

# Self-assessment/CPD answers

Below, you can find the answers to the self-assessment questions published in this chapter.

## Answers

### Macrovascular disease: pathogenesis and risk assessment

#### Question 1

**Correct answer: B.** Liraglutide is the most pragmatic choice given that it promotes weight loss and has been associated with favourable cardiovascular outcomes. Lipids are within target (so A is incorrect), and the use of aspirin (C) in primary prevention is not advocated by diabetes guidelines. Although both insulin (D) and gliclazide (E) are likely to improve glycaemic control, both are associated with weight gain.

#### Question 2

**Correct answer: E.** Pharmacological stress testing with myocardial perfusion scintigraphy is a pragmatic choice, given her limited exercise capacity and the technique's ability to identify patients with myocardial perfusion defects. Her symptoms are probably not gastric in origin so omeprazole (A) is unlikely to prove useful. Moreover, she has a high risk of cardiovascular disease. Although carotid artery intima-media thickness (B) has been shown to predict myocardial infarction and stroke in the general population, this may not hold true for individuals with diabetes. Coronary artery calcium score testing (C) is best reserved as a screening test in asymptomatic patients at intermediate risk of cardiovascular disease. Exercise ECG testing (D) is unlikely to be helpful given the patient's limited exercise tolerance.

#### Question 3

**Correct answer: C.** Introduction of an angiotensin-converting enzyme (ACE) inhibitor is likely to control his blood pressure and may reduce the albuminuria. Moreover, ACE inhibitors have been associated with favourable cardiovascular outcomes. He is likely to be suffering from obstructive sleep apnoea, and although he is hypogonadal, confirming or ruling out obstructive sleep apnoea, and if necessary treating it, is crucial before treatment with testosterone (A). Although referral for sleep studies (B) would be indicated, treatment with nasal continuous positive airway pressure/bi-level positive airways pressure/oral appliance (CPAP/BIPAP/OA) therapy has not been consistently shown to improve cardiovascular outcomes. Nocturnal CPAP/BIPAP/OA therapy is likely to be indicated if severe obstructive sleep apnoea is confirmed, but oxygen therapy (E) is best reserved until after further assessment. Although N-terminal pro-B-type natriuretic peptide (NT-proBNP) (D) predicts cardiovascular

events in patients with type 2 diabetes and microalbuminuria, its measurement does not directly impact on cardiovascular risk.

### Reducing cardiovascular risk in patients with type 2 diabetes mellitus

#### Question 1

**Correct answer: A.** HbA<sub>1c</sub> measurement is now the recommended diagnostic test for diabetes mellitus (World Health Organization, 2010). HbA<sub>1c</sub>  $\geq 48$  mmol/mol on two occasions is diagnostic of diabetes mellitus.

Other diagnostic criteria for diabetes include:

- Fasting BM  $>7$  mmol/litre on two different occasions
- Random BM  $> 11$  mmol/litre on two different occasions
- Presence of symptoms of diabetes in addition to either a random BM  $> 11$  mmol/litre or fasting BM  $> 7$  mmol/litre

#### Question 2

**Correct answer: B.** Treatment with an angiotensin-converting-enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) (if the patient is intolerant of ACEis) decreases the progression of albuminuria, promotes normoalbuminuria and may eventually reduce the risk of renal dysfunction. A systolic blood pressure  $<140$  mmHg should be the target. (A) Amlodipine is used as a second-line option if an ACEi or an ARB does not improve the blood pressure. (C) Losartan is used if an ACEi is causing side effects, commonly a chronic cough. (D) Canagliflozin is a sodium-glucose transport protein 2 used to treat diabetes, therefore will not affect blood pressure. (E) Bisoprolol can be used as an adjunct if ACEi, ARB and calcium channel blockers are not effective treatment.  $\beta$ -blockers can worsen glycaemic control as they can block the release of insulin by interacting with pancreatic receptors. This would lower insulin levels regardless of blood glucose being high.

#### Question 3

**Correct answer: C.** Patients randomized to empagliflozin recorded a 38% reduction in cardiovascular mortality and a 32% reduction in all-cause mortality. There was a 35% reduction in hospitalization for heart failure, alongside improvements in renal function. Empagliflozin is an SGLT-2 inhibitor; reduces body weight and systolic blood pressure. (A) Gliclazide causes weight gain. It may prevent protective ischaemic cardiac preconditioning after MI. (B) Pioglitazone increases cardiovascular disease (CVD) risk with age and duration of diabetes with possible congestive heart failure

exacerbation in older patients with underlying CVD. (D) Insulin glargine is given as the last line of treatment in patients with type 2 diabetes. (E) Saxagliptin increased rate of hospitalization for heart failure in the SAVOR-TIMI 53 trial.

