Could nutraceuticals be a further weapon in the battle for weight loss?

Nutraceuticals are a growing sector of the supplements market. Several that have been the subject of scientific and medical research are currently being marketed as aids to weight loss. In this article, Georgina Boon and Brian Lockwood examine the issue.

In the UK, as in many other developed countries, we are experiencing a growing obesity epidemic. Between 1993 and 2003 the number of clinically obese individuals almost doubled. Numbers of clinically obese men rose from 13 per cent to 23 per cent, and women from 16 per cent to 23 per cent. A further 44 per cent of men and 33 per cent of women in the UK are classed as being clinically overweight.

Childhood obesity has also become a major issue, with the Government aiming new policies at curbing the increase of unhealthy children, and the recent Channel 4 television series, “Jamie’s School Dinners”, highlighted the role of convenience food in the growing childhood obesity epidemic.

Not only is obesity a major health problem, it worries individuals for cosmetic reasons, and the enormous variety of dieting supplements and popularity of slimming clubs indicate how weight loss has become a multimillion pound industry.

In the US, the number one health issue (as reported by 40 per cent of Americans) is the need to lose weight for reasons of appearance. Two thirds of Americans (representing 138 million American adults) also report that they have used some method to maintain or manage their weight in the past year.

Methods of weight loss
Low carbohydrate diets are just one example from the seemingly endless list of weight loss diets on offer. The popularity of the Atkins diet, the glycaemic index diet and meal replacement diets, such as Slimfast, are examples of the many routes people are willing to try in order to achieve weight loss.

Clubs and organisations where group support and encouragement are available alongside a diet regimen are also popular. Weight Watchers is an international slimming organisation that has 6,000 classes weekly in the UK and claims to have helped around 30 million dieters to lose weight. Slimming World, which has joined forces with NHS primary care trusts to aid dieters, is another example.

Supplements for weight loss are numerous. People generally prefer to seek a shortcut to weight loss, so the market for such supplements, which often claim to give fast results, is large. Coupled with the fact that many of these products can be marketed as food supplements, with relatively little regulatory control, the market is rapidly expanding.

The universally acknowledged way to weight loss is a calorie-controlled diet with increased physical activity, as most health care professionals advise. Diet alone is useful, but for long-term maintenance of body weight, exercise is critical, helping prevent the “yo-yo effect” of rapid weight gain after a period of dieting. Self-monitoring and other behavioural interventions can also enhance weight loss.
Conventional pharmaceutical treatments, such as orlistat, are also available for weight loss, but only on prescription. Orlistat works by blocking fat absorption but has an unpleasant and common side effects of fecal incontinence and flatulence.16

**Nutraceuticals for weight loss?**

Nutraceuticals are a growing sector of the supplements market, and encompass a wide variety of products that can be formulated into capsules or tablets, or even incorporated into foods or convenience foods such as snack bars. There are several nutraceuticals currently being marketed as aids to weight loss that have been the subject of scientific and medical research. The major examples include L-carnitine and acetyl-L-carnitine, dehydroepiandrosterone (DHEA), green tea and conjugated linoleic acid (CLA).

**L-Carnitine and acetyl-L-carnitine**

L-Carnitine is an endogenous product found in the kidneys and liver produced from the amino acids methionine and lysine. It can be found in dairy products and red meat.

L-Carnitine is a co-factor in the process of fat oxidation for cellular energy production.11 Fat oxidation in muscle tissue is reduced in obesity due to a reduction of L-carnitine-mediated enzyme activity.12 It is for the above reasons that carnitine is purported to be of benefit in obese people by increasing fat oxidation, and why it is often promoted as a “fat burner”. However, it has not been tested for its effectiveness or safety over prolonged periods.

