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Dietary treatments of obesity

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Numerous dietary treatments that purport to promote something unique for stimulating weight loss have been published. These treatments include fad diets, diets formulated by various commercial slimming clubs, very-low-energy diets (VLCD) and conventional diets. Fad diets may possibly reduce some weight short-term; however, there is no scientific basis to their long-term use. Commercial slimming clubs may be suitable for some individuals but they need to be properly assessed professionally. There are specific guidelines for the use of VLCD, which are only appropriate for short-term use. There is scientific evidence to suggest that conventional diets can produce both short- and long-term weight loss. A successful weight-loss programme depends on a multidisciplinary team approach. Management strategies should be devised for addressing issues such as goals, monitoring, follow-up, relapse and evaluation. Initial assessments should include medical, laboratory and anthropometric data, fitness level and dietary and behavioural attitudes. These results will form the basis of the treatment plan. Frequent visits to the clinic are fundamental in promoting continuing weight loss during the long-term maintenance stage of treatment. The visits should be made worthwhile for the patient. Realistic and attainable goals for diet, exercise and behaviour modification should be made. The diet should have a novel approach and be tailored to the needs of the patient. It should be adequate nutritionally, low in energy and fat. The overall aim should be to promote lifelong changes in lifestyle, improvement in quality of life and health risks.

Conventional diet: Assessments in obesity: Attainable weight goals: Long-term weight maintenance

There is overwhelming evidence to support the fact that obesity contributes to premature mortality, morbidity and social disadvantage (Pi-Sunyer, 1991). It has now become a global epidemic, and is a serious health problem requiring immediate action (World Health Organization, 1998).

Maintenance of lost weight is the most important issue in the treatment of obesity (Foreyt & Goodrick, 1994). Stunkard (1958) summarized the results of the efforts made during the previous 30 years to control obesity by dietary means: ‘Most obese persons will not stay in treatment, of those who stay in treatment most will not lose weight, and of those who do lose weight, most will regain it’. Approximately 40 years later the same author states: ‘We have not been able to prevent obesity in the past, and we do not have the tools to do it better in the future’ (Stunkard, 1995).

Despite this pessimistic prediction we must recognize that obesity continues to be an escalating major health problem that demands urgent attention and action.

Obesity is the cinderella of medical specialities, its investigation and management often being regarded as an unrewarding chore for endocrinologists and general physicians (Finer, 1998). Studies have shown a prejudice against obese patients, who are characterized as lazy and lacking in self-control (Cade & O’Connell, 1991). Obese people often hold negative beliefs about themselves and their bodies, which manifests itself in low self-esteem (Sullivan *et al.* 1993). A significant component of their beliefs derive from the omnipresent negative attitudes in Western society about individuals who are overweight (Brownell & Kramer, 1994). Furthermore, they are susceptible to exploitation in

Abbreviations: GI, glycaemic index; VLCD, very-low-energy diets.

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their desperation to lose weight. There is an urgent need therefore to develop and implement a positive approach to the management of obesity by taking into account current aetiological, epidemiological and published dietary strategies, which have incorporated long-term physical activity and behaviour-modification programmes.

Epidemiology

Several epidemiological studies have shown that various factors are associated with the development of obesity. These factors include educational level, dietary intake, alcohol consumption and the decline in physical activity. The lower the level of education the higher the incidence of obesity (Kuczmarski, 1994; Seidell, 1997). Foods high in fat content have a stimulatory effect (Torduff & Reed, 1991). The percentage fat intake in the diet is increasing (World Health Organization, 1998). Evidence from several dietary studies has shown that there is an inverse relationship between fat and carbohydrate (especially simple sugars) intake, referred to as the 'fat-sugar see-saw' (Gibney *et al.* 1995). Moderate alcohol intake may be associated with a higher BMI (Prentice, 1995). In relation to physical activity, only one-fifth of the US population gets enough exercise to affect health and weight positively (Bennett, 1995). There is a continuous decline in physical activity due to factors such as computer games, video rental and television viewing (Buchowski & Sun, 1996). Urban residence (James, 1995), and energy saving devices both in the home and in the workplace are also major contributors to the decline (World Health Organization, 1998).

