect to essential hypertension and a raised BMI, an ACE inhibitor may be appropriate; other options include a calcium antagonist.

Regarding beta blockers and thiazides, evidence suggests they may increase insulin resistance and risk of diabetes, hence you may choose to avoid them here.

Other contraindications to ACE inhibition include:

- angio-oedema
- breastfeeding, and
- significant renal artery stenosis.

Reference:

Cooper WO, Hernandez-Diaz S, Arbogast PG, et al. [Major congenital malformations after first-trimester exposure to ACE inhibitors.](#) *N Engl J Med.* 2006;354:2443-51.

### Answer Statistics



Times answered: 6173

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 55 of 109

A 63-year-old man, with chronic renal failure and type 2 diabetes, presents to the surgery complaining of generalised aching. He takes twice daily mixed insulin for his diabetes, and ramipril for vascular risk modification.

On examination his BP is 155/92 mmHg, pulse is 75 and regular. Physical examination is otherwise unremarkable.

Haemoglobin	109 g/L	(135-180)
White cell count	$6.1 \times 10^9/L$	(4-10)
Platelets	$191 \times 10^9/L$	(150-400)
Sodium	140 mmol/L	(134-143)
Potassium	5.3 mmol/L	(3.5-5)
Creatinine	320 $\mu\text{mol/L}$	(60-120)
Calcium	2.05 mmol/L	(2.2-2.67)
Urine	Protein +	

Which of the following is the most likely underlying diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Hypoparathyroidism
<input type="checkbox"/>	Primary hyperparathyroidism
<input type="checkbox"/>	

Secondary hyperparathyroidism	<input checked="" type="checkbox"/> This is the correct answer
Tertiary hyperparathyroidism	<input type="checkbox"/> Incorrect answer selected
Vitamin D intoxication	

Chronic renal failure leads to low levels of hydroxylated vitamin D, and hence to hypocalcaemia. This leads to a secondary increase in parathyroid hormone levels.

The second, fourth and fifth options will cause hypercalcaemia. Hypoparathyroidism is a possibility, but given you are told in the question stem that he has chronic renal failure, it is more likely that he has secondary hyperparathyroidism.

Standard therapy of choice is three times per week 1-alpha calcidol. Once the calcium approaches the normal range there is often an associated fall in parathyroid levels.

Cinacalcet may be used in patients with end-stage renal disease receiving maintenance haemodialysis, with frequent monitoring of parathormone and calcium.

### Answer Statistics

1		18%
2		3%
3		63%
4		14%
5		3%

Times answered: 6233

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

## Question 53 of 100

A 59-year-old man with chronic renal failure comes to the surgery complaining of tiredness and lethargy. He has a long-standing history of type 1 diabetes and takes a range of medications.

On examination, his BP is 145/84 mmHg.

Investigations show:

Haemoglobin	94 g/L	(135-180)
White cell count	$6.4 \times 10^9/L$	(4-10)
Platelets	$162 \times 10^9/L$	(150-400)
Sodium	140 mmol/L	(134-143)
Potassium	5.0 mmol/L	(3.5-5)
Creatinine	219 $\mu\text{mol/L}$	(60-120)
Ferritin	10 $\mu\text{g/L}$	(20-60)
Faecal occult blood	Negative	
Urine	Protein ++	

Which of the following is the most appropriate next step?

(Please select 1 option)

<input type="checkbox"/> Erythropoietin
<input checked="" type="checkbox"/> IV iron transfusion <span style="color: green;">This is the correct answer</span>

Oral ferrous sulphate	<input type="checkbox"/> Incorrect answer selected
Referral for lower GI endoscopy	
Referral for upper GI endoscopy	

The causes of anaemia in haemodialysis patients are numerous. Firstly, there is insufficient production of erythropoietin (EPO) and, secondly, iron deficiency is present in most. The tubing of dialysis equipment causes continued low-level blood loss, there may be chronic inflammation any other vitamin deficiencies (or folic acid) and gastrointestinal absorption of iron is often reduced. In addition, uraemic toxins can inhibit erythropoiesis, and it appears there is shortened red cell survival in chronic renal failure (possibly due to haemolysis).

If left untreated, the anaemia of chronic kidney disease is associated with deterioration in cardiac function, increased risk of stroke, decreased cognition and mental acuity and fatigues. Treating anaemia in these patients markedly improves quality of life, and decreases morbidity and mortality. There is unlikely to be a gastrointestinal source of bleeding in this case, especially as faecal occult blood is negative.

The Kidney Disease Outcomes Quality Initiative (KDOQI) and European Revised Evidence-Based Practice 2004 Guidelines recommend:

- Haemoglobin 105-125 g/L
- Ferritin: >100 µg/L in pre-dialysis and peritoneal dialysis patients, >200 µg/L in haemodialysis patients
- Transferrin saturation >20%

It is imperative that renal patients avoid repeated blood transfusion, unless in extremis, so that future renal transplantation will not be precluded by allo-sensitisation.

Before initiation of recombinant erythropoiesis-stimulating agents the patient should be replete in B12, folate and iron. The serum ferritin and transferrin saturation should be checked, as most patients will be iron deficient. If any are found to be low they should be replaced. The intravenous route of replacement is preferred in patients found to be significantly iron deficient, as in this case.

Once iron stores are restored and ferritin is in the normal range, if the patient is still anaemic then erythropoietin would be the next appropriate option.

Please note that this answer remains correct whether the patient is receiving dialysis or not. The difference is you have a different target of ferritin if they are pre-dialysis, as stated above.

Reference:

The Renal Association. [Haemodialysis.](#)

# Work Smart

Core Questions

Question 54 of 100

A 14-year-old boy is referred by the practice nurse for follow-up with you. He was brought by his mother to see the practice nurse because of progressive hearing loss.

Examination and basic investigations revealed nothing of note, apart from haematuria detected on routine urine testing. Apparently, he has an 18-year-old brother who also suffers from deafness and has mild renal impairment.

Investigations show:

Haemoglobin	130 g/L	(135-180)
White cell count	$7.1 \times 10^9/L$	(4-10)
Platelets	$199 \times 10^9/L$	(150-400)
Sodium	140 mmol/L	(134-143)
Potassium	4.7 mmol/L	(3.5-5)
Creatinine	110 $\mu\text{mol/L}$	(60-120)
ESR	8	(<10)
Urine	Blood +	

Which of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Alport's syndrome	<input checked="" type="checkbox"/> This is the correct answer

Autosomal dominant polycystic kidney disease	<input type="checkbox"/> Incorrect answer selected
IgA nephropathy	
Membranous nephropathy	
Minimal change disease	

Alport's syndrome comprises:

- Sensorineural hearing loss
- Progressive renal failure
- Haematuria
- Ocular abnormalities including cataract formation.

The condition is often associated with an X-linked dominant inheritance pattern and hence males are more severely affected.

Prevalence is around 1 in 5000, and the condition occurs because of type 4 collagen mutations. Deafness usually occurs before the onset of renal failure, which is related itself to progressive nephritis.

Rigorous control of hypertension may delay the onset of end-stage renal failure, which is seen in 90% of patients with Alport's by the age of 40 years.

### Answer Statistics

1		95%
2		2%
3		1%
4		1%
5		1%

Times answered: 6275

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

## Question 56 of 109

A 34-year-old man presents with worsening shortness of breath, wheeze, lethargy and nausea. He has a history of asthma which has been managed by one of your partners with salbutamol and a twice daily combination of a long-acting beta-2 agonist and an inhaled steroid inhaler.

On examination his BP is 150/92 mmHg, his pulse is 80 and regular. He has extensive wheeze throughout both lung fields.

Investigations show:

Haemoglobin	118 g/L	(135-180)
White cell count	10.1 ×10 <sup>9</sup> /L	(4-10)
	Eosinophils 30%	-
Platelets	190 ×10 <sup>9</sup> /L	(150-400)
Sodium	140 mmol/L	(134-143)
Potassium	4.9 mmol/L	(3.5-5)
Creatinine	189 μmol/L	(60-120)
ESR	62	(<10)
Urine	Blood++	
	Protein ++	

Which of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Alport's syndrome	
<input checked="" type="checkbox"/>	Churg-Strauss syndrome	<span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	IgA nephropathy	
<input type="checkbox"/>	Post-streptococcal glomerulonephritis	<span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Wegener's granulomatosis	

The history of rapidly worsening symptoms of asthma, accompanied by hypertension, raised creatinine and blood and proteinuria are features of Churg-Strauss.

Churg-Strauss is a small and medium sized artery vasculitis. p-ANCA is positive in 70% of patients.

High dose steroids with the addition of cyclophosphamide or azathioprine are standard therapy for the condition.

With treatment, the one-year survival rate for Churg-Strauss is 90%; 62% at five years.

### Answer Statistics



Times answered: 6157

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 57 of 109

A 16-year-old boy presents with periorbital and peripheral oedema which has developed over the past few weeks. He had a previous episode some two years earlier but this responded over the course of a few weeks to a course of prednisolone.

On examination he has a BP of 141/80 mmHg, with pulse of 68. His chest is clear but he has bilateral pitting oedema.

Investigations show:

Haemoglobin	129 g/L	(135-180)
White cell count	$6.1 \times 10^9/L$	(4-10)
Platelets	$209 \times 10^9/L$	(150-400)
Sodium	139 mmol/L	(134-143)
Potassium	4.8 mmol/L	(3.5-5)
Creatinine	110 $\mu\text{mol/L}$	(60-120)
Albumin	24 g/L	(30-50)
Urine	Protein ++	

Which of the following represents the most appropriate management plan for him?

(Please select 1 option)

<input type="checkbox"/>	Oral combination corticosteroids and cyclophosphamide	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>		

Oral corticosteroids	<input checked="" type="checkbox"/> This is the correct answer
Oral cyclophosphamide	
Oral methotrexate	
Renal biopsy	

The age of this patient and his previous response to corticosteroids is suggestive of an underlying diagnosis of minimal change nephropathy. As such, a further course of corticosteroids is the treatment of choice.

Given the inherent but low risks associated with renal biopsy, it is usually only attempted when three or more episodes of oedema have occurred.

Very few patients with minimal change disease actually progress to end stage renal disease, and only around 10% of children with the disease suffer from hypertension.

### Answer Statistics



Times answered: 6148

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 58 of 109

A 62-year-old woman presents with severe nausea and lethargy a few days after beginning diclofenac and amoxicillin from her GP for pain and a urinary tract infection. She has no past history of note apart from hypertension for which she takes ramipril, and she believes she injured her back lifting a wardrobe.

On examination her BP is 159/92 mmHg, she has bilateral crackles on auscultation of the chest, her pulse is 89 and regular. Abdominal examination is unremarkable. She has a widespread erythematous rash.

Investigations show:

Hb	119 g/L	(135-180)
WCC	8.9 ×10 <sup>9</sup> /L	(4-11)
	Eosinophilia	
PLT	203 × 10 <sup>9</sup> /l	(150-400)
Na	139 mmol/l	(135-146)
K	6.1 mmol/l	(3.5-5)
Cr	382 mmol/l	(79-118)
Urine	Protein++	
	Blood-	
	White cells-	

Which of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Acute tubular necrosis	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> Churg-Strauss syndrome	
<input checked="" type="checkbox"/> Interstitial nephritis	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/> Membranous nephropathy	
<input type="checkbox"/> Pyelonephritis	

The rapid onset of renal failure, coupled with a rash and eosinophilia is highly suspicious of a diagnosis of interstitial nephritis as a result of exposure to non-steroidal or amoxicillin.

40-60% of cases of interstitial nephritis are due to drug hypersensitivity. Those most commonly involved include penicillins, cephalosporins, vancomycin, NSAIDs, thiazides and furosemide. Interstitial nephritis usually develops within 2-60 days of treatment with a beta-lactam, and presents with haematuria, acute kidney injury, and fever. A maculopapular rash and hepatic involvement can also occur. Interstitial nephritis associated with NSAIDs is most commonly seen in elderly patients who have taken non-steroidals intermittently for months to years. Proteinuria is dominant, and the nephrotic syndrome can develop.

Ultrasound scanning is generally recommended in all cases of acute kidney injury, to exclude renal tract obstruction. In interstitial nephritis, renal size is usually normal and there may be some increased cortical echogenicity. A definite diagnosis can only be made with renal biopsy, which usually shows mononuclear cell infiltrate throughout the interstitium with associated oedema.

The mainstay of treatment is to withdraw any drug which may be causative. High-dose prednisolone is indicated in some cases to hasten recovery. Dialysis may be required in severe cases.

### Answer Statistics



# Work Smart

Question 55 of 100

A 52-year-old man presents to the clinic having problems controlling his blood pressure, despite taking three anti-hypertensive agents, ramipril 10 mg, indapamide 2.5 mg, and amlodipine 5 mg.

Over the past few weeks, he has been monitoring his BP at home and it is rarely below 155/90 mmHg.

On examination in the clinic, his BP is 160/95 mmHg, his pulse is 85 and regular. He has a left carotid bruit. Respiratory and abdominal examinations are unremarkable.

Investigations show:

Haemoglobin	120 g/L	(135-177)
White cells	$6.3 \times 10^9/L$	(4-11)
Platelets	$200 \times 10^9/L$	(150-400)
Sodium	140 mmol/L	(135-146)
Potassium	4.8 mmol/L	(3.5-5)
Creatinine	182 $\mu\text{mol/L}$	(79-118)

Renal ultrasound scan showed significant size discrepancy, with the left kidney 2 cm smaller than the right.

Which of the following is the most appropriate investigation to confirm the diagnosis?

(Please select 1 option)

<input type="checkbox"/> Contrast CT
<input checked="" type="checkbox"/> Duplex ultrasound scanning <span style="color: red;">Incorrect answer selected</span>

IVU	
Magnetic resonance angiogram	<input checked="" type="checkbox"/> This is the correct answer
Traditional angiography	

The presence of difficult to treat hypertension, renal impairment, evidence of other atherosclerotic disease (carotid bruit) and discrepant renal size makes renovascular disease a distinct possibility here.

Renovascular disease is the term given to disease of the arterial supply of the kidney(s) which results in renal hypoperfusion. This leads to hyperactivation of the renin-angiotensin-aldosterone axis, which results in hypertension and chronic kidney disease.

The choice of best test for diagnosis of renovascular disease remains controversial. In practice, individual centres may have their own protocol for screening tests. However, for the purpose of the MRCP examination the following points should be followed:

MR angiography (MRA) should be considered the optimum non-invasive screening test for renovascular disease, and can be performed safely in patients with CKD stage 3 and 4. However, there is increasing concern regarding gadolinium-related nephrogenic systemic fibrosis and guidelines may, therefore, change in the future.

CT angiography is commonly used but can be complicated by radio-contrast nephropathy in patients with CKD.

Duplex ultrasound combines measurement of proximal renal artery blood flow velocity with intrarenal restrictive index. It is an accurate test for detection of renovascular disease, and assessment of severity, but is time-consuming and high operator dependent.

Intra-arterial angiography is now reserved for patients with complex anatomy, and when confirming severity prior to revascularisation.

An intravenous urogram (IVU) is used to assist with the diagnosis of urinary tract stones, rather than renovascular disease.

## Answer Statistics



# Work Smart

Question 56 of 100

A 22-year-old woman who is taking long-term doxycycline for severe acne comes to the clinic complaining of chronic thirst and polyuria. She has to pass urine two to three times per night, which is highly unusual for her.

There is no significant past medical history, and her only medication is the oral contraceptive pill.

On examination, her lying BP is 136/80 mmHg, with a postural drop of 15 mmHg. Her BMI is 29. There were no other significant findings on physical examination.

Investigations show:

Haemoglobin	138 g/L	(115-165)
White cells	$6.3 \times 10^9/L$	(4-11)
Platelets	$222 \times 10^9/L$	(150-400)
Sodium	141 mmol/L	(135-146)
Potassium	4.8 mmol/L	(3.5-5)
Creatinine	122 $\mu\text{mol/L}$	(79-118)
Urea	8.5 mmol/L	(2.5-6.7)

Which of the following is the most appropriate treatment?

(Please select 1 option)

<input type="checkbox"/> Discontinue the doxycycline	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/> Fluid restrict her	

	Increase her oral fluid intake
	Intranasal vasopressin <input type="checkbox"/> Incorrect answer selected
	Oral bendroflumethiazide

The history of polydipsia, polyuria and nocturia, in this case, is typical of diabetes insipidus. From the information given in the stem, we can suggest this is nephrogenic diabetes insipidus secondary to doxycycline. Other drugs which can cause this include lithium, some antifungals and some anti-virals.

Whilst increasing her oral intake may relieve some of her symptoms of thirst, discontinuing the doxycycline is the only way to resolve both her thirst and her polyuria.

High dose intranasal vasopressin may relieve her symptoms but the most appropriate treatment is discontinuation of the tetracycline antibiotic.

### Answer Statistics



Times answered: 6159

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 59 of 109

A 62-year-old man attends a clinic complaining of progressive peripheral oedema, which has got to the stage whereby the end of the day he is hardly able to wear his shoes. He has a past history of hypertension which is managed with amlodipine, but nil else of note.

On examination, his BP is 155/85 mmHg. His pulse is 78 and regular. His heart sounds are normal and his chest is clear. He has gross pitting oedema to mid shin on both lower limbs.

Haemoglobin	139 g/L	(135-177)
White cell count	$7.6 \times 10^9/L$	(4-11)
Platelets	$290 \times 10^9/L$	(150-400)
Serum sodium	140 mmol/L	(135-146)
Serum potassium	4.0 mmol/L	(3.5-5)
Creatinine	135 $\mu\text{mol/L}$	(79-118)
Albumin	24 g/L	(35-50)
Urinary protein	3.5 g/24 hr	

Renal biopsy: Thickened renal capillary walls seen on biopsy, but with patent lumina.

Which of the following treatments is most likely to affect this patient's prognosis?

(Please select 1 option)

<input type="checkbox"/>	Prednisolone and cyclophosphamide	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>		

Prednisolone
Ramipril
Rituximab <input type="checkbox"/> Incorrect answer selected
Simvastatin

The most likely underlying diagnosis, in this case, is membranous nephropathy. Treatment varies depending on the severity and symptoms. Approximately 30% of cases are secondary to other conditions, and in those cases treatment of the underlying cause may be curative.

A low-salt diet and diuretics (usually loop diuretics) can control oedema. ACE inhibitors are used to decrease proteinuria, and control hypertension (which should be treated aggressively). Angiotensin receptor blockers are used for those patients intolerant of ACE inhibitors. Statins (hepatic 3-methylglutaryl coenzyme A reductase inhibitors) help treat hypercholesterolemia.

Routine anticoagulation is controversial, and there is little consensus with regard to its use. The risk appears to be related to serum albumin level. If not used, the patient should be closely monitored for signs of venous thrombosis and anticoagulation continued long-term if it does occur.

Patients who are asymptomatic and non-nephrotic do not require treatment with immunosuppressives. Those who are nephrotic and asymptomatic may also undergo spontaneous remission, and can be observed particularly if they have normal renal function.

Immunosuppression is indicated in those patients who have:

- Increased creatinine level at presentation
- Progressive disease
- Symptomatic nephrotic syndrome (which is the case in this scenario)
- Persistent nephrotic syndrome (especially in men or those older than 50y)
- Thromboembolism
- Tubulointerstitial changes or focal sclerosis

It can also be considered in those with increased IgG excretion, HLA-DR3/B8, white race, elevation of urinary excretion of complement activation products.

Where immunosuppression is indicated, corticosteroids alone are ineffective. The Kidney Disease Improving Global Outcomes (KDIGO) guidelines recommend alternating months of corticosteroids and cyclophosphamide, initially over 6 months, with the aim of preserving renal function and achieving total remission.

Mycophenolate mofetil can be used where there is a concern regarding the toxicity of alkylating agents.

Cyclosporin and calcineurin inhibitors can also be successful in those who don't tolerate the steroid/cyclophosphamide regimen.

Rituximab is a monoclonal antibody against the CD20 antigen of B lymphocytes, and can be used where the standard immunosuppression options detailed above fail.

Corticotropin has also been used in this setting.

Reference & Further Reading:

[Membranous Glomerulonephritis Medication](#)

### Answer Statistics



Times answered: 6009

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 60 of 109

A 50-year-old man is admitted to hospital with a third attack of renal stones in the last six months. He suffers from Crohn's disease and has previously had a limited small bowel resection, but his disease is now quiescent.

On examination his BP is 115/72 mmHg, his BMI is 19.5 kg/m<sup>2</sup>, and he has a midline scar consistent with a previous laparotomy.

Investigations:

Haemoglobin	120 g/L	(135-177)
White cell count	5.9 × 10 <sup>9</sup> /L	(4-11)
Platelets	172 × 10 <sup>9</sup> /L	(150-400)
Serum sodium	139 mmol/L	(135-146)
Serum potassium	3.9 mmol/L	(3.5-5)
Creatinine	133 μmol/L	(79-118)
24 hour urinary oxalate excretion	Increased	-

Which of the following is likely to be the most effective and appropriate intervention?

(Please select 1 option)

<input checked="" type="checkbox"/> Increase fluid intake	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/> Reduce dietary calcium intake	

Reduce intake of offal	<input type="checkbox"/> Incorrect answer selected
Start bendroflumethiazide	
Start furosemide	

Several mechanisms have been postulated to explain the develop of hyperoxaluria in patients with intestinal disease. These include increased colonic permeability, reduced free intestinal calcium available to bind oxalate, and decreased levels of O formigenes to degrade intestinal oxalate.

