

Liquid energy in a bottle

The trend in energy drinks is to move beyond simple caffeine fortification and to provide a more targeted physiological benefit. STEFAN SIEBRECHT, PhD, takes a seat at the bench with the latest ingredients

Sports and energy drinks have grown in number and application since Gatorade – that first functional beverage that replaced electrolytes like sodium and potassium lost during exercise. Today's

drink target is low-calorie

sports drinks specifically designed to replenish and hydrate the body. Other innovative beverage-makers

are looking for noncaffeinated sources to provide a sustained energy boost. New technologies are providing performance attributes that improve muscle tissue repair and reduce muscle-fibre damage.

There are currently two different definitions of energy drinks. One is just 'high-sugar energy drinks,' which could have a sugar content up to 24 per cent – a lot of energy indeed. The other is the classic 'stimulant energy drink,' which contains sugar energy in the same amount as soft drinks,

around 10 per cent, but which also contains added caffeine as a stimulant for energy release in the body.

CAFFEINE STIMULATES GROWTH

These caffeinated stimulant drinks took off in Thailand and then conquered the whole of Asia. Now they sell around three bio litres, mostly in Asia and the

US, and are expected to grow by 25 per cent in the next three years. The volume of energy-drink sales is quite small in comparison with soft drinks (200 billion litres), bottled water (180 billion litres), iced tea (15 billion litres) or sport drinks (11 billion litres). However, the profit of energy drinks is quite high – 3.9 billion Euro per year.

In the beginning, the dosage of caffeine in Asian energy drinks was too high, and energy drinks were not allowed in Europe and the US. When the caffeine content was reduced to 80mg per serving – less than the 100mg found in a normal cup of coffee – energy drinks became permitted in most countries and started their success story. Caffeine is a stimulant that increases metabolism by increasing fat mobilisation from deposits – lipolysis. It became successful because of the immediate effects of increased alertness and energy that people feel.

The caffeine effect is only temporary, however, and it gets lost if energy drinks or other caffeinated drinks are consumed regularly. High caffeine consumption is associated with some health risks such as high blood pressure and increased metabolic stress. The party combination of caffeinated energy drinks with alcohol is dangerous, and, although a warning on the label states they should not be consumed with alcohol, it is common practise in many pubs.

The taste of caffeine is quite bitter. A product developer has to mask the bitterness by adding strong flavours and a lot of sweetness. Guarana has a low amount of caffeine and is used as a slow-release caffeine source, but an effective level of caffeine is difficult to reach if only guarana is used. Some companies there-

fore add guarana and label it as 'natural caffeine' and then add a certain amount of synthetic caffeine to reach the effective level of caffeine.

Stimulants (other than coffee) are regarded as dangerous and unhealthy, especially since ephedra, a very successful weight-loss stimulant, was banned in the US.

CAFFEINE ALTERNATIVES

High sugar and caffeine contents are some of the reasons why people increasingly regard these drinks as unhealthy. Women in particular do not like them. This led to the idea by the company HER Nutrition to create the worldwide first alternative energy drink especially aimed at women, called HER Energy drink (HER stands for 'healthy energy revitalizer'). The drink is not differently designed; the difference is only in the marketing. For women it would be a better alternative if the drink would contain some milk proteins and a lower sugar content, and the caffeine were replaced by the green tea catechin EGCG to make it healthier.

EGCG is an antioxidant that increases fat burning and therefore reduces the fat deposits in the skin, which reduces the appearance of cellulite. This effect is said in Asia to be one of the secrets why Asian people often have better skin, and less cellulite and body weight.

In studies over the past seven years EGCG, and specifically the Teavigo brand EGCG, has been shown to increase fat metabolism and also to prevent weight gain, even in high-fat diets. This makes it a healthy ingredient for children and women. In Asia, green tea has been used for centuries in high daily dosages without causing health problems or liver damage. Green tea and other plant extracts often ►



FORMULATIONS

have a bitter and astringent taste. Asians become accustomed to these kinds of tastes over time. In Europe and the US, companies try to mask the bitter tastes or hide them by adding a lot of sugar.