### Diabetic retinopathy

#### Question 1

**Correct answer:** E. A vitreous haemorrhage causes a shower of floaters, and the amount of blurring that develops over the next hour or two depends on the extent of bleeding into the vitreous. If it is not possible for the ophthalmologist to see the retina clearly, an ultrasound B-scan is often performed to check that the retina is flat (not detached) behind the blood. The haemorrhage is then given time to clear spontaneously over the next few weeks.

#### Question 2

**Correct answer:** D. The most predictive signs of ischaemia are multiple blot haemorrhages, venous beading and intraretinal microvascular abnormalities.

#### Question 3

**Correct answer:** B. Optical coherence tomography angiography detects flow within a vessel.

### The diabetic foot

#### Question 1

**Correct answer:** C. The history and examination are strongly suggestive of an acute Charcot neuroarthropathy. Doppler studies (A), X-ray (B) and an offloading device (C) are all required, but offloading should be started immediately before he goes to the X-ray department. (D) is incorrect as any person with a hot unilateral swollen foot with neuropathy should be considered to have a Charcot neuroarthropathy. Checking erythrocyte sedimentation rate or C-reactive protein concentration is not particularly helpful and would delay treatment. (E) – X-rays and scans might be performed but the patient should be put immediately into a cast prior to these.

#### Question 2

**Correct answer:** B. Both probing to bone and a sausage-shaped toe are highly suggestive of osteomyelitis: the abundant callus is also typical but is not seen in ischaemic ulcers (D, E). Inability to palpate the dorsalis pedis pulse is probably secondary to the swelling. A hot foot with a plantar ulcer and callus is not typical of ischaemic or neuro-ischaemic ulcers.

### Sexual problems in diabetes

#### Question 1

**Correct answer:** D. The common co-pathology in obese diabetic men is low testosterone levels.

Decreased nitric oxide (A) underlies erectile dysfunction, due to parasympathetic (B) neuropathy. Follicle-stimulating hormone and luteinizing hormone (C) MAY be low if he has co-

incidental hypogonadotropic hypogonadism but are more likely to be appropriately raised due to his low testosterone levels. It is appropriate to check thyroid function (E), both hypo- and hyperthyroidism can affect erectile function.

### Infections in people with diabetes

#### Question 1

**Correct answer:** B. *Escherichia coli* and *Klebsiella pneumoniae* are both common causes of emphysematous pyelonephritis but *E. coli* is more common. *Clostridium perfringens* (A) causes gas gangrene and is a Gram-positive rod. *Morganella* (C) and *Pseudomonas* (D) are both Gram-negative rods and can cause urinary tract infections, but it is unusual to get necrosis or gas. Group A streptococci can cause septic shock but not this clinical picture, and anyway *Streptococcus* is a Gram-positive coccus.

#### Question 2

**Correct answer:** D. There are three main causes of mucormycosis – *Mucor*, *Rhizopus* and *Absidia* – and *Mucor* is most common. The clinical presentation, cranial nerve palsies and black crusty material in a diabetic individual are strongly indicative of mucormycosis, which is a medical and surgical emergency.

#### Question 3

**Correct answer:** C. This is malignant otitis externa so anti-pseudomonal antibiotics are required. The only one in this list which covers *Pseudomonas* is meropenem. Ertapenem is a once-daily carbapenem, but does not cover *Pseudomonas*. Vancomycin is a glycopeptide, thus only has Gram-positive activity. Linezolid is a relatively new agent, which also only has Gram-positive activity. Of the cephalosporins, ceftazidime covers *Pseudomonas*, but ceftriaxone does not. Note that ciprofloxacin is the only oral anti-pseudomonal agent. It may be that the patient did not respond to ciprofloxacin as the *Pseudomonas* was ciprofloxacin resistant or it was given in a low dose.

### Gestational diabetes

#### Question 1

**Correct answer:** D. In view of her past history of gestational diabetes mellitus, the National Institute for Health and Care Excellence guidelines recommend that a screening test (either 75-g oral glucose tolerance test or 1 week of self-monitoring of blood glucose) be performed as soon as possible after the booking visit. Women at high risk of gestational diabetes mellitus (GDM) (e.g. with a prior history of GDM or South Asian heritage) should be screened at this stage rather than at 24–28 weeks to diagnose GDM as early as possible and initiate treatment if necessary. HbA<sub>1c</sub> is not a reliable measure of glycaemic control during pregnancy.

#### Question 2

**Correct answer:** E. Her 2-hour glucose result is diagnostic of gestational diabetes mellitus so she should start self-monitoring of blood glucose.

**Question 3**

**Correct answer:** A. She needs insulin for rapid optimization of her fasting glucose levels and to minimize further fetal adiposity. Glibenclamide (C, E) and metformin (E) should only be given before (glibenclamide) or with (metformin) meals. After 2 weeks of dietary modification, if adequate glycaemic control is not achieved women should be placed on insulin therapy. This is especially important in light of the fetal growth acceleration (B). She has evidence of hyperglycaemia, not hypoglycaemia, and therefore D is inappropriate.