The weight-reducing programme

Successful weight management requires a lifelong commitment to healthy eating practices, physical activity that is enjoyable and sustainable, and setting achievable goals through a behaviour-modification programme. The programme should involve assessments, management strategies and follow-up. It should be structured and well supervised.

Assessments

Assessment by the physician should include a comprehensive medical history, physical examination and risk factors associated with obesity, and complications, if any. Some medical and laboratory investigations may also be necessary. Binge eating has been reported to be as high as 33 % in obese patients (Spitzer *et al.* 1992) and should therefore be included in the assessment. Studies suggest that traditional weight-control programmes may be less beneficial for obese people who have this disorder (Bruce & Wilfey, 1996).

Weight cycling should also be checked. Weight cycling, also known as 'yo-yo' dieting, refers to the phenomenon of repeatedly losing and regaining weight (Brownell & Rodin, 1994). A substantial number of studies indicate that body composition is unaffected by weight cycling (Prentice *et al.* 1992). Some studies indicate that maintaining a stable weight, even if overweight, may be less harmful to health

than repeated bouts of weight gains and losses. Such concerns should not deter obese individuals who want to lose weight from trying, but rather should encourage them to commit to lifelong changes that will maintain weight losses (National Task Force on the Prevention and Treatment of Obesity, 1994). Cardiovascular fitness and barriers against taking adequate exercise should also be investigated.

Anthropometry

The most commonly used criterion for classifying the extent of obesity is BMI. It is calculated by determining the weight (kg) divided by the square of the height (m), i.e. kg/m^2 (World Health Organization, 1995). The normal range for adults is 18.5–24.9 kg/m^2 (World Health Organization, 1998). The higher the BMI the greater the health risk. When BMI is 25–29 kg/m^2 , management recommendations are diet, exercise and behaviour modification. When BMI is $\geq 30 \text{ kg/m}^2$, long-term weight management should be initiated. Very-low-energy diets (VLCD) and drug therapy may also be appropriate, as they lead to decreased risk of co-morbidities. When BMI is $\geq 40 \text{ kg/m}^2$, the goal should be a 20–30 % reduction. If conventional treatment fails, surgery may be considered (World Health Organization, 1998). Other practical and economical anthropometric measurements that can be taken are waist circumference, hip circumference and waist : hip ratio.

Waist : hip ratio is a measure of regional fat distribution. It is calculated by dividing the waist circumference by the hip circumference. A ratio of > 1.0 for men and 0.8 for women is associated with cardiovascular risk factors such as hypertension, hypertriglycerolaemia, hyperinsulinaemia and glucose intolerance (Krotkiewski *et al.* 1983). Waist circumference has been suggested to predict intra-abdominal fat at least as accurately as waist : hip ratio (Pouliot *et al.* 1994). A circumference of $\geq 1020 \text{ mm}$ for men and $\geq 890 \text{ mm}$ for women is associated with a substantial health risk, and a circumference of $\geq 940 \text{ mm}$ for men and $\geq 800 \text{ mm}$ for women is associated with increased health risk (Lean *et al.* 1995).

The methodology for waist and hip measurements should be precise, consistent and as accurate as possible. For obese patients where waist may not be present, the smallest horizontal circumference is appropriate. It is located approximately between the twelfth rib and the iliac crest. The patient should be unclothed at the waist and standing with the abdomen relaxed, arms at side and feet together. A non-stretchable tape-measure should be used, and there should be no skin compression (Yanovski, 1993). A flexible steel tape is suitable. The value is read at the end of a normal expiration (Aronne, 1998). Another methodology is recommended by the Scottish Intercollegiate Guidelines Network (1996) for measuring waist circumference. In addition to the patient standing, the waist is located midway in the mid-axillary line between the lowest rim of the ribcage and the iliac crest, not at the maximum point or at the umbilicus (Scottish Intercollegiate Guidelines Network, 1996). Hip circumference is measured at the maximum posterior extensions between the iliac crest and buttocks (Croft *et al.* 1995), or at the widest area around the trochanters (Lapidus *et al.* 1984, Larsson *et al.* 1984).

The technique for measuring hip circumference involves the patient wearing underwear, standing tall with arms at sides. A non-stretchable tape-measure should be used, and there should be no skin compression (Yanovski, 1993). The tape-measure should be fitted firmly against the patient (Hauner, 1990). In obese patients the anterior abdominal wall may sag and must be included in the measurement (Yanovski, 1993).

