Obesity

Learning Objectvies:

1. **To understand the impact of obesity on general health;**
2. **To appreciate the causes of obesity in relation to lifestyle;**
3. **To understand the role of leptin in managing appetite;**
4. **To appreciate the different treatment options when managing a patient with obesity.**

The prevalence of obesity has increased dramatically over the last two decades throughout the world and is associated with a range of medical and psychological complications. It is now recognized that obesity is one of the most important public health problems of our time. Despite this, the trend of increasing obesity continues, indicating that current public health measures to prevent obesity are failing.

Although there is a high degree of heritability for obesity, the rapid rise in the prevalence of obesity suggests that environmental factors, such as altered diets and decreased energy expenditure, are more important in the change in obesity patterns within countries. Body weight is tightly regulated such that even small mismatches of less than 100 kcal/ day in energy intake and expenditure may result in massive obesity. Despite this, the management of the individual with obesity is challenging. There is much pessimism regarding weight reducing programmes and it has been said that most obese people do not enter treatment, most who do fail to lose weight and most who lose weight regain it.

Normal weight and degrees of either overweight or underweight are defined by the World Health Organization using the body mass index. The definition of obesity and overweight, as well as underweight, are based on the observation that mortality is related to body mass index with mortality being lowest within the BMI range of 20 to 25kg/m^2 and increasing at BMIs above and below this range. The effect of BMI on mortality may have been overestimated because of the effect of smoking and consequent illness and clinical disorders causing weight loss. These data are based on

white European subjects, and for individuals of South Asian ethnicity, the upper limit of normal BMI may need to be reduced.

It is estimated that obesity reduces life expectancy by round 9 years and accounts for 30000 deaths in the UK per annum. It costs the UK National Health Service £480 million or 1.5% of total expenditure. In addition, indirect costs are probably £2 billion. Overweight and obesity are also associated with a number of metabolic and cardiovascular complications, musculoskeletal disease and several cancers, accounting for 18million days of sickness absence per annum

Body mass index is calculated according to the following formula:

Weight in kilograms / (height in metres)^2

- UnderweightBMI<18.5kg/m^2
- Normal weight BMI18.5-25kg/m^2
- Overweight >25 kg/m^2
- Obesity BMI >30 kg/m^2
- Morbid obesity BMl>40 kg/m^2•

Obesity increases the risk of diabetes, dyslipidaemia and insulin resistance by more than threefold while increasing coronary heart disease and hypertension two to threefold. It is estimated that up to 80% of all new cases of diabetes can be attributed to obesity. The risk of developing type 2 diabetes increases across the normal range, such that the risk of diabetes in a middle-aged woman whose BMI is greater than 35kg/m^2 is 93.2 times greater than woman whose BMI is below 22.5 kg/ m^2.

There is compelling evidence that our society discriminates against 'fat people' and this is damaging to the psychological well-being of obese individuals. Obese women are likely to leave school earlier, are less likely to be married and have higher rates of household poverty than women who are not overweight. These findings are independent of baseline socioeconomic status and are not seen in people with other chronic conditions such as asthma or musculoskeletal abnormalities.

Limitations of using BMI

As the health risks associated with obesity relate to an excess storage of body fat, and in particular visceral fat, certain individuals will be misclassified with body mass index. For any given BMI, women have a higher percentage of body fat than men. This can lead to the anomalous situation where a lean young male bodybuilder may have an identical body mass index to a middle-aged obese woman. Nevertheless, across populations, body mass index correlates well with percentage body fat making this an easy measure of obesity.

Body fat may be preferentially located in the abdomen (central obesity) or surrounding the hips and thighs (peripheral obesity). Central obesity is associated with the metabolic syndrome and is a better predictor of health risk; at the same level of obesity, the more visceral fat, the greater the risk of developing cardiovascular and metabolic complications of obesity. Differences in the distribution of body fat explain why individuals from Asian backgrounds are at higher risk of the complications of obesity for any given BMI than white Europeans, as Asians tend to have greater central fat distribution. There are also gender differences in body fat distribution with most women developing peripheral obesity while men develop central adiposity.