**Diabetes in the elderly****Question 1**

**Correct answer:** A. Normal 2-hour postprandial blood glucose or glucose tolerance test excludes diabetes. Classic symptoms of diabetes (B) are less prominent in old age, and a fasting blood glucose (C) may be normal in early cases. HbA<sub>1c</sub> (D) although diagnostic when high, a normal HbA<sub>1c</sub> may miss true cases due to its low sensitivity. Glucosuria (E) may be absent in early cases of diabetes in older people due to the high renal threshold of glucose excretion in old age.

**Question 2**

**Correct answer:** E. Underlying undiagnosed depression or dementia can lead to poor compliance with self-care tasks and deterioration in diabetes control. A change of insulin (A) may be too complex for her and may lead to more poor compliance and further deterioration. Oral agents (B) lead to unnecessary polypharmacy and further non-compliance. (C) can be done routinely but will not give the answer. Referral (D) will not diagnose the cause and she will remain non-compliant with dietician instructions.

**Question 3**

**Correct answer:** D. Because of the short life expectancy, focus should be on quality of life maintenance rather than on long-term HbA<sub>1c</sub> targets. HbA<sub>1c</sub> of 58 mmol/mol (7.5%) (A) may be too tight considering her age and co-morbidities. Symptoms of polyuria and thirst (B) may be absent in this age group. Random blood glucose between 4 and 7 mmol/litre (C) is too tight and may increase the risk of hypoglycaemia. She will be at risk of extreme blood glucose values if left without measurements (E).

**Diabetes in psychiatric disease****Question 1**

**Correct answer:** D. Although all of these psychiatric disorders occur in people with diabetes, he has classical symptoms of depression that have been going on for longer than 2 weeks.

**Question 2**

**Correct answer:** C. Selective serotonin reuptake inhibitors are usually the treatment of choice for people with diabetes and depression. Sertraline (B) would be a good choice but duloxetine (C) is also licensed to treat painful diabetic

peripheral neuropathy and so could be used to treat both conditions. Amitriptyline (A) is best avoided because of its cardiac adverse effects. Mirtazapine (D) and paroxetine (E) are both associated with weight gain.

**Question 3**

**Correct answer:** A. He is describing classical symptoms of diabetes so this must be excluded before considering other diagnoses. Anticholinergic adverse effects (C) and psychogenic polydipsia (D) are possible and could be considered if diabetes is excluded. Plasma glucose measurement (A) is more sensitive than HbA<sub>1c</sub> (B) in situations where the glucose may be changing rapidly, as can happen after the initiation of antipsychotics.

**Delivery and organization of diabetes care: integrated care****Question 1**

**Correct answer:** A. All the others are descriptions of how A might be achieved, but are not in themselves integrated care.

**Question 2**

**Correct answer:** A. All of the above may be true, although D is the least likely to work if there is no local clinical engagement. One piece missing is the voice of patients in redesigning the local pathways.

**Question 3**

**Correct answer:** D. The National Diabetes Audit core audit reports diabetes performance in both primary and secondary care and can be examined at practice level.

**Psychological aspects of diabetes management****Question 1**

**Correct answer:** A. You need to accept that she is an individual of limited personal and social resources who is unlikely to be able to cope with two major problems at once. Increasing her fear about the possibility of serious consequences of poor diabetes control (B, C) is likely to be counterproductive at this stage. She needs social rather than psychological help in the first instance, so refer her to social services to address the housing issues. Try to stay in touch thereafter (or arrange for someone else to do so). There is no evidence of depression (D). Address the diabetes-related problems (E) once she has attained a degree of stability in her life.

**Question 2**

**Correct answer:** D. Taking a history (A) from someone who is emotionally distressed is difficult and unrewarding. Unless this man brings up eye problems or fears about his kidneys (B), this can wait. Assess whether he is ready and willing to attend structured diabetes education before referring him for this (C). His distress appears to be understandable, so resist the temptation to refer him to mental health services (E). The time is probably best spent listening and trying to establish a supportive relationship.

**Question 3**

**Correct answer: C.** Patients with chronic mental health issues and diabetes represent a significant challenge to diabetes teams (and GPs). The support of a specialist mental health service, if available, can be very helpful in managing these patients. It should, however, be remembered that it is the patient who will decide whether to follow the advice. They are responsible for the decisions they take and for the consequences of those decisions. It is the role of the healthcare professional to provide guidance and empathy. Being

perceived as taking the side of the GP (A) is likely to produce an oppositional response. Patients with complex mental health needs tend not to do well in group settings (B). Imposing a healthcare professional's agenda (D) will in all likelihood strengthen her determination to remain in control. Healthcare professionals should always be mindful of suicidal risk in these patients, but an assessment of suicidal risk (E) should only be undertaken if it is brought up, directly or indirectly, by the patient. Otherwise the patient might feel she is being monitored rather than helped.