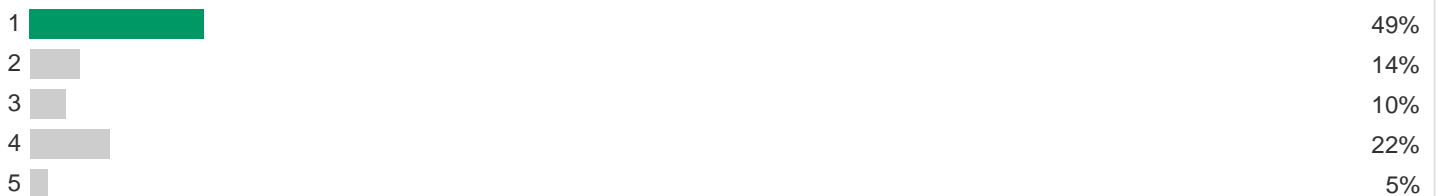
Reducing intake of offal is most helpful at reducing urate excretion; foods such as chocolate, rhubarb, and nuts are high in oxalate. One contributor to this patient's increased oxalate excretion is undoubtedly his partial small bowel resection, and increasing dietary calcium intake decreases urinary oxalate excretion by reducing absorption (as free oxalate is bound).

Therefore, the most effective and appropriate intervention from those given is to increase his oral fluid intake significantly. Increased fluid intake restores fluid lost through the digestive tract, and also acts as a dilutional inhibitor of crystal and stone formation.

Other treatments which can help enteric hyperoxaluria include:

- Calcium, cholestyramine and magnesium - bind strongly to free intestinal oxalate, preventing absorption.
- Iron and aluminium - act as intestinal oxalate-binding agents.
- Potassium citrate - alkalinises the urine, which reduces urinary oxalate excretion.

## Answer Statistics



Times answered: 6580

# Work Smart

Question 61 of 109

A 40-year-old woman comes to the clinic complaining of lethargy and joint pains over the past few months, and most recently, increasing nausea and anorexia over the past two to three weeks. She also had a photosensitive rash on her cheeks, for which her GP prescribed topical sun block.

On examination, she has a malar rash. Her BP is 155/98 mmHg, and pulse is regular at 82. Otherwise, physical examination is unremarkable.

Investigations showed:

Haemoglobin	100 g/L	(115-165)
White cell count	$9.6 \times 10^9/L$	(4-11)
Platelets	$135 \times 10^9/L$	(150-400)
Serum sodium	141 mmol/L	(135-146)
Serum potassium	5.8 mmol/L	(3.5-5)
Creatinine	241 $\mu\text{mol/L}$	(79-118)
Anti-nuclear antibody	Positive	
Urine	Blood +	
	Protein ++	

Which of the following is likely to be the most sensitive marker of disease activity?

(Please select 1 option)

	Anti-dsDNA antibodies
--	-----------------------

	Anti-ro antibodies
	Anti-la antibodies
	C1 levels
	C3 levels <input type="checkbox"/> Correct

This patient's clinical picture is consistent with an exacerbation of systemic lupus erythematosus, which has led to nephritis and renal impairment.

Whilst the first three antibodies may be positive in patients with lupus, the C3 complement component is consumed during an acute attack and is, therefore, the best marker of disease activity.

In this situation, where significant renal impairment is already noted, steroids and cyclophosphamide in combination are the treatment of choice.

### Answer Statistics

1		70%
2		4%
3		1%
4		2%
5		22%

Times answered: 5865

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 57 of 100

A 67-year-old man with chronic renal failure, who uses peritoneal dialysis, presents to the renal ward with a cloudy bag. This is his first episode of continuous ambulatory peritoneal dialysis (CAPD) peritonitis in over two years of dialysing.

He has type 1 diabetes, which precipitated his renal impairment. On examination, he is pyrexial at 38.2°C. His abdomen is diffusely tender, although he has bowel sounds on auscultation.

Investigations showed:

Haemoglobin	102 g/L	(135-177)
White cell count	$13.6 \times 10^9/L$	(4-11)
Platelets	$270 \times 10^9/L$	(150-400)
Serum sodium	138 mmol/L	(135-146)
Serum potassium	4.3 mmol/L	(3.5-5)
Creatinine	346 $\mu\text{mol/L}$	(79-118)
Dialysis fluid	$>100$ white cells per $\text{mm}^3$	

Which of the following is the most likely infecting organism?

(Please select 1 option)

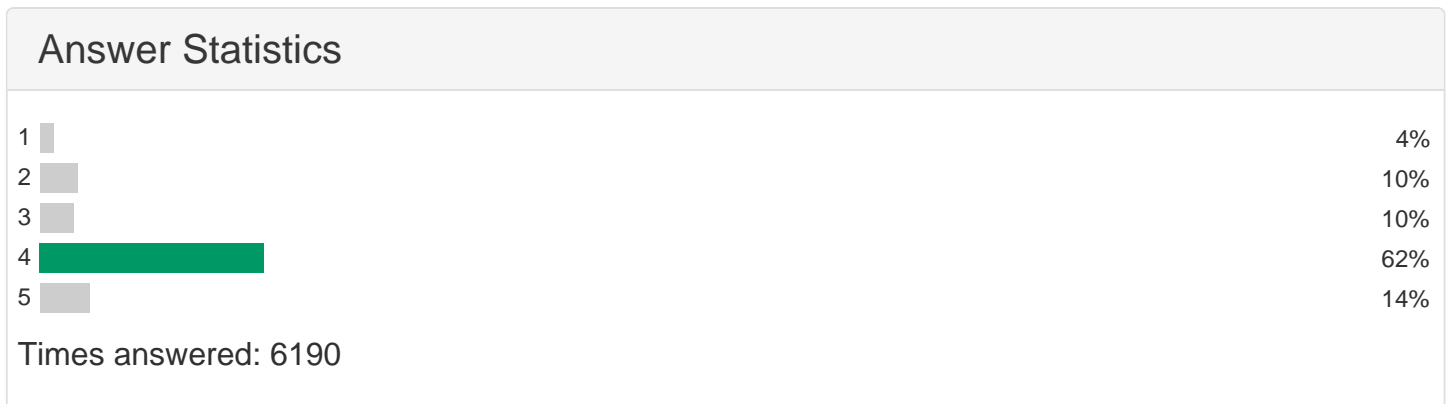
<input type="checkbox"/>	<i>B. fragilis</i>
<input type="checkbox"/>	<i>Bacteroides spp</i>
<input type="checkbox"/>	

<i>P. aeruginosa</i>	
<i>S. aureus</i>	<input checked="" type="checkbox"/> This is the correct answer
<i>S. pyogenes</i>	<input type="checkbox"/> Incorrect answer selected

*S. aureus* and *S. epidermidis* are the two most common pathogens identified in cases of CAPD peritonitis.

Various treatment regimes exist, but the majority involve intraperitoneal vancomycin and an oral quinolone. Once culture results are received, the regime can then be tailored appropriately.

The key to avoiding long-term complications of CAPD peritonitis is prompt intervention to avoid chronic colonisation of the CAPD catheter and adhesion formation, which prevents adequate fluid exchange.



### Test Analysis

Correct	Incorrect	Partially Correct
Correct		

## Work Smart

Question 58 of 100

A 52-year-old man has a history of hypertension, managed with amlodipine and indapamide. His GP recently tried to commence ramipril, but had to curtail this as his creatinine rose from 129 to 194 after one week of therapy.

He smokes 20 cigarettes per day and is a vasculopath, having suffered a transient ischaemic attack (TIA) one year earlier.

On examination in the clinic, his BP is 155/92 mmHg, pulse is regular at 80 and a left carotid bruit is audible.

Investigations show:

Haemoglobin	120 g/L	(135-177)
White cell count	$6.0 \times 10^9/L$	(4-11)
Platelets	$288 \times 10^9/L$	(150-400)
Serum sodium	140 mmol/L	(135-146)
Serum potassium	4.0 mmol/L	(3.5-5)
Creatinine	122 $\mu\text{mol/L}$	(79-118)
Ultrasound scan	Right kidney smaller than the left	
Renal MRA	Suggestive of 80% right renal artery stenosis	

Which of the following is the most appropriate next step in his management?

(Please select 1 option)

Add bisoprolol to his anti-hypertensive regimen  This is the correct answer

Re-introduce low dose ramipril to his regimen
Refer for urgent angioplasty and stenting
Refer for vascular surgery <input type="checkbox"/> <b>Incorrect answer selected</b>
Trial valsartan as an alternative to ACE inhibition

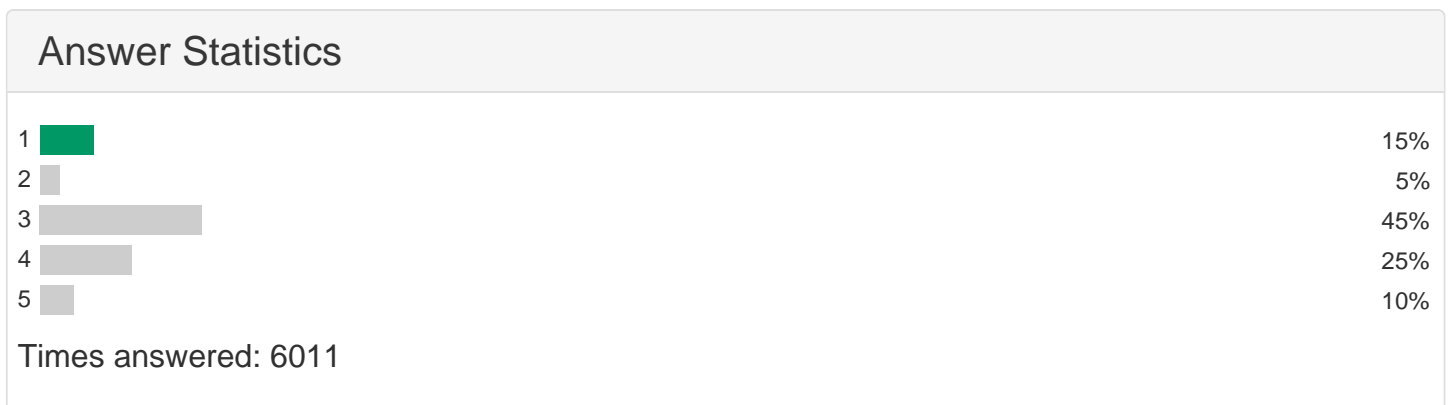
There is considerable debate about the success of angioplasty/stenting or vascular surgery in patients with atherosclerotic renal artery stenosis and difficult to manage hypertension. The most recent study by Bax et al showed no difference in outcomes between those patients managed with medical therapy versus stenting.

Other studies suggest that complications of stenting or angioplasty outweigh any benefits versus medical therapy.

There is no evidence to support re-introducing ACE inhibition or substituting an angiotensin receptor blocker (ARB) with respect to potential outcomes. As such, in the first instance, response to increased medical therapy for blood pressure should be assessed.

Reference:

Bax L, et al. [Stent placement in patients with atherosclerotic renal artery stenosis and impaired renal function: a randomized trial](#). *Ann Intern Med*. 2009;150:840-8.



### Test Analysis

# Work Smart

Question 59 of 100

A 17-year-old male presents to the Emergency Department with facial and periorbital oedema. This is the third episode over the past two years, and on each of the previous two occasions, the problem has been treated with oral corticosteroids.

On examination, he has periorbital and bilateral lower limb pitting oedema. His BP is 125/72 mmHg, pulse is 72 and regular. He has no significant findings on auscultation of the chest.

Investigations show:

Haemoglobin	125 g/L	(135-177)
White cell count	$5.0 \times 10^9/L$	(4-11)
Platelets	$260 \times 10^9/L$	(150-400)
Serum sodium	138 mmol/L	(135-146)
Serum potassium	4.2 mmol/L	(3.5-5)
Creatinine	110 $\mu\text{mol/L}$	(79-118)
Albumin	24 g/L	(35-50)
Urine	Protein +++	

Which of the following is the most appropriate initial way to treat him?

(Please select 1 option)

<input type="checkbox"/>	Admit for methylprednisolone and cyclophosphamide
<input type="checkbox"/>	

Observe	<input type="checkbox"/> Incorrect answer selected
Prednisolone 10 mg/day for six weeks	
Prednisolone 60 mg/day for six weeks	<input checked="" type="checkbox"/> This is the correct answer
Trial of ramipril	

The repeated cycles of corticosteroid responsive nephrotic syndrome suggest that this individual has minimal change disease. Therefore he is likely once again to respond to high dose prednisolone, with a tapering dose after the first six weeks of therapy.

In patients who fail to respond initially to corticosteroids, cyclophosphamide, mycophenolate mofetil, tacrolimus and ciclosporin are optional second line agents. There are no strict indications for these, but tend to be used if there is steroid resistance or dependence, partial response to steroids, frequent relapses, and toxicity or contraindications to steroids. These agents can be used sequentially if there is a failure to respond.

### Answer Statistics



Times answered: 5960

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 60 of 100

A 50-year-old man is admitted to the hospital with a third attack of renal stones in the last six months. He suffers from Crohn's disease and has previously had a limited small bowel resection, but his disease is now quiescent. Apparently, there is a history of high calcium levels in other blood relatives. On examination, his BP is 115/72 mmHg, his BMI is 19.5, he has a midline scar consistent with a previous laparotomy.

Investigations show:

Haemoglobin	120 g/L	(115-165)
White cell count	6.4 ×10 <sup>9</sup> /L	(4-11)
Platelets	272 ×10 <sup>9</sup> /L	(150-400)
Serum sodium	138 mmol/L	(135-146)
Serum potassium	4.1 mmol/L	(3.5-5)
Creatinine	85 µmol/L	(79-118)
Calcium	2.89 mmol/L	(2.20-2.67)
PTH	Upper limit of normal range	

Which of the following is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Familial hypocalciuric hypercalcaemia	<input checked="" type="checkbox"/> This is the correct answer
--	--

Primary hyperparathyroidism	
PTHrP levels increased due to underlying malignancy	
Secondary hyperparathyroidism	
Tertiary hyperparathyroidism	<input type="checkbox"/> Incorrect answer selected

Plasma calcium is tightly regulated by parathyroid hormone (PTH) and vitamin D, which act on the gastrointestinal tract, kidney, and bone. PTH releases calcium from bone and inhibits its excretion from the kidney. Vitamin D promotes calcium absorption from the gastrointestinal tract. Plasma calcium levels are detected by a calcium-sensing receptor on the parathyroid glands.

This gentleman has a raised calcium with an inappropriately high PTH. The remainder of his bloods are normal, with no evidence of renal failure or malabsorption.

Familial hypocalciuric hypercalcaemia is an autosomal dominant condition and is the most likely diagnosis in this case.

The disease most often leads to asymptomatic elevated levels of serum calcium, although some patients with the condition may suffer recurrent episodes of renal stones.

The inherited condition is usually caused by a mutation in the calcium-sensing receptor gene. The perceived lack of calcium levels by the parathyroid leads to resetting of calcium and PTH to higher levels. It does not require any treatment.

Primary hyperparathyroidism is caused by parathyroid adenomas or hyperplasia, which results in raised PTH and subsequently raised plasma and urinary calcium. Alkaline phosphatase is raised, and serum phosphate is reduced.

Secondary hyperparathyroidism is compensatory hypertrophy of all four glands due to hypocalcaemia (due to chronic kidney disease, or malabsorption). PTH is raised and calcium is low or normal.

Tertiary hyperparathyroidism develops after a prolonged period of secondary hyperparathyroidism. The parathyroid glands become autonomous and both PTH and calcium are raised.

PTH-related protein is responsible for 80% of hypercalcaemia in malignancy and acts on the same receptors as PTH. It is secreted by squamous cell tumours, breast and renal tumours. Serum calcium is raised, but PTH will be low.

Further Reading:

Auwerx J, et al. [Familial hypocalciuric hypercalcaemia - familial benign hypercalcaemia: a review.](#) *Postgrad Med J.* 1987;63:835-40.

# Work Smart

Core Questions

Question 62 of 109

A 18-year-old student presents to the student health service with frank haematuria that began some 48 hours after an upper respiratory tract infection.

On examination he is afebrile, BP is 110/72 mmHg and pulse is 70. His chest is clear and his abdomen is soft and non-tender.

Investigations reveal:

Haemoglobin	140 g/L	(135-177)
White cell count	$8.0 \times 10^9/L$	(4-11)
Platelets	$248 \times 10^9/L$	(150-400)
Serum sodium	138 mmol/L	(135-146)
Serum potassium	4.3 mmol/L	(3.5-5)
Creatinine	85 $\mu\text{mol/L}$	(79-118)
Urine	Blood +++	

Which of the following is the most appropriate way to manage him?

(Please select 1 option)

<input type="checkbox"/>	ACE inhibitor titrated to maximal tolerated dose
<input type="checkbox"/>	ACE inhibitor titrated to maximal tolerated dose and ARB in combination
<input type="checkbox"/>	Methylprednisolone and cyclophosphamide

Observation  This is the correct answer

Prednisolone 60 mg/day  Incorrect answer selected

This patient almost certainly has IgA nephropathy, given his presentation with frank haematuria occurring in such close proximity to a recent upper respiratory tract infection.

The findings including normal blood pressure, normal creatinine and haematuria without proteinuria point towards a benign prognosis and for this reason he only requires regular monitoring rather than intervention with immunosuppressive agents.

Treatment with corticosteroids is usually reserved for those patients with hypertension and a rising creatinine.

Where there is significant hypertension +/- proteinuria, then ACE inhibitors are the first choice antihypertensive agent.

Post-streptococcus glomerulonephritis usually occurs one to three weeks after initial infection.

## Answer Statistics



Times answered: 6023

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 63 of 109

A 63-year-old woman is admitted to hospital with a three-day history of diarrhoea and vomiting. Her family tell you she has been virtually unable to eat or drink, but has managed to take her tablets during that time.

Her past medical history includes essential hypertension and ischaemic heart disease. Her current medication consists aspirin 75 mg daily, ramipril 5 mg daily, simvastatin 40 mg daily.

Her admission bloods demonstrate:

Sodium	144 mmol/l	137 - 144
Potassium	4.1 mmol/l	3.5 - 4.9
Urea	10.8 mmol/l	2.5 - 7.5
Creatinine	195 µmol/l	60 - 110

Which of the following is most appropriate?

(Please select 1 option)

<input type="checkbox"/>	Double dose of ramipril
<input type="checkbox"/>	Give clopidogrel 300 mg stat
<input type="checkbox"/>	Give loperamide
<input type="checkbox"/>	Withhold aspirin
<input checked="" type="checkbox"/>	Withhold ramipril <span style="color: green;">Correct</span>

The history is entirely consistent with gastroenteritis, and as a result of the protracted vomiting, the patient has become dehydrated. In this context, an ACE inhibitor (ramipril) is dangerous and should be stopped.

Within the kidneys the afferent and efferent arterioles take blood to (afferent) and from (efferent) the glomerulus.

ACE inhibitors work by decreasing the tone of the efferent arterioles, which in a euvolaemic patient can protect the kidney in hypertension, diabetes and other insults. However, in a hypovolaemic patient (such as this patient) this can lead to catastrophic impairment of renal function.

### Answer Statistics



Times answered: 6094

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 61 of 100

A patient who was recently admitted to the medical receiving unit with general malaise has been found to have deranged renal function. Your registrar asks you to arrange 'an urgent scan' to exclude obstruction of the kidneys.

Which of the following is most appropriate?

(Please select 1 option)

<input type="checkbox"/>	CT KUB (kidneys, ureters and bladder)
<input type="checkbox"/>	MR angiography of renal tract
<input type="checkbox"/>	MRI kidneys
<input type="checkbox"/>	Plain abdominal x ray
<input checked="" type="checkbox"/>	Ultrasound renal tract <span style="color: green;">Correct</span>

Acute imaging of the kidneys is intended primarily to exclude obstructive uropathy, which would be demonstrated on ultrasound imaging. Ultrasound imaging is a safe, non-invasive means rapidly to exclude a correctable cause of renal impairment. It is readily available in most hospitals and can be performed by a sonographer or radiologist.

A CT KUB is indicated when the USS (and clinical history) is suggestive of the presence of renal calculi, whether or not they are causing obstruction.

MR imaging of the kidneys can help determine the nature of a lesion seen on ultrasound imaging. It is expensive, time-consuming, and not available in all locations. Furthermore many patients with

magnetic materials inserted, for example, pacemakers, defibrillators are precluded from entering the strong magnetic field. These factors preclude its use as a first-line approach to excluding acute obstruction of the kidney.

MR angiography is helpful to exclude renal artery stenosis. This will not confirm or refute the presence of post-renal obstruction.

A plain abdominal x ray will occasionally demonstrate the presence of radio-opaque renal calculi, but cannot confirm or refute the presence of post-renal obstruction. It should not be done routinely in all patients with acute renal impairment unless there is a strong clinical suspicion of renal calculi (in which case most patients will proceed to having a CT KUB examination).

### Answer Statistics

1		22%
2		4%
3		2%
4		2%
5		70%

Times answered: 6945

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 62 of 100

A 62-year-old gentleman is being investigated for normochromic, normocytic anaemia. He is diagnosed with diabetes mellitus type II and essential hypertension.

His haemoglobin is stable at 95 g/L (normal range 130-162 g/L), his creatinine clearance is calculated at 45 ml/min (normal range 97-137 ml/min), ferritin at 50 µg/L (normal range 12-300 µg/L) and his serum erythropoietin level comes back at 8 (normal range: 4-24 mU/mL).

Which of the following is the most appropriate management?

