Information for Healthcare Professionals

THERMO-BOOST®

ANTIOXIDANT ENERGY DRINK

Prepared by:

Dr. Dennis Jones
M.A. (Cantab.), Ph.D. (Cantab.), C.Sci.,
C.Chem., FRSC (UK), C.Biol., M.I.Biol.

March 2018

slimgenics®

Thermo-Boost®
Antioxidant Energy Drink

Thermo-Boost is a proprietary Antioxidant Energy Drink designed to increase the metabolism, boost the immune system and help maintain physical and mental energy levels. Thermo-Boost has ingredients that have been shown to reduce allergy symptoms and has anti-inflammatory properties. This great tasting drink contains the antioxidant vitamins A, C and E to repair free radical damage as well as B vitamins necessary for protein and carbohydrate metabolism. Thermo-Boost also contains herbs and nutrients that have powerful Thermogenic properties that assist in achieving and maintaining a healthy weight and a dietary fiber to support digestive health.

Note: This product should be avoided by nursing mothers, those people using a prescription blood thinning medication and those who are severely sensitive to caffeine.

Thermo-Boost proprietary blend includes:
Vitamins A, C, E, B1, B2, B3, and B6 / Quercetin / Greet Tea /Asian Ginseng / Bacopa /Ginkgo /Chicory Root

Vitamin A is used in the form of beta-carotene. Beta-carotene and other carotenoids are provitamins for Vitamin A (retinol). The carotenoids, including beta-carotene, are also antioxidants, and are fat-soluble. Unlike retinol, which is can be toxic in large amounts, the carotenoids are non-toxic even in quite large amounts, since the body only converts as much beta-carotene to retinol as required. Vitamin A helps to maintain the surface linings of your eye and your respiratory, urinary, and intestinal tracts. When those linings break down, bacteria can enter your body and cause infection. Vitamin A may help prevent bacteria and viruses from entering your body by maintaining the integrity of skin and mucous membranes.

Vitamin C also known as ascorbic acid is a water-soluble vitamin. Unlike most mammals, humans do not have the ability to make their own vitamin C. Therefore, we must obtain vitamin C through our diet. Vitamin C is a highly effective antioxidant. It is essential for the formation of collagen and intercellular material, bone and teeth and for the healing of wounds. It helps maintain elasticity of the skin, aids the absorption of iron and improves resistance to infection. Vitamin C also plays an important role in the synthesis of the neurotransmitter, norepinephrine. Neurotransmitters are critical to brain function and are known to affect mood. In addition, vitamin C is required for the transport of fat to cellular organelles called mitochondria, for conversion to energy.

Vitamin E is a fat-soluble vitamin that is a powerful biological antioxidant and it protects vitamin A and essential fatty acids from oxidation in the body cells and prevents breakdown of body tissues. Vitamin E also contributes to a healthy circulatory system and aids in proper blood clotting and improves wound healing. Results from scientific studies suggest that vitamin E may help lower the risk of several chronic conditions including heart disease, stroke, diabetes and cataracts. Vitamin E has also been shown to play a role in immune function, in DNA repair, and other metabolic processes.

B Complex Vitamins: There are eight water-soluble B vitamins. Since these vitamins are soluble in water they are dispersed throughout the body dissolved in fluid. They are not stored in the body to any appreciable extent and must be replenished every day. Their influence on the body lasts for 14-18 hours after ingestion after which their potency decreases. These vitamins referred to as B complex vitamins, assist and regulate carbohydrate, fat and protein metabolism and are essential mechanisms which produce energy for the body. They also contribute to hemoglobin synthesis and red blood cell production which carries oxygen around the body. Furthermore, B complex vitamins help maintain muscle tone along the wall of the digestive tract and promote healthy skin, hair, eyes, mouth, liver and nervous system.

Vitamin B1 is also known as thiamin. Thiamin is involved in numerous body functions, including nervous system and muscle function, flow of electrolytes in and out of nerve and muscle cells, multiple enzyme processes, and production of hydrochloric acid (which is necessary for proper digestion). It is especially vital for changing carbohydrates to energy. As a coenzyme, thiamin plays a key role in energy production, conversion of glucose to fat. Every cell of the body requires vitamin B1 to form the fuel the body runs on called ATP. Nerve cells require vitamin B1 in order to function normally.

