

Tackling diabetes: Weight management issues for people with type 2 diabetes

Roy Rasalam, Wen Bun Leong, Shahrads Taheri

The World Health Organization has estimated that more than 600 million adults worldwide are now classified as obese, which is defined as a BMI of ≥ 30 kg/m². The rising prevalence of obesity has led to a simultaneous increase in the prevalence of type 2 diabetes, and the term “diabesity” has been coined to describe those with type 2 diabetes and obesity. The aim of this review is to describe the prevalence of obesity and type 2 diabetes in Australia and summarise practical aspects of weight management. It will also explore the role of healthcare professionals in weight management and the prevention of the complications of diabesity.

Obesity results from a chronic surplus of energy intake combined with inadequate energy expenditure. It is defined as having a BMI of ≥ 30 kg/m² (≥ 27.5 kg/m² for South Asians). The prevalence of obesity is on the rise globally; the World Health Organization ([WHO], 2016) has estimated that more than 1.9 billion adults worldwide are now classified as overweight and 600 million adults are classified as obese. In Australia, 63% of adults are above average weight (35% overweight, 28% obese; Australian Bureau of Statistics, 2012). The proportion of the adult population with a BMI of ≥ 35 kg/m² increased substantially from 1 in 20 adults in 1995 to 1 in 10 adults in 2011–12 (Australian Bureau of Statistics, 2013), and projections suggest that by 2025, the prevalence of overweight and obesity will increase to over 70%, with approximately one third of the adult population classified as obese (Obesity Australia, 2014).

Obese individuals have a higher risk of developing metabolic abnormalities, such as type 2 diabetes, dyslipidaemia, non-alcoholic fatty liver disease, hypertension, and obstructive

sleep apnoea (OSA). Unsurprisingly, life expectancy is lower in people with obesity compared with those with a normal BMI of 18.5–24.9 kg/m² (Peeters et al, 2003). Obese individuals are also more likely to miss work due to sickness, have disabilities, such as immobility (secondary to osteoarthritis), and have reduced quality of life.

As obesity is a major risk factor for the development of type 2 diabetes, the rising trend in obesity has led to a simultaneous increase in the prevalence of type 2 diabetes. Currently, the estimated diabetes prevalence worldwide is 415 million, and this is projected to rise to 642 million by 2042 (International Diabetes Federation [IDF], 2015). In Australia, diabetes affects at least 1.2 million of the population, and there are a further 1.5 million people with prediabetes (National Diabetes Strategy Advisory Group, 2015). There is also estimated to be an additional 500 000 silent, undiagnosed cases of type 2 diabetes. Each day, 280 Australians develop diabetes, which equates to one person every 5 minutes (Diabetes Australia, 2015). The parallel increase of obesity and type 2 diabetes has led to the development



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Learning objectives

After reading this article, the participant should be able to:

1. Outline how anti-diabetes medications may effect weight and how it is important to warn people with diabetes before the start of treatment.
2. Understand weight loss options and how to provide holistic, individualised care.

Key words

- Bariatric surgery
- Diabesity
- Weight management

Authors

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Page points

1. Orlistat is currently the only approved drug available on the Pharmaceutical Benefits Scheme (PBS) for weight loss, thus, emphasis should be on lifestyle change, appropriate selection of drugs used in diabetes treatment, and bariatric surgery for those with severe obesity.
2. Depression is common among people with obesity, as well as those with type 2 diabetes, and this can affect motivation to lose weight.

of the term “diabetes” to describe people with both conditions.

Weight management in diabetes

The majority of people with type 2 diabetes are overweight or obese. Several studies have shown the importance of lifestyle change and weight loss for the prevention of type 2 diabetes in individuals who are at-risk of developing the disease (Thomas et al, 2010). Weight reduction improves diabetes and reduces cardiovascular risk.