(Please select 1 option)

<input type="checkbox"/>	Check haemoglobin at 6-monthly intervals
<input type="checkbox"/>	Commencement of subcutaneous darbepoietin
<input checked="" type="checkbox"/>	Intravenous iron supplementation <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Transfusion aiming for Hb of 100-120 g/L
<input type="checkbox"/>	Transfusion aiming for Hb of 120-140 g/L <span style="color: red;">Incorrect answer selected</span>

This patient has CKD stage 3A (borderline 3B). Renal-related anaemia can start to develop at this stage as alteration in erythropoietin production occurs. It is worsened by reduced dietary intake of iron due to anorexia, impaired intestinal absorption of iron, toxic effect of uraemia on erythroid precursors and reduced red blood cell survival.

It is imperative that renal patients avoid repeated blood transfusion, unless in extremis, so that future renal transplantation will not be precluded by allo-sensitisation.

Before initiation of recombinant erythropoiesis-stimulating agents the patient should be iron replete. The serum ferritin and transferrin saturation should be checked, as most patients will be iron deficient.

Targets for treatment are:

- Haemoglobin 105-125 g/L
- Ferritin: >100 µg/L in pre-dialysis and peritoneal dialysis patients, >200 µg/L in haemodialysis patients
- Transferrin saturation >20%

This patient should also be referred to a nephrologist, as early assessment of the causes of his renal impairment is beneficial. Patients with CKD stage 3A, who are non-proteinuric, have a low risk of progression and can usually be managed in the community following an initial assessment by a nephrologist.

Those with proteinuria are usually managed in secondary care, as the protein is directly toxic to the tubules and this typically results in progression of renal impairment.

## Answer Statistics



Times answered: 6679

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 64 of 109

A 45-year-old gentleman presents with loin pain and haematuria and is found on ultrasound examination to have polycystic kidney disease.

Of note, his father died of a brain haemorrhage in his 50s. Genetic testing reveals that the patient has the PKD-1 gene mutation.

On which chromosome is this gene mutation found?

(Please select 1 option)

<input type="checkbox"/>	Chromosome 2
<input type="checkbox"/>	Chromosome 4
<input type="checkbox"/>	Chromosome 12
<input type="checkbox"/>	Chromosome 15
<input checked="" type="checkbox"/>	Chromosome 16 <span style="color: green;">Correct</span>

The PKD-1 gene mutation is found on chromosome 16p.

The PKD-2 gene mutation is found on chromosome 4 and gives rise to a milder phenotype.

The other chromosomes do not contain the PKD-1 gene.

Reference:

Wilson, PD. [Polycystic Kidney Disease](#). *N Engl J Med*. 2004;350:151-64.

# Work Smart

Question 63 of 100

Patients with end stage renal failure on haemodialysis may have anaemia secondary to multiple causes.

One important cause is erythropoietin (EPO) deficiency. EPO injections can be given intravenously or subcutaneously and are effective, providing that iron stores are replete.

Which of the following blood tests in conjunction with serum ferritin is the recommended test for iron status in patients with anaemia?

(Please select 1 option)

<input type="checkbox"/>	C reactive protein (CRP)
<input type="checkbox"/>	Erythrocyte sedimentation rate (ESR)
<input type="checkbox"/>	Mean cell volume
<input type="checkbox"/>	Serum iron
<input checked="" type="checkbox"/>	Transferrin saturation <span style="color: green;">Correct</span>

A transferrin saturation less than 20% is used in conjunction with serum ferritin to assess need for iron replacement in the management of anaemia in chronic kidney disease.

According to NICE guidelines, ferritin in conjunction with either transferrin saturation or percentage hypochromic red cells is used to assess anaemia.

Low mean cell volume can be indicative of iron deficiency but may also be attributable to other causes and so this is incorrect.

Serum iron, although a marker of iron status is not a recommended test, is incorrect.

C-reactive protein and erythrocyte sedimentation rate are inflammatory markers and have no bearing on the management of iron status in anaemia in chronic kidney disease. Hence these options are incorrect.

Reference:

NICE. [Anaemia management in people with chronic kidney disease \(NG8\)](#).

### Answer Statistics



Times answered: 6181

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 31.75%

# Work Smart

Core Questions

Question 64 of 100

Inappropriately high parathyroid hormone secretion (PTH) in renal patients can lead to significant bone reabsorption and premature fractures.

Which one of the following is known to stimulate parathyroid hormone production?

(Please select 1 option)

<input type="checkbox"/>	Calcium acetate tablets
<input type="checkbox"/>	Hypercalcaemia <span style="color: red;">❑ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	Hyperphosphataemia <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Hypophosphataemia
<input type="checkbox"/>	Serum alkaline phosphatase

Hyperphosphataemia is known directly to stimulate the parathyroid gland to produce PTH.

Hypercalcaemia and hypophosphataemia should suppress PTH production via negative feedback pathways. Hence these options are incorrect.

Phosphate binders such as calcium acetate are used to reduce phosphate in the serum and hence lower PTH production.

Serum alkaline phosphatase has no bearing on PTH production but may rise in hyperparathyroid states due to increased bone turnover.

# Work Smart

Question 65 of 100

A 28-year-old gentleman presents with haematuria, progressive renal impairment and hearing problems.

Of note, there is a strong family history of renal problems with family members requiring dialysis. Further workup of this gentleman leads to a diagnosis of Alport's syndrome.

What is the characteristic otological problem associated with this condition?

(Please select 1 option)

<input type="checkbox"/>	Conductive deafness
<input type="checkbox"/>	Mastoiditis
<input type="checkbox"/>	Perforated ear drum
<input type="checkbox"/>	Recurrent otitis media
<input checked="" type="checkbox"/>	Sensorineural deafness <span style="color: green;">Correct</span>

Alport's syndrome is associated with a gene mutation resulting in a disruption in the formation of type IV collagen. This is due to impaired adhesion of the organ of Corti which contains the auditory sensory cells. This is related to the structural integrity of the basement membrane, important for the kidney, middle ear and eye function. Sensorineural deafness results as a consequence.

It is not associated with conductive deafness.

There is no increased association with ear infections such as otitis media, mastoiditis and perforated ear drum. Hence these answers should not be selected.

# Work Smart

Question 65 of 109

A 66-year-old gentleman with a history of benign prostatic hyperplasia is admitted with a rise in creatinine from 100  $\mu\text{mol/L}$  to 300  $\mu\text{mol/L}$  from a routine blood test done in the community.

The admitting team requests an ultrasound of the kidneys which shows normal sized kidneys with no evidence of hydronephrosis.

Of the options below, select the most appropriate size of a normal adult kidney on ultrasound appearance (measured longitudinally).

(Please select 1 option)

<input type="checkbox"/>	6 cm
<input checked="" type="checkbox"/>	11 cm <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	15 cm
<input type="checkbox"/>	18 cm
<input type="checkbox"/>	20 cm <span style="color: red;">Incorrect answer selected</span>

Ultrasonography plays a crucial part in evaluating acute and chronic renal impairment. In this case of suspected prostatic obstruction, it is important to exclude hydronephrosis.

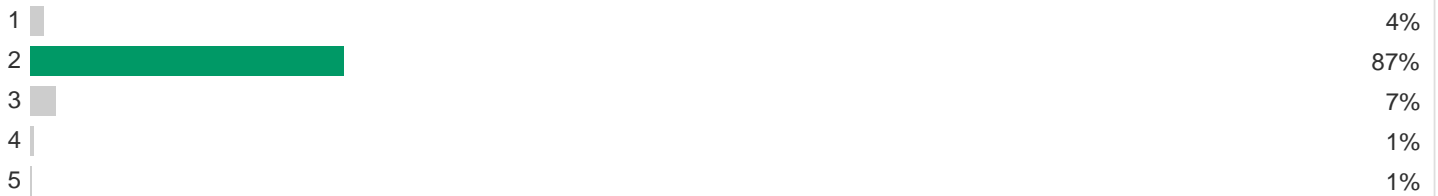
In the adult population, the usual range of kidney size measured longitudinally is between 9-12 cm.

The other options fall out of this range and should therefore not be selected.

Reference:

Emamian SA, et al. [Kidney dimensions at sonography: correlation with age, sex, and habitus in 665 adult volunteers.](#) *AJR Am J Roentgenol.* 1993;160:83-6.

## Answer Statistics



Times answered: 6138

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.92%

Total Answered: 65

## Feedback

# Work Smart

Question 66 of 109

Which of the following diabetic medications increases the risk of contrast-induced nephropathy?

(Please select 1 option)

<input type="checkbox"/>	Acarbose
<input type="checkbox"/>	Exenatide
<input type="checkbox"/>	Gliclazide
<input type="checkbox"/>	Insulin
<input checked="" type="checkbox"/>	Metformin <span style="color: green;">Correct</span>

Contrast-induced nephropathy is a complication of intravenous contrast given during some radiological procedures. Existing renal impairment, dehydration and the use of metformin increase the risk of this.

Metformin is usually withheld for 48 hours after the use of contrast.

Acarbose should not be selected because it is a post-prandial glucose regulator and has no relation to contrast-induced nephropathy. Likewise, the remaining incorrect options are safe to use after the administration of intravenous contrast and do not increase the risk of contrast-induced nephropathy.

Reference:

Barrett BJ, Parfrey PS. [Clinical practice. Preventing nephropathy induced by contrast medium.](#) *N Engl J Med.* 2006;354:379-86.

# Work Smart

Question 67 of 109

A 65-year-old lady is evaluated for shortness of breath. The attending clinician is concerned about a pulmonary embolism and proceeds with a CT pulmonary angiogram.

The radiologist is concerned about the risk of contrast-induced nephropathy as the patient has some degree of existing renal impairment.

At what time period does contrast-induced nephropathy classically peak?

(Please select 1 option)

<input type="checkbox"/>	4-8 hours
<input type="checkbox"/>	24-48 hours
<input checked="" type="checkbox"/>	3-5 days <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	14 days
<input type="checkbox"/>	28 days <span style="color: red;">Incorrect answer selected</span>

Studies have shown that contrast-induced nephropathy is most likely to occur 48 to 72 hours after the administration of intravenous contrast hence option C is the best answer.

The other time periods stated are less likely and are therefore incorrect.

Reference:

Barrett BJ, Parfrey PS. [Clinical practice. Preventing nephropathy induced by contrast medium.](#) *N Engl J Med.* 2006;354:379-86.

# Work Smart

Question 66 of 100

A 24-year-old female presents with a 48-hour history of vomiting and epigastric pain. She has vomited over ten times in the last day.

There is no history of diarrhoea and the presumed diagnosis is viral gastroenteritis.

What is the most likely picture of her acid base status?

(Please select 1 option)

<input type="checkbox"/>	Mixed metabolic acidosis and respiratory alkalosis
<input type="checkbox"/>	Primary metabolic acidosis
<input checked="" type="checkbox"/>	Primary metabolic alkalosis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Primary respiratory acidosis
<input type="checkbox"/>	Primary respiratory alkalosis <span style="color: red;">Incorrect answer selected</span>

Copious vomiting in this patient leads to loss of gastric contents which are predominantly acidic.

Loss of acid secretions from the stomach renders this patient deficient of acid in her blood; hence her acid base status will be reflective of metabolic alkalosis. One may also expect a lower serum potassium and chloride which are also lost in gastric secretions.

Primary metabolic acidosis, mixed metabolic acidosis and respiratory alkalosis are incorrect because the patient is in acid deficit rather than acid excess.

There is no primary respiratory pathology in the question and so primary respiratory acidosis and primary respiratory alkalosis are incorrect.

# Work Smart

Question 67 of 100

A 35-year-old gentleman presents with new onset renal failure and a non-blanching rash across his legs.

In addition, he describes a history of recurrent sinus infections and nose bleeds.

Which of the following tests are most likely to be diagnostic in this case?

(Please select 1 option)

<input type="checkbox"/>	ANA
<input checked="" type="checkbox"/>	C-ANCA <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	P-ANCA
<input type="checkbox"/>	Rheumatoid factor
<input type="checkbox"/>	Serum electrophoresis <span style="color: red;">Incorrect answer selected</span>

The question depicts a likely case of Wegener's granulomatosis and hence c-ANCA is the most likely diagnostic test of those listed.

Wegener's granulomatosis is a disease of granulomatous inflammation involving the kidney, upper respiratory and sinus tracts. It is most often associated with the anti-cytoplasmic ANCA (c-ANCA) positivity.

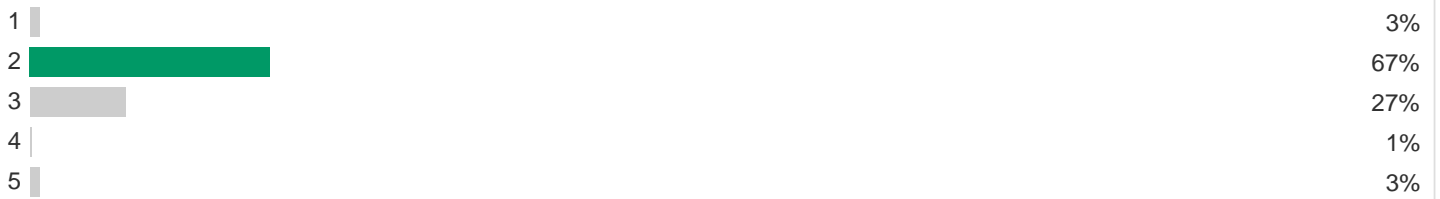
Anti-nuclear antibody can be positive in a wide range of connective tissue diseases and is not the best diagnostic test listed and so is incorrect.

P-ANCA is associated with microscopic polyangiitis and not Wegener's and so should not be

selected.

Rheumatoid factor and serum electrophoresis for myeloma are not diagnostic tests in this case and so are incorrect.

### Answer Statistics



Times answered: 6225

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 31.34%

Total Answered: 67

# Work Smart

Core Questions

Question 68 of 100

A 28-year-old gentleman presents to hospital feeling unwell with a few days history of diarrhoea and abdominal pain. He reports having eaten at a 'burger van' a few days ago.

He has no previous hospitalisations. His initial laboratory tests show new onset renal impairment, anaemia and low platelets. His clotting is normal.

Which of the following pathogens is most likely to be responsible for this presentation?

(Please select 1 option)

<input type="checkbox"/>	<i>Clostridium difficile</i>
<input checked="" type="checkbox"/>	<i>Escherichia coli</i> <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	<i>Enterococcus faecalis</i> <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Methicillin resistant D. <i>Staphylococcus aureus</i> (MRSA)
<input type="checkbox"/>	<i>Streptococcus viridans</i>

The question describes the clinical picture of the haemolytic uraemic syndrome with a diarrhoea prodrome. *Escherichia coli* is the most likely responsible pathogen.

Haemolytic uraemic syndrome is a syndrome composing of the triad of:

- microangiopathic haemolytic anaemia
- low platelets, and
- renal failure.

A number of pathogens are implicated including *Escherichia coli*, usually the O157:H7 subtype. This produces a verotoxin (also known as Shiga toxin) which binds to endothelial receptors, particularly in the renal, gastrointestinal and central nervous systems thereby causing the clinical symptoms. Thrombin and fibrin are deposited in the microvasculature and cause haemolysis of circulating erythrocytes. Platelets are also sequestered.

The other pathogens which can cause HUS are *Streptococcus pneumoniae*, *Shigella dysenteriae* (type 1 and 3), HIV and Coxsackie virus.

This presentation is not classical of *C. difficile* as we are given no risk factors for this in the question, so this option is incorrect.

*Enterococcus faecalis* is a bowel commensal which is unlikely to cause the degree of pathology described in this case.

There is no reason to suspect this gentleman is MRSA positive.

*Streptococcus viridans* is an upper respiratory tract and throat bacteria. This patient's presentation does not involve that organ system so this option is incorrect.

## Answer Statistics

1		4%
2		86%
3		6%
4		2%
5		2%

Times answered: 6182

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 68 of 109

A 60-year-old female presents with cough, haemoptysis and haematuria.

Her laboratory tests show impaired renal function. After a thorough workup, anti-glomerular basement membrane (anti-GBM) antibody is positive, diagnosing Goodpasture's syndrome.

Which class of antibody is the anti-GBM most likely to be?

(Please select 1 option)

<input type="checkbox"/>	IgA
<input type="checkbox"/>	IgD
<input type="checkbox"/>	IgE
<input checked="" type="checkbox"/>	IgG <span style="color: green;">Correct</span>
<input type="checkbox"/>	IgM

Goodpasture's syndrome is an autoimmune disease due to an antibody directed at the glomerular basement membrane. The most frequent class of antibody implicated in this disease is IgG.

Anti-GBM in the Goodpasture's syndrome is rarely due to IgA and IgM. IgD and IgE are not implicated as anti-GBM.

# Work Smart

Question 69 of 100

A 78-year-old gentleman is admitted with diarrhoea, recent onset of atrial fibrillation, acute renal failure and abdominal pain.

Some of his laboratory parameters are shown below:

Sodium	146 mmol/L	(135-145)
Potassium	3 mmol/L	(3.5-5.0)
Bicarbonate	14 mmol/L	(24-30)
Chloride	95 mmol/L	(95-105)
Urea	30 mmol/L	(2.5-6.5)

What is the anion gap of this patient?

(Please select 1 option)

<input type="checkbox"/>	24
<input type="checkbox"/>	30
<input checked="" type="checkbox"/>	40 <b>Correct</b>
<input type="checkbox"/>	45
<input type="checkbox"/>	48



The anion gap is an estimate of the unmeasured anions in the serum and helps to differentiate the causes of metabolic acidosis.

The anion gap is calculated by the sum of the positive ions in the blood (mainly sodium and potassium) from which is subtracted the sum of the negative ions (chloride and bicarbonate). This is described by the following formula:

- $([Na^+] + [K^+]) - ([Cl^-] + [HCO_3^-])$
- $(146 + 3) - (14 + 95) = 40$
- The normal range is 3-11.

This gentleman has a significantly raised anion gap possibly secondary to ischaemic bowel and lactic acid production. Note that the serum urea is not involved in the calculation of the anion gap.

### Answer Statistics

1		5%
2		12%
3		77%
4		3%
5		3%

Times answered: 6115

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 69 of 109

A 35-year-old gentleman attends the renal clinic with weight gain and shortness of breath.

Laboratory results show a low albumin, raised cholesterol and urine dipstick shows 3+ protein.

What is the minimum value of protein:creatinine ratio that would be classed as 'nephrotic range' from the answers below?

(Please select 1 option)

<input type="checkbox"/>	50 mg/mmol	
<input type="checkbox"/>	100 mg/mmol	
<input checked="" type="checkbox"/>	200 mg/mmol	Incorrect answer selected
<input type="checkbox"/>	250 mg/mmol	
<input type="checkbox"/>	300 mg/mmol	This is the correct answer

The triad of proteinuria, hypoalbuminaemia and oedema typifies the nephrotic syndrome.

The minimum threshold for proteinuria which is defined as 'nephrotic' is 300 mg/mmol. Hence each of the options below this level are incorrect and should not be selected.

Reference:

Hull RP, Goldsmith DJ. [Nephrotic Syndrome in adults](#). *BMJ*. 2008;336:1185-9

# Work Smart

Question 70 of 109

A 65-year-old woman with a history of recurrent urinary tract infections attends the Emergency Department with loin pain and haematuria.

She is diagnosed with renal stones the composition of which is magnesium ammonium phosphate.

Which of the following organisms are likely to be implicated in her urinary infections?

(Please select 1 option)

<input type="checkbox"/>	<i>Bacteroides fragilis</i>
<input type="checkbox"/>	<i>Enterococcus faecalis</i>
<input type="checkbox"/>	<i>Escherichia coli</i>
<input checked="" type="checkbox"/>	<i>Proteus mirabilis</i> <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	<i>Staphylococcus aureus</i> <span style="color: red;">Incorrect answer selected</span>

Triple phosphate stones are classically produced by urea-splitting organisms such as *Klebsiella* or *Proteus*.

*Bacteroides fragilis* and *Enterococcus faecalis* are bowel commensals but do not produce triple phosphate stones and so these answers are incorrect.

*Escherichia coli* is a common urinary tract pathogen but it is not associated with triple phosphate stones.

*Staphylococcus aureus* is rarely a urinary pathogen and is not associated with the production of triple phosphate stones.

Reference:

Moe OW. [Kidney stones: pathophysiology and medical management](#). *Lancet*. 2006;367:333-44.

## Answer Statistics



Times answered: 6188

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 18.57%

Total Answered: 70

## Feedback

# Work Smart

Question 70 of 100

During which age range is IgA nephropathy usually diagnosed?

(Please select 1 option)

<input type="checkbox"/>	10-20 years
<input checked="" type="checkbox"/>	20-40 years <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	40-60 years
<input type="checkbox"/>	60-70 years <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	70+

IgA nephropathy has a male preponderance and is commonly diagnosed in the age range of 20-40.

The options which fall out of this age range are incorrect and should not be selected.

Reference:

Donadio JV, Grande JP. [IgA nephropathy](#). *N Engl J Med*. 2002;347:738-48.

## Answer Statistics

# Work Smart

Question 71 of 109

Which of the following diuretics acts as a carbonic anhydrase inhibitor?

(Please select 1 option)

<input checked="" type="checkbox"/>	Acetazolamide	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Bumetanide	
<input type="checkbox"/>	Furosemide	
<input type="checkbox"/>	Metolazone	
<input type="checkbox"/>	Spirolactone	<input type="checkbox"/> Incorrect answer selected

Acetazolamide is a carbonic anhydrase inhibitor and has a weak diuretic activity.

Furosemide is wrong as it acts on the ascending limb of the loop of Henle and prevents active water reabsorption in the kidney by blocking the sodium, potassium, chloride cotransport channel.

Bumetanide has a similar action.

Metolazone blocks sodium reabsorption in the distal convoluted channel.

Spirolactone is an aldosterone receptor antagonist at the cortical collecting duct.

# Work Smart

Question 71 of 100

Which of the following lifestyle characteristics is associated with IgA nephropathy?