The use of the waist measurement can be used to identify those at high risk of developing the metabolic complications of obesity, particularly if combined with a fasting triglyceride concentration. Waist measurements of 100 to 102 cm in men and 88 to 90 cm in women alone provide useful reference values to identify obese patients who may be at high risk for chronic metabolic diseases. If hypertriglyceridaemia (>2.0mmol/L) is also present, over 80% of men with waist measurements greater than 90 cm will be at risk of the metabolic syndrome.

Obesity trends

The WHO MONICA project has been following obesity trends in 21 countries among randomly selected middle-aged participants from the early 1980s to the mid-1990s. Mean BMI as well as the prevalence of overweight has increased in virtually every Western European country, Australia, USA and China.

Within the UK, the prevalence of obesity in adults has almost trebled since 1980, such that in 2002, 23% of men and 25% of women were obese. The prevalence of obesity among children is lower but the increase in the prevalence of overweight is similar to the rise in obesity in adults. Obesity rates are higher in low social classes and in some ethnic minority groups, particularly from South Asia.

The Centers for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS) provides dramatic evidence to demonstrate the continuing rise in the prevalence of obesity within the United States. Each year, state health departments use standard procedures to collect data through a series of monthly telephone interviews with US adults. In 1991, four states had obesity prevalence rates of 15 to 19% and no states had rates at or above 20%. In 2003, 15 states had obesity prevalence rates of 15 to 19%; 31 states had rates of 20 to 24%; and four states had rates greater than 25%. As these data rely on self-reported height and weight, it is likely that these represent underestimates of the true prevalence of obesity.

Causes of obesity

The causes of obesity are multifactorial, ranging from purely genetic conditions, such as leptin deficiency, to entirely environmental conditions. It is, however, certain that obesity can only occur when energy intake remains greater than energy expenditure for a long period of time. Thus, if either energy intakes increases, or energy expenditure decreases or both, the individual will gain weight. Both energy intake and expenditure are affected by internal homeostatic mechanisms as well as external environmental factors.

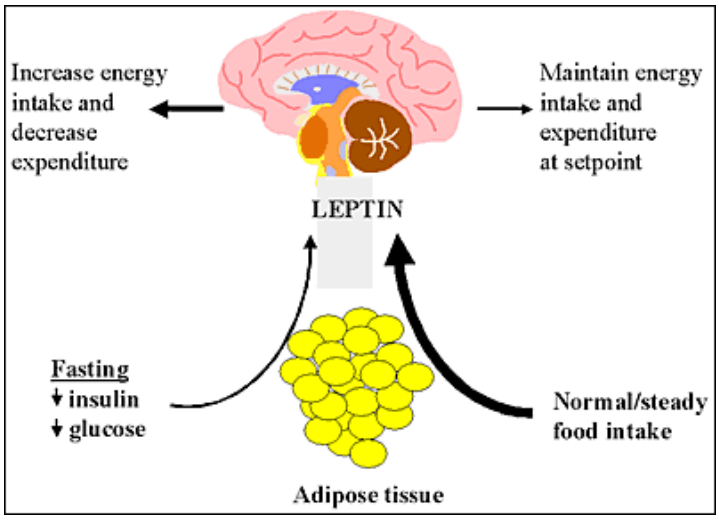
Given the diversity of factors affecting energy balance, it is remarkable how well body weight can be regulated. Most adults are able to maintain their body weight to within a few kilograms over 40 or more years in spite of having eaten in excess of 20 tonnes of food. Even in individuals who become obese the mismatch between energy intake and energy expenditure is extremely small. Daniel Lamberts lived in Leicestershire, UK during the 18th century and earned a living by exhibiting himself as a natural curiosity, having reached the weight of 700pounds (320 kg). It is

estimated that when he died at the age of 39, he weighed 52 stone 11 pounds (336 kg), of which approximately 230 kg would have been fat, containing approximately 2 million kcal. Assuming that there was progressive weight gain throughout his life, the excess consumption would have been only around 140 kcal/ day, equivalent to an apple a day!