Diet

In order to obtain a realistic assessment of dietary patterns and food and nutrient intakes of a patient, the nutritionist or dietitian should be a good listener, supportive, objective and non-judgemental. Considerations should also be given to the readiness of the patient to lose weight (Aronne, 1998) and their expectations; so it is important, therefore, to make the most of the consultation for them. Building a partnership and cultivating it through good communication is fundamental. This objective can be achieved by having a sympathetic approach, considering the history, the knowledge and attitudes of the patient to the problem and focusing on the key elements of the consultation. Establishing a good rapport may encourage the patient to disclose more accurately actual quantities of food and fluid (including alcohol) consumed, as dietary under-reporting in the obese is well documented (Heitmann & Lissner, 1995; Poppitt *et al.* 1998; Lissner *et al.* 2000), and should therefore be considered in this assessment.

A well-structured, comprehensive diet history is of paramount importance and invaluable. Information should include: usual dietary habits, including time of day and frequency of meals and snacks; knowledge of household measures and portion sizes; method of cooking; eating out; take-aways; alcohol consumption; vitamin or mineral supplementation, if any. Socio-economic factors should also be considered. A practical method of calculating the energy content, together with establishing adequacy of both macro- and micronutrients for the age and sex of the patient, is essential. Once identified the key issues to be addressed will then become evident.

Team approach and goals

The strength of the multidisciplinary team approach to treatment of obesity is that it is more effective clinically, and through the team's inter-personal skills treatment can be monitored, and support can be offered as intensively as the disease warrants (Nonas, 1998).

All weight-management programmes should set agreed and realistic goals. These should include reduction of body weight, maintenance of lower body weight in the long term, or at least prevention of further weight gain. Controlling other co-morbidities is also essential. The initial weight-loss target should be 10 % over a 6-month period, with weekly weight losses of 0.5–1.0 kg. After these 6 months the patient should be further reviewed for a weight-maintenance programme of diet, exercise and behaviour modification (National Institutes of Health, National Heart, Lung and Blood Institute, North American Association for The Study of Obesity, 1998). A weight loss of 5–10 % initial body

weight improves hypertension, total and HDL-cholesterol, diabetic control (Goldstein, 1992) and psycho-social function (Stunkard & Wadden, 1992). Setting a target to attain ideal body weight for patients is inappropriate for a number of reasons. These reasons include the fact that repeated failures to achieve and sustain substantial weight loss may worsen a patient's depression and lack of self-esteem, resulting in further weight gain (World Health Organization, 1998). Modest weight loss of 5–10 kg has been shown to decrease mortality by as much as 25 % (Williamson *et al.* 1995). There are a number of health hazards associated with weight loss. These hazards include gallstones in women (Bray, 1985) and decreased bone density (Avenell, 1994); however, the overall benefits of weight loss outweigh the hazards.

Forms of dietary treatment

Currently, various dietary treatment options are available. These options include individualized programmes in clinical settings. These programmes are based on conventional-type diets which are, in general, low in energy and fat and high in fibre content. Other treatments include VLCD, commercial slimming groups and unconventional diets. Certain criteria should be followed when defining the appropriate dietary treatment for a patient. The treatment should adhere to a code of practice in relation to training counsellors, and incorporate an effective intervention strategy which will promote the necessary lifelong changes for adaptation to healthy eating and lifestyle practices. This treatment in turn should lead to improvement in quality of life and self-esteem for the patient. There is no programme that is right for every single individual (Brownell & Wadden, 1991)

Very-low-energy diets

Numerous dietary regimens have been devised in an attempt to achieve progressive weight loss in individuals (Council on Scientific Affairs, 1988). Among these regimens are VLCD. VLCD are defined as hypoenergetic diets containing less than 3350 kJ (800 kcal)/d (National Task Force on the Prevention and Treatment of Obesity, 1993). They were devised in the 1920s to provide larger and more rapid short-term weight loss than standard low-energy diets, whilst avoiding the dangers and adverse effects of total fasting (National Task Force on the Prevention and Treatment of Obesity, 1993). VLCD are available as commercial liquid formulas (Jebb & Goldberg, 1988). Various formulations are available on the market. These formulations include those low in carbohydrate and those high in carbohydrate plus moderate protein. The moderate-carbohydrate plus moderate-protein products appear to have the best protein-sparing effect (Vasquez *et al.* 1995).