(Please select 1 option)

<input checked="" type="checkbox"/>	Alcohol excess	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Cocaine use	
<input type="checkbox"/>	High cholesterol	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Obesity	
<input type="checkbox"/>	Red meat intake	

IgA nephropathy is associated with a host of medical conditions. Heavy alcohol use in the past is also associated with the disease.

There is no known significant association with cocaine use, high cholesterol, obesity or red meat intake. These answers are therefore incorrect.

Reference:

Donadio JV, Grande JP. [IgA nephropathy](#). *N Engl J Med*. 2002;347:738-48.

# Work Smart

Core Questions

Question 72 of 109

A 60-year-old female is referred to the medical intake with serum potassium of 6.5 mmol/L.

She has a history of type 2 diabetes mellitus, chronic obstructive pulmonary disease (COPD), previous myocardial infarction and osteoarthritis.

Which of the following medications are most likely to contribute to her hyperkalaemia?

(Please select 1 option)

<input type="checkbox"/>	Aspirin
<input type="checkbox"/>	Clopidogrel
<input type="checkbox"/>	Insulin glargine
<input checked="" type="checkbox"/>	Lisinopril <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Salbutamol inhaler <span style="color: red;">Incorrect answer selected</span>

This question requires basic knowledge of medications that can contribute to hyperkalaemia.

Lisinopril, as an angiotensin converting enzyme (ACE) inhibitor is the most likely cause of her hyperkalaemia. The inhibition of angiotensin II production reduces aldosterone levels resulting in a reduction in potassium secretion in the distal tubule. This is associated with a rise in serum potassium.

Anti-platelet agents themselves are not associated with potassium changes and so aspirin and clopidogrel are incorrect.

Insulin and salbutamol cause potassium to shift from extra to intracellular compartments and so

would not cause a rise in serum potassium.

## Answer Statistics



Times answered: 6171

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 18.06%

Total Answered: 72

## Feedback

# Work Smart

Core Questions

Question 72 of 100

A 50-year-old lady is referred to the renal team with progressive renal impairment and for consideration of renal replacement therapy in the future.

She has a history of type 1 diabetes mellitus (DM) since her teens. Her ultrasound scan shows normally sized kidneys and her urine dip is positive for protein. A renal biopsy is undertaken.

Which of the following findings would be diagnostic of diabetic related kidney injury?

(Please select 1 option)

<input type="checkbox"/>	C4d stain positive	
<input type="checkbox"/>	Congo red stain positive	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Kimmelstiel-Wilson lesion	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Owl's eyes inclusion	
<input type="checkbox"/>	Ring sideroblasts	

Kimmelstiel-Wilson lesions depict nodular glomerulosclerosis which is seen in diabetic kidney disease. This option should, therefore, be selected as it is the only biopsy finding that is specific to diabetic related kidney disease.

C4d staining is used for detection of BK virus after renal transplantation and is therefore incorrect.

Congo red stain should not be selected as this is used to detect amyloidosis.

Owl's eyes inclusion depicts the biopsy appearance of the Reed-Sternberg cell in Hodgkin's lymphoma or cytomegalovirus (CMV) infection so this is incorrect.

Ring sideroblasts are peripheral blood film findings in lead toxicity so this is incorrect.

## Answer Statistics



Times answered: 6225

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 30.56%

Total Answered: 72

## Feedback

# Work Smart

Question 73 of 109

A 37-year-old gentleman presents with renal colic and has confirmed renal stones on radiological imaging.

He is treated with analgesia and sent home with follow-up by the urology team. He manages to pass a stone in his urine and this is sent for analysis.

What is the most common composition of renal stones in the general population?

(Please select 1 option)

<input checked="" type="checkbox"/>	Calcium oxalate <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Calcium phosphate
<input checked="" type="checkbox"/>	Cystine <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Magnesium ammonium phosphate
<input type="checkbox"/>	Uric acid

Calcium oxalate stones are the most frequent, followed by calcium phosphate. Together these make up a significant majority of stones.

Cystine stones are rare and associated with tubular defects. This answer should not be selected.

Magnesium ammonium phosphate stones are associated with urea splitting organisms and are not common.

Uric acid stones make up about 5-10% of stones and are less common than calcium based stones.

Reference:

Moe OW. [Kidney stones: pathophysiology and medical management](#). *Lancet*. 2006;367:333-44.

## Answer Statistics



Times answered: 6218

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 17.81%

Total Answered: 73

## Feedback

# Work Smart

Core Questions

Question 73 of 100

A 35-year-old presents to the infectious disease team following a new diagnosis of HIV.

Her CD4 count is 150 cells/mm<sup>3</sup> and a viral load is 10,000. She is commenced on anti-retrovirals.

At a follow-up appointment four weeks later she has routine blood tests, of which her creatinine is shown below. She is euvolaemic and has not taken any additional medications over the counter.

On presentation her results showed:

Serum creatinine	80 µmol/l	(60 - 90)
------------------	-----------	-----------

and four weeks later:

Serum creatinine	220 µmol/l	(60 - 90)
------------------	------------	-----------

Which of the following answers is most likely to be responsible for her acute renal impairment?

(Please select 1 option)

<input type="checkbox"/> Efavirenz <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/> HIV associated nephropathy
<input type="checkbox"/> Lamivudine
<input type="checkbox"/> Non-compliance with medications
<input checked="" type="checkbox"/> Tenofovir <span style="color: green;">This is the correct answer</span>

This question requires knowledge of the side effects of anti-retroviral medications.


Tenofovir is associated with acute and chronic renal impairment and of the answers given is the most likely cause of the acute renal impairment.

Non-compliance with medications should not be selected as there is no reason why this would specifically affect renal function. This would be assessed with repeat viral loads and CD4 counts to which we do not have access.

HIV associated nephropathy is incorrect given the speed of deterioration in renal function.

Of the anti-retroviral medications, tenofovir is associated with acute renal dysfunction more than efavirenz and lamivudine.

### Answer Statistics

1		21%
2		15%
3		27%
4		3%
5		36%

Times answered: 6830

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 74 of 109

A 66-year-old gentleman is admitted with an exacerbation of chronic congestive heart failure and is treated with intravenous diuretics.

His serum potassium results are shown below.

Admission:

Serum potassium	4 mmol/L	(3.5-5.0)
-----------------	----------	-----------

Day 3 of admission:

Serum potassium	3 mmol/L	(3.5-5.0)
-----------------	----------	-----------

Which is the best estimate of the total body potassium loss of this patient since admission?

(Please select 1 option)

<input type="checkbox"/> 1 mmol
<input checked="" type="checkbox"/> 10 mmol <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/> 50 mmol
<input type="checkbox"/> 75 mmol
<input type="checkbox"/> 200 mmol <span style="color: green;">This is the correct answer</span>

This question highlights the importance of potassium distribution within the body. It is a predominantly

intracellular ion.

Small reductions in serum potassium are associated with relatively large reductions in total body potassium.

1 mmol, 10 mmol, 50 mmol and 75 mmol are all under-estimates of total body potassium and therefore are incorrect and should not be selected.


There is no exact formula to derive the 200 mmol. The candidates should recognise that potassium is mainly an intracellular ion (about 95% is intracellular). An approximation for total body loss for potassium is that a drop in 1 mmol/L  $K^+$  of serum potassium is approximately equivalent to a 200 mmol  $K^+$  total body loss. It should be stressed that this is an approximation.

Given that 200 mmol is an approximate calculation, the other options are deliberately chosen to be clearly incorrect (the next highest value being 75 mmol). This question should correlate with clinical experience. It is rare that a large drop in potassium can be corrected with a few tablets with oral potassium and often intravenous replacement at higher doses are required.

Reference:

Gennari FJ. [Hypokalaemia](#). *N Engl J Med*. 1998;339:451-8.

## Answer Statistics

1		13%
2		29%
3		26%
4		19%
5		13%

Times answered: 6123

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 75 of 109

According to the current classification, which of the following glomerular filtration rate (GFR) ranges in ml/min/1.73 m<sup>2</sup> is representative of stage IV chronic kidney disease (CKD)?

(Please select 1 option)

<input type="checkbox"/>	0-10
<input type="checkbox"/>	<15
<input checked="" type="checkbox"/>	15-29 <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	30-59
<input type="checkbox"/>	60-80 <span style="color: red;">Incorrect answer selected</span>

This question tests knowledge of the classification of chronic kidney disease.

The table below lists stages of CKD and corresponding GFRs.

The incorrect options listed above are not reflective of stage IV chronic kidney disease.

Stage	GFR (ml/min/1.73 m <sup>2</sup> )	Description
1	>90	Normal or increased GFR with other evidence of renal damage
2	60-89	Slight decrease in GFR, with other evidence of renal damage

3A	45-59	Moderate decrease in GFR, with or without other evidence of renal damage
3	30-44	As above
4	15-29	Severe decrease in GFR, with or without other evidence of renal damage
5	<15	Established renal failure

The suffix (p) is used to denote the presence of proteinuria when staging CKD. These patients have a worse prognosis, which usually warrants secondary care follow-up.

Reference:

NICE. [Chronic kidney disease in adults: assessment and management \(CG182\)](#).

### Answer Statistics



Times answered: 6917

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 76 of 109

The healthy adult usually ingests about 8400 mg per week of phosphate through their diet, the majority of which is excreted through faeces and the kidney.

Which of the answers below is the best approximation for the amount of phosphate excreted through the kidneys every week?

(Please select 1 option)

<input type="checkbox"/>	1200 mg	
<input checked="" type="checkbox"/>	2400 mg	Incorrect answer selected
<input type="checkbox"/>	3000 mg	
<input type="checkbox"/>	5400 mg	This is the correct answer
<input type="checkbox"/>	6000 mg	

The kidney plays a significant role in phosphate excretion which is why long-term impairment of kidney function disrupts phosphate excretion.

Not only does hyperphosphataemia affect calcium and bone metabolism, but it is associated with increased cardiovascular mortality.

About 5400 mg of phosphate is excreted per week through the kidneys.

The other answers are incorrect estimates of phosphate excretion and should not be selected.

Reference:

Tonelli M, Pannu N, Manns B. [Oral phosphate binders in patients with kidney failure.](#) *N Engl J Med.* 2010;362:1312-24.

## Answer Statistics



Times answered: 6100

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 17.11%

Total Answered: 76

## Feedback

# Work Smart

Question 77 of 109

The healthy adult kidney excretes 5400 mg per week of phosphate.

What is the maximum amount of phosphate that can be removed by dialysis per week in a patient with anuric renal failure who is dialysis dependent?

(Please select 1 option)

<input type="checkbox"/>	200 mg
<input type="checkbox"/>	500 mg
<input checked="" type="checkbox"/>	800 mg <span style="color: red;">❑ Incorrect answer selected</span>
<input type="checkbox"/>	2700 mg <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	5000 mg

This question illustrates the problem with phosphate clearance in patients with renal failure.

Dialysis is able to remove only about half of the phosphate that the healthy kidney would be able to do.

2700 mg is correct and the other answers are incorrect. In such patients, strict dietary control and the use of phosphate binders are necessary to prevent accumulation of phosphate.

References:

Tonelli M, Pannu N, Manns B. Oral phosphate binders in patients with kidney failure. *N Engl J Med.* 8 Apr 2010;362(14):1312-24.

# Work Smart

Question 78 of 109

Which of the following is the best description of the drug cinacalcet?

(Please select 1 option)

<input type="checkbox"/>	Binding phosphate in the gut lumen
<input checked="" type="checkbox"/>	Calcimimetic <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Increasing absorption of calcium from the gut
<input type="checkbox"/>	Preventing ADH action at the distal collecting duct
<input type="checkbox"/>	Preventing osteoclast action <span style="color: red;">Incorrect answer selected</span>

Cinacalcet is a calcimimetic, acting on the calcium-sensing receptor on the parathyroid gland. It has a particular use in the control of secondary hyperparathyroidism in renal failure. Mimicking negative feedback on the parathyroid gland results in the reduction of parathyroid hormone secretion from the parathyroid gland.

Binding phosphate in the gut lumen is incorrect; this represents the action of phosphate binders.

Increasing absorption of calcium from the gut is incorrect as it represents the action of vitamin D.

Cinacalcet does not have an action of antidiuretic hormone (ADH) and so preventing ADH action at the distal collecting duct is incorrect.

Neither does it affect osteoclasts directly; preventing osteoclast action is wrong as this represents the action of bisphosphonates.

# Work Smart

Core Questions

Question 74 of 100

The kidney plays a number of important homeostatic and excretory roles. Despite being a small percentage of total body mass, it receives a significant proportion of the cardiac output.

Which of the following answers best estimates the proportion of cardiac output to the kidneys under normal physiological conditions?

(Please select 1 option)

<input type="checkbox"/>	5%
<input type="checkbox"/>	10%
<input checked="" type="checkbox"/>	20% <b>Correct</b>
<input type="checkbox"/>	40%
<input type="checkbox"/>	50%

The kidney requires a significant proportion of the cardiac output to fulfil its functions.

The actual value of cardiac output can vary depending on different physiological states (for example, stress and hypovolaemia) but approximately 20-25% of the cardiac output goes towards the kidney. Therefore 20% is correct.

The other options are incorrect estimates and should not be selected.

# Work Smart

Core Questions

Question 79 of 109

A 30-year-old gentleman with a history of heavy alcohol intake presents with macroscopic haematuria.

He reports having an upper respiratory tract infection in the last two days. His renal function continues to decline and he is evaluated in the renal unit. His serum C<sup>3</sup> is normal.

What is a biopsy of his kidneys most likely to show?

(Please select 1 option)

<input type="checkbox"/>	C4d staining positive
<input type="checkbox"/>	Effacement of podocytes on electron microscopy
<input type="checkbox"/>	Humps in the subepithelial space on electron microscopy <span style="color: red;">❑ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	IgA deposition in the mesangium <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Tram track pattern on light microscopy

The history of alcohol excess and macroscopic haematuria soon after an upper respiratory tract infection should point the candidate towards IgA nephropathy. This is further confirmed by the normal C<sup>3</sup> level.

C4d staining positive is incorrect as this refers to the detection of BK virus by the C4d stain.

Podocyte effacement is incorrect as this is diagnostic of minimal change disease.

The hump-like appearance in subepithelial space is characteristic of post-streptococcal glomerulonephritis.

The tram track appearance on light microscopy represents membranoproliferative glomerulonephritis and therefore should not be selected.

## Answer Statistics



Times answered: 6127

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.46%

Total Answered: 79

## Feedback

# Work Smart

Question 75 of 100

A 14-year-old boy visits his general practitioner complaining of feeling unwell, passing smoky dark urine and having swelling of his ankles.

Of note, he reports a sore throat two weeks prior. His anti-streptolysin O titre is positive and his renal function is mildly impaired.

If this patient were to have a renal biopsy, which of the following is the most likely finding?

(Please select 1 option)

<input type="checkbox"/>	C4d staining positive	<input checked="" type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Effacement of podocytes on electron microscopy	
<input type="checkbox"/>	Humps in the subepithelial space on electron microscopy	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	IgA deposition in the mesangium	
<input type="checkbox"/>	Tram track pattern on light microscopy	

Not all cases of post-streptococcal glomerulonephritis (GN) require a biopsy.

The characteristic electron microscopy findings are described in the correct option.

C4d staining positive is incorrect as this refers to the detection of BK virus by the C4d stain.

Podocyte effacement is incorrect as this is diagnostic of minimal change disease.

IgA deposition in the mesangium is a biopsy finding in IgA nephropathy and so is incorrect.

The tram track appearance on light microscopy represents membranoproliferative glomerulonephritis

# Work Smart

Core Questions

Question 76 of 100

Which of the following immune complex glomerulonephritides is associated with a normal complement C<sup>3</sup>?

(Please select 1 option)

<input type="checkbox"/>	Cryoglobulinaemia
<input type="checkbox"/>	Endocarditis
<input checked="" type="checkbox"/>	IgA nephropathy <span style="color: green;">Correct</span>
<input type="checkbox"/>	Membranoproliferative GN
<input type="checkbox"/>	Post-streptococcal GN

Immune complex glomerulonephritides can be classified based on normal or decreased C<sup>3</sup>.

Of the answers above IgA nephropathy should be selected as this is associated with normal C<sup>3</sup>.

Cryoglobulinaemia is associated with reduced C<sup>3</sup> and C<sup>4</sup>.

Infective endocarditis is associated with a decrease in complement (C<sup>3</sup> and C<sup>4</sup>).

Both membranoproliferative GN and post-streptococcal GN are associated with reduced C<sup>3</sup>.

# Work Smart

Core Questions

Question 80 of 109

A 65-year-old with type 2 diabetes mellitus and a heavy smoking history is started on an angiotensin-converting enzyme inhibitor (ACEI) for high blood pressure.

His creatinine subsequently doubles from 100  $\mu\text{mol/L}$  to 200  $\mu\text{mol/L}$ . His general practitioner is concerned about the possibility of renal artery stenosis.

Which of the following investigations would give the highest diagnostic yield for this condition?

(Please select 1 option)

<input type="checkbox"/>	CT abdomen
<input type="checkbox"/>	CT abdomen with contrast
<input type="checkbox"/>	Duplex ultrasonography <span style="color: red;">❑ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	Magnetic resonance angiogram (MRA) <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Plasma renin levels

Renal artery stenosis is an important cause of hypertension to recognise.

A rise in creatinine of 15% from baseline is expected with the commencement of an ACE-inhibitor.

In this vignette, the large rise in creatinine should warrant a search for renal artery stenosis given the likelihood of vascular disease.

Of the investigations listed, CT abdomen and CT abdomen with contrast should not be selected as CT imaging should be directed towards the aorta and not the abdomen (CT angiogram). In addition, the contrast could cause nephrotoxicity in the context of recent acute kidney injury.

Plasma renin levels can be measured but lack specificity.

Duplex ultrasonography is a common first line investigation but may not be diagnostic due to technical difficulties (obese patients, overlying bowel gas).

This leaves MRA as the top choice for investigating renal artery stenosis.

Reference:

Dworkin LD, Cooper CJ. [Clinical Practice. Renal-artery stenosis](#). *N Engl J Med*. 2009;361:1972-1978.

### Answer Statistics



Times answered: 6213

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 77 of 100

A 65-year-old gentleman with type 2 diabetes mellitus and hypertension is started on an ACE-inhibitor.

Which of the following is the most appropriate time period to check his creatinine and potassium after commencing the medication?

(Please select 1 option)

<input type="checkbox"/>	24 hours after starting the medication
<input type="checkbox"/>	48 hours after starting the medication <span style="color: red;">❑ Incorrect answer selected</span>
<input checked="" type="checkbox"/>	One to two weeks after starting the medication <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Six hours after he takes the medication
<input type="checkbox"/>	Two months after starting the medication

Monitoring of renal function and potassium is important after commencement of an ACE inhibitor.

The optimum period to check this is one to two weeks after commencing the medication.

Six, 24 and 48 hours after starting the medication are too early to detect relevant changes. These answers should not be selected.

Two months after starting the medication is too late and should not be selected.

References:

[The Renal Association: Hypertension](#)

# Work Smart

Core Questions

Question 81 of 109

Urinary protein:creatinine ratio (PCR) represents a reliable way of quantifying proteinuria.

What PCR value in mg/mmol approximates to a 24-hour urine protein collection of 1 g?

(Please select 1 option)

<input type="checkbox"/>	10 mg/mmol	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	100 mg/mmol	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	500 mg/mmol	
<input type="checkbox"/>	750 mg/mmol	
<input type="checkbox"/>	1 g/mmol	

Urinary protein creatinine ratio is a spot test that has been shown to approximate 24-hour urinary protein collection reliably. It avoids the cumbersome nature of collecting urine over 24 hours.

Average individuals pass around 10 mmol urinary creatinine each day. Therefore:

- uPCR 25 = 250 mg protein/day
- uPCR 100 = 1000 mg protein/day

A 24-hour urinary protein collection of 1 g is therefore approximately equivalent to urinary PCR of 100 mg/mmol. The other values are incorrect and should not be selected.

Further Reading:

## Answer Statistics



Times answered: 6876

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.05%

Total Answered: 81

## Feedback

# Work Smart

Question 78 of 100

Creatinine has a number of limitations as an estimate of glomerular filtration rate (GFR), including variation with muscle mass and age.

Which of the following answers represents a novel marker of estimating GFR?

(Please select 1 option)

<input type="checkbox"/>	Alpha amyloid protein
<input checked="" type="checkbox"/>	Cystatin c <b>This is the correct answer</b>
<input type="checkbox"/>	Inulin
<input type="checkbox"/>	Insulin-like growth factor 1 (IGF-1)
<input type="checkbox"/>	Nystatin <b>Incorrect answer selected</b>

This question demonstrates knowledge of markers of glomerular filtration rate.

Serum creatinine has limitations as a marker of GFR.

Nystatin is an antifungal agent and not a marker of GFR.

Inulin is a valid marker of renal function and was used experimentally in the past for many years.

Alpha amyloid protein and IGF-1 have no role in estimating renal function.

# Work Smart

Question 79 of 100

A 75-year-old lady with metastatic lung small cell cancer is admitted with confusion, lethargy and hyponatraemia.

The admitting clinicians think that her presentation is compatible with a syndrome of inappropriate antidiuretic hormone (SIADH).

Which of the following medications is the appropriate treatment for this?

(Please select 1 option)

<input type="checkbox"/>	Demeclocycline	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Furosemide	
<input type="checkbox"/>	Intranasal desmopressin	
<input type="checkbox"/>	Intravenous 5% dextrose	
<input type="checkbox"/>	Spironolactone	<input type="checkbox"/> Incorrect answer selected

SIADH is the excess production of antidiuretic hormone (ADH) resulting in increased water retention at the distal tubules.