Appetite is largely regulated by the ventromedial and lateral hypothalamus, with the ventromedial hypothalamus being a satiety centre and the lateral hypothalamus being thought of as a hunger centre. Lesions in the lateral hypothalamus cause complete cessation of feeding while stimulation of this area leads to overeating. The reciprocal is seen in the ventromedial hypothalamus. The neurobiology of appetite control is only now being unravelled. The discovery of adipose tissue hormone, leptin, provided a new paradigm for our understanding of the control of body weight. Under normal circumstances, circulating leptin concentrations increase as fat mass increases and decrease as fat mass decreases.

Leptin

Leptin, identified in 1994, is secreted from adipocytes and signals to the brain to regulate fat mass. Leptin is actively transported across the blood-brain barrier and reaches the hypothalamus, where it binds to specific leptin receptors located on the surface of neuropeptide Y (NPY) containing cells. NPY has a powerful stimulating effect on appetite and leptin suppresses the secretion of NPY, leading to suppression of appetite.



Thus as fat mass increases, the increased leptin suppresses NPY and appetite decreases. This provides a classical endocrine negative feedback mechanism by which appetite and basal metabolic expenditure is regulated in response to changing levels of adiposity.

The central action of leptin was first demonstrated by studies carried out in mice that had defective leptin secretion and who developed severe obesity – the mouse on the right demonstrates this (in case you weren't sure which one!)

Abnormalities in the leptin receptor also led to severe obesity. This led to the hope that abnormalities in leptin action may be responsible for human obesity. While rare genetic abnormalities in humans in leptin and its receptor have been identified in cases of severe, early-onset obesity, in most situations leptin levels increase in obesity and treatment with leptin does not lead to a fall in body weight. This is in contrast to the rare individuals with leptin deficiency whose body mass index falls dramatically with leptin therapy.

Ghrelin

Ghrelin acts as an appetite-stimulating hormone and is implicated in both short- and long-term appetite and body weight regulation. It is secreted from the stomach and circulates in the blood stream where its levels rise and fall before and after meals, respectively, in response to hunger levels. Ghrelin stimulates food intake by activating NPY neurons, which express ghrelin receptors, thereby balancing inhibitory signals received from insulin and leptin. Individuals suffering from Prader-Willi syndrome, a genetic disorder characterized by a chronic feeling of hunger that leads to obesity, experience high plasma ghrelin levels.

The contribution of genetic factors has been shown from twin, family and adoption studies, which suggest that up to 70% of the variance of body mass index is accounted for by genetic variance. Over the last decade, in addition to genetic mutations in leptin and its receptor, a number of other human genes have been identified in which major mis-sense or nonsense mutations have caused severe, early-onset obesity, usually

through the disruption of normal appetite control mechanisms. Although these cases only represent a minority of all obesity, these studies will begin to identify the critical molecular components of the human energy balance regulatory systems, which should allow the targeting of more effective therapies in the future.

Despite the strong contribution of genetics to the development of obesity, the current obesity epidemic cannot be explained by genetics alone. The change in obesity patterns has arisen as the result of an adverse environment interacting with a susceptible genotype.

Dietary intake

The National Food Survey in United Kingdom provides the longest running continuous survey of household consumption in the world. This has shown that, over the last 50 years, food consumption within the home has decreased. At first sight these data appear to be paradoxical until it is remembered that as much as 50% of all food is consumed outside the home. Since the Second World War, within Europe more food is produced than is required. This has led to intense competition and incentives to bulk buy; there can be few people who have never taken advantage of 'two for the price of one' offers, or the better value 'jumbo' pack.