Pharmacological agents used for the treatment of obesity itself have had a chequered history with many being withdrawn because of serious side effects (most recently, rimonabant and sibutramine) and concerns regarding safety (Samat et al, 2008). There is currently only one Pharmaceutical Benefits Scheme (PBS)-reimbursed drug available in Australia – orlistat. Thus, emphasis should be on lifestyle change, appropriate selection of drugs used in diabetes treatment, and bariatric surgery for those with severe obesity. *Box 1* describes the steps healthcare professionals should take when assessing a person with obesity. It is important to gauge the individual’s readiness for change and also to help to maintain momentum in motivated people. Informing obese people that weight loss can reduce pill or injection burden and also has the potential to create remission of their diabetes, should be a big motivating force to lose weight.

Mental health issues

Depression is common among people with obesity, as well as those with type 2 diabetes, and this can affect motivation to lose weight. In clinical practice,

there should be routine assessment for anxiety and depression in people with diabetes. Both depression (66%) and anxiety (70%) are very common in severely obese individuals, compared to the general population, where the levels are 33% for anxiety and 11.4% for depression (Jagielski et al, 2014). An issue with using screening tools for anxiety and depression is that they have not been specifically evaluated in individuals with severe obesity or obesity complicated by diabetes. Nevertheless, there is a need to identify mood disorders as they will hinder the individual addressing issues with their obesity and diabetes. Some individuals may require medication for depression depending on severity and it should be remembered that many anti-depressants cause weight gain.

In some cases, an eating disorder might be present. These include binge eating or night-eating syndrome. Binge eating is defined as consumption of a large amount of food in a short period of time due to subjective loss of control (Snyder, 2009). Night eating is characterised by eating a significant portion of daily calories after the main meal in the evening (Allison et al, 2006). Both conditions are more common in women. Individuals with these conditions should be referred for psychological support and management.

Obesity is a chronic disorder; drastic lifestyle change is unlikely to result in maintained long-term weight loss, given the body’s fierce biological drive to retain body weight. It is important for individuals to be advised to make small sustainable changes that are likely to be maintained. It is generally recommended that people should aim to lose 0.5–1 kg per week (National Heart Lung Blood Institute and National Institute of Diabetes Digestive Kidney Diseases, 1998; Scottish Intercollegiate Guidelines Network [SIGN], 2010).

There are several dietary interventions available to help achieve weight loss goals, including the 600 calorie deficit diet, low-energy diet (LED) and very-low-energy diet (VLED), carbohydrate restriction diet, low-glycaemic index diet, Mediterranean diet and low-fat diet (Leong and Taheri, 2012). A study has reported remission of type 2 diabetes after 8 weeks of a VLED but whether this can be maintained long term is unclear (Lim et al, 2011). It is important to tailor the dietary approach to the individual. VLEDs

Box 1. General assessment of a person with obesity.

- Weight history (onset of obesity, family history).
- Dieting history (positive/negative aspects from previous weight loss attempts).
- Eating patterns (skipping meals, snack intake, binge eating, fast-food intake).
- Dietary intake (food diary, usually assessed by a dietitian).
- Physical activity (use of pedometer, levels of sedentary behaviour).
- Alcohol intake.
- Smoking history.
- Psychological issues (depression, eating disorders).
- Individual’s expectation (realistic or unrealistic).
- Individual’s motivation (willingness and ability to change).
- Social circumstances and emotional support.

are considered safe and are recommended for a maximum of 12 weeks (NICE, 2006). Emerging data show that LEDs are just as effective as VLEDs and are better tolerated (Riecke et al, 2010). There needs to be close supervision of people with type 2 diabetes who embark on these diets to ensure they have support and they are safe by, for example, avoiding hypoglycaemia in insulin-treated individuals.

Intensive lifestyle intervention is useful for weight loss and diabetes control in people with type 2 diabetes. The Look AHEAD study showed that a 5% reduction of total initial body weight resulted in significant reduction in cardiovascular risk factors (Look and Wing, 2010). The treatment programme is well structured with regular weekly or fortnightly follow-up for the first 3–6 months. Group sessions are more cost effective and are shown to provide better initial weight reduction as they offer greater support and healthy competition between members.