Among many causes, small cell cancer is associated with ADH secretion.

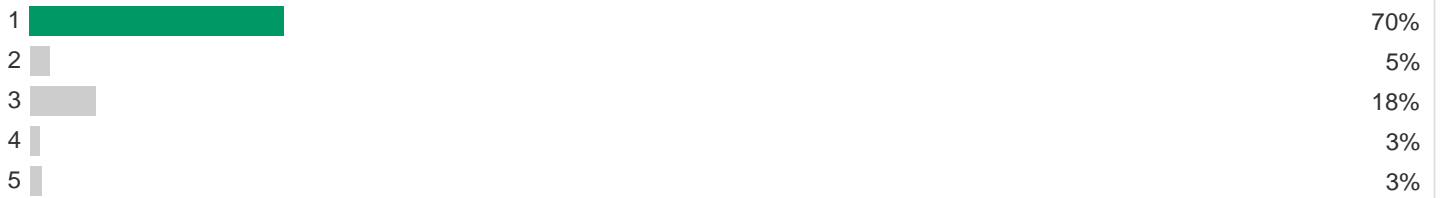
Demeclocycline will block the action of ADH on the distal tubules, thereby preventing water reabsorption.

Furosemide and spironolactone are diuretics and likely to lower serum sodium.

Intranasal desmopressin is equivalent to ADH and will worsen the situation, further lowering serum sodium.

Rehydration with 5% dextrose is likely to lower serum sodium more, so this should be avoided.

## Answer Statistics



Times answered: 6040

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 30.38%

Total Answered: 79

# Work Smart

Question 80 of 100

Which of the following criteria fit with a diagnosis of syndrome of inappropriate antidiuretic hormone secretion (SIADH)?

(Please select 1 option)

<input type="checkbox"/>	Hyperkalaemia
<input type="checkbox"/>	Hypernatraemia
<input type="checkbox"/>	Serum hyperosmolality
<input checked="" type="checkbox"/>	Urine osmolality greater than 100milliosmoles/kg <span style="color: green;">Correct</span>
<input type="checkbox"/>	Urine sodium less than 20mmol/litre

SIADH results in excess ADH production with subsequent excess water reabsorption at the distal tubules. The resulting picture is one of dilute serum and concentrated urine. It is characterised by the following essential criteria:

- normal renal, adrenal and thyroid function
- no recent use of diuretics
- clinical euvolaemia
- decreased serum osmolality (less than 275 milliosmoles/kg of water)
- increased urine osmolality (more than 100 milliosmoles/kg of water) in the context of hypotonic serum.

Hypernatraemia does not fit as the patient should be hyponatraemic in SIADH. The serum potassium

level is typically within normal limits.

Urine sodium less than 20 mmol/litre suggests a dilute rather than concentrated urine. The urine sodium is typically >20 mmol/litre in SIADH.

Further Reading:

Ellison D, Berl T. The syndrome of inappropriate antidiuresis. *N Engl J Med.* 17 May 2007;356(20):2064-72.

### Answer Statistics



Times answered: 6200

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 31.25%

# Work Smart

Question 82 of 109

Antidiuretic hormone (ADH) plays an important role in osmoregulation.

Which of the mechanisms listed most accurately describes the action of ADH on the kidney?

(Please select 1 option)

<input type="checkbox"/>	Carbonic anhydrase inhibition in the proximal tubule
<input type="checkbox"/>	Constriction of the efferent arteriole of the glomerular apparatus more than the afferent
<input type="checkbox"/>	Downregulation of sodium channel in the thick ascending limb of the loop of Henle
<input checked="" type="checkbox"/>	Insertion of aquaporin channels in the collecting duct of the kidney <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Insertion of ATP dependent sodium channels in the distal tubule <span style="color: red;">Incorrect answer selected</span>

ADH plays a crucial role in maintaining the normal concentration of the serum.

Released by the posterior pituitary, it results in the insertion of aquaporin channels in the collecting duct, allowing water reabsorption. ADH does not inhibit carbonic anhydrase, nor is it related to constriction of afferent or efferent arterioles.

ADH is not associated with action on the thick ascending limb of the loop of Henle, or in the distal tubule.

# Work Smart

Question 83 of 109

Which of the following is the recommended amount of sodium that should be given per day for a 70 kg adult male on maintenance intravenous fluids?

(Please select 1 option)

<input type="checkbox"/>	30 mmol
<input checked="" type="checkbox"/>	70 mmol <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	120 mmol
<input type="checkbox"/>	160 mmol
<input checked="" type="checkbox"/>	180 mmol <span style="color: red;">Incorrect answer selected</span>

Understanding sodium requirements is important especially when maintenance intravenous fluid prescriptions are required. Daily maintenance requirements vary between individuals and the clinical situation, but according to the most recent NICE guidelines for a 70 kg male the amounts prescribed for patients on maintenance fluids are:

- 25-30 ml/kg/day of water and
- approximately 1 mmol/kg/day of potassium, sodium and chloride and
- approximately 50-100 g/day of glucose to limit starvation ketosis.

Hartmann's solution contains 131 mmol sodium per litre, normal saline has 150 mmol/L and dextrose saline has 30 mmol/L.

## Reference & Further Reading:

[IV fluid prescription \(by body weight\) for routine maintenance over a 24-hour period](#)

### Answer Statistics

1		8%
2		34%
3		38%
4		15%
5		5%

Times answered: 6095

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.66%

Total Answered: 83

# Work Smart

Question 81 of 100

A 74-year-old gentleman with dementia is admitted from the nursing staff, with worsening confusion and inability to eat and drink.

He is clinically dehydrated and his serum sodium laboratory value is measured at 168 mmol/litre.

Assuming the normal serum sodium value is 140 mmol/litre, and his total body water is 40 litres, calculate the free water deficit.

(Please select 1 option)

<input type="checkbox"/>	1 litre
<input type="checkbox"/>	5 litres
<input checked="" type="checkbox"/>	8 litres <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	15 litres
<input type="checkbox"/>	20 litres <span style="color: red;">Incorrect answer selected</span>

The free water calculation is as follows:

$(\text{Serum sodium} - 140) / 140 \times \text{total body water} = \text{free water deficit in litres. } (168 - 140 / 140) = 0.2 \times 40 = 8 \text{ litres.}$

The calculation for free water deficit is demonstrated above. 1 litre and 5 litres are underestimates of the free water deficit and so these should not be selected. 15 litres and 20 litres are overestimates and these should not be selected.

# Work Smart

Question 82 of 100

Antidiuretic hormone (ADH) plays a crucial homeostatic role in osmoregulation.

From where is antidiuretic hormone released?

(Please select 1 option)

<input type="checkbox"/>	Adrenal medulla
<input checked="" type="checkbox"/>	Anterior pituitary <span style="color: red;">❌ Incorrect answer selected</span>
<input type="checkbox"/>	Hypothalamus
<input type="checkbox"/>	Posterior pituitary <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Right atrium

Antidiuretic hormone is synthesised in the hypothalamus and stored and released from the posterior pituitary.

The other locations described are incorrect and the other options should not be selected.

## Answer Statistics

# Work Smart

Question 84 of 109

A 56-year-old gentleman established on peritoneal dialysis presents with abdominal pain, fever and cloudy drainage.

A diagnosis of peritoneal dialysis (PD) peritonitis is suspected.

Which of the following laboratory findings is most useful in establishing the diagnosis of PD peritonitis?

(Please select 1 option)

<input type="checkbox"/>	Doubling in serum C reactive protein (CRP)
<input type="checkbox"/>	Doubling in serum creatinine
<input type="checkbox"/>	Neutrophils consisting 10% of total white cell count (WCC) in PD fluid
<input type="checkbox"/>	Raised serum amylase
<input checked="" type="checkbox"/>	White cell count > 100/mm <sup>3</sup> in PD fluid sample <span style="color: green;">Correct</span>

PD peritonitis is an important complication of peritoneal dialysis. The vignette describes a typical presentation.

A high suspicion for the diagnosis is required and empirical treatment is often started.

PD fluid WCC of greater than 100/mm<sup>3</sup> is diagnostic of PD peritonitis and should be selected.

Raised serum CRP may be associated but is not necessarily diagnostic.

Likewise, doubling of serum creatinine may have multiple reasons and should not be selected.

Although amylase may be raised there can be other intra-abdominal causes.

A PD fluid neutrophil percentage of greater than 50% and not 10% is in keeping with PD peritonitis.

## Answer Statistics



Times answered: 6172

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.67%

Total Answered: 84

## Feedback

# Work Smart

Question 85 of 109

A 34-year-old lady is brought into the emergency department with protracted seizures. Laboratory studies reveal that her serum sodium is 114 mmol/litre.

The attending physicians wish to treat her with 'hypertonic saline' - stronger than the normal physiologic concentration.

What is deemed to be the physiologic concentration of saline?

(Please select 1 option)

<input type="checkbox"/>	0.45%
<input checked="" type="checkbox"/>	0.9% <b>This is the correct answer</b>
<input type="checkbox"/>	1.2% <b>Incorrect answer selected</b>
<input type="checkbox"/>	3%
<input type="checkbox"/>	5%

There are few indications for hypertonic saline. Ongoing seizures secondary to hyponatraemia is one such indication.

There are a number of hypertonic saline solution concentrations above the normal physiological value of 0.9%. The question asks for the physiological saline concentration and so 0.9% is correct.

Other answers listed are not physiologic and should not be selected.

Saline at 0.45% concentration is often termed half normal saline.

The remaining options represent hypertonic saline concentrations that can be administered.

## Answer Statistics



Times answered: 6114

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.47%

Total Answered: 85

## Feedback

# Work Smart

Question 86 of 109

A 40-year-old gentleman required high doses of intravenous diuretics after his renal transplant for the purposes of fluid management.

Soon after administration, he developed hearing loss, tinnitus and vertigo.

Which diuretic is most likely to have caused this?

(Please select 1 option)

<input type="checkbox"/>	Acetazolamide
<input type="checkbox"/>	Bendroflumethiazide
<input checked="" type="checkbox"/>	Furosemide <b>Correct</b>
<input type="checkbox"/>	Spironolactone
<input type="checkbox"/>	Triamterene

Use of diuretics has variable side effects, predominantly electrolyte derangement.

Loop diuretics such as furosemide are associated with ototoxicity.

Thiazide diuretics such as bendroflumethiazide do not have this association; neither do potassium sparing diuretics such as spironolactone and triamterene.

Acetazolamide, a carbonic anhydrase inhibitor, is not usually associated with ototoxicity.

## Answer Statistics



Times answered: 6152

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 17.44%

Total Answered: 86

Feedback

Question Navigator

Revision Notes

# Work Smart

Question 87 of 109

A 72-year-old man presented with shortness of breath of two-month duration. He has been treated for rheumatoid arthritis for the past 30 years.

On examination, his blood pressure was 190/110 mmHg, he had bilateral pitting ankle oedema, fourth heart sound, bilateral basal crackles and arthritic changes in the hands, wrists, ankles and left knee.

Basic investigations revealed the following results:

Sodium	128mmol/L	(137-144)
Potassium	4.2 mmol/L	(3.5-4.9)
Urea	30 mmol/L	(2.5-7.0)
Creatinine	610 µmol/L	(60-110)
Glucose	7.8 mmol/L	(3-6)
Urinalysis	protein +++	

Ultrasound KUB shows right and left kidneys 10 cm and 10.6 cm respectively. There is no obstruction.

What is the cause of renal failure?

(Please select 1 option)

<input type="checkbox"/>	Acute glomerulonephritis
<input checked="" type="checkbox"/>	Amyloidosis <b>This is the correct answer</b>
<input type="checkbox"/>	Analgesic nephropathy

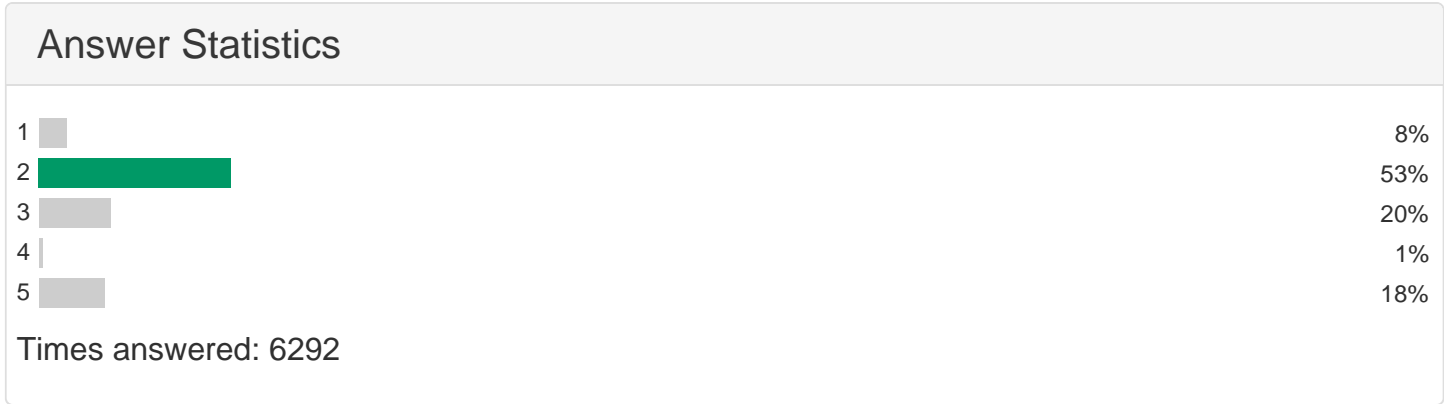
Chronic pyelonephritis
Hypertensive nephropathy <input type="checkbox"/> Incorrect answer selected

The presence of nephrotic syndrome in this scenario should lead you to consider amyloidosis. This is likely to be secondary to rheumatoid arthritis, which results in high levels of serum amyloid A protein. The kidneys are usually normal size, or slightly large. There can be associated cardiac dysfunction or restrictive cardiomyopathy. Hypertension is rare and is likely a distractor in this situation.

Hypertensive nephropathy is associated with minor proteinuria only (<0.5 g/day).

Acute glomerulonephritis presents more acutely, with both blood and protein in the urine.

Patients with chronic pyelonephritis typically have a history of recurrent urinary tract infections. Nephrotic syndrome is not classical, and the kidneys are typically small and scarred.



### Test Analysis

Correct	Incorrect	Partially Correct
Correct		

# Work Smart

Question 83 of 100

You perform a renal function test on a 25-year-old man and an 83-year-old lady.

Both of them have a creatinine level of 90 mmol/L. You note, however, that the estimated glomerular filtration rate (eGFR) for the young man is 95 ml/min/1.73m<sup>2</sup> and that the eGFR for the elderly lady is 55 ml/min/1.73m<sup>2</sup>.

Which of the following is the most likely explanation?

(Please select 1 option)

<input type="checkbox"/>	Age-related change to the medullary vasculature	<input type="checkbox"/> Incorrect answer selected
<input checked="" type="checkbox"/>	Age-related muscle loss in the elderly lady	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Increased glomerular filtration rate in the young man	
<input type="checkbox"/>	Increased muscle mass in the young man	
<input type="checkbox"/>	Reduced blood flow in the afferent arterioles of the cortex in the elderly lady	

Age-related muscle loss in the elderly lady is correct because there is a decline in glomerular filtration rate and plasma flow rate associated with age.

The creatinine level in the plasma does not increase because there is age-related muscle loss. A 'normal' creatinine in an elderly patient is thus not indicative of normal renal function and is a poor marker to establish whether an elderly patient has renal impairment. It is much more accurate to use estimated glomerular filtration rate (eGFR).

Age-related change to the medullary vasculature is incorrect because there is no change to medullary

vasculature associated with ageing.

Increased glomerular filtration rate in the young man is incorrect because this man has a normal glomerular filtration rate.

Increased muscle mass in the young man is incorrect because if there was increased muscle mass, the creatinine level could be normal or even high. This would however not explain why the elderly lady has a lower eGFR and 'normal' creatinine.

Reduced blood flow in the afferent arterioles of the cortex in the elderly lady should not be selected because, although there is reduced blood flow in the afferent arterioles of the cortex associated with ageing, this would not explain the relatively 'normal' level of creatinine in the elderly lady.

Reference:

Mangoni AA, Jackson SH. [Age-related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications](#). *Br J Clin Pharmacol*. 2004;57:6-14.

## Answer Statistics



Times answered: 6230

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

## Question 84 of 100

A 55-year-old male is admitted to hospital with a four-week history of breathlessness and dry cough. He has a medical history of longstanding asthma and intermittent tension headaches for which he takes simple analgesia.

On clinical examination, he appears pale and unwell. His blood pressure is 170/95 mmHg. Heart sounds are normal and the chest is clear. A few non-blanching skin lesions less than 5 mm in size are found on lower limbs.

Investigations show:

Haemoglobin	80 g/L	(130-180)
White cell count	$10 \times 10^9/L$	(4-11)
Neutrophils	$7 \times 10^9/L$	(1.5-7)
Lymphocytes	$1.8 \times 10^9/L$	(1.5-4)
Eosinophils	$1.2 \times 10^9/L$	(0.04-0.4)
ESR	55 mm/hr	(0-15)
CRP	45 mg/L	(<10)
Sodium	134 mmol/L	(137-144)
Potassium	4.7 mmol/L	(3.5-4.9)
Creatinine	650 mmol/L	(60-110 $\mu\text{mol/L}$ )

Urine dipstick shows blood ++ and protein +++.

Renal ultrasound: both kidneys normal in size, no evidence of urinary obstruction.

What is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/> Analgesic nephropathy	<input type="checkbox"/> Incorrect answer selected
<input checked="" type="checkbox"/> Churg-Strauss syndrome	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/> Goodpasture's disease	
<input type="checkbox"/> IgA nephritis	
<input type="checkbox"/> Renal amyloidosis	

Analgesic nephropathy is incorrect. This may cause insidious onset of renal failure but is not associated with elevated inflammatory markers, eosinophilia, or asthma.

Churg-Strauss syndrome (CSS) is the correct answer. Acute presentation with glomerulonephritis, eosinophilia, skin vasculitis, and elevated inflammatory markers on a background of longstanding asthma makes Churg-Strauss the most likely diagnosis.

CSS is a rare form of small-vessel vasculitis, characterised by asthma, allergic rhinitis and prominent peripheral blood eosinophilia. Rarely, it can cause either an anterior or a posterior ischaemic optic neuropathy, which presents with visual loss.

The most commonly involved organ is the lung, followed by the skin. CSS, however, can affect any organ system, including the cardiovascular, gastrointestinal, renal, and central nervous systems. The unifying feature of patients presenting with CSS is asthma. Vasculitis involving the peripheral nervous system is also a characteristic feature, and mononeuritis multiplex occurs in 75% of patients.

Vasculitis of extrapulmonary organs is largely responsible for the morbidity and mortality associated with CSS. 40-60% are associated with positive ANCA, usually pANCA/MPO. Intravenous glucocorticoid is used for initial therapy of acute multi-organ disease, followed by oral glucocorticoid therapy, often with azathioprine as a steroid-sparing agent. Loss of vision must be treated aggressively.

IgA nephritis is incorrect. IgA nephropathy can be associated with glomerulonephritis but does not explain the skin changes or the asthma.

Goodpasture's disease is incorrect. Goodpasture's disease is also a cause of a rapidly progressive glomerulonephritis. However, it is not classically associated with eosinophilia and would not explain the past history of asthma.

Renal amyloidosis is incorrect. The presentation in amyloidosis is usually chronic rather than acute and the renal ultrasound scan does not support amyloidosis which is usually associated with enlarged kidneys.

## Answer Statistics



Times answered: 6082

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 29.76%

Total Answered: 84

## Feedback

# Work Smart

Question 88 of 109

A 49-year-old smoker who had been diagnosed with diabetes mellitus two years ago was hospitalised because of a foot ulcer. Below knee amputation was performed because of necrotising fasciitis.

Pre-operatively, his serum creatinine measured 78  $\mu\text{mol/L}$ . After recovery from the operation, a repeat creatinine showed a level of 54  $\mu\text{mol/L}$ .

What is the most likely explanation for the decrease in serum creatinine level?

(Please select 1 option)

<input checked="" type="checkbox"/>	The kidney function did not improve but creatinine generation reduced after amputation <b>This is the correct answer</b>
<input type="checkbox"/>	The kidney improved with resolved inflammation
<input type="checkbox"/>	The nephrologist started dialysis
<input type="checkbox"/>	This is compatible with daily variation of creatinine level <b><input type="checkbox"/> Incorrect answer selected</b>
<input type="checkbox"/>	None of the above

The use of serum creatinine to estimate the glomerular filtration rate can be misleading when the patient has abnormal muscle mass (such as leg amputation).

We assume an improvement of kidney function when there is a falling creatinine level; this statement holds true only in the absence of a large change in muscle mass (or meat intake).

The generation of creatinine is primarily determined by dietary intake and muscle mass, which probably accounts for the apparent 'improvement' in the creatinine level after an amputation.

Dialysis cannot be chosen as an explanation for the decrease in serum creatinine level in this instance because the question mentioned no clear indication for dialysis.

## Answer Statistics



Times answered: 6086

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 17.05%

Total Answered: 88

## Feedback

# Work Smart

Question 85 of 100

A 77-year-old chronic smoker presented with toe gangrene. He suffered from diabetes mellitus and had a shrunken right kidney.

The patient had a serum creatinine level of 340  $\mu\text{mol/L}$  before this admission. Neither dorsalis pedis nor posterior tibial pulses were palpable. He was assessed by the vascular surgeon, who recommended a magnetic resonance angiography (MRA) with gadolinium (in order to minimise the risk of contrast-induced nephropathy).