The National Food Survey has also indicated that there are changes in the types of food that we are eating. There has been a shift from carbohydrate to fat consumption. This is important because most individuals regulate their meals size according to weight or volume rather than caloric intake. Fat contains approximately 9 kcal/ g while carbohydrate and protein contain 4 kcal/ g. Short-term metabolic studies show that when the fat content of the diet is increased, individuals continue to eat the same quantity of food and consequently move into positive energy balance.

There is some evidence from cross-sectional and longitudinal studies that the proportion of energy consumed as fat is linked with an increase in the prevalence of obesity. More recently, however, particularly in the UK and US, there has been a decline in the proportion of energy consumed as fat, while the prevalence of obesity continues to rise. This may reflect the relatively long lag phase in the development of obesity and so it may be many years before this dietary change affects the prevalence

of obesity.

We have evolved to undertake vigorous physical activity and therefore it should be unsurprising that inactivity is associated with ill health. Total energy expenditure is the sum of our basal metabolic rate, dietary-induced thermogenesis, adaptive thermogenesis, such as shivering, and physical activity. Of these, physical activity offers the greatest scope for an individual to increase their energy expenditure. Physical activity can be defined as any bodily movement produced by skeletal muscle which results in energy expenditure and can be subdivided into different components, such as exercise or sport. Activity can be also divided according to its intensity and duration. Low-intensity activities may include walking or household work while more intense activities may include running or cycling faster than 10 miles an hour or up hills. Sedentary behaviour, such as television viewing, is also significant when considering weight gain as it constrains the opportunity to be active and therefore reduces energy expenditure.

Physical inactivity is a major determinant of the current obesity epidemic. Several studies have shown that physically active people have lower levels of body fat and weight than inactive people. There are also strong relationships between indicators of inactivity, such as television viewing and car ownership, and secular trends in obesity. Unfortunately, epidemiological studies have shown that we are becoming progressively less active. The Allied Dunbar National Fitness Survey, undertaken in 1995, indicated that 29% of men and 28% of women were classed as sedentary while only 16% of men and 5% of women participated in regular vigorous activity. Inactivity increases with age but social class differences are not strong because occupational activity is often balanced with leisure time activity. In the US, 60% of adults were not regularly active and 25% reported no significant activity at all. Similarly, children are also becoming increasingly inactive.

Technological advances have reduced our physical activity in many spheres. The increasing number of cars has reduced the amount of physical activity we undertake travelling to and from work. It is estimated that household appliances have reduced our energy expenditure by around 500kcal/day within the home. These trends have meant that we have endeavoured to compartmentalize our exercise into 30 to 40 min in the gym two or three times a week rather than focusing on increasing our energy

expenditure throughout the day.

As well as eating because we need to eat, many of us also eat for pleasure. Much of the research into obesity has been concerned with the former homeostatic control of eating rather than focusing on the latter hedonistic reasons why we eat. Yet these two aspects of eating are complementary and have two different CNS systems controlling them.

There is much to be learnt from studying the eating behaviours of people who gain weight. It is known that overweight individuals select more energy-dense food, display enhanced hunger traits with less satiety and eat larger and more frequent meals. Their eating behaviour is also less inhibited. Individuals who tend to gain weight have a greater readiness to eat and will eat opportunistically. There are differences in the timing of eating; obese individuals tend to eat more in the afternoon and less in the morning. In contrast, enjoyment from food is seen as being less important in those who do not gain weight and health rather than taste becomes a more important factor when choosing food.

Despite the apparent simplicity of the solution for the prevention of obesity, there is little evidence of the efficacy of health education programmes within the general population. Education alone is probably insufficient and behaviour modification is also needed. Healthcare professionals need to take obesity seriously and must collectively support obesity prevention strategies to prevent the undermining of healthy lifestyle advice.

A public health and governmental response is also needed to reduce the obesity epidemic. This could include legislation or a more 'ecological' approach in which there is a co-ordinated strategy to influence the individual by education and behaviour change and the toxic environment through economic, physical and sociocultural pressures.