Vitamin B2 known as riboflavin, works together with the family of B-complex vitamins to provide the body with energy by metabolizing carbohydrates, fats, and proteins. It also helps in the regeneration of glutathione, an enzyme that rids the body of free radicals. Riboflavin helps to increase iron levels for those suffering from iron-deficiency anemia and helps to maintain good vision, skin, nails and hair.

Vitamin B3 also known as niacin. Niacin works with other B vitamins to help release energy from carbohydrates. It helps keep nerves, skin, eyes, and the digestive system healthy. It also is used to reduce cholesterol and triglyceride levels in the blood. Other functions of niacin include removing toxic chemicals from the body, and assisting in the production of steroid hormones made by the adrenal gland, such as sex hormones and stress-related hormones. Thermo-Boost has niacinamide which is a form of niacin that doesn't cause the "niacin flush" that some people experience with other forms of niacin.

Vitamin B6 performs a wide variety of functions in your body and is essential for your good health. For example vitamin B6 is needed for more than 100 enzymes involved in protein metabolism. The more protein you eat, the more vitamin B6 you need. It is also essential for red blood cell metabolism and the nervous and immune systems need vitamin B6 to function efficiently. Vitamin B6 also helps maintain your blood glucose within a normal range. When caloric intake is low your body needs vitamin B6 to help convert stored carbohydrate or other nutrients to glucose to maintain normal blood sugar levels.

Quercetin is a plant pigment found in many foods such as onions, broccoli, apples, tea, grapes and red wine. It's not a nutrient, but is classified as a flavonoid. Flavonoids have been referred to as "nature's biological response modifiers" because of strong experimental evidence of their inherent ability to modify the body's reaction to allergens, viruses, and carcinogens. They show anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activity. In addition to those benefits quercetin is believed to improve blood vessel strength, help prevent cataracts, enhance Thermogenesis, energy expenditure, and stimulate fat oxidation.

Green Tea originated in China, where it has been used for over 5000 years as an invigorating and healthy drink. Green tea is rich in catechin polyphenols, particularly epigallocatechin gallate (EGCG). EGCG is a powerful anti-oxidant: besides inhibiting the growth of cancer cells, it kills cancer cells without harming healthy tissue. It has also been effective in lowering LDL cholesterol levels, and inhibiting the abnormal formation of blood clots.

Green tea is Thermogenic! In fact studies shows that green tea extract increases the metabolic rate by 4%. These effects are probably due to the high concentrations of catechin polyphenols found in green tea. Green tea inhibits fat absorption and helps glucose regulation. Reports say that the catechins in green tea help to inhibit the movement of glucose into fat cells. It helps to slow the rise in blood sugar after a meal. This prevents high insulin spikes (lots of insulin promotes fat storage) and the subsequent fat storage.

Asian Ginseng or Panax Ginseng is native to China and Korea and has been used in various systems of medicine for many centuries. Ginseng contains active complex carbohydrates called ginsenosides, each with the capacity to stimulate or soothe the nervous system, balance metabolic processes, decrease blood sugar, improve muscle tone and stimulate the endocrine system.

Research has shown that ginseng is effective in maintaining and restoring the cell's capacity to function and therefore may be considered useful as an anti-aging treatment. It is an "adaptogen" supporting the body's functions and increasing its resistance to physical, chemical and biological stress. Other benefits of ginseng include vasodilatation, increased red cell production, and both blood pressure and blood cholesterol lowering effects.

Ginkgo biloba seeds and leaves have been used in traditional Chinese medicine for hundreds of years to treat ear, nose, throat and chest disorders like bronchitis. More recently, Ginkgo Leaf Extract (GLE) has been used to treat a variety of ailments and conditions, including Alzheimer's disease/dementia, asthma, bronchitis, fatigue, and tinnitus (ringing in the ears).

It dilates blood vessels and increases circulation and has been shown to decreases B/P and cholesterol. Ginkgo is beneficial to all organs that have rich blood supplies, including the brain, heart, liver, kidneys, lungs, and spleen, to mention a few.