What opinion would you formulate?

(Please select 1 option)

<input type="checkbox"/>	Adequate hydration before gadolinium administration should solve the problem
<input type="checkbox"/>	Diabetes mellitus is a contraindication for magnetic resonance angiography
<input checked="" type="checkbox"/>	The magnetic resonance angiography with gadolinium is not recommended because it carries a risk of nephrogenic systemic fibrosis <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	This patient should be administered N-acetylcysteine before receiving gadolinium
<input type="checkbox"/>	This patient should be offered imaging with gadolinium because he had a high risk for iodinated radio contrast-induced nephropathy <span style="color: red;">Incorrect answer selected</span>

According to the latest guidelines, the need for a gadolinium-based contrast study should be carefully considered in any patient with chronic kidney disease stage 3 or greater.

Our patient, in other words, had a high risk for this condition of nephrogenic systemic fibrosis (NSF) with potentially fatal consequence. Because of a higher dose requirement of gadolinium in

angiography, the odds of NSF are even higher for the patient.

This toxicity of gadolinium cannot be circumvented by hydration or N-acetylcysteine; they are considered to be more appropriate for preventing radio contrast-induced nephropathy.

### Answer Statistics



Times answered: 6071

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 29.41%

Total Answered: 85

# Work Smart

Question 89 of 109

You are asked to see an orthopaedic patient who developed renal failure after a two-week course of gentamicin.

No features of hypovolaemia or sepsis are evident. You suspect a diagnosis of aminoglycoside-induced acute tubular necrosis.

Which of the following fit the diagnosis?

(Please select 1 option)

<input type="checkbox"/>	The patient's acute renal failure usually appears within two days of gentamicin
<input checked="" type="checkbox"/>	The patient is non-oliguric <b>This is the correct answer</b>
<input type="checkbox"/>	The urine microscopy shows active red cell casts
<input type="checkbox"/>	We expect an irreversible renal failure <b>Incorrect answer selected</b>
<input type="checkbox"/>	All of above

The correct answer is that the patient is non-oliguric. The reversible acute tubular necrosis after aminoglycoside reflects a concurrent impairment in the concentrating ability, and most patients are non-oliguric.

We expect a diagnosis of acute renal failure beginning more than five days after the initiation of gentamicin; the suggestion that acute renal failure usually appears within two days of gentamicin is therefore incorrect.

The urine sediment should either be benign or show granular or epithelial cell casts.

The doctor's role is to ensure no hypovolaemia, sepsis, or catabolic state, all of which will defer tubular regeneration (recovery). Irreversible tubulointerstitial damage, however, is uncommon after discontinuing aminoglycoside.

## Answer Statistics



Times answered: 6055

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.85%

Total Answered: 89

## Feedback

# Work Smart

Question 90 of 109

A 40-year-old woman was referred for proteinuria (2.6 g daily). Her serum creatinine level was 120  $\mu\text{mol/L}$ . The referral letter mentioned a low serum complement C3 level.

With reference to the latter information, which of the following comments are relevant to her disease?

1. A history of infective endocarditis is of relevance.
2. A detailed medical history and physical examination to search for infection focus.
3. Diagnosis of myeloma should be suspected.
4. Hepatitis B and C serology should be sought.
5. Laboratory testing should include anti-nuclear antibody (ANA) and anti-double-stranded DNA antibody.

(Please select 1 option)

<input type="checkbox"/>	1 and 4
<input type="checkbox"/>	2 only
<input type="checkbox"/>	3 and 4
<input checked="" type="checkbox"/>	All except 3 <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	All of above <span style="color: red;">Incorrect answer selected</span>

This is a case of hypocomplementaemia glomerular disease. Differential diagnosis should include:

- Postinfectious glomerulonephritis (classically infective endocarditis)
- Lupus nephritis

- Membranoproliferative glomerulonephritis
- Mixed cryoglobulinaemia

Her proteinuria points to glomerular pathology. Glomerular diseases with low complement levels narrow down the differential diagnosis.

Membranoproliferative glomerulonephritis is classically associated with decreased serum C3 (and a normal C4, indicating activation of the alternative pathway of complement). This indicates one form of chronic immune complex disease (see above for the common examples).

On the other hand, lupus nephritis is associated with activation of the classical pathway and often associated with suppression of both C3 and C4. This is considered a correct answer although the question did not mention the C4 level.

The median age at diagnosis of multiple myeloma is 70 years, much older than this case.

Renal impairment is unrelated to immune complex; it occurs mostly as a result of direct tubular damage from excess protein load, dehydration, hypercalcaemia, and the use of nephrotoxic medications.

## Answer Statistics



Times answered: 6135

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 86 of 100

An elderly man was hospitalised because of viral encephalitis for which he received aciclovir intravenously.

There was a decline in the urine output five days later. A nephrologist in consultation suggested aciclovir-induced acute kidney injury.

Which of the following characteristics are compatible with the diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Renal ultrasound is expected to show hydronephrosis
<input checked="" type="checkbox"/>	The mechanism is tubular obstruction <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	The patient should be asymptomatic apart from decrease in the urine output
<input type="checkbox"/>	The urine microscopy does not add information
<input type="checkbox"/>	This patient's renal function typically begins to deteriorate three weeks after aciclovir therapy <span style="color: red;">Incorrect answer selected</span>

Intravenous doses of aciclovir, which has a relatively low solubility, can lead to deposition of aciclovir crystals in the renal tubules, resulting in intratubular obstruction and foci of interstitial inflammation. This occurs more often in a dehydrated patient.

The decline in renal function is expected to begin shortly after aciclovir therapy, rather than three weeks after therapy.

No hydronephrosis is seen because the obstruction is intratubular (and not ureteral).

However, the patient will complain of flank or abdominal pain (presumably due to urinary tract obstruction).

In some cases, birefringent needle-shaped aciclovir crystals can be seen in the patient's urine (particularly under polarised light), so the urine microscopy may indeed add information.

This condition can be prevented by prior hydration and slow drug infusion.

## Answer Statistics



Times answered: 6095

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 29.07%

Total Answered: 86

# Work Smart

Question 91 of 109

A 48-year-old teacher came to the nephrology clinic; he was found to have stage 3 chronic kidney disease during a health check. He wished to discuss future renal replacement therapy.

Which of the following is/are considered to be contraindication/s to peritoneal dialysis?

1. Presence of colostomy
2. Heparin allergy
3. Hepatitis B infection
4. History of complex abdominal surgery with adhesion

(Please select 1 option)

<input checked="" type="checkbox"/> 1 and 4	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/> 1, 3 and 4	
<input type="checkbox"/> 4 only	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/> All of the above	
<input type="checkbox"/> None of the above	

Peritoneal dialysis makes use of a closed system (peritoneal cavity) to allow effective dialysis.

Colostomies are thought to increase the risk of peritonitis with peritoneal dialysis. The decision to use PD in patients with a colostomy or ileostomy is based on individuals, but they are thought to be relative contraindications and haemodialysis is often felt to be more appropriate.

Complex abdominal surgery and resultant extensive adhesion damage the peritoneal membrane (peritoneal fibrosis) and lead to compartments within the peritoneum. This is now considered a relative contraindication to peritoneal dialysis.

Heparin anticoagulation, in contrast to extracorporeal haemodialysis therapy, is not needed for peritoneal dialysis.

Simple abdominal surgery, however, does not preclude peritoneal dialysis; examples include cholecystectomy, appendectomy or caesarian section.

## Answer Statistics



Times answered: 6250

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.48%

# Work Smart

Core Questions

Question 87 of 100

A 25-year-old lady with SLE (anti-nuclear antibody positive [1:6400], anti-dsDNA antibody positive) presents with a few weeks' history of feeling generally unwell, tired, worsening malar rash, and has mild pedal oedema.

On examination, the BP is 190/100 mm Hg, and there are 3+ proteins, 3+ blood in her urine.

What is the diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Diffuse proliferative glomerulonephritis	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Membranous glomerulonephritis	
<input type="checkbox"/>	Mesangial glomerulonephritis	
<input type="checkbox"/>	Minimal change glomerulonephritis	
<input type="checkbox"/>	Nephrotic syndrome	<input type="checkbox"/> Incorrect answer selected

Hypertension, pedal oedema, nephritic urinary sediments (blood and protein positive) in a patient with systemic lupus erythematosus (SLE) suggests the diagnosis of class IV (diffuse proliferative glomerulonephritis) or class III (focal segmental glomerulonephritis) lupus nephritis. ds-DNA antibodies increase the risk of lupus nephritis.

Mesangial glomerulonephritis presents with mild proteinuria.

Minimal change, or membranous glomerulonephritis present with proteinuria, which may be in the nephrotic range.

The renal manifestations of SLE are highly variable, ranging from mild asymptomatic proteinuria and/or haematuria to rapidly progressive uraemia. The various presentations are difficult to classify into clinical syndromes and histological classes. Although lupus nephritis affects a third of patients early in the disease it is frequently unrecognised until nephritic and/or nephrotic syndrome with renal failure occur.

Histologically, a number of different types of renal diseases are recognised in SLE, with immune-complex mediated glomerular disease being the most common.

The standard classification divides these into five different patterns:

- I - No disease
- II - Mesangial
- III - Focal proliferative
- IV - Diffuse proliferative
- V - Membranous.

Mesangial nephritis represents the earliest and mildest form of glomerular involvement. It presents clinically as microscopic haematuria and/or proteinuria. Hypertension is uncommon and nephrotic syndrome and renal impairment are very rarely seen. Biopsy demonstrates segmental areas of increased mesangial matrix and cellularity. The prognosis is good and specific treatment is indicated only if the disease progresses.

Focal proliferative disease is more advanced, but still affects less than 50% of glomeruli. Haematuria and proteinuria is almost always seen, and nephrotic syndrome, hypertension and elevated creatinine may be present. Electron microscopy shows immune deposits in the subendothelial space of the glomerular capillary wall and the mesangium. Prognosis is variable.

Diffuse proliferative glomerulonephritis is the most common and severe form of lupus nephritis. Haematuria and proteinuria are almost always present, and nephrotic syndrome, hypertension and renal impairment common. Biopsies demonstrate profuse deposits of IgG within the glomeruli. Immunosuppressive therapy is required in these cases to prevent progression to end-stage renal failure.

Patients with membranous lupus nephritis tend to present with nephrotic syndrome. Microscopic haematuria and hypertension may also be seen. Biopsies show diffuse thickening of the glomerular capillary wall. Progression is variable, and immunosuppression is not always needed.

With regard to the management of lupus nephritis, a biopsy is indicated in those patients with abnormal urinalysis and/or reduced renal function. This can provide a histological classification as well as information regarding activity, chronicity and prognosis.

Cyclophosphamide, mycophenolate mofetil and azathioprine reduce mortality in proliferative forms of lupus glomerulonephritis.

## Reference:

1. Contreras G et al. [Lupus nephritis: a clinical review for practicing nephrologists](#). *Clin Nephrol.* 2002;57:95-107.
2. Molino C et al. [Clinical approach to lupus nephritis: recent advances](#). *Eur J Intern Med.* 2009;20:447-53.

## Answer Statistics



Times answered: 7200

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 28.74%

Total Answered: 87

# Work Smart

Core Questions

## Question 92 of 109

A 60-year-old man presents to nephrology clinic with fatigue. He has a history of stage four chronic kidney disease, secondary to hypertension.

A full blood count reveals a normocytic anaemia with a haemoglobin concentration of 97 g/L. White cell count and platelets are within normal limits.

You are considering commencing treatment for his anaemia.

What is the most appropriate investigation to help guide treatment?

(Please select 1 option)

<input type="checkbox"/>	Peripheral blood film
<input type="checkbox"/>	Serum erythropoietin
<input checked="" type="checkbox"/>	Serum ferritin <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Serum lactate dehydrogenase
<input type="checkbox"/>	Urinary 24 hour creatinine clearance <span style="color: red;">Incorrect answer selected</span>

Renal-related anaemia can start to develop at this stage as an alteration in erythropoietin production occurs. It is worsened by reduced dietary intake of iron due to anorexia, impaired intestinal absorption of iron, toxic effect of uraemia on erythroid precursors and reduced red blood cell survival.

It is imperative that renal patients avoid repeated blood transfusion, unless in extremis, so that future renal transplantation will not be precluded by allo-sensitisation.

Before initiation of recombinant erythropoiesis-stimulating agents the patient should be iron replete.

The serum ferritin and transferrin saturation should be checked, as most patients will be iron deficient.

Targets for treatment are:

- haemoglobin 105-125 g/L
- ferritin >100 µg/L in pre-dialysis and peritoneal dialysis patients, >200 µg/L in haemodialysis patients, and
- transferrin saturation >20%

Measurement of serum erythropoietin adds no benefit when diagnosing and managing anaemia in chronic kidney disease due to the unreliability of the test.

With a normal white cell and platelet count, a peripheral blood film is not indicated as an initial investigation.

Serum lactate dehydrogenase is not indicated as there is no indication of haemolysis from the history.

Urinary 24 hour creatinine clearance may be useful in the assessment of renal disease but will not aid further evaluation of anaemia in this case.

### Answer Statistics



Times answered: 6832

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 88 of 100

A 42-year-old woman presents to nephrology clinic. She has end stage renal disease due to type 1 diabetes mellitus, and is awaiting transplant. She has been using peritoneal dialysis for six months.

She is complaining of fatigue and you note her haemoglobin to be 96 g/L. You are considering commencing erythropoietin treatment.

What is the most common side effect of erythropoietin when used in patients with chronic kidney disease?

(Please select 1 option)

<input type="checkbox"/>	Blurred vision
<input type="checkbox"/>	Hepatotoxicity
<input checked="" type="checkbox"/>	Hypertension <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Hypokalaemia <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Thrombocytopenia

Erythropoietin therapy may be considered in patients with chronic kidney disease who have anaemia to increase haemoglobin concentration to 110-120 g/L.

Serious side-effects of erythropoietin, when used in chronic kidney disease, are:

- hypertension - 20% of patients require increased antihypertensive therapy
- seizures
- thromboembolic disease

- anaphylaxis
- failure of treatment - this may be due to untreated iron deficiency, marrow fibrosis, drug therapy, development of antibodies against the treatment, testosterone deficiency in males, or poor compliance.

Blurred and hepatotoxicity are not recognised side effects.

New or worsening hypertension is a common side effect of erythropoietin therapy. Twenty percent of patients will require increased antihypertensive therapy. Erythropoietin may even precipitate a hypertensive crisis.

Hypokalaemia is not a recognised side effect. Instead, hyperkalaemia may occur.

Thrombocytopenia is not a recognised side effect. A dose-dependent rise in platelet count is common, due to erythropoietin affinity for thrombopoietin receptors.

### Answer Statistics



Times answered: 6132

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 93 of 109

A 79-year-old woman presents to the Emergency Department following a mechanical fall, resulting in a left fractured neck of femur and a long-lie of 14 hours.

She is oliguric; her urine is dark in colour and shows 4+ to haemoglobin on urine dipstick.

Which of the following is consistent with a diagnosis of rhabdomyolysis?

(Please select 1 option)

<input checked="" type="checkbox"/>	Hypocalcaemia <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Hypokalaemia
<input type="checkbox"/>	Hyponatraemia
<input type="checkbox"/>	Hypophosphataemia
<input type="checkbox"/>	Thrombocytopenia <span style="color: red;">Incorrect answer selected</span>

Her urine is dark due to myoglobin.

Dipstick will be positive for blood (a false positive). On microscopy, no red cells are seen although there may be pigmented granular casts.

As serum calcium is bound to damaged muscle, rhabdomyolysis may result in hypocalcaemia. Around 20% of patients become hypercalcaemic during recovery as this bound calcium is remobilised.

Hypokalaemia is not a typical feature of rhabdomyolysis. Instead, hyperkalaemia may be present and is a life-threatening complication of the syndrome. It occurs because potassium is released from

necrotic myocytes and this is exacerbated in the context of acute kidney injury and metabolic acidosis.



However, severe hypokalaemia is considered as one of the causes of rhabdomyolysis.

Hyponatraemia is not a typical feature of rhabdomyolysis. Instead, sodium may be high if the patient is water deplete following trauma.

Hypophosphataemia is not a typical feature of rhabdomyolysis. Phosphate may instead be normal or high. However, severe hypophosphataemia is considered as one of the causes of rhabdomyolysis.

Thrombocytopenia would warrant consideration of an alternate diagnosis. It is not a typical feature of rhabdomyolysis.

## Answer Statistics

1		41%
2		9%
3		14%
4		23%
5		12%

Times answered: 7206

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 94 of 109

An 85-year-old woman presents to the medical intake with oliguria and dark urine following a mechanical fall and a long-lie of 20 hours.

She has acute kidney injury with a glomerular filtration rate of 32 ml/min/1.73m<sup>3</sup> and creatine kinase is raised at 25,000 (normal range 25-195 iu/l).

You commence initial therapy and prescribe her regular medications.

Which of her medications is it most important to stop in these circumstances?

(Please select 1 option)

<input type="checkbox"/>	Aspirin 75 mg PO OD
<input type="checkbox"/>	Oral calcium supplements
<input type="checkbox"/>	Paracetamol 1 g PO QDS
<input type="checkbox"/>	Salbutamol inhaler PRN
<input checked="" type="checkbox"/>	Simvastatin 40 mg PO ON <span style="color: green;">Correct</span>

Initial management is that of rehydration and correction of electrolyte disturbances. The biochemical features of rhabdomyolysis are raised creatine kinase, hypocalcaemia, hyperkalaemia and acute kidney injury.

Administration of bicarbonate in cases where the urine pH is less than 6.5 despite fluid repletion has been advocated.

Statins should be avoided in patients with rhabdomyolysis due to myotoxicity.

In those taking statins the risk of sporadic rhabdomyolysis is 0.44 per 10,000 patients per year.

Relatively safe in these circumstances are:

- aspirin
- oral calcium
- paracetamol, and
- inhaled salbutamol.

Statins are myotoxic and can cause rhabdomyolysis independent from trauma. They should be stopped in any patient presenting with the syndrome.

### Answer Statistics



Times answered: 6085

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 95 of 109

A 48-year-old woman patient presents to the medical intake with bilateral leg swelling.

Urine dipstick shows 4+ protein and serum albumin is 14 g/l (normal range 35-50 g/l). Renal function is within normal range.

Further urinalysis indicates nephrotic-range proteinuria. Further to this, a renal biopsy is performed which shows thickened glomerular capillary loops.

Which of the following may be a cause for this presentation?

(Please select 1 option)

<input type="checkbox"/>	<i>Candida</i> spp.
<input type="checkbox"/>	<i>Escherichia coli</i> 0157:H7 <input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	<i>Helicobacter pylori</i>
<input checked="" type="checkbox"/>	Hepatitis B <input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	<i>Mycoplasma</i> spp.

Membranous nephropathy is the second most common cause of nephrotic syndrome in adults in western countries, accounting for 22-33% of cases and coming in just behind focal segmental glomerulosclerosis. It is primary (idiopathic) in two-thirds of cases.

Secondary causes include:

- autoimmune disease

- infections
- drugs (captopril, gold, nonsteroidal anti-inflammatory drugs [NSAIDs]), or
- malignancy.

Infectious causes of membranous nephropathy include:

- hepatitis B
- hepatitis C
- syphilis, and
- malaria.

It can also be seen in HIV although this disease is more often associated with a focal glomerulosclerosis.

*Candida* spp. are not causes of membranous nephropathy.

Although related to haemolytic-uraemic syndrome, *Escherichia coli* 0157 is not a cause of membranous nephropathy.

*H. pylori* is related to peptic ulcer disease and is not a cause of membranous nephropathy.

Hepatitis B is a secondary cause of membranous nephropathy and patients with this syndrome should be tested.

Although a cause of atypical pneumonia, *Mycoplasma* spp. is not a cause of membranous nephropathy.

## Answer Statistics



Times answered: 6125

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 96 of 109

A 20-year-old woman presents to the acute medical intake with lethargy and confusion.

On examination you note a purpuric rash covering the abdominal wall and thighs and a fever of 38°C. Investigations reveal a haemolytic anaemia, thrombocytopenia and acute kidney injury.

Which feature of the presentation makes the diagnosis of thrombotic thrombocytopenic purpura more likely than haemolytic-uraemic syndrome?

(Please select 1 option)

<input type="checkbox"/>	Acute kidney injury
<input checked="" type="checkbox"/>	Confusion <b>This is the correct answer</b>
<input type="checkbox"/>	Fever
<input type="checkbox"/>	Haemolytic anaemia
<input type="checkbox"/>	Thrombocytopenia <b>Incorrect answer selected</b>

Thrombotic thrombocytopenic purpura (TTP) and haemolytic-uraemic syndrome (HUS) have overlapping clinical features, with up to 60% of TTP patients missing at least one component of the classical pentad and around 30% of HUS patients having neurological symptoms and fever.

Acute kidney injury can be present in both conditions. It is typically more severe in haemolytic-uraemic syndrome. Neurological symptoms are much less common in patients presenting with haemolytic-uraemic syndrome.

Fever, haemolytic anaemia, and thrombocytopenia can be present in both conditions.

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## Work Smart

Question 96 of 109

A 20-year-old woman presents to the acute medical intake with lethargy and confusion.

On examination you note a purpuric rash covering the abdominal wall and thighs and a fever of 38°C. Investigations reveal a haemolytic anaemia, thrombocytopenia and acute kidney injury.

Which feature of the presentation makes the diagnosis of thrombotic thrombocytopenic purpura more likely than haemolytic-uraemic syndrome?