Management of the individual with obesity

The major aim of a weight-management programme is to improve health by red ucing morbidity and mortality associated with obesity rather than simply lowering weight

and adiposity. A 10% weight loss is associated with a major reduction in death and metabolic complications of obesity.

The scale of the problem means that we are unable to treat all patients with obesity and therefore it is important to select patients that we are most likely to help. Characteristics of patients likely to lose weight during a weight-management programme are:

- High initial body mass
- High central obesity
- High energy intake
- Initial weight loss

Early weight loss probably reflects the patient's ability to comply with the weight-management programme. Patients need to be well motivated to undertake the lifestyle changes. High self-esteem and the acceptance of the need to change also predict weight loss. This is particularly challenging in the arena of mental illness where obesity may well complicate the mental state of the patient.

It is important to set appropriate goals to prevent disappointment and frustration during the programme. A 10% weight loss is an appropriate goal because it is achievable, results in significant health benefits and can be maintained. However, in one study when most patients were asked how much weight they would like to lose, only 1 % reported they would be happy with a weight loss of less than 10% while 63% expected to lose more than 20% of weight. The natural history of body weight throughout a lifetime is a gradual increase, and therefore the first aim of a weight-management programme is to prevent further weight gain before moving on to weight loss.

Patient should also be aware of the long-term challenge of weight loss. In the same way that weight gain occurred over many years, a lifelong change to their lifestyle is needed to reduce weight. Patient should be encouraged not to think of short-term fixes. A significant portion of our total energy intake is made up from the basal metabolic rate. If energy intake falls below basal metabolic rates, strong protective adaptations occur to try to maintain weight. The patient feels lethargic, tired and

listless and will be unable to maintain this situation for any length of time. Too great a calorie deficit will therefore lead to failure. On the other hand if a deficit of around 500 kcal is advocated, the patient can lose around 1 kg of weight per week and this is sustainable over the long term.

Dietary strategies

There is a huge popular literature about diets that will aid weight loss. Most of these diets fail to appreciate that nutrition is a demand led process and therefore any diet should meet the requirements of the body. There is a need to include both fats and carbohydrates as energy supplies and any diet that excludes one or other of these components will create a mismatch between supply and demand. Diets need to be sustainable over the long-term and most diets that exclude many different food types, such as the Atkins or Ornish diet, cannot be maintained for more than several months.

The first aim of dietary advice therefore must be to ensure that the individuals eat sufficient food to meet their metabolic needs. Patient should be advised to avoid extreme eating restraints and dieting. In order to reduce calorie consumption, two dietary changes should be considered: the types of food should be changed and portion sizes reduced. A systematic review of all dietary interventions lasting greater than 1 year found that there is little evidence to support the use of diets apart from low fat diets for weight reduction. Low fat diets for up to 36 months resulted in modest weight losses of around 3.5 kg. The consumption of low-energy-dense foods and sweeteners may also reduce meal energy intake.

Portion size is also extremely important. There is good evidence that energy intake is proportional to the amount of food available at mealtimes and by reducing portion size energy consumption falls. Over the last decade the average size of dinner plate in the United States restaurant has gone up from 9 inches to 12 inches. The same volume of food on a larger plate appears smaller and therefore this will lead to over-consumption while the use of a small plate is a useful means by which patients can reduce portion size.

It is important to re-establish 'normal' eating behaviour and attitudes towards food. Many people eat for reasons that have nothing to do with hunger. For example, people

might eat from boredom, to cope with sadness or to be sociable. Encouraging healthy eating patterns can lead to a reduction in energy intake. It is important that while food is consumed, the individual's attention is focused on the food. If the attention is divided, such as by working at a computer, the reward gained from eating is reduced and therefore people eat more. It is important that food does not become associated with other activities, such as watching television, because this will lead to less healthy eating behaviours. Patients should be advised to eat only at a dining-room or kitchen table at mealtimes. Cravings for food are often short lived and therefore a useful strategy can be to distract the patient with an alternative activity such as a 5-min walk when a craving occurs. The value of commercial weight loss programmes has not been fully established but they may lead to greater weight loss than an individual's own attempts to lose weight.

