

SLIMMING

(1) OTC WEIGHT CONTROL PRODUCTS

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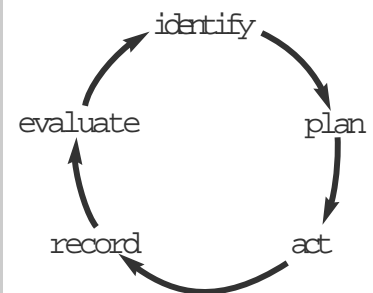
Fat Blaster, Fat Blocker, Fat Binder and Fat Magnets are just a few of the many “weight control” or “slimming” products available. But what is the rationale behind such products often sold in pharmacies and do they really work? Pharmacists must ensure that their activities for promoting weight loss are in the best interest of the patient. This article is the first of two about slimming. It looks at the evidence base behind some ingredients and products thought to help with weight loss and finds that the evidence is fairly limited



identify gaps in your knowledge

1. Name two popular weight control products.
2. Do you know what their “active” ingredients are and how these are thought to work?
3. If you need to find out about the efficacy or safety of a product, what reliable sources of information are available?

This article relates to the Royal Pharmaceutical Society’s core competencies of “health education” (see “Medicines, ethics and practice — a guide for pharmacists”, number 26, July 2002, pp105–6). You should consider how it will be of value to your practice.



Change in lifestyle, both diet and physical activity, should be considered as the basis for any weight loss regimen. However, some people may find these changes, particularly in the long term, difficult to achieve. In addition, many individuals seek a rapid solution to being overweight, for example, if they are going on holiday, getting married or attending some other important social function. Not surprisingly, therefore, the demand for weight control and slimming products is high, and the fact that these can be marketed as food supplements with relatively little regulatory control has led to enormous growth in the range available.

We all know that weight loss is mediated through reduction in energy intake, increase in energy expenditure or both. Weight control products contain ingredients suggested to work by one or both of these mechanisms. Thus, on the energy input side of the equation they are purported to increase satiety or decrease absorption. On the output side, they are said to work by increasing fat oxidation, increasing metabolic rate, or reducing lipogenesis.

Like other food supplements, weight control products are available over the counter from a variety of sources, including health food stores, community pharmacies and the internet. Moreover, the information provided about weight control products, especially on the internet, may often be vague and inaccurate. Pharmacists therefore need to be aware of the true potential value, or otherwise, of these products together with issues relating to their safety.

L-CARNITINE

Carnitine is produced endogenously in the liver and kidney from the amino acids, lysine and methionine. It is also obtained from foods such as red meat and dairy produce. Carnitine, in the form of the enzyme carnitine palmitoyl transferase (CPT), is an essential co-factor in the oxidation of fatty acids. The activity of CPT in mus-

cle appears to be reduced in the obese and defects in the CPT transport system are associated with lipid accumulation in muscle. This suggests that increasing muscle carnitine content may be beneficial in obese individuals. However, although studies have shown that supplements can raise carnitine levels in the blood, there is little evidence that they can raise levels in muscle,¹ where it is needed in order for it to have an effect on fatty acid oxidation. Moreover, studies have not demonstrated an increase in lipid oxidation.^{1,2}

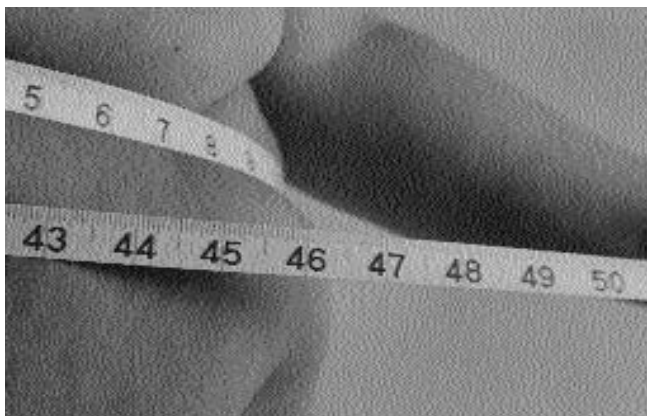
The literature pertaining to L-carnitine as a supplement is concerned mainly with its use as an ergogenic aid (anything that increases energy utilisation and improves performance) in sport, and no controlled studies examining the effects of carnitine on weight loss have been published. L-carnitine is actively promoted as a “fat burner”, but without hard evidence that supplements can increase muscle carnitine content and enhance fatty acid oxidation, the use of such supplements for weight loss is not justified. Oral supplements may cause nausea and diarrhoea, but no other serious adverse effects have been noted.

CHITOSAN

Chitosan is a polymer of glucosamine, which is produced from chitin. Chitin itself is derived from the shells of arthropods, such as crabs, shrimps and lobsters. Chitosan binds to dietary fat, and as a consequence of this it is purported to reduce the absorption of fat from the gastrointestinal tract. Studies in animals have shown that chitosan can reduce body weight, and some studies in humans have shown similar effects, although those showing benefit tend not to have been published in peer-reviewed journals and are limited by methodological flaws.