(Please select 1 option)

<input type="checkbox"/>	Acute kidney injury
<input type="checkbox"/>	Confusion
<input type="checkbox"/>	Fever
<input type="checkbox"/>	Haemolytic anaemia
<input type="checkbox"/>	Thrombocytopenia

Skip question

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 97 of 109

You are auditing the nephrology department's rates of peritoneal dialysis peritonitis, observing the proportion of cases that are culture positive and the associated organism.

In the United Kingdom, what is the most common causative organism in peritoneal dialysis peritonitis?

(Please select 1 option)

<input type="checkbox"/>	Coagulase negative <i>Staphylococcus</i> <input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	<i>Enterococcus</i> spp.
<input type="checkbox"/>	<i>Escherichia coli</i>
<input type="checkbox"/>	<i>Pseudomonas</i> spp.
<input checked="" type="checkbox"/>	<i>Staphylococcus aureus</i> <input type="checkbox"/> Incorrect answer selected

Around 10-30% of cases are culture negative.

At 20-25% overall, coagulase negative *Staphylococcus* is the most commonly cultured organism. With improved hygiene and technique, rates of staphylococcal infection are falling.

Intra-abdominal pathology (such as a ruptured viscus) should be considered if more than one organism is grown, especially if Gram-negative or anaerobic.

Repeated treatment increases the risk of resistant organisms. This may require loss of catheter and switch to haemodialysis.

Coagulase negative *Staphylococcus* is the most commonly cultured organism in peritoneal dialysis

peritonitis. It represents 20-25% of cases. It is a skin commensal that opportunistically causes infection through the catheter site.

*Enterococcus* represents 1-5% of cases and occurs less frequently than coagulase-negative *Staphylococcus*.

*Escherichia coli* is less common.

Overall, Gram-negative organisms represent 10-15% of cases.

*Pseudomonas* represents 5% of cases and occurs less frequently than coagulase-negative *Staphylococcus*.

*Staphylococcus aureus* represents 10-15% of cases and occurs less frequently than coagulase-negative *Staphylococcus*.

## Answer Statistics

1		25%
2		7%
3		14%
4		4%
5		50%

Times answered: 6117

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 98 of 109

You are reviewing the guidelines for GP referral to the hospital service for possible renal artery stenosis because of an increase in the number of referrals over the past few months.

Which of the following correctly reflects a criterion for a patient who should be referred for further investigations?

(Please select 1 option)

<input type="checkbox"/>	BP >150/90 mmHg despite 2 anti-hypertensives
<input type="checkbox"/>	Fall of GFR >10% during first 2 months after starting an ACE inhibitor
<input checked="" type="checkbox"/>	Fall of GFR >15% over 12 months <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Pulmonary oedema with reduced LV function <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Unexplained hyperkalaemia with hypertension

Current UK guidelines with regard to chronic kidney disease recommend referral for further investigation of atherosclerotic renal artery stenosis when there is:

- Refractory hypertension (BP >150/90 mmHg despite 3 antihypertensives)
- Recurrent episodes of pulmonary oedema despite normal left ventricular function
- Rise of >20% serum creatinine or fall of GFR >15% over 12 months with high clinical suspicion of widespread atherosclerosis, or during the first 2 months after initiation with an ACE inhibitor or angiotensin receptor blocker.

Further Reading:

## Answer Statistics



Times answered: 6098

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 16.33%

Total Answered: 98

## Feedback

# Work Smart

Core Questions

Question 89 of 100

You are taking part in a clinical trial for a new monoclonal antibody designed to increase the population of T regulatory cells for treating a range of T cell mediated autoimmune disorders.

Which of the following is a feature of T regulatory cells?

(Please select 1 option)

<input type="checkbox"/>	20% of mature CD4 positive cells are regulatory T cells
<input checked="" type="checkbox"/>	CD4+ CD25+ are thought to be the most important T regulatory cell population <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	No CD8+ T regulatory cells exist
<input type="checkbox"/>	Regulatory cells do not express CD3 receptors
<input type="checkbox"/>	They produce large amounts of IL-2 <span style="color: red;">Incorrect answer selected</span>

CD4+ CD25+ Fox-P3 + T regulatory cells are thought to be the most important T regulatory cell population. They are thought to play an important role in regulating immune responses after invading organisms have been tackled and preventing the development of autoimmunity.

Regulatory T cells are not thought to produce IL-2.

A small population of CD8+ human regulatory T cells has been identified in addition to the larger population of CD4+ regulatory cells.

All T cells express the CD3 receptor, and in humans 5-10% of CD4+ cells are regulatory T cells.

# Work Smart

Core Questions

Question 99 of 109

A 64-year old man is admitted to the Emergency Department.

A recent discharge letter lists his comorbidities as diet controlled diabetes mellitus, chronic renal failure, angina, hypercholesterolaemia and hypertension.

He drinks between four to six units per day and is an ex-smoker with a 20 pack year history. You note blood tests from one month ago indicating a urea of 21 mmol/L and creatinine of 600 µmol/L.

He describes a sudden onset retrosternal pain that started 12 hours previously and is sharp and pleuritic.

On examination, he is distressed but haemodynamically stable with a blood pressure of 133/57 mmHg, a heart rate of 78 and oxygen saturations of 99% on air. He is hunched forward as he feels this makes the pain better. He does not have a fistula in situ.

His heart sounds are dual with no murmurs and there are fine bibasal crepitations on respiratory examination. You can not discern a raised JVP but there is mild bilateral pitting oedema to mid calf.

An ECG reveals ST elevation in all leads. A chest radiograph indicates mild pulmonary oedema with no cardiomegaly. A full blood count is normal and electrolytes reveal:

Sodium	140 mmol/L
Potassium	5.2 mmol/L
Urea	44 mmol/L
Creatinine	746 µmol/L

What is the most appropriate management for this patient?

(Please select 1 option)

CT angiogram
Haemodialysis <input checked="" type="checkbox"/> This is the correct answer
Omeprazole and oesophagogastroduodenoscopy
Primary coronary angioplasty <input type="checkbox"/> Incorrect answer selected
Treatment dose low molecular weight heparin and CT pulmonary angiogram

The most likely diagnosis in the patient is uraemic pericarditis. We do not have enough history to discern how his kidney disease is usually managed, but in the presence of pericarditis haemodialysis is required.

Other hard indications for acute haemodialysis are hyperkalaemia, acidosis and pulmonary oedema not responding to medical treatment.

Softer indications include other uraemic symptoms and anuria without any hard indications.

- Aortic dissection is typically a sharp pain radiating to the back. The long history and ECG changes make this diagnosis unlikely.
- Haemodialysis is appropriate in this patient with uraemic pericarditis.
- Omeprazole and oesophagogastroduodenoscopy would be inappropriate as there is no suggestion of upper gastrointestinal pathology.
- Primary coronary angioplasty would not be suitable for this patient as the ECG changes of global ST segment elevation relate better to pericarditis than acute coronary syndrome.
- The history and ECG changes fit better with pericarditis than a pulmonary embolism; therefore treatment with dose low molecular weight heparin and CTPA would be inappropriate.

## Answer Statistics

1		8%
2		68%
3		3%
4		12%
5		10%

Times answered: 6176

# Work Smart

Question 90 of 100

A 22-year-old woman presents with features of nephrotic syndrome and a renal biopsy is performed. What would you expect to see on light and electron microscopy if you were expecting a diagnosis of minimal change disease?

(Please select 1 option)

<input type="checkbox"/>	Fusion of foot processes of podocytes is seen on light microscopy
<input type="checkbox"/>	In advanced disease there is hyalinisation of glomeruli seen on light microscopy
<input checked="" type="checkbox"/>	The glomerular basement membrane is normal on electron microscopy <b>This is the correct answer</b>
<input type="checkbox"/>	Tubules may show calcification in lining cells on light microscopy
<input type="checkbox"/>	Wire-loop lesions are seen on light microscopy <b>Incorrect answer selected</b>

Minimal change disease is typically seen in children less than 6-years-old and in a minority of adults with nephrotic syndrome.

There is no glomerular abnormality on light microscopy.

Electron microscopy shows effacement of the foot processes of podocytes (visceral epithelial cells) and a normal basement membrane.

Treatment is with steroids; disease remission often occurs within two weeks although relapse may occur.

- Fusion of foot processes of podocytes is seen on electron microscopy, not light microscopy.
- There is no hyalinisation; this is an abnormality seen in other renal diseases, such as amyloidosis.
- The glomerular basement membrane is normal on electron microscopy, though there is an abnormality of podocytes with fusion of foot processes.
- Tubules may show accumulation of lipid in lining cells on light microscopy, but not calcification.
- Light microscopy reveals no glomerular abnormalities. Wire-loop lesions are seen in post-infectious glomerulonephritis and lupus nephritis.

### Answer Statistics



Times answered: 6098

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 100 of 109

A 22-year-old woman presents with right loin pain, oliguria and coke-coloured urine.

Blood pressure is increased at 160/70 mmHg and urinary dipstick shows protein ++++ and blood ++++. Microscopy is awaited.

Blood tests reveal:

Hb	126 g/L	(115 - 165)
WCC	$8.4 \times 10^9/L$	(4 - 11)
Platelets	$412 \times 10^9/L$	(150 - 400)
Na	137 mmol/L	(137 - 144)
K	5.7 mmol/L	(3.5 - 4.9)
Creatinine	263 $\mu\text{mol/L}$	(60 - 110)
Urea	25.2 mmol/L	(2.5 - 7.5)

What is the most appropriate next investigation of this patient?

(Please select 1 option)

<input type="checkbox"/>	DMSA scan
<input type="checkbox"/>	Plain abdominal KUB <span style="color: red;">❑ Incorrect answer selected</span>
<input type="checkbox"/>	Renal angiography
<input type="checkbox"/>	

Renal biopsy	
Renal ultrasound scan	<input checked="" type="checkbox"/> This is the correct answer

Although this patient has features of nephritic syndrome and may warrant biopsy in the future, a renal ultrasound scan is the best next investigation.

Renal ultrasound allows one to assess kidney size, the presence of hydronephrosis, cysts or tumours and any developmental abnormalities. Doppler traces also allow renal blood flow to be assessed.

If a clear identifiable precipitant is identified as the cause of the acute kidney injury an ultrasound may not be appropriate.

If a patient is in acute urinary retention and their creatinine falls spontaneously with the insertion of a catheter, they do not necessarily need an ultrasound.

If a patient has had an insult such as profound hypotension or has AKI in the context of sepsis with a previously normal creatinine, an ultrasound will not add much to the diagnosis unless they fail to recover with time.

However, the above patient warrants ultrasound imaging.

- A DMSA scan is not indicated for this patient.
- A plain abdominal KUB is less frequently used compared to a CT KUB for stone disease, however, this patient has nephritis.
- Angiography is not indicated for this patient.
- A renal biopsy may be indicated in the future, but an ultrasound should be performed first.

A renal ultrasound scan should be performed in all patients with acute kidney injury, unless a clear treatable cause is identified.

### Answer Statistics



Times answered: 6061

# Work Smart

Question 91 of 100

A 69-year-old man developed *Pseudomonas aeruginosa* infection.

He was started on gentamicin.

Aminoglycoside nephrotoxicity correlates with which one of the following?

(Please select 1 option)

<input checked="" type="checkbox"/>	Frequency of aminoglycoside dosing <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	High peak and low trough aminoglycoside levels
<input type="checkbox"/>	Ototoxicity
<input type="checkbox"/>	Post-antibiotic effect
<input type="checkbox"/>	Supratherapeutic doses administered once daily <span style="color: red;">Incorrect answer selected</span>

Aminoglycoside undergoes glomerular filtration and then reabsorption in the proximal tubule where tubular cell injury/death occurs.

Administering aminoglycoside less frequently allows the kidney more time to "recover" from drug accumulation within the proximal tubular cells and hence minimises nephrotoxicity.

Although aminoglycoside toxicity is not that common, over the past years an experimental animal model has provided insights regarding the mechanisms of cytotoxicity.



Aminoglycoside toxicity occurs in those cell types in which the drug accumulates; primarily the proximal tubules in the cortex.

Multiple human clinical trials (including meta-analysis), as well as animal studies, report less nephrotoxicity and equal efficacy when aminoglycosides are given once daily (supratherapeutic doses) rather than in conventional divided doses.

This once-daily dosing approach exploits the post-antibiotic bactericidal effect even when drug levels fall below the so-called "therapeutic levels" allowing for a longer dosing interval (thus high peaks and low troughs are desirable).

Ototoxicity probably has a different underlying pathophysiology from that of nephrotoxicity; the two do not predict one another.

### Answer Statistics

1		30%
2		21%
3		33%
4		4%
5		14%

Times answered: 6048

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 92 of 100

A 32-year-old woman is assessed at the antenatal clinic; she had no known medical disease prior to this pregnancy.

Which of the following scenarios is most compatible with chronic hypertension in pregnancy?

(Please select 1 option)

<input type="checkbox"/>	Blood pressure 135/92 mmHg at 28 weeks of gestation
<input checked="" type="checkbox"/>	Blood pressure 142/90 mmHg at 12 weeks of gestation <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Development of pre-eclampsia at 32 weeks
<input checked="" type="checkbox"/>	Development of pre-eclampsia at 35 weeks <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Documentation of proteinuria +++ by urine dipstick at 35 weeks of gestation

Chronic hypertension in pregnancy is defined as blood pressure of at least 140 mmHg systolic or 90 mmHg diastolic before pregnancy, or for women who first present for care during pregnancy as in this case, before 20 weeks of gestation.

Proteinuria at the third trimester, if not present initially, favours the diagnosis of pre-eclampsia, instead of end-organ damage of chronic hypertension.

Women with chronic hypertension have an increased chance of pre-eclampsia and therefore pre-eclampsia per se does not exclude concurrent chronic hypertension. In fact, the condition of pre-eclampsia tends to develop at less than 34 weeks of gestation with chronic hypertension, earlier than is typical in women without antecedent hypertension.

Most women with chronic hypertension have a decrease in blood pressure during pregnancy. Their blood pressure falls toward the end of the first trimester. Still, chronic hypertension has to be diagnosed by first documentation of high blood pressure before 20 weeks of gestation.

## Answer Statistics



Times answered: 6015

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 27.17%

Total Answered: 92

## Feedback

# Work Smart

Core Questions

Question 101 of 109

You are asked to see a haemodialysis patient who developed high fever one hour after initiation of dialysis.

Her dialysis was performed using a tunnelled right internal jugular vein catheter, which has been in place and functioning for one year. No other vascular access has been created.

The current catheter exit site looked clean. Examination showed no cardiac murmur. Blood cultures were drawn from the catheter and her peripheral arm; both grew methicillin-resistant *Staphylococcus aureus* (MRSA).

Which ONE of the following best describes the correct treatment approach?

(Please select 1 option)

<input type="checkbox"/>	Administer vancomycin
<input type="checkbox"/>	Administer vancomycin and gentamicin
<input checked="" type="checkbox"/>	Administer vancomycin and remove the central venous catheter <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Administer vancomycin, keep the central venous catheter but add concomitant antibiotic lock (making use of supratherapeutic concentrations of vancomycin within the catheter lumen after each dialysis session)
<input type="checkbox"/>	Discharge the patient with oral flucloxacillin <span style="color: red;">Incorrect answer selected</span>

Catheter removal is strongly recommended in *Staphylococcus aureus* bloodstream infection given the high risk of recurrence in these patients.

Flucloxacillin should not be used in MRSA infection; vancomycin is the drug of choice.

Daptomycin might be needed if the minimum inhibitory concentration is  $\geq 2$   $\mu\text{g/ml}$  indicative of heterogeneous vancomycin intermediate *S. aureus* (hVISA).

Catheter removal is also recommended in non-staphylococcus aureus catheter-related bloodstream infection in the following circumstances:

- Severe sepsis
- Haemodynamic instability
- Endocarditis
- Evidence of metastatic infection, or
- Persistence of bacteraemia after 48-72 hours of effective antibiotics.

Antibiotic lock therapy involves instillation of high-dose antibiotics (prepared using heparin) at the end of each dialysis session into the catheter to maintain high concentrations within the dialysis catheter.

The reported success rate to salvage a tunnelled catheter using a combination of systemic antimicrobials and antibiotic lock therapy is only 40% to 55% with *S. aureus* (compared with 75% to 84% with coagulase negative *Staphylococci*).

### Answer Statistics



Times answered: 6114

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Core Questions

Question 102 of 109

Which of the following is the best imaging to identify renal scarring, for instance after childhood febrile urinary tract infection?

(Please select 1 option)

<input type="checkbox"/>	Intravenous pyelography
<input checked="" type="checkbox"/>	Renal DMSA scintigraphy <b>This is the correct answer</b>
<input type="checkbox"/>	Renal DTPA scintigraphy <b>Incorrect answer selected</b>
<input type="checkbox"/>	Renal ultrasonography
<input type="checkbox"/>	Voiding cystourethrography

Renal scintigraphy with DMSA involves administration of radioactive isotope which is avidly taken up by the renal parenchyma. This permits the identification of regions of decreased uptake that may represent acute inflammation (such as pyelonephritis) or renal scarring.

The technique of dimercaptosuccinic acid DMSA scan also allows detection of congenital renal disorder.

A small kidney with uniform uptake of DMSA is likely to represent congenital hypodysplasia, whereas a focal area of reduced cortical uptake associated with loss of contours is more likely to represent an infection-related scar.

Renal DTPA involves an isotope that is exclusively filtered by the glomeruli, and is used to give a "perfusion index" and evaluate excretion (obstruction assessment) of the kidney.

Voiding cystourethrography is used to determine whether there is vesicoureteral reflux, which might give an increased risk (but not diagnostic) of renal scarring.

Ultrasonography also does not reliably detect low-grade scarring.

## Answer Statistics



Times answered: 6042

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.69%

Total Answered: 102

# Work Smart

Core Questions

Question 93 of 100

A 69-year-old man developed spontaneous bacterial peritonitis complicating his Child's C liver cirrhosis. There was no sign of hypovolaemia.

Which of the following measures was best supported by evidence to prevent the development of hepatorenal syndrome?

(Please select 1 option)

<input type="checkbox"/>	Central venous pressure monitoring
<input checked="" type="checkbox"/>	Intravenous albumin administration <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Intravenous dopamine infusion
<input type="checkbox"/>	Neomycin
<input type="checkbox"/>	Regular lactulose use <span style="color: red;">Incorrect answer selected</span>

Administration of albumin (1.5 g per kilogram of body weight at diagnosis and 1.0 g per kilogram 48 hours later), in addition to antibiotics, has been shown in randomised controlled trial to markedly reduce the risk of hepatorenal syndrome.

The mechanism of albumin is thought to be its positive effect on circulatory function and other effects, such as antioxidant properties.

Judicious use of diuretics prevents renal failure but this patient has no sign of hypovolaemia.

Central venous pressure monitoring is not indicated.

Synthetic disaccharide lactulose is for preventing hepatic encephalopathy and has no role in

preventing hepatorenal syndrome.

Neomycin, by the same token, is thought to be a treatment of choice for hepatic encephalopathy (but limited evidence). In fact, it has been associated with ototoxicity and nephrotoxicity.

## Answer Statistics



Times answered: 6115

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 26.88%

Total Answered: 93

# Work Smart

Core Questions

Question 93 of 100

A 69-year-old man developed spontaneous bacterial peritonitis complicating his Child's C liver cirrhosis. There was no sign of hypovolaemia.

Which of the following measures was best supported by evidence to prevent the development of hepatorenal syndrome?

(Please select 1 option)

<input type="checkbox"/>	Central venous pressure monitoring
<input type="checkbox"/>	Intravenous albumin administration
<input type="checkbox"/>	Intravenous dopamine infusion
<input type="checkbox"/>	Neomycin
<input type="checkbox"/>	Regular lactulose use

[Skip question](#)

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 103 of 109

What is the most compatible joint finding of patients suffering from Henoch-Schönlein purpura?

(Please select 1 option)

<input type="checkbox"/>	Erosive arthropathy
<input type="checkbox"/>	Preponderance of temporomandibular joint <span style="color: red;">❑ Incorrect answer selected</span>
<input type="checkbox"/>	Symmetrical small hand joints
<input checked="" type="checkbox"/>	Transient non-deforming oligoarthritis, mostly large joints of the legs <span style="color: green;">❑ This is the correct answer</span>
<input type="checkbox"/>	Typical enthesitis

The arthritis of Henoch-Schönlein purpura is usually transient or migratory, involves one to four joints, and is non-deforming. Typical sites are the lower extremity large joints (hips, knees, and ankles). Affected young children may refuse to walk.

Kidney manifestation occurs only in 10-50% of patients with the disease.

Purpura is the sine qua non of Henoch-Schönlein purpura. It may be difficult to diagnose this disease if the patient first presents with kidney involvement or joint manifestation.

Joint disease of Henoch-Schönlein purpura does not cause any chronic damage, as opposed to that of rheumatoid arthritis (hence Erosive arthropathy is incorrect).

Symmetrical joint involvement of hands is atypical.

Enthesitis, inflammation of the region of attachment of tendons and ligaments, is a feature of

ankylosing spondylitis and other spondyloarthritis.

## Answer Statistics



Times answered: 6011

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.53%

Total Answered: 103

## Feedback

# Work Smart

Core Questions

Question 94 of 100

A construction site worker was referred to the hospital because of severe leg cramps, after working in hot weather for over eight hours. He was dehydrated.

Investigations revealed:

Serum albumin	59 g/L	(37 - 49)
Serum calcium	3.09 mmol/L	(2.2 - 2.6)
Serum creatinine	301 µmol/L	(60 - 110)

What is the most appropriate immediate management?