Exercise

Exercise can play an important part in a weight-management programme. While high energy expenditure can outstrip energy intake and therefore promotes weight loss in its own right, exercise also has a role in the prevention of weight regain when combined with dietary interventions. It is important that patients decrease the amount of time that they spend sitting or occupied in sedentary activities. Low intensity activity is also of great importance; for example an 80-year-old patient with agitated Alzheimer's disease will expand more calories per day than an Olympic athlete because the patient with Alzheimer's is walking for nearly 24 h every day. The total time spent active is important and exercise does not need to be undertaken in a single period. Patients need to think about ways of including physical activity in their everyday lives. This can be achieved in many areas; for example patients can be encouraged to use the stairs rather than lifts, to get off the bus one stop early, or to park at the far end of the car park rather than right next to the door. Physical activity needs to fit in with daily life and the functional capabilities of individual and ideally should be pleasurable. The most appropriate type of exercise that patients can undertake is the one that will still be pursued a decade later.

Drugs

Pharmacological treatment of obesity has a chequered history and many physicians

still regard these drugs with suspicion and scepticism. Whilst it is true that the currently available drugs are relatively ineffective when used alone, when used in combination with lifestyle and behavioural modification programs, they are a useful adjunct in the management of obesity. The drugs that are currently available can be divided into two main categories, those acting on the gastrointestinal system, and centrally acting drugs which affect appetite. The three drugs that are currently available for the management of obesity are:

- orlistat, which is a pancreatic lipase inhibitor
- sibutramine, which is a serotonin and noradrenaline reuptake inhibitor.
- rimonabant, which is an endocannabinoid receptor antagonist

Orlistat inhibits pancreatic and gastric lipases, thereby reducing ingested triglyceride hydrolysis. It produces a dose-dependent reduction in dietary fat absorption that is near maximal at the currently available dose of 120 mg three times a day. In clinical trials lasting up to 4 years it leads to modest weight loss of up to 10%. This weight loss is associated with a reduction in other cardiovascular risk factors including waist circumference, blood pressure, dyslipidaemia and hyperglycaemia. In patients with impaired glucose tolerance, it reduces the risk of incident diabetes by 37% over and above the effect of lifestyle intervention alone. In patients with pre-existing diabetes, many may be able to reduce or discontinue their oral hypoglycaemic medication.

The main limiting factor for the use of orlistat is the development of gastrointestinal side-effects secondary to fat malabsorption. These include loose or liquid stools, faecal urgency and anal leajage, and can be associated with fat soluble vitamins malabsorption. As the consumption of a high fat diet will inevitably lead to severe gastrointestinal side-effects, it is important that the prescription of orlistat is accompanied by behavioural and dietary advice. Prior to the use of orlistat, it is important to educate the patient about the drug's mode of action and the dietary changes needed to reduce the side-effects. As facilities may not always be available locally, Roche, who manufacture the drug, have established a free telephone and online patient support programme that has been shown to improve the compliance with drug therapy as well as achieving greater weight loss.

When orlistat was first introduced into the United Kingdom, its license limited its

usage to 2 years. However, as longer studies have been reported and there is a greater appreciation of the chronic relapsing nature of obesity, this restriction has now been removed and patients can continue to use the drug as long as it remains effective. It is important to note that the drug should not be considered ineffective because weight loss has stopped, provided the new lowered weight is maintained. Discontinuation of the drug at this stage may well lead to weight regain. There is no published literature to suggest that the use of orlistat is associated with dependency on the drug.