A meta-analysis³ identified five studies evaluating the effectiveness of chitosan for the treatment of obesity. The conclusion was that mean weight loss with chitosan was 3.3kg more than with placebo. All of these studies were published in a single journal over a two-year period and discrepancies in the data suggest again that these studies were flawed. A more recent 28-day randomised double-blind trial found no significant differences in body mass index in 30

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Changes in dietary and physical activities should be considered as the basis for any weight loss regimen

overweight individuals receiving chitosan or placebo.⁴ There is, therefore, no substantive evidence that chitosan can help in weight loss in humans. There are no long-term studies assessing the safety of chitosan, but in animals, chitosan has been shown to reduce the absorption of fat-soluble vitamins.

Examples of products that contain chitosan are Fat Magnets capsules, Lipobind capsules and Liposorb capsules. Strobby tablets contain a polymer of β -1,4-D-glucosamine and β -1,4-N-acetyl-D-glucosamine and Fat Binder capsules contain absorbitol, another form of chitosan.

CHROMIUM

Chromium is an essential trace element required for normal carbohydrate and fat metabolism. Because chromium can enhance insulin sensitivity, decrease circulating insulin levels and improve glucose tolerance it has been suggested that it could increase satiety and improve body composition and body weight. However, the literature with respect to the effect of chromium on weight reduction in humans is equivocal. Some studies show that chromium increases loss of fat and gain in lean muscle tissue, but others do not, and many of the studies showing a beneficial effect are not published in peer-reviewed journals.

Oral chromium is relatively non-toxic, but recent reports have associated excessive doses of chromium with renal impairment, rhabdomyolysis (skeletal muscle breakdown and release of muscle contents into plasma) and damage to deoxyribonucleic acid. Examples of products that contain chromium are Lipobind capsules and Fat Blaster tablets.

CONJUGATED LINOLEIC ACID

Conjugated linoleic acid (CLA) is a naturally occurring polyunsaturated fatty acid found in meat and dairy produce. CLA transports dietary fat and glucose to cells. It promotes the use of glucose to provide energy and build muscle rather than being converted to fat. This effect lies behind the claims that CLA is useful for promoting weight loss. Most of the studies so far have been conducted in animals, and these studies suggest that CLA can reduce body fat, increase metabolism and reduce energy intake. In humans, preliminary evidence suggests that CLA may have a mild anabolic effect in body builders, but there is no evidence pertaining to the efficacy or safety of CLA in people who are overweight.

FIBRE

Various fibre sources, including bran, pectin and psyllium are used as ingredients in weight loss products. The suggested mechanism of action is increasing satiety, so reducing energy intake. In addition, bran may reduce the absorption of fat. There is some tentative evidence to suggest that fibre can reduce short-term food intake. However, amounts larger than those found in supplements are generally required to achieve this. Furthermore, there is no evidence that fibre supplements can induce significant weight loss in the long term.

The consumption of large amounts of fibre supplements is associated with bloating, diarrhoea and nausea. Large quantities of bran may reduce absorption of vitamins and minerals, although it is unlikely that water soluble fibres (pectin and psyllium) will do this. An example of a fibre containing product is Fibre Slim hunger control tablets.

HYDROXYCITRIC ACID

Hydroxycitric acid (HCA) is a compound found in the Indian plants, *Garcinia cambogia* and *Garcinia indica*. The rationale for its incorporation in slimming products is that it is purported to reduce lipogenesis, suppress food intake and reduce body weight gain. Reduction in hepatic lipogenesis has been demonstrated both *in vitro* and *in vivo* in animals; however, whether this is an important mechanism for fat storage in humans is open to debate.

Several studies in humans have provided supportive evidence for the efficacy of HCA in weight loss, but most have suffered from experimental inadequacies and/or were reported in journals that were not peer-reviewed. In some of the studies, HCA was co-administered with other ingredients such as chromium or chitosan, or used with a low fat diet, making the assessment of the effect of HCA *per se* impossible. Furthermore, no studies to date have measured blood or tissue levels of HCA in response to supplementation.

In a recent randomised controlled trial,⁵ obese volunteers were prescribed a low energy, high fibre diet and were randomised to receive either HCA (1,500mg daily) or placebo over 12 weeks. Both groups lost a significant amount of weight, but differences in weight loss and body fat were not significant between the two groups. No significant side effects have been documented, but the long-term safety of HCA has yet to be investigated. Products that contain HCA include Fat Blaster tablets and Herbaltrim tablets.

LECITHIN

Lecithin is a phospholipid found in egg yolks, liver, peanuts and soya beans. As a supplement for weight loss, lecithin is suggested to work by preventing the deposition of fat in fat cells. A two-year Swedish study⁶ investigated the effect of a protein powder containing lecithin with vitamin B₆ and kelp in 24 women. This intervention produced a negligible benefit in terms of weight loss, although the authors noted that compliance was poor. Lecithin is the ingredient in Nature's Aid Trim-it capsules.