(Please select 1 option)

<input type="checkbox"/>	Check his serum protein electrophoresis to exclude myeloma
<input type="checkbox"/>	Forced diuresis
<input checked="" type="checkbox"/>	Intravenous saline infusion and check ionised calcium <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Perform electrocardiogram (ECG) to look for short QT interval
<input type="checkbox"/>	Start bisphosphonate zoledronic acid <span style="color: red;">Incorrect answer selected</span>

The patient was suffering from heat cramps (painful muscular cramping during or after exertion in hot environments). He developed haemoconcentration and elevated protein (and albumin), leading to a phenomenon of pseudohypercalcaemia. In this condition, the total serum calcium is high but the

ionised calcium should be normal.

As a rule of thumb, the first step in the diagnostic evaluation of hypercalcaemia (and more often hypocalcaemia) should be to make sure that the "abnormality" in the total serum calcium levels is not due to abnormal albumin concentrations. In cases of abnormal albumin level, adjusted calcium might better reflect the correct calcium level.

Only ionised (or free) calcium is physiologically active and should be checked if in doubt, such as in patients with very abnormal albumin level. Extensive investigation, such as protein electrophoresis, should be omitted if pseudohypercalcaemia is confirmed.

Bisphosphonate should not be started in this gentleman with acute kidney injury (and is not indicated because of pseudohypercalcaemia rather than genuine hypercalcaemia).

In 2011 an FDA announcement contained a new contraindication and updated warning on kidney impairment for zoledronic acid. The drug is contraindicated in patients with creatinine clearance less than 35 mL/min or in patients with evidence of acute renal impairment. This warning follows a previous New England Journal of Medicine correspondence article describing 72 cases (FDA Adverse Event Reporting System) of renal failure associated with zoledronic acid from 2001 to 2003.

Pseudohypercalcaemia is asymptomatic and should not affect the ECG.

Forced diuresis is not a consideration in this case given the presence of dehydration.

## Answer Statistics



Times answered: 6143

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 104 of 109

A 72-year-old man with chronic kidney disease and atrial fibrillation was followed up in the outpatient clinic. The doctor requested an elective colonoscopy examination.

This patient has been taking dabigatran (an oral thrombin inhibitor). His estimated creatinine clearance was 30 ml/min/1.73 m<sup>2</sup>.

How should we advise the patient before colonoscopy examination?

(Please select 1 option)

<input type="checkbox"/>	Check the clotting profile (prothrombin time) and decide the timing of stopping dabigatran before colonoscopy	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Continue the dabigatran	
<input type="checkbox"/>	Stop dabigatran one to two days before colonoscopy	
<input type="checkbox"/>	Stop dabigatran three to five days before colonoscopy	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Stop dabigatran two weeks before colonoscopy	

The drug dabigatran has a half life elimination of 12-14 hours in normal subjects; it lasts longer in patients with abnormal kidney function.

For patients with normal creatinine clearance, it is safe to discontinue the drug one to two days before colonoscopy procedure. For the patient in this scenario, it is better to stop the drug three to five days before the procedure. An even longer period might be considered for those undergoing major surgery, spinal puncture or placement of epidural catheter (in whom complete haemostasis is warranted).

Dabigatran is an oral anticoagulant that should be stopped before colonoscopy. The drug contributes to INR elevation but its effect cannot be monitored in such manner. Similarly, use of aPTT can only provide an approximation of dabigatran's anticoagulant activity.

It should be noted that there is absence of antidote to reverse rapidly the anticoagulant effects of dabigatran in the case of life-threatening haemorrhage or surgery.

The time to discontinue the drug depends on the patient kidney function. In fact, it is recommended to evaluate renal function prior to (and during) therapy; there is indication-specific dose reduction protocol in patients with moderate renal impairment. Haemodialysis removes around 60% of the drug over two to three hours.

Clearance of the low molecular weight heparin is predominantly by renal route.

Please note that unfractionated heparin's half life is not affected by renal function; it is metabolised by hepatic and vascular endothelial heparinases.

## Answer Statistics



Times answered: 6362

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 105 of 109

A man developed *Helicobacter pylori* related duodenal ulcer after kidney transplantation.

He did not use aspirin; other concurrent medication included cyclosporine, prednisolone, azathioprine and amlodipine. The patient reported no known drug allergy.

What is the most reasonable eradication treatment regimen?

(Please select 1 option)

<input checked="" type="checkbox"/>	Bismuth + pantoprazole + metronidazole + tetracycline	<input type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Monotherapy with proton pump inhibitor	
<input checked="" type="checkbox"/>	Pantoprazole + amoxicillin	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Pantoprazole + amoxicillin + clarithromycin	
<input type="checkbox"/>	Pantoprazole + metronidazole + clarithromycin	

Clarithromycin is relatively contraindicated in kidney transplant recipients because of its interaction with cyclosporine.

Quadruple therapy containing a proton pump inhibitor, bismuth, metronidazole, and tetracycline, has been shown in meta-analysis of comparative randomised controlled trials to achieve a similar eradication rate to clarithromycin-based triple therapy.

Monotherapies and dual therapies (the second and third answer choices) - usually a proton pump inhibitor and one antibiotic - have always had disappointing results in eradication of *Helicobacter pylori*.

The fourth and fifth answer choices are theoretically effective in *H. pylori* infection, but clarithromycin interacts with cyclosporine. Being an enzyme inhibitor, this macrolide will result in an (undesirable) increase in the blood level of cyclosporine.

Bismuth-based quadruple therapy, as recommended in the Maastricht Consensus Report, is the main option for second-line therapy.

### Answer Statistics



Times answered: 6221

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.24%

Total Answered: 105

# Work Smart

Question 95 of 100

A 32-year-old woman with IgA nephropathy attended the clinic shortly after having a positive pregnancy test.

On physical examination, pulse rate was 60/minute and blood pressure was 145/83 mmHg. Fundi and cardiac examinations were normal. There was no pedal oedema.

Urine protein measured 0.7 g daily. Her serum creatinine level was 60 µmol/L. Medications at that time were lisinopril and folic acid.

Which of the following recommendations is most appropriate?

(Please select 1 option)

<input type="checkbox"/>	Continue the folic acid and lisinopril
<input type="checkbox"/>	Continue the folic acid and lisinopril, but advise to stop lisinopril in the second half of pregnancy
<input type="checkbox"/>	Change lisinopril to losartan
<input checked="" type="checkbox"/>	Stop lisinopril <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Target blood pressure of < 120/80 mmHg during pregnancy <span style="color: red;">Incorrect answer selected</span>

Both ACE inhibitor and angiotensin-receptor blocker are contraindicated in pregnancy.

The use of ACE inhibitor during the second half of the pregnancy (the second option) has been well known to be associated with oligohydramnios (probably resulting from impaired fetal renal function) and neonatal anuria, and fetal death.

Although the old teaching might allow the use of lisinopril during the first trimester, an observational retrospective cohort study that included women with exposure to ACE inhibitors in the first trimester, as reported in 2006, raised the issue that the drug is associated with increased odds for cardiovascular defects and central nervous system defects.

By extrapolation, other blockers of renin-angiotensin system should also be switched to other class of antihypertensive drugs (before conception, if possible). In other words, the second and third options are not appropriate.

Blood pressure goal during pregnancy, in general, is less aggressive (the fifth answer option); a very tight blood pressure control is linked with an increased risk of fetal growth restriction. Pre-pregnancy doses of antihypertensive medications are not infrequently reduced, particularly in the second trimester.

### Answer Statistics



Times answered: 5939

### Test Analysis

CorrectIncorrectPartially  
Correct

## Work Smart

Question 106 of 109

A 54-year-old woman presents for the third time in six months with a urinary tract infection and left loin pain. On each occasion *Proteus* has been identified.

She is successfully treated for this episode with a one week course of trimethoprim, and a KUB is reported as showing a left staghorn calculus.

Which of the following is the most likely chemical composition of the staghorn calculus?

(Please select 1 option)

<input type="checkbox"/>	Ammonium magnesium phosphate	<input checked="" type="checkbox"/> This is the correct answer
<input type="checkbox"/>	Calcium oxalate	
<input type="checkbox"/>	Calcium phosphate	
<input type="checkbox"/>	Calcium urate	<input type="checkbox"/> Incorrect answer selected
<input type="checkbox"/>	Cystine	

The correct answer is ammonium magnesium phosphate (struvite).

Struvite stones are associated with *Proteus* infection because *Proteus* creates a situation where ammonia and urine pH are both increased, leading to ideal conditions for stone formation.

Urease inhibitors have been used as medical therapy to reduce stone formation in conjunction with antibiotic therapy for underlying *Proteus*, although surgical stone removal may be required.

Cystine stones are associated with cystinuria, urate stones with gout, and oxalate stones are associated with short bowel syndrome.

Calcium phosphate stones are seen in renal tubular acidosis.

### Answer Statistics



Times answered: 6011

### Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.09%

Total Answered: 106

### Feedback

# Work Smart

Core Questions

Question 96 of 100

A 47-year-old patient who underwent a renal transplant three years previously is well established on ciclosporin. He currently takes the Capimune formulation.

He comes to see you as there has been a manufacturing problem and he cannot get Capimune until it is back in stock in four days time.

What is best course of action?

(Please select 1 option)

<input type="checkbox"/>	Advise him that ciclosporin has a long half life and that he can safely wait until his usual formulation is back in stock without taking Capimune
<input type="checkbox"/>	Advise him that ciclosporin has a long half life and that he can safely wait until his usual formulation is back in stock without taking Capimune, but provide additional protection with high dose oral prednisolone during this period
<input type="checkbox"/>	Switch him to another formulation and continue with this long term
<input checked="" type="checkbox"/>	Switch him to another formulation and monitor his renal function, ciclosporin level and blood pressure whilst the changeover is being made <b>This is the correct answer</b>
<input type="checkbox"/>	Switch him to another formulation of ciclosporin, then back to Capimune when it is available again <b>Incorrect answer selected</b>

Different formulations of ciclosporin have different pharmacokinetic properties and it is essential that ciclosporin is prescribed by brand and *not* generically.

When switching from one formulation to another the patient must be very closely monitored.

It would be sensible to obtain advice from the local renal unit before switching therapy.

## Answer Statistics



Times answered: 6726

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 26.04%

Total Answered: 96

## Feedback

# Work Smart

Core Questions

Question 97 of 100

A 54-year-old man attends the surgery. He has a history of myocardial infarction and is taking simvastatin for secondary prevention.

However, his brother recently experienced rhabdomyolysis and he is now concerned about the risk of rhabdomyolysis due to his simvastatin.

Which statin is associated with the lowest risk of rhabdomyolysis?

(Please select 1 option)

<input type="checkbox"/>	Atorvastatin
<input type="checkbox"/>	Cerivastatin
<input checked="" type="checkbox"/>	Fluvastatin <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Lovastatin <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	Simvastatin

Statins are generally very safe medications but confer a small risk of rhabdomyolysis. Data are conflicting about the likely incidence of rhabdomyolysis in statin users, but certain statins appear to have a lower incidence than others.

Statins and their associated risk of rhabdomyolysis:

Atorvastatin	0.04%
Cerivastatin	3.16%

Fluvastatin	<0.04%
Pravastatin	0.04%
Lovastatin	0.19%
Simvastatin	0.12%

The lipophilic statins, simvastatin, lovastatin and cerivastatin are all associated with a higher incidence of rhabdomyolysis compared to hydrophilic statins.

It is possible that the lipophilic statins have a greater ability to cross the myocyte cell membrane and cause direct effects on intracellular organelles.

Cerivastatin has been withdrawn from the market as the risk of rhabdomyolysis was considered unacceptably high.

Further Reading:

Jamal SM, Eisenberg MJ, Christopoulos S. [Rhabdomyolysis associated with hydroxymethylglutaryl-coenzyme A reductase inhibitors](#). *Am Heart J*. 2004;147:956-65.

## Answer Statistics



Times answered: 4813

## Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 98 of 100

A 20-year-old man comes to the nephrology clinic for discussion of abdominal USS screening for autosomal dominant polycystic kidney disease (ADPKD) type 1. His father is 45-years-old and has recently begun haemodialysis for ADPKD and end-stage renal failure.

His first USS is reported as entirely normal.

Which of the following is the correct advice for him?

(Please select 1 option)

<input type="checkbox"/>	His chance of having ADPKD is less than 1%
<input checked="" type="checkbox"/>	His chance of having ADPKD is less than 5% <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	His chance of having ADPKD is less than 10%
<input type="checkbox"/>	His chance of having ADPKD is less than 20%
<input type="checkbox"/>	Only scanning at age>30 years is predictive of the condition <span style="color: red;">Incorrect answer selected</span>

His chance of having ADPKD is less than 5%. This is based on ultrasound criteria developed by screening a cohort of patients at risk for ADPKD. The findings that should lead to the diagnosis being made are:

- Two or more unilateral or bilateral cysts in individuals between 15 and 30 years of age
- Two cysts in each kidney in individuals 30 to 59 years
- Four cysts in each kidney in individuals 60 years or older.

These have a specificity of 100% with respect to diagnosis of the condition. Among patients aged between 15 and 30 years, sensitivity is 95%, and at age 20 years the false-negative rate is said to be 4%. By age 30 years, sensitivity increases to close to 100%; therefore, at this age the condition can definitely be excluded.

Screening at age younger than 15 years is not recommended. Screening is recommended because individuals may be asked to become kidney donors for other family members, and early and aggressive management of hypertension in affected individuals may delay the onset of end-stage renal failure.

### Answer Statistics



Times answered: 3059

### Test Analysis

CorrectIncorrectPartially  
Correct

# Work Smart

Question 107 of 109

A 49-year-old woman is referred to the Emergency Department with worsening renal function and two episodes of haemoptysis (a teacup full each time) over the past 24 hours. She has been seen on a number of occasions by the GP with fevers, arthralgia, and a rash over the past four months. She takes no regular medication.

On examination her BP is 152/90, pulse is 85 and regular. You note livedo reticularis and a purpuric rash affecting both legs. There is wheeze on auscultation of the chest, O2 saturation on air is 92%.

Investigations:

Hb	104g/l	115-160
WCC	10.9x10 <sup>9</sup> /l	6-10
PLT	142 x 10 <sup>9</sup> /l	150-400
Na	140 mmol/l	135-145
K	5.1 mmol/l	3.5-5.5
Cr	212 µmol/l(112 µmol/l4m prior)	50-90
ESR	72 mm/hr	<10
CRP	112 mg/dl	<10
ANA	positive	
MPO ANCA	positive	

Which of the following is the most likely diagnosis?

(Please select 1 option)


<input type="checkbox"/>	Goodpasture's syndrome
<input checked="" type="checkbox"/>	Microscopic polyangiitis <span style="color: green;">Correct</span>
<input type="checkbox"/>	Mixed connective tissue disease
<input type="checkbox"/>	Systemic lupus erythematosus
<input type="checkbox"/>	Wegener's granulomatosis

The answer is microscopic polyangiitis. The picture of worsening renal function, coupled with haemoptysis, chest signs and a purpuric rash is consistent with microscopic polyangiitis.

MPO ANCA positivity further supports the diagnosis. PR3 ANCA is more consistent with a granulomatous polyangiitis such as Wegener's (which classically presents with sinusitis/nasal congestion). Biopsy is important in establishing the diagnosis, with the skin lesions an obvious initial source of tissue.

Anti-GBM antibodies are associated with Goodpasture's syndrome, in which more rapid renal dysfunction and more marked pulmonary haemorrhage would be more classic. Mixed connective tissue disease combines features of systemic sclerosis, myositis, SLE and rheumatoid arthritis, and therefore the symptoms described here would not be classical.

### Answer Statistics

1		28%
2		26%
3		5%
4		7%
5		34%

Times answered: 2525

### Test Analysis

CorrectIncorrectPartially

# Work Smart

Question 99 of 100

Which of the following is the mechanism of action of the diuretic spironolactone?

(Please select 1 option)

<input type="checkbox"/>	Osmotic diuretic
<input type="checkbox"/>	Sodium/chloride co-transporter at distal convoluted tubule
<input checked="" type="checkbox"/>	Sodium/potassium co-transporter at the distal convoluted tubule <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Sodium/potassium co-transporter at the proximal convoluted tubule
<input type="checkbox"/>	Sodium/potassium/chloride co-transporter in thick ascending limb of the loop of Henle <span style="color: red;">Incorrect answer selected</span>

Spironolactone is a steroid with a structure which resembles aldosterone, a naturally occurring adrenocorticoid hormone. It acts as a competitive inhibitor of aldosterone and acts at the distal convoluted tubule and inhibits the sodium/potassium co-transporter, thereby increasing sodium and water excretion and reducing potassium excretion. It is classed as a potassium sparing diuretic or aldosterone antagonist.

Mannitol and isosorbide are examples of osmotic diuretics.

Inhibition of the sodium/chloride co-transporter is the mechanism of action of thiazide diuretics, and loop diuretics work at the thick ascending limb of the loop of Henle.

Reference & Further Reading:

## Answer Statistics



Times answered: 1604

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 25.25%

Total Answered: 99

## Feedback

# Work Smart

Core Questions

Question 108 of 109

A renal transplant patient who has been taking cyclosporine for a number of years presents with a small, hard lesion on the side of their head. It has a brown irregular border with a central hard area.

Which is the most likely diagnosis?

(Please select 1 option)

<input type="checkbox"/>	Actinic keratosis. <span style="color: red;">❌ Incorrect answer selected</span>
<input type="checkbox"/>	Basal cell carcinoma (BCC)
<input type="checkbox"/>	Malignant melanoma
<input type="checkbox"/>	Seborrhoeic keratosis
<input checked="" type="checkbox"/>	Squamous cell carcinoma (SCC_) <span style="color: green;">✅ This is the correct answer</span>

Long term immunosuppression, for example with ciclosporin, can predispose patients with autoimmune disorders or transplant to infections and malignancy. The most common malignancies are SCCs or BCCs of the skin. The description of this lesion most classically fits that of an SCC. BCCs classically occur on the face or in sun-exposed areas, and are red/pink and pearly in nature. They may also ulcerate.

Malignant melanoma is usually an irregular, pigmented, growing mole that may be asymmetrical and showing worrying features e.g. bleeding.

Seborrhoeic keratoses are benign keratinised warts which are a sign of skin aging.

Actinic keratosis is a dry pre-cancerous skin change associated with sun exposure.

# Work Smart

Core Questions

Question 109 of 109

A 52-year-old woman with a history of bipolar disorder presents following an overdose of her mood stabilising medication; she cannot remember the name of the tablets.

On examination she is drowsy and hyperreflexic and bloods show a worsening hypokalaemic metabolic acidosis.

The renal team has been informed and are arranging for urgent dialysis.

Which is the most appropriate immediate management while waiting for dialysis?

(Please select 1 option)

<input type="checkbox"/>	IV albumin
<input type="checkbox"/>	IV dextrose
<input type="checkbox"/>	IV furosemide
<input checked="" type="checkbox"/>	IV sodium bicarbonate <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Oral sodium bicarbonate <span style="color: red;">Incorrect answer selected</span>

IV sodium bicarbonate is the most suitable option here to correct the worsening acidosis, although admittedly, dialysis is the optimum treatment in what sounds like severe lithium toxicity.

IV furosemide will not improve symptoms of lithium toxicity and there is no mention of hypoglycaemia in this patient ruling out the need for IV dextrose.

IV albumin use is predominantly for rapid volume expansion and the patient above does not have any need for this as such.

Oral sodium bicarbonate would not be of use in a patient with rapidly worsening acidosis as the time taken for absorption and availability in the blood would be too long.

## Answer Statistics



Times answered: 1711

## Test Analysis

CorrectIncorrectPartially  
Correct

Score: 15.6%

Total Answered: 109

## Feedback

# Work Smart

Core Questions

Question 100 of 100

A 61-year-old man has received a kidney transplant for chronic IgA nephropathy. He is on suitable immunosuppression with cyclosporine, steroids and mycophenolic acid. He has suffered two bouts of CMV infection over the last four months. Now, he came for follow up and complained of two painful nodules on his shin. He enjoyed a reasonably normal life and usually spent time indoors.

Examination revealed two fungating nodules with surface bleeding spots below the knee. There was also one hard lymph node in the inguinal chain.

What is the cause of development of this condition in this patient?

(Please select 1 option)

<input checked="" type="checkbox"/>	Cyclosporine <span style="color: green;">This is the correct answer</span>
<input type="checkbox"/>	Mycophenolic acid
<input type="checkbox"/>	Opportunistic infection
<input type="checkbox"/>	Steroids <span style="color: red;">Incorrect answer selected</span>
<input type="checkbox"/>	The organ transplantation itself

This post-renal transplant patient has developed a skin malignancy. Post-transplant patients are much more prone to develop malignancy compared to normal population. Cyclosporine is one of the main reasons for development of post-transplant malignancy.

Mycophenolic acid is a potent immunosuppressant, but it alone is not implicated in carcinogenesis.

The clinical description is suggestive of a malignancy, not opportunistic infection.

Steroids are not known to give rise to malignancy.


Organ transplantation is an immunosuppressive state and it increases the risks for malignancy. But drugs like cyclosporine are the main culprit in causing malignancy.

Non-melanoma skin cancers (NMSC) are the commonest malignancies in post-transplant state. Of these, squamous cell Ca is the commonest.

References & Further Reading:

Walsh SB et al. Cyclosporine A mediates Pathogenesis of Aggressive Cutaneous Squamous Cell Carcinoma by Augmenting Epithelial-Mesenchymal Transition: Role of TGF- $\beta$  Signaling Pathway. Mol Carcinog. 2011; 50(7): 516-27

## Answer Statistics

1		30%
2		19%
3		35%
4		8%
5		9%

Times answered: 347

## Test Analysis

CorrectIncorrectPartially  
Correct