Currently, the only anti-obesity medication available on the PBS is the pancreatic lipase inhibitor orlistat which works by inhibiting absorption of fat in the intestine. It is recommended to be used as an adjunct to other weight management interventions, and the drug should be prescribed only with accompanying lifestyle advice and support. Use of orlistat beyond 12 months is mainly for weight maintenance as many people regain weight they have lost after the treatment is discontinued (Torgerson et al, 2004). In rare cases, orlistat can result in deficiency of fat-soluble vitamins, particularly vitamin D, which is normally found in low levels in people with obesity and diabetes (Compher et al, 2008).

Another anti-obesity medication (not on the PBS) is phentermine. It is a sympathomimetic amine with an appetite-suppressant effect exerted through its action on the hypothalamus. The drug is approved as a short-term adjunct in a medically monitored regimen of weight reduction, exercise, diet (caloric restriction) and behaviour modification in obese people with a BMI of 30 kg/m² or greater. It is contraindicated in cardiovascular disease, psychiatric illness, drug dependence, hyperthyroidism, glaucoma and concomitant treatment with monoamine oxidase inhibitors. Side effects of phentermine may include tachycardia or

elevated blood pressure (cardiovascular system); restlessness, insomnia or headache (nervous system); or nausea, constipation or dry mouth (gastrointestinal systems; iNovo Pharmaceuticals, 2013). Due to the precautions associated with this medication, it is suggested that its use is limited to prescribers with experience using phentermine and regular monitoring is required when in use.

Recently, a new injectable anti-obesity medication, liraglutide 3 mg, has become available. It is a glucagon-like peptide-1 (GLP-1) receptor agonist, but is not currently on the PBS. The drug is approved for use in addition to a reduced-calorie diet and increased physical activity for an individual with a BMI of ≥ 30 kg/m², or ≥ 27 kg/m² with at least one additional weight-related dysglycaemic comorbidity (prediabetes or type 2 diabetes), hypertension, dyslipidaemia or OSA. Side effects may include nausea, diarrhoea, constipation, vomiting and increased heart rate, and there have been rare reported cases of pancreatitis. In the SCALE Obesity and Prediabetes study, more patients with prediabetes at baseline had their diagnosis reversed (69.2%) compared to the cohort treated with placebo (32.7%; Novo Nordisk, 2015).

Glycaemic control and reduction in hypertension and dyslipidaemia are the cornerstones of diabetes care, with best results obtained for blood pressure and cholesterol reduction. Unfortunately, the emphasis on these factors has somewhat detracted from lifestyle change and weight loss, and the focus on glycaemic control has paradoxically resulted in weight gain. Weight gain further exacerbates glycaemic control resulting in further treatment intensification, thus creating a vicious cycle. A summary of anti-diabetes medications and their effects on weight and other side effects are shown in *Table 1*. These factors should be considered when deciding diabetes management strategies for people with obesity.

Role of healthcare professionals

During a consultation with a person who has type 2 diabetes and obesity, healthcare professionals should use their often limited time to cover the areas summarised below:

- Medication review: It is essential to exclude unnecessary medications and alter those that may cause weight gain. An individualised approach to

Page points

1. Liraglutide 3 mg, an injectable glucagon-like peptide-1 receptor agonist, is a new option (not on the PBS) for weight loss in people with or without diabetes in conjunction with reduced calorie diet and exercise. It may also prevent the progression of prediabetes.
2. It is essential for healthcare professionals to exclude unnecessary medications and alter those that may cause weight gain.

Table 1. Summary of currently available diabetes treatments and their effects on HbA_{1c}, body weight and their adverse side effects (Nathan et al, 2009; Inzucchi et al, 2012; Munro et al, 2013).