Bacopa is an herb that commonly grows in marshy areas throughout India. It has been used in India, for several centuries as a "brain tonic", used for enhancing memory development, learning, and concentration. Recent studies show that Bacopa may in fact improve cognitive performance and enhance mental acuity. It has also shown to have some anti anxiety properties as well as strong antioxidant properties.

Chicory Root contains a soluble fiber known as oligofructose that increase the activity of the beneficial bacteria in the gut. It does this by acting as a "food" for the good bacteria called probiotics in your digestive system. Think of probiotics as the opposite of antibiotics - instead of killing harmful bacteria, they introduce the good ones. So oligofructose is known as a "prebiotic" because it feeds the probiotics or the gut flora.

Other benefits of oligofructose include stimulating the immune system, relieve constipation, decrease the risk of osteoporosis by increasing mineral absorption, reducing the risk of atherosclerosis by lowering the synthesis of triglycerides and fatty acids in the liver and regulating carbohydrate and lipid metabolism by lowering blood glucose levels.

Dosage: Two servings per day, one in the morning and one in the afternoon.

Thermogenesis and free radical scavenging in a drink!

» The product is in the form of stick-packs, easy to use. Just tear off the top, pour the powder into a water-bottle, shake until dissolved, and enjoy a refreshing drink.

» Contains the antioxidant vitamins ß-carotene (a precursor of Vitamin A), Vitamin C (as ascorbic acid) and Vitamin E (as DL-a-tocopheryl acetate) as well as the B-vitamins that are required for carbohydrate and protein metabolism.

» Contains powerful antioxidants and free radical scavengers, including quercetin and polyphenols from Green Tea (Camellia sinensis). Biological antioxidants can scavenge and destroy free radicals, which are reactive agents formed in the body and which can damage cell membranes and metabolic intermediates susceptible to oxidation. Biological antioxidants can help repair cell membranes damaged by oxidation.

» Thermogenic, can stimulate lipolysis, and can help boost energy by increasing metabolic rate.

» This is not only due to the caffeine from Green Tea, but to the quercetin and similar flavonoids in the Ginkgo and Green Tea, which have recently been shown to enhance energy through mechanisms very similar to those of methylxanthines (such as caffeine and theobromine).

» Ginkgosides from Ginkgo (Ginkgo biloba) may enhance mental acuity.

» Ginsenosides present in Asian Ginseng (Panax ginseng) have a tonic effect on metabolism, and in particular can optimize hepatic metabolism, making the utilization of oxygen (for oxidative, energy-generating processes) more efficient.

» All flavors make pleasant low-calorie drinks when used according to directions, which can assist those on diet plans in achieving an acceptable water intake.

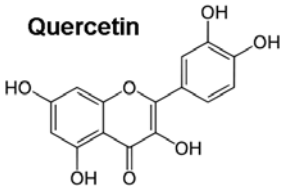
» Contains the dietary fiber oligofructose (fructooligosaccharide), which is a prebiotic that can improve colonic health and function (Quote: A prebiotic is "a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the gastrointestinal microflora that confers benefits upon host well-being and health.").

» Daily intake of Thermo-Boost helps maintain a powerful antioxidant and free radical scavenging defense system, and is beneficial for maintaining sustained energy levels and, when used in conjunction with dietary programs, assisting with weight loss.

For the scientific rationale behind this product, read on!

THESE STATEMENTS HAVE NOT BEEN EVALUATED BY THE FOOD AND DRUG ADMINISTRATION.
THIS PRODUCT IS NOT INTENDED TO DIAGNOSE, TREAT, CURE OR PREVENT ANY DISEASE.

Quercetin:

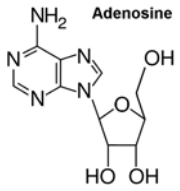


Quercetin is a flavonoid, specifically classified in the subclass of flavonols. It is widely distributed in nature, and together with representatives of other subclasses of flavonoids (flavones, flavanones, flavan-3-ols, isoflavones, proanthocyanidins and anthocyanidins) is found in a wide variety of foods and botanicals (USDA, 2002, 2003). It has been estimated that the total flavanoid intake per day in humans is between 1 and 2 grams (Haysteen, 2002).