VLCD produce average weight losses which are two to three times greater than weight losses resulting from conventional low-energy reducing diets, when used for the same period (Wadden, 1993). On a VLCD weight losses have been reported (National Task Force on the Prevention and Treatment of Obesity, 1993) to be 1.5–2 kg/week for women and 2–2.5 kg/week for men, with an average weight loss of 20 kg over 12 weeks, compared with

0.4–0.5 kg/week with an average weight loss of 8.5 kg over 20–24 weeks on a low-energy diet. VLCD may be indicated for those patients with a BMI > 30 kg/m² (Pi-Sunyer, 1992; World Health Organization, 1998), and in those patients with a BMI of 27–30 kg/m² who have medical conditions that might respond to rapid weight loss (National Task Force on the Prevention and Treatment of Obesity, 1993). These diets can acutely reduce hypertension (Eliahou *et al.* 1992) and significantly improve lipid profiles (Parenti *et al.* 1992; Byson *et al.* 1996). Improvement in insulin sensitivity and enhanced glucose metabolism have also been documented (Eliahou *et al.* 1992).

There are a number of contraindications to the use of VLCD. These contraindications include cardiac abnormalities (Fisler, 1992), cholelithiasis or cholecystitis (World Health Organization, 1998), and renal dysfunction (Pi-Sunyer, 1993). Other relative contraindications include reduced bone density (Langlois *et al.* 1996), hyperuricaemia and gout (Wadden *et al.* 1990). The VLCD are inappropriate for infants and children, and pregnant and lactating women (Department of Health and Social Security, 1987; National Task Force on the Prevention and Treatment of Obesity, 1993). Those individuals who wish to use a VLCD must do so under close medical supervision (Wadden *et al.* 1990; National Task Force on the Prevention and Treatment of Obesity, 1993).

Commercial slimming clubs

Commercial slimming clubs, e.g. Weight Watchers, are found extensively in Western society. These clubs may provide an appropriate option for well-motivated patients; however, in order to provide continued clinical monitoring a follow-up visit to the clinic is desirable. Evidence suggests that high attrition rates are a problem (Council on Scientific Affairs, 1988). These clubs should be evaluated using certain criteria, which should include appropriateness of staff, methods of screening clients, clear details on dietary treatment, exercise and behaviour modification programmes (Scottish Intercollegiate Guidelines Network, 1996). The Food and Nutrition Board, Institute of Medicine, National Academy of Sciences (1995) has suggested that there should be a voluntary accreditation within these commercial slimming clubs. Lack of evidence means that it is not possible to evaluate whether these clubs are more successful in achieving long-term weight loss compared with programmes devised by a clinical multidisciplinary team.

Unconventional diets

The aggressive marketing of fad diets that supposedly produce prompt weight reduction is ongoing. These unconventional diets include the cabbage diet (also known as the Weight Watchers' drop diet; Kron TV (1996)), the zone diet (Sears, 2000), the food combining diet (Marsden, 1993), the sugar busters diet (Steward *et al.* 1998) and the Atkins diet (Atkins, 1998). Claims made by those who produce such diets are always compelling, as otherwise they would not sell. Scientific evidence for these slimming diets that purport to promote weight loss is unfounded. The promoters of these diets fail to provide an assessment of the short- and

long-term results of their treatment plans, even though such evaluations are possible and would allow consumers to make informed decisions (Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, 1995).