Diabetes treatment	General effects on body weight	Adverse side effects
Biguanides	No weight gain	Gastrointestinal side effects; very rare cases of lactic acidosis
Sulphonylureas	Weight gain	Hypoglycaemia
α-Glucosidase inhibitors	Weight neutral	Gastrointestinal side effects
Glucagon-like peptide-1 analogues	Weight loss	Nausea, vomiting, pancreatitis
Insulin	Weight gain	Hypoglycaemia
Thiazolidinediones	Weight gain	Fluid retention, heart failure
Dipeptidyl peptidase-4 inhibitors	Weight neutral	Upper respiratory tract infection, nasopharyngitis, headache
Sodium–glucose cotransporter 2 inhibitors	Weight loss	Urinary tract and genital infection

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1. Cutting down on alcohol intake is very beneficial as some alcoholic drinks are high in calories and can cause weight gain. Some individuals can lose a significant amount of weight after cutting down on alcohol.
2. When eating disorders, such as comfort eating, emotional eating, binge eating and night-time eating are suspected, appropriate dietary and/or psychological assessment is required.

Box 2. Common drugs that promote weight gain (Leong and Taheri, 2012).

- Anti-diabetes medications (insulin, sulphonylurea, thiazolidinedione)
- Anti-hypertensives (beta-blockers, calcium-channel blockers)
- Diabetic neuropathy treatment (amitriptyline, gabapentin)
- Anti-depressants (tricyclic anti-depressants, some serotonin-specific reuptake inhibitors, mirtazapine)
- Corticosteroids
- Antihistamines
- Anti-psychotics (clozapine, olanzapine, risperidone, quetiapine)
- Mood stabilisers (lithium)
- Anti-neoplastic agents (tamoxifen)

diabetes medication means choosing drugs that are either weight neutral or that can promote weight loss in people with diabetes. *Box 2* shows a list of common drugs that may induce weight gain (Leong and Taheri, 2012).

- Smoking cessation: This is important as part of cardiovascular and cancer risk assessment. The Framingham Heart Study has reported that a 40-year-old obese smoker can lose 13 years in life expectancy compared with a normal-weight

non-smoking counterpart (Peeters et al, 2003); therefore, smoking cessation advice is extremely important. Unfortunately, the process of smoking cessation may lead to higher food consumption and alteration of the body’s metabolism, which may result in weight gain (Williamson et al, 1991; Chiolero et al, 2008). Nicotine replacement or chewing gum may help to prevent snacking. Bupropion, a smoking cessation drug, could be considered as it has been shown to result in weight loss. Appropriate preparation for the individual’s quit date, and beyond, should help avoid excessive weight gain.

- Alcohol and carbonated drinks: Cutting down on alcohol intake is very beneficial as some alcoholic drinks are high in calories and can cause weight gain. Some individuals can lose a significant amount of weight after cutting down on alcohol. Carbonated drink intake is a particularly common issue for people with obesity and diabetes so they should be encouraged to switch to water.
- Advice and goal setting: Several studies have found a discrepancy in the expectation of successful weight loss between patients and healthcare professionals (Foster et al, 2001; Wee et al, 2006). It is necessary to set achievable targets at initial assessment to prevent unrealistic expectations or negative emotions and attitudes. The recommended goal is 0.5–1 kg or 1–2 lb weight reduction per week (SIGN, 2010) and losing 5–10% of body weight in 6 months. This could be achieved by reducing portion sizes, avoiding second helpings, cutting down on alcohol and a carbohydrate restriction diet.
- Eating disorders: When eating disorders, such as comfort eating, emotional eating, binge eating and night-time eating are suspected, appropriate dietary and/or psychological assessment is required.
- Orlistat: Studies have shown modest weight reduction (5 kg) with most weight loss occurring in the first 6 months of treatment with orlistat in conjunction with lifestyle changes (Wadden et al, 2011). It is recommended that orlistat in conjunction with professional dietetic and weight management advice should be used in addition to lifestyle intervention.
- Phentermine: A meta-analysis of six studies

ranging from 2–24 weeks found that participants using phentermine 15–30 mg/day had a mean additional weight loss relative to placebo of 3.6 kg, with mean total weight loss of 6.3 kg (Yanovski and Yanovski, 2014). However, use of this medication should be limited, and patients should be screened for contraindications.