Initial attention was drawn to quercetin because of its pronounced in vitro antioxidant activity, a property shared with many other flavonoids. Quercetin is also a potent antioxidant under biological conditions, for example, quercetin significantly reduced DNA damage caused by oxidative stress in cultures of human nasal mucosal cells (Reiter et al., 2009), but there is evidence that the in vivo antioxidant activity in both humans and animals may be indirect rather than direct, involving metabolites or conjugates of quercetin itself (Spencer et al., 2003; Stevenson and Hurst, 2007). That postulate detracts in no way from the beneficial biological antioxidant properties of quercetin, but rather shows a parallel to the behaviour and mechanisms of the older and more conventional antioxidants such as the antioxidant vitamins and selenium.

Quercetin has, however, more recently been shown to possess a number of physiological benefits which cannot directly be ascribed to biological antioxidant activity. For example, quercetin has been shown to possess antihypertensive effcts in man (Edwards et al., 2007; Bischoff, 2008), to improve function of endothelial cells (Loke et al., 2008), to possess antiinflammatory activity (McAnulty et al., 2008; Bischoff, 2008), but above all, to enhance energy metabolism and possibly increase endurance during physical exertion. It is tempting to speculate that powerful antioxidant and free radical scavenging activities, which can contribute to the repair of membranes and sub-cellular structures damaged by oxidation, can improve metabolic performance, and this speculation is undoubtedly true to some extent, but the enhancement of energy metabolism brought about by quercetin and related flavonols is of a greater order of magnitude than can be attributed to a simple optimization of cellular function.

Furthermore, Beatty et al. (2000) failed to detect a substantial effect of dietary flavonols (quercetin predominating) on oxidative DNA damage in human leucocytes, which is not an entirely unexpected result since it has been hypothesized that the main targets for the repair actions of free radical scavengers are membranes.

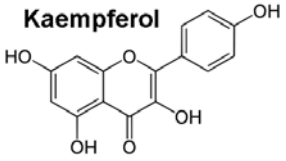


The demonstrated biochemical and physiological effects of quercetin and other flavonols do indicate that quercetin and related substances, like methylxanthines, can modulate actions of adenosine (a purine nucleoside involved in many physiological processes) in the body, in part by acting as antagonists at receptors. There are 4 types of adenosine receptor present in the body, A1, A2A, A2B and A3. Activation of A2A or A2B receptors results in increased adenylate cyclase (the enzyme which converts adenosine triphosphate, ATP, to cyclic adenosine monophosphate, abbreviated as cAMP) activity and thus increases levels of cAMP, while activation of A1 or A3 receptors reduces formation of cAMP.

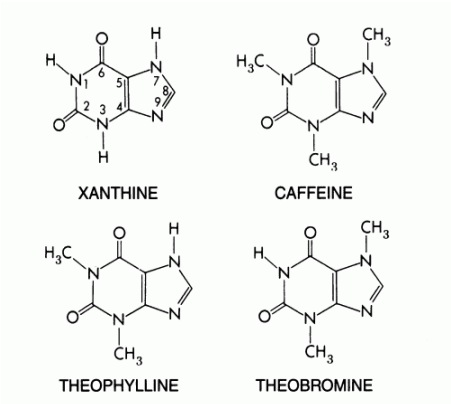
The presence of cAMP in cells is of considerable physiological importance, since together with its associated protein kinases, cAMP regulates many intracellular processes, including glycogen, sugar and lipid metabolism, and is in fact the "2nd messenger" responsible for thermogenesis: noradrenaline (norepinephrine) binds to a receptor (β-type, the β3 is of most interest in thermogenesis) either at a sympathetic nerve terminal or on a non-innervated cell, such as a lipocyte, possessing β3 receptors.

This activates a heterotrimeric G protein which in turn associates with adenylate cyclase and thus increases both the level of cAMP and the transmission of the “message” throughout the cell. The end result, at least in muscle and liver cells, can be simplistically defined as enhanced metabolic activity, while in lipocytes the end result is lipolysis. The combination of the two activities, increased metabolic activity and increased substrate mobilization, is generally referred to as thermogenesis (literally “creation of energy”).