Conventional diets

Dietary treatment should be tailored as far as possible to the needs and dietary habits of the patient, which can be derived from their food diary or dietary assessment. The best means of achieving a healthy weight include a healthy diet, with an energy level that does not exceed energy expenditure and which can be sustained, and therefore will promote compliance in the long term. The energy prescription can be derived from the normograms produced by Lean & James (1986), based on estimates of metabolic rate from work commissioned by Food and Agriculture Organization/World Health Organization/United Nations University (1985). A deficit of 2.1–2.5 MJ/d less than actual intake is usually well tolerated (World Health Organization, 1998). Greater energy restriction does not improve weight loss (Frost *et al.* 1991). The composition of the diet is important. Some debate surrounds the issue of the percentage energy contribution of fat. It has been suggested that high-fat diets are not the primary cause of excess body fat, and therefore the solution does not lie in reducing fat intake (Willett, 1998). However, based on cross-sectional studies, a high-fat, low-carbohydrate diet does contribute to the maintenance of obesity. Reducing fat intake by 10 %, weight loss was found in twenty-eight intervention trials to be 2.9 kg over a 6-month period (Bray & Popkin, 1998). A meta-analysis of weight loss on sixteen intervention studies using *ad libitum* access to low-fat diets found that body weight was reduced in overweight patients (Astrup *et al.* 2000). The practice, therefore, should be to prescribe a diet comprising not more than 30 % total fat energy, which is similar to the guidelines devised by Departments of Health in several countries in Western society.

The diet should be high in complex carbohydrate and fibre, which should be based on an increased intake of wholegrain cereals, vegetables and fruit (Shah *et al.* 1994). Depending on the age and sex of the patient, adequacy for vitamins and minerals in the prescribed diet must always be checked and dietary manipulation undertaken if deemed appropriate.

The glycaemic index concept

Different foods containing an equal amount of carbohydrate vary considerably in their effects on hormonal and glucose responses after a meal (Jenkins *et al.* 1983, 1988). This factor has led to the development of the glycaemic index (GI) method of classifying carbohydrate-rich foods according to their relative glycaemic impact (Foster-Powell & Brand-Miller, 1995). The GI is a direct measure of the glycaemic response to a food, and thus reflects all the mechanisms that can influence the glycaemic response (Englyst *et al.* 1999).

Various studies have shown that meals characterized by low-GI foods prolong the duration of satiety (Leathwood &

Pollet, 1988; Holt *et al.* 1994), suggesting a possible preventative role in the genesis of obesity (Leathwood & Pollet, 1988; Morris & Zemel, 1999). A recent study of obese subjects found that following the intake of a high-GI meal there was a rapid absorption of glucose, which induced a sequence of hormonal and metabolic changes that subsequently promoted excessive food intake (Ludwig *et al.* 1999). Reducing the GI of the diet may also have beneficial effects on blood lipids (Jenkins *et al.* 1987; Frost *et al.* 1999; Jarvi *et al.* 1999) and cardiovascular disease (Morris & Zemel, 1999).

In relation to the practical application of the GI concept, it is essential to look at the diet as a whole (Jarvi *et al.* 1999). The GI may be used, in conjunction with information about food composition, to guide food choices (Food and Agriculture Organization/World Health Organization, 1998). The GI is useful only 'when comparing different foodstuffs within the same food group' (Jarvi *et al.* 1999); therefore, the GI should not be used as an isolated concept that does not take other food components into account (Wolever & Brand Miller, 1995; Jarvi *et al.* 1999; Saltzman, 1999). This factor is particularly important when considering the essential role of reducing overall daily energy intake in obese subjects.

While short-term studies suggest that foods with a low GI exert a stronger effect on satiety than those with a high GI, long-term studies are lacking and the importance for body fatness is unknown (Astrup *et al.* 2000).

Exercise

Inactivity is closely correlated with obesity (Prentice & Jebb, 1995). Exercise contributes significantly to weight loss. A meta-analysis of the effect of exercise, with or without dieting, on body composition of overweight subjects found that men lost an extra 3 kg over a 30-week period and women lost an extra 1.4 kg over a 12-week period (Garrow & Summerbell, 1995). An 8-year study on the relationship of cardio-respiratory fitness and body composition with all-cause and cardiovascular disease mortality in lean and obese men concluded that the health benefits of leanness are limited to fit men and that being fit may reduce the hazards of obesity (Lee *et al.* 1999). Regular exercise as a goal, therefore, cannot be overemphasized in the long-term maintenance programme. It is important that dietary habits and exercise are recognized as necessary lifelong practices that require regular monitoring, rather than temporary measures to be undertaken.