- **Liraglutide:** In the SCALE Obesity and Prediabetes Study, liraglutide 3 mg was compared against placebo in a study where participants additionally received one-to-one support on a reduced calorie diet (approximately 500 kcal/day [2090 kJ/day] deficit) and exercise counselling (recommended increase in physical activity of minimum 150 minutes per week). By the end of the study, 63.5% of the cohort taking liraglutide 3 mg achieved $\geq 5\%$ weight loss compared to 26.6% of those in the placebo group. Furthermore, 32.8% of the liraglutide 3 mg group achieved $>10\%$ weight loss compared to 10.1% in the placebo group at 56 weeks. In the SCALE Diabetes study where participants continued to receive lifestyle advice, 49.8% of the liraglutide group achieved $\geq 5\%$ weight loss compared to 13.5% of the placebo group, and 22.9% of the liraglutide group compared to 4.2% of the placebo group achieved $>10\%$ weight loss at 56 weeks (Novo Nordisk, 2015).
- **Additional issues:** Identifying additional issues that may impinge on body weight and diabetes, such as OSA, is essential when addressing the individual's cardiometabolic risk and addressing these issues would help to improve quality of life.

When individuals experience difficulties with losing even the minimum amount of weight, which is common in people with type 2 diabetes, a holistic review is necessary. There might be underlying psychological issues, such as eating disorders or previous experience of abuse, social factors, such as marital discordance, or healthcare issues, such as disabilities, causing problems with physical activity.

Bariatric surgery

Currently, bariatric surgery is the most effective treatment available for weight reduction for people with type 2 diabetes and extreme obesity. NICE (2006) and the IDF (Dixon et al, 2011) have recommended the use of bariatric surgery in this

population. For adults with BMI >40 kg/m², or adults with BMI >35 kg/m² and comorbidities that may improve with weight loss, bariatric surgery may be considered, taking into account the individual situation (The Royal Australian College of General Practitioners and Diabetes Australia, 2016).

This year, a joint statement by international diabetes organisations was published following the 2nd Diabetes Surgery Summit (Rubino et al, 2016). It is endorsed by 45 medical and scientific societies to provide guidance and clarification on the role of bariatric surgery in type 2 diabetes, and includes the following recommendations as well as a useful algorithm for treating people with diabetes (*Figure 1*).

- Metabolic surgery should be a recommended option to treat type 2 diabetes in appropriate surgical candidates with class III obesity (BMI ≥ 40 kg/m²), regardless of the level of glycaemic control or complexity of glucose-lowering regimens. It should also be recommended in people with class II obesity (BMI 35–39.9 kg/m²) with inadequately controlled hyperglycaemia despite lifestyle and optimal medical therapy.
- Metabolic surgery should be considered an option to treat type 2 diabetes in people with class I obesity (BMI 30–34.9 kg/m²) and inadequately controlled hyperglycaemia, despite optimal medical treatment by either oral or injectable medications (including insulin).

Besides weight loss, studies have shown that bariatric surgery prolongs life expectancy, possibly from a reduction in incidence of malignancies, and it lowers cardiometabolic risk factors, resulting in decreased cardiovascular events (Sjostrom et al, 2007). The procedures commonly carried out in the NHS are laparoscopic Roux-en-Y gastric bypass (RYGB), laparoscopic adjustable gastric band (LAGB) and laparoscopic sleeve gastrectomy (LSG) surgery. RYGB is both restrictive (reducing the amount of food eaten) and malabsorptive (reducing the absorption of food), while LSG and LAGB are anatomically restrictive surgeries with differential physiological effects.