Sibutramine is a centrally acting serotonin and noradrenaline reuptake inhibitor which leads to diminished appetite and decreased food intake. Clinical studies have shown that patients lose up to around 10% of body weight before reaching a plateau. If the drug is discontinued, weight is then regained. The weight loss is associated with a reduction in waist circumference, improved lipid profile and decreased insulin resistance. The noradrenergic effects of sibutramine can cause an increase in heart rate and blood pressure. However, this may be offset by the reduction in blood pressure that occurs with weight loss. Other side-effects include:

- drymouth
- constipation
- insomnia
- irritability
- unusual impatience or excitation
- headache
- rhinitis and nausea

Within the UK, weight reducing drugs are recommended for use in patients whose BMI is greater than 30kg/m^2 or in patients with comorbidity whose BMI is greater than 28kg/m^2. Initially, the drug should be used for a 3-month trial period and should only be continued if the patient loses more than 5% of body weight. Furthermore, it should be reconsidered if the patient has not lost more than 10% of body weight within the first 6 months.

Rimonabant is an endocannabinoid-1 receptor antagonist, which has been shown to be effective in reducing body weight and in weight maintenance with up to 2

years of therapy in several phase III studies. It has recently entered clinical practice. Endocannabinoids increase food intake through endocannabinoid-1 receptor activation and animal experiments show that antagonism of this receptor reduces sucrose and food intake. Endocannabinoid-1 receptors are also found in peripheral tissues where activation of this receptor leads to increased insulin resistance, possibly through alteration in adipocytokine production, such as decreased adiponectin secretion. Antagonism of this receptor leads to weight loss and a reduction in features of the metabolic syndrome, with only around half of the improvements in metabolic profile being explained by changes in weight. The main side-effects of rimonabant are depressed mood, anxiety and nausea and therefore caution may be needed if this drug is to be used in patients with psychiatric illness. There have been small trials of these drugs in the treatment of schizophrenia and while inconclusive have not shown any worsening of psychiatric symptoms.

Several other drugs have been considered for the use in the management of obesity including pseudophedrine, ephedra, sertraline, yohimbine, amphetamine or its derivatives, bupropion, benzocaine, threachlorocitric acid, sertraline and bromocriptine. There is currently a paucity of data about their effectiveness and these were not recommended in a recent Cochrane systematic database review.

Bariatric surgery

Bariatric surgery is currently the only long-term cure for obesity. There are two main types of operation to treat obesity. Malabsorption techniques bypass part of the stomach or small intestine while restrictive surgery lead to reduced dietary intake by reducing the size of the stomach and therefore improves satiety. The best evidence for the long-term effects of gastric surgery for obesity comes from the Swedish Obese Subjects Study where the weight loss after 2 years was typically between 30 and 40 kg. Quality of life improves dramatically following surgery and this is associated with major improvements in metabolic side-effects of obesity. A review of bariatric surgery has also suggested that gastric bypass surgery is associated with a 99 to 100% prevention of diabetes in patients with impaired glucose tolerance and an 80 to 90% clinical resolution of diagnosed early type 2 diabetes.

At present, obesity surgery is only recommended for those with morbid obesity. Each patient requires an extensive preoperative assessment which includes a psychological assessment as surgery will not treat an eating disorder and may lead to worsening of the mental state if patients are dependent on food.

Conclusions

Obesity has become a major health problem throughout the world. While genetics can explain much of the variability of body mass index within a given population, it is environmental changes over the last 50 years that have precipitated the obesity epidemic. A public health and governmental response is needed to reduce the toxic environment in which we live. The management of the individual with obesity is challenging but successful results can be obtained through lifestyle modification when combined with realistic goals and patient selection. Drug therapy is currently in its infancy but the use of orlistat or sibutramine is a useful adjunct to weight loss. Bariatric surgery is the only long-term solution for patients with morbid obesity. There can no longer be a place for therapeutic nihilism and therefore we need to develop strategies within health settings to promote lifestyles that will both prevent and treat overweight and obesity.