The actual result in terms of the whole organism thus depends on the relative distribution of the different types of adenosine receptors and on which type is activated to the greatest extent. Positive effects on energy metabolism would therefore seem to require that sensitive cells have a preponderance of A1 and A3 receptors, blocking of which would thus prevent adenosine from reducing adenylate cyclase activity, leaving the cell receptive and sensitized to β-activation. It can thus be seen that the flavonols, such as quercetin, add an extra dimension to classical thermogenesis.



Melzig and Franke (1995) and Melzig (1996) reported that flavonols such as quercetin and kaempferol inhibited adenosine deaminase in aortic endothelial cells, thus reducing inactivation of adenosine. This finding explains some of the beneficial cardiovascular and anti-inflammatory properties of such flavonols, but increasing adenosine availability in the tissues mainly responsible for thermogenesis would be more likely to reduce thermogenesis. However, there is a significant evidence that quercetin, and one presumes other related flavonoids, act as adenosine antagonists at A1 receptors (Alexander, 2006), and that in many respects flavonols of the quercetin type mimic the effects of the traditional adenosine antagonists, the methylxanthines (caffeine, theobromine, theophylline) at adenosine receptors (Cheuvront et al., 2009), though they seem to be devoid of the central nervous system stimulant effects of the methylxanthines. It is in fact somewhat surprising that flavonols can be as effective as methylxanthines in this respect, since the structures of the methylxanthines are much closer to that of adenosine itself.



Da-Silva et al. (2007) showed that kaempferol treatment of human skeletal muscle myoblasts resulted in a several-fold increase in generation of cAMP and protein kinase A activation, with approximately 30% increase in skeletal muscle myocyte oxygen consumption. The cAMP-responsive gene for type 2 iodothyronine deiodinase (D2), an intracellular enzyme that activates thyroid hormone (T3) for the nucleus, was approximately threefold upregulated by kaempferol; furthermore, the activity half-life for D2 was also dramatically and selectively increased. The net effect was an approximately 10-fold stimulation of D2 activity as measured in cell sonicates, with a concurrent increase of approximately 2.6-fold in the rate of T3 production, which persisted for at least 24 hours, even after kaempferol had been removed from the system. Since kaempferol and quercetin are closely related, it can be assumed that quercetin would exert similar actions.

Lines and Ono (2006) reveal results showing that quercetin and kaempferol inhibit at least two of the isoenzymes in the phosphodiesterase family, namely PDE 4 and PDE 5A. Quercetin was the more potent of the two, and both were also more potent than caffeine, a known inhibitor of the various enzymes collectively known as phosphodiesterase (Magkos and Kavouras, 2005).

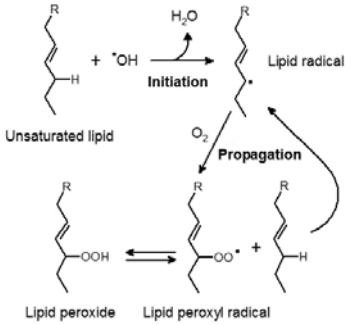
Interestingly, quercetin was shown to be particularly effective at inhibiting PDE 5A, which is the phosphodiesterase isoenzyme that is targeted by sildenafil and other drugs used to treat erectile dysfunction. Inhibition of PDE 5 isoenzymes, while it will increase levels of cAMP in cells, also increases levels of cyclic guanosine monophosphate (cGMP), a cyclic "2nd messenger" that functions in a way basically similar to cAMP but may have greater actions on inducing relaxation of smooth muscle and vasodilation. Sildenafil, used therapeutically for treatment of erectile dysfunction, acts mainly by inhibiting PDE 5 isoenzymes and increasing cGMP levels.