Apart from weight loss, bariatric surgery has been shown to lead to remission of type 2 diabetes. The success rates differ with different techniques; for LAGB, remission is reported to be between 58%

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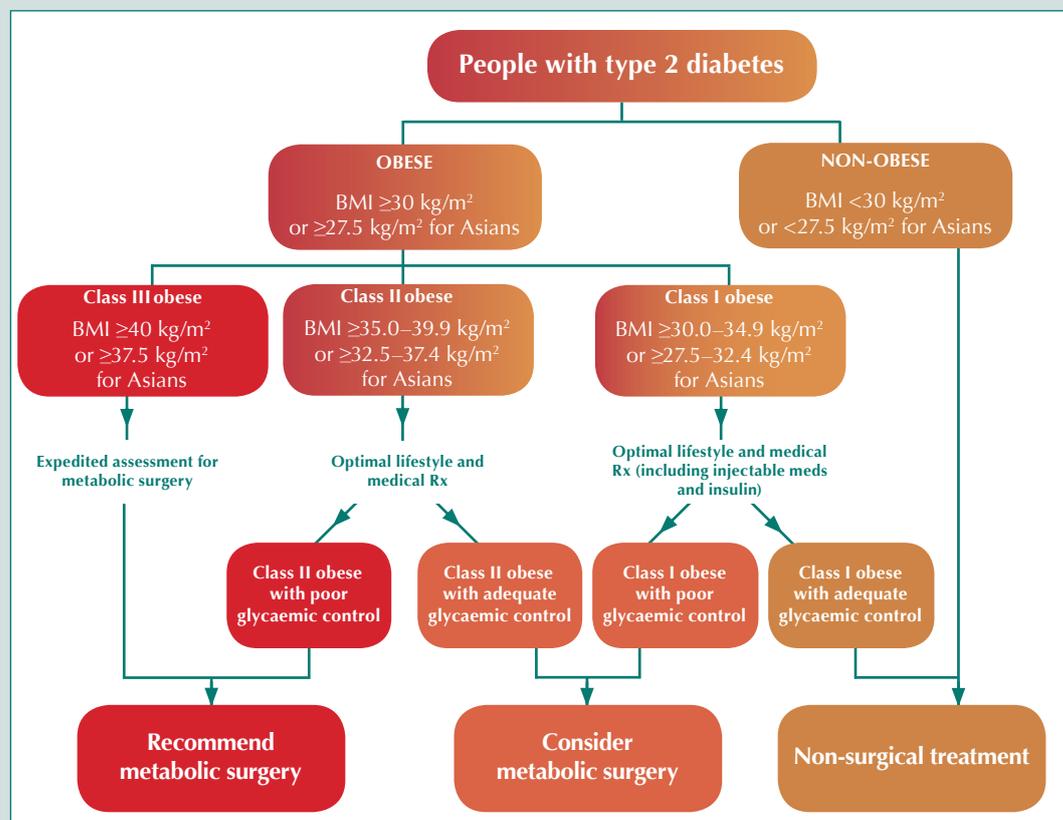


Figure 1. Algorithm for the treatment of type 2 diabetes, as recommended by DSS-II voting delegates. The indications above are intended for patients who are appropriate candidates for elective surgery (Rubino et al, 2016). DSS-II=2nd Diabetes Surgery Summit; meds=medication; Rx=prescription.

and 62%, while for RYGB it is between 71% and 83% (Buchwald et al, 2004; 2009). One hypothesis for the difference in remission is the effect of hormonal changes, especially GLP-1 following RYGB. Post-prandial GLP-1 levels are increased after RYGB (Yousseif et al, 2014). Although weight loss and type 2 diabetes remission results are better for RYGB, it is the most costly option, requires a longer hospital stay, and has a higher short-term complication rate and mortality, as well as the need for life-long nutritional supplementation after the operation. Over time, weight regain is common after both procedures and while diabetes may initially go into remission, it may well reappear at a later date.

Conclusion

The rising prevalence in obesity has led to the increasing prevalence of type 2 diabetes and this had led to the use of the term diabetes. Smoking cessation and reduction in alcohol intake,

alongside dietary and lifestyle advice, will help in weight reduction and if not, at the very least promote weight maintenance and prevention of complications. Modest weight loss can be achieved through dietary changes and intensive lifestyle interventions. Helping people with type 2 diabetes achieve weight loss will improve HbA_{1c} control and other cardiometabolic risk factors. Life expectancy may also be prolonged from weight loss. In suitable individuals, medications such as orlistat or liraglutide 3 mg may be considered to help them achieve weight loss where lifestyle modifications alone have failed. Currently, for those with type 2 diabetes and extreme obesity, the most effective treatment is bariatric surgery. ■