The Teavigo brand of pure EGCG has higher EGCG content and offers the functionality and safety of green tea extract without being bitter, even at high dosages. A bitter and awful taste at least has one advantage: it seems to reduce food intake. Maybe that is one of the reasons why Asians used these plant drinks like Pu-Ehr Tea in the past when there was a food shortage, to reduce their appetite.

SWEETENER CHOICES

The sugar sources high fructose corn syrup or sucrose have negative health connotations. Other low-GI sugars like the disaccharides isomaltulose or trehalose are used as alternatives but they are expensive. Isomaltulose is derived from sucrose and has a mild sweet taste, while trehalose has

ry contain rich antioxidant power, but unfortunately their astringent taste is typically masked through the use of a lot of sugar.

BOTANICALS

Botanicals are mostly used as 'label candy,' that is, in amounts that are sub-therapeutic. Market research studies showed that young people do not care for herbs but only for the 'kick' that is provided by caffeine. Other more health-conscious consumers do not trust the claims at all and are more or less afraid of consuming such multi-purpose drinks.

But aren't there quality herbals out there that could have therapeutic applications for energy drinks? Herbal extracts are mostly from the Chinese traditional medicine world, such as ginseng and ginkgo. In Chinese medicine these extracts are medicals and used only in ill people. In Europe and the US, pharmaceutical drugs are on the market to treat diseases. The drinks contain much lower dosages than the

A new possible ingredient for energy drinks is protein in the form of milk peptides

half the sweetness of sucrose, giving it a clean flavour. Isomaltulose is being employed as a slow-release carbohydrate with the same amount of calories as sugar, though it has longer absorption for sustained energy.

To avoid a high peak in blood glucose and the ensuing drop into a hypoglycaemic state with increasing hunger, a lower but constant supply of some carbohydrates could be beneficial. Therefore, a sugar content of 2-4 per cent in a soft or energy drink with some added protein (1-2 per cent) could avoid hypoglycaemia, avoid hunger longer and supply sufficient energy for life on the go.

Various fruits contain sweetness, colour as well as antioxidant properties. Dark red juices like cranberry, blueberry and blackber-

effective drugs, although there is still a health risk. Plant extracts are not pure compounds, so quality, purity and contaminations with heavy metals or pesticides is an issue.

All plant extracts contain many substances that our metabolism regards as dangerous and sends them to the liver to detoxify. A constant high consumption of dangerous extracts could harm the liver. Kava kava was banned in the EU because of concerns about liver damage. If herbal extracts are used, the safety data are most important and only the best qualities should be used.

NEW PROTEIN DRINKS

A new possible ingredient for use in energy drinks is protein in the form of milk peptides.

Protein has a positive health image. A lot of consumers regard protein as 'energy without sugar' and align a higher protein intake with gaining more muscle, decreasing body fat and increasing their health.

Normally, protein cannot be solved in water-based soft drinks and even not in carbonated drinks where it would foam up. Proteins that are hydrolysed into very small particles foam less and are clearly soluble, but they should not contain too many free amino acids – this makes for poor taste as well as instability in solution.

A new casein hydrolysate called PeptoPro offers all 20 amino acids in the same ratio as the milk protein casein but as small milk peptides. This hydrolysate was developed together with the Dutch Olympic Committee and was tested in several studies in trained professional athletes.

These peptides are low in foaming, soluble in water and stable in solution. This led to the idea to create the first healthy carbonated energy drink prototype containing cranberry juice, 2.5 per cent milk protein as peptides and Teavigo brand EGCG as a caffeine replacement, which was already produced by the patent holder DSM in 2005.

The drink was aimed at people who look for a healthier alternative in the energy drinks sector. The protein helps to shape up and increase muscle and strength, and the green tea catechin EGCG increases alertness, stimulates fat burning and prevents weight gain from fat.

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