The most popular forms of exercise in the general population and with those who are obese in the EU are respectively, walking for 30 min 59 % and 32 %, gardening 27 % and 22 %, cycling 34 % and 14 %, non-participation 30 % and 39 % (Institute of European Food Studies, 1998). The most beneficial effects of physical activity on cardiovascular disease mortality can be attained through daily low to moderate intensity activity (Fletcher *et al.* 1996). These activities include walking and gardening. Walking for 30–60 min almost every day can substantially reduce body weight and fat, as well as promoting both physical and psychological health benefits (Department of Health and Human Services, 1996). Cycling, which is a weight-bearing

form of exercise, may be appropriate for some obese patients. Improving fitness level and energy expenditure should be undertaken gradually; e.g. a starter phase lasting 2–6 weeks and a slow progression phase where duration and intensity are increased every 1–3 weeks depending on individual tolerance. After 6 months–1 year (maintenance phase), the patient may choose to sustain the current level of exercise to maintain fitness and weight loss (Pollack *et al.* 1984).

Behaviour modification

The philosophy of behaviour modification addresses the processes that are necessary for lifelong lifestyle changes. Various studies have demonstrated the effectiveness of behavioural techniques. A review of fourteen randomized control studies on weight control and behaviour modification concluded that after a duration of 6 months weight loss was 10 % initial body weight. After 40 weeks 60 % of the weight loss was maintained (Wing, 1999). Long- and short-term goals should therefore be set, as this form of therapy is an integral component of the management programme. The long-term goal should be to improve eating habits and to exercise more (Wilson, 1994). Short-term goals should be specific and measurable, e.g. adherence to reducing food intake and increasing exercise. In addition, these goals should be attainable, e.g. no fast foods during the week, walk for 30 min on 3 d weekly. A reward that is desirable and tangible (not food) should only be available if the goal is met, e.g. a night out at a play (O'Neil & Jarrell, 1992). Other appropriate strategies include self-monitoring, e.g. detailed recording of dietary practices and foods consumed, limiting cues that prompt overeating, focusing on improved eating habits, overcoming negative statements and relapse prevention, i.e. forgiving oneself and motivating oneself to start again (World Health Organization, 1998).

Weight maintenance and long-term follow-up

Weight-loss outcome in the long term is a critical issue when evaluating dietary treatment. Most published studies illustrate short-term effectiveness only. These include high-fibre diets (Rabast, 1994) and VLCD (Jebb & Goldberg, 1998). A small number of studies achieved long-term weight-loss using conventional diet plus exercise and/or behaviour modification regimens (Lean *et al.* 1990; Hakala, 1994; Miller *et al.* 1997). Combined short- and long-term programmes have been recommended by various bodies (Scottish Intercollegiate Guidelines Network, 1996; World Health Organization, 1998).

Frequent appointments at the clinic are an essential part of the supportive component of a multidisciplinary weight-management programme. They are fundamental to promoting continuing weight loss during the maintenance stage of the treatment (Brownell & Jeffrey, 1987; Lavery & Loewy, 1993). In addition to monitoring dietary changes, exercise and behaviour-modification techniques should also be reviewed and documented. Patient success and progress should always be recognized and commended. Relapse avoidance is important, but if it occurs then it should be addressed positively. Here, the goal should be to encourage

the development of methods of overcoming the cues that trigger non-adherence to the designated programme in order to prevent or reduce further weight gain (O'Neil & Jarrell, 1992). It is not helpful to reprimand the patient, as this factor can lower their self-esteem and be destructive to the professional-patient partnership. This situation in turn may precipitate the problem of reluctance to return for the next appointment or dropping out, the rates of which are high and well-documented in long-term follow-up programmes (Weintraub *et al.* 1992). Positive reinforcement may encourage continued attempts at attaining the set goals.

All appointments should be made worthwhile for the patient. Various dietary methods of promoting weight loss can include 'calorie' counting, low-fat products on the market, exchange diets, and limiting certain foods (Klem *et al.* 1997). Support from family and friends should be encouraged (Scottish Intercollegiate Guidelines Network, 1996).

Evaluation

All treatment programmes should be evaluated regularly. Key elements include low withdrawal and relapse rates (Atkinson, 1993), improvement in quality of life and health risks for the patients, making significant progress with the patients in attaining the goals that were set for them, regular monitoring, patient satisfaction and long-term follow-up.

Conclusions

Conventional dietary treatment together with an individualized exercise and behaviour-modification programme is currently the most prudent method of managing the obese patient. Novel approaches to this form of management remain challenging for the practitioner.

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