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Online CPD activity

Visit www.diabetesonthenet.com/cpd to record your answers and gain a certificate of participation

Participants should read the preceding article before answering the multiple choice questions below. There is ONE correct answer to each question. After submitting your answers online, you will be immediately notified of your score. A pass mark of 70% is required to obtain a certificate of successful participation; however, it is possible to take the test a maximum of three times. A short explanation of the correct answer is provided. Before accessing your certificate, you will be given the opportunity to evaluate the activity and reflect on the module, stating how you will use what you have learnt in practice. The CPD centre keeps a record of your CPD activities and provides the option to add items to an action plan, which will help you to collate evidence for your annual appraisal.

1. According to the *General Practice Management of Type 2 Diabetes: 2016–18* guidelines, among people with type 2 diabetes, what patient characteristics denote who is suitable for bariatric surgery? Select ONE option only.

- A. BMI 20–25 kg/m²
- B. BMI 25–30 kg/m²
- C. BMI 30–35 kg/m²
- D. BMI >40 kg/m², or BMI >35 kg/m² and comorbidities that may improve with weight loss
- E. All of the above

2. Which ONE of the following has been linked to weight gain? Select ONE option only.

- A. Metformin
- B. Sulfonylurea
- C. DPP-4 inhibitors
- D. GLP-1 receptor agonists
- E. None of the above

3. Which of the following drugs promote weight loss and are administered by subcutaneous injection? Select ONE option only.

- A. Orlistat
- B. Phentermine
- C. Lithium
- D. Liraglutide
- E. All of the above

4. What is the number of overweight and obese people according to the World Health Organization in 2016? Select ONE option only.

- A. 230 million overweight, 70 million obese

- B. 1.9 billion overweight, 600 million obese
- C. 2.3 billion overweight, 700 million obese
- D. 2.5 billion overweight, 1 billion obese
- E. 3 billion overweight, 500 million obese

5. According to SIGN, what is the recommended goal for people who are trying to lose weight? Select ONE option only.

- A. 5–10% of body weight in 6 months
- B. 10–12% of body weight in 6 months
- C. 1.9–5.0 kg per week
- D. 5.3–10.0 kg per week
- E. 5.3–10.0 kg per month

6. A 34-year-old Asian man has a BMI of 27 kg/m². Which ONE of the following is the MOST appropriate classification of his BMI? Select ONE option only.

- A. Underweight
- B. Healthy weight
- C. Overweight
- D. Obese (Grade 1)
- E. Obese (Grade 2)

7. Which of these statements are CORRECT about very-low-calorie diets? Select ONE option only.

- A. They are defined as 800 kcal/day or fewer
- B. They should be used for a maximum of 12 weeks
- C. The person following the diet should be given ongoing clinical support
- D. Very-low-calorie diets should be considered for people who are obese and who have a clinically-assessed need for rapid weight loss
- E. All of the above

8. Which of these statements is NOT true for orlistat? Select ONE option only.

- A. Orlistat can lead to malabsorption of vitamin A
- B. Orlistat cannot be used in children
- C. Orlistat should be discontinued if no weight loss is achieved after 3 months of treatment
- D. Orlistat should be continued for more than 12 months for weight maintenance
- E. Orlistat has been shown to be effective for modest weight reduction

9. Which of the following statements is NOT true regarding weight management? Select ONE option only.

- A. At 12 months, a very-low-energy diet and a low-energy diet both result in similar weight reduction
- B. The recommended amount of physical activity is 300 minutes of moderate intensity activity per week
- C. Young women should seek early pregnancy after bariatric surgery as the body is most fertile at that time
- D. Patients often have unrealistic expectations of successful weight loss
- E. Smoking cessation is associated with weight gain, while reducing alcohol intake can help in weight reduction

10. Which of the following common drugs PROMOTE weight gain? Select ONE option only.

- A. Beta-blockers
- B. Amitriptyline
- C. Clozapine
- D. Lithium
- E. All of the above