PATCHES

A skin patch (Crave Control) claimed to reduce cravings for sweet food and chocolate, is available. The patches are impregnated with a mixture of scents producing a smell similar to vanilla, and the idea is to saturate the olfactory senses. Smell contributes to the desire for food, but over-exposure to food aromas can reduce the appetite. A small, unpublished clinical trial undertaken by the chief dietitian at St George's Hospital, London, showed that a test group wearing the patch lost an average of 5lbs compared to 2lbs in the placebo group. After a month the test group's cravings for sugary foods, especially chocolate, was reduced. Diet Scent patches are also available.

SEAWEED

Various forms of seaweed are used in weight control products, such as kelp, the blue-green algae spirulina (one of the ingredients in Trim-cal tablets) and bladderwrack (also known as *Fucus vesiculosus*). These are used on the basis that they contain iodine, which increases the activity of the thyroid gland, which in turn increases energy expenditure. However, although obesity can result from hypothyroidism, this is a rare cause. To date there is no evidence that increasing iodine intake in individuals without hypothyroidism has any effect on weight loss and no conclusive evidence on the value of supplements containing seaweed in human obesity.

The United States Food and Drug Administration has advised that oral weight control products containing compounds like kelp should be taken with a full glass of water to avoid oesophageal obstruction. These products are therefore unsuitable for people who have difficulty swallowing. If taken in excessive doses, products containing iodine can cause hyperthyroidism.

action : practice points

1. Considering what you have learnt from this article, write down reasons for and against community pharmacies stocking slimming or weight control products. If you were a community pharmacist, would you personally recommend a product?
2. Research the evidence base behind a popular weight control product.
3. Review the range of weight control products stocked in the pharmacy where you work.

evaluate

How could your learning have been more effective?
What will you do now and how will this be achieved?

ST JOHN'S WORT

St John's wort is widely used as a herbal therapy for depression. Because it appears to have serotonergic activity, it is thought to have the potential to suppress appetite and cause weight loss. Two preliminary studies, one published in abstract form, the other as yet unpublished, indicate that St John's wort and ma huang (an ephedrine containing ingredient) in combination may induce weight loss. However, the design of the studies did not allow determination of whether the weight loss was due to the product or to either ingredient. There is therefore no conclusive evidence that St John's wort is effective as a slimming ingredient.

YERBA MATE, GUARANA AND DAMIANA

A mixture of the herbs yerba mate, guarana and damiana is contained in a product called Zotrim. A preliminary double-blind, placebo-controlled trial of this preparation showed that over 45 days it induced significant weight loss (5.1kg) in overweight patients treated in a primary care setting.⁷ Maintenance treatment over 12 months in an uncontrolled environment resulted in no further weight loss, but no weight gain. The preparation was shown to delay gastric emptying. It may therefore increase satiation and reduce energy intake, but the authors state that further clinical studies, with investigation of each of the three ingredients, are required.

OTHER INGREDIENTS

Other ingredients in weight control products include capsaicin, various herbal diuretics (for example, Adios tablets contain boldo and dandelion root), amino acids, pyruvate and isoflavones, but there is no good published evidence supporting the effectiveness of any of these ingredients in weight control. Products which contain ephedrine have been shown to produce weight loss, particularly in combination with caffeine and aspirin. But products containing ma huang should not be recommended due to the risk of gastrointestinal, cardiovascular and neurological side effects. Ma huang has caused several deaths in the US.

CONCLUSION

There is little convincing evidence of benefit for any ingredient in over-the-counter weight control products. Studies published to date often suffer from methodological flaws, such as small group sizes, lack of intention to treat analysis, inclusion of a variety of ingredients in trials and short duration. This lack of good research is a pity because it leaves pharmacists with no sound basis on which to recommend these products. Further long-term, rigorous studies are needed and, if any of these products are shown to work, individuals will likely need to take them for relatively long periods. This means that long-term toxicity studies also need to be conducted.

In the meantime, dietary and other lifestyle changes should remain the foundation of any weight loss regimen. That said, individuals may fail to achieve adequate amounts of vitamins and minerals on a low-energy diet, and a multivitamin and mineral preparation may be recommended.

If you wish to find out more about a product or ingredient for slimming or weight control, it is often difficult to know where to start because of the wealth of information available. It may also sometimes be difficult to know if that information is scientifically sound. This is where your evidence-based medicine skills will be useful in interpreting and appraising any trials you find. A good place to start would be to do a Medline (www.ncbi.nlm.nih.gov/entrez/query.fcgi) search for papers published in respectable journals, such as the *American Journal of Clinical Nutrition*, the *European Journal of Clinical Nutrition*, *Obesity Review* or the *International Journal of Obesity*. You might also consider approaching a product's manufacturer and asking for evidence of the product's efficacy. But bear in mind that this evidence may well be biased.

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