One study in rats found that L-carnitine supplementation in combination with an energy-restricted diet had no effect on weight loss and body composition in comparison with rats fed an energy-restricted diet alone.13 Results showed both groups lost considerable amounts of weight and had a marked reduction in body fat, but there were no significant differences between the control group and the treated group, and the treated group was a crossover study in which the 10 volunteers who used the supplement were asked not to alter their usual diet or activity levels. A small study (n=10) of male adults indicated that green tea extract significantly increased 24-hour energy expenditure.21 This was a crossover study in which the 10 volunteers were assigned one of three treatments (a placebo, green tea extract or the equivalent amount of caffeine to that in the green tea extract) on three occasions. Treatment with the placebo, and also caffeine, did not have any significant effects on energy expenditure. These results rule out the hypothesis that caffeine alone is responsible for the effect seen on increased energy expenditure. The major limitation of this study, aside from its small sample size, is that it did not actually measure body weight as a parameter, since it was only carried out for a period of 24 hours at any one time. However, the authors do suggest that green tea extract has the potential to influence body weight and body composition due to its promotion of fat oxidation and thermogenic properties. An important obser-
Green tea is a source of the polyphenol epigallocatechin gallate, a nutraceutical taken for weight loss, but its use should be monitored.
A year-long study into the effects of CLA on body fat mass concluded that long-term supplementation of CLA in healthy overweight adults significantly reduced body fat mass. It was a randomised, double blind, placebo-controlled study, with no diet or lifestyle restrictions placed on the volunteers. A slight reduction in body mass index and body weight was seen in the CLA group, whereas there was no change in the placebo group. Adverse effects were mainly gastrointestinal, and classed as just “mild” or “moderate”. A high compliance and low drop-out rate of volunteers also showed CLA was well tolerated.

A further review found that there were insufficient data to support the use of CLA for weight loss in humans, and that overall quality, safety and efficacy of CLA are uncertain. It recommended that doctors should caution patients about the use of CLA, and closely monitor those who take the supplement, because efficacy and safety have not been proven.

A recent study concluded that the metabolic effects of CLA are complex and still not well understood. This is partly due to the lack of knowledge regarding the mechanisms of CLA at a molecular level, and the lack of controlled studies on the different isomers of CLA. Another study found that there was no effect on body weight and body mass index in volunteers taking CLA for a 12-week period, but that CLA, in a dose of 3g per day, was found to be safe. Further studies are required to in order to make a clear judgement on the efficacy of CLA as a weight loss aid.

Conclusion
Of the nutraceuticals reviewed, DHEA seems the most likely candidate for producing actual weight loss, as opposed to alteration of body composition. It has shown weight loss effects in both animal and human studies. L-Carnitine has demonstrated potential as an ergogenic aid, but there is little firm evidence to support its use for weight loss. Green tea has also shown little evidence of an ability to cause weight loss, although studies have shown it can increase energy expenditure, so further long-term trials may be valuable to assess whether it can have effects on body weight over an increased period. Green tea also seems to have a better safety profile than the other nutraceuticals reviewed. CLA has been shown to have variable ability to reduce body fat in humans. However, although it has shown weight loss effects in rodents, it has not yet been shown to cause weight loss in humans.

So far, the studies that have been published do not go far enough in establishing the safety that is critically important for supplements that are likely to be taken in the long term, or the efficacy of these nutraceuticals in large studies in humans with actual body weight loss as a parameter, as opposed to energy expenditure or body fat loss with no overall weight loss.

Despite the promise and lure of nutraceutical supplements and crash diets, consumers can never expect dramatic weight loss and long-term maintenance of a lower body weight unless they reduce their calorie intake and undertake some form of exercise. For those individuals with a body mass index indicative of clinical obesity (30kg/m² and above), medical intervention for weight loss must be considered to reduce the risk of weight-related health problems such as type 2 diabetes and cardiovascular disease.

Even if taking a nutraceutical is only a psychological prop or placebo to aid weight loss, alongside diet or lifestyle changes, it may be helpful because if there is an overall weight loss then that will be beneficial to the patient’s health. One argument frequently claimed for use of supplements is that when patients have tried and failed on other weight loss regimes and various diets, their weight may have become a serious health threat, so that any possible aid to weight loss becomes worth trying. The risks of any dieting aids must be balanced against the benefits of weight loss and the reduction of the health risks of remaining overweight.

With the huge range of products available, pharmacists are at the front line when it comes to explaining and justifying the relative merits of the various weight loss supplements available, alongside offering basic diet and lifestyle advice to customers, and knowing when to direct them to their GP if medical intervention is required. The ability of pharmacists to analyse and evaluate the clinical evidence of different products will allow them to offer good quality advice, as opposed to the possibility of inaccurate and often unreliable information supplied by the media and on the internet. However, a lack of quality data clearly impacts on the ability of the pharmacist to offer good quality advice. Further trials are needed for these nutraceuticals to establish a greater degree of knowledge on their potential contribution to weight loss.

References