It is reasonable to assume that, as with the methylxanthines, quercetin and related flavonols inhibit all of the phosphodiesterase isoenzymes to varying extents, and thus increase activities of cAMP-activated protein kinases, which basically completes the picture as far as energy enhancement is concerned (Zhou and Zhang, 2009). Such energy enhancement has indeed been demonstrated in intact organisms as well as in isolated cell cultures. For example, MacRae and Mefferd (2006) showed that quercetin supplementation significantly improved high intensity time trial cycling performance through enhancement of power output. Stewart et al. (2008) demonstrated significant enhancement of energy expenditure in mice given quercetin and a high-fat diet, but the effect was transient, seen after 3 weeks but not after 8 weeks. However, circulating plasma quercetin concentrations declined between 3 weeks and 8 weeks for reasons that were not obvious. Cheuvrent at al. (2009) investigated whether single doses of caffeine and quercetin were capable of improving exercise performance during heat stress, but found that, unlike the enhancement seen under temperate conditions, neither substance showed any improvement in exercise performance under heat stress conditions, possibly because other physiological mechanisms were called into play to compensate for the heat stress.

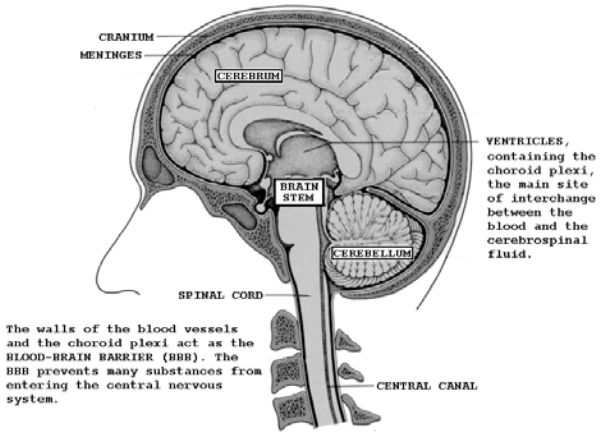
Though there is much evidence that the energy enhancement seen with quercetin and other flavonols does involve adenosine antagonism, phosphodiesterase inhibition, increased intracellular levels of cyclic nucleoside monophosphates and activation of protein kinases, other possible mechanisms are being investigated, for example, Davis et al. (2009) suggest that increased exercise tolerance brought about by quercetin may be due to increased mitochondrial biogenesis, which theoretically could result in increased fitness without training. However, the same theoretical conclusion can be drawn from the proven actions of the flavonols on the already-defined "thermogenic" mechanisms within cells.

Quercetin and other flavonoids are thus demonstrably powerful antioxidants, both in vivo and in vitro, with both direct and indirect free radical scavenging actions that are beneficial in terms of combatting oxidative processes in membranes and sub-cellular organelles and repairing oxidative damage to these structures, thus restoring them to full functionality.

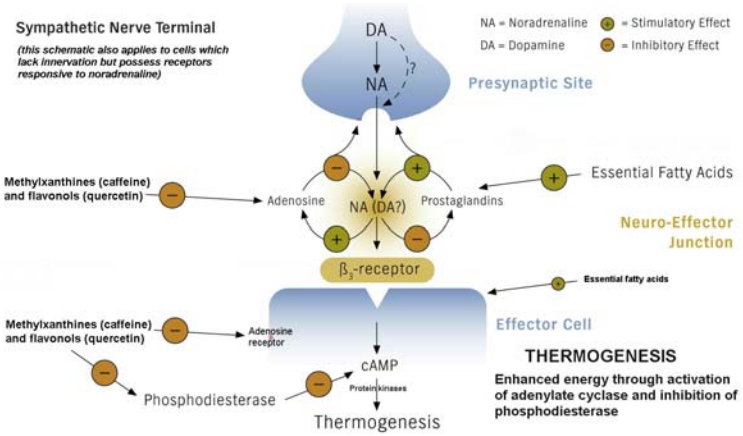
Much of the oxidative damage to membranes and other structures results from peroxide-mediated self-propagating free radical reactions as summarized in the figure. Most flavonoids, including quercetin, are capable of breaking the propagating chain reaction either at the initiation stage, by neutralizing the hydroxyl radical, or at the lipid peroxyl stage.



Antioxidant properties alone are insufficient to explain the energy enhancement actions of flavonoids in general or quercetin in particular. There is, however, sufficient evidence to strongly suggest that quercetin and related flavonols at least are involved in the general process of thermogenesis and that their involvement in this process is very similar to that of the methylxanthines. However, they also appear to lack the central nervous system stimulant actions of the methylxanthines or at most, show such actions in very attenuated form, a possible consequence of differences in lipophilicity and relative ability to cross the blood-brain barrier.

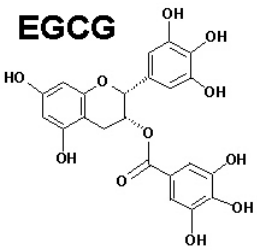


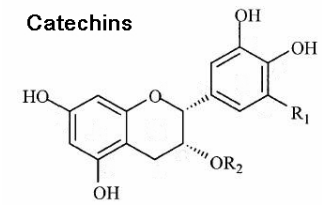
Thus the actions of quercetin and other flavonoids which show similar actions on energy enhancement can be explained within the general mechanism of thermogenesis, though there remain a number of unknown facts. For example, the distribution of adenosine receptors throughout the body, unlike the distribution of sympathicomimetic β-receptors, has not been exhaustively investigated, and the relative distribution of adenosine receptors of types A1, A2A, A2B and A3 remains unknown, as well as the relative degrees of expression and regulation of these receptors. While some cells with β3-receptors are innervated by afferent nerves of the sympathetic nervous system, other cells, such as lipocytes of adipose tissue, are largely devoid of innervation and rely on circulating noradrenaline for activation. Methylxanthines act as adenosine antagonists mainly at the end-plate of the sympathetic nerve which serves an innervated cell, and it is presumed they do so by preventing the activation of adenosine A2A and A2B receptors, thus reducing cAMP formation in the sympathetic nerve end-plate and thus reducing the release of noradrenaline into the synaptic cleft. However, in non-innervated effector cells, methylxanthines also increase levels of cAMP and the cAMP-dependent protein kinases, which could be due to antagonism at the level of the adenosine A1/A3 receptors in addition to the known inhibition of phosphodiesterase iso-enzymes. Whether the flavonoids mimic the methylxanthines exactly, or whether the different adenosine receptors are more or less antagonized by flavonoids than by methylxanthines also remains unknown, but the mechanisms involved may be briefly summarized by the diagram of thermogenesis shown.



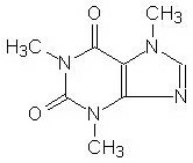
Green Tea (Camellia sinensis):

The Tea plant originated in China, where it has been used for over 5000 years as an invigorating and healthy drink. Tea can basically be classified as white, green or black. All consist of the leaves and smaller stems of the plant. White Tea, however, is basically unprocessed and as picked, though it may be dried. Green Tea is dried for a longer period of time, and undergoes some oxidation, without, however, significant effect on the methylxanthines and catechins it obtains. Black Tea, however, is fully oxidised and the catechins have accordingly been modified. While Green Tea and its extracts do contain methylxanthines, particularly caffeine, it also contains antioxidants called polyphenolic catechins, the main one of which is epigallocatechin gallate, generally abbreviated as EGCG, a powerful antioxidant. In addition to EGCG, Green Tea and its extracts also contain free catechins and gallic acid, which are also effective antioxidants.





Tea is well known as a caffeinaceous herb. The methylxanthine in Green Tea is predominantly caffeine, which is a mild central nervous system stimulant, but also has other beneficial physiological actions. Mechanisms of action of caffeine and other methylxanthines are not well understood, but their main effects are due to the inhibition of phosphodiesterase, causing accumulation of cAMP, and they may also block adenosine receptors. The methylxanthines act as respiratory and CNS stimulants, smooth muscle relaxants, diuretics, cardiac stimulants and stimulants of skeletal muscle.



Caffeine

At an empirical level, caffeine has long been known as a thermogenic substance that is capable of increasing the resting metabolic rate (RMR) and increasing lipolysis, that is, the increase in breakdown of triglycerides (fat) in adipose tissue stores, and these actions are referenced in many standard reference works. The actions of interest in this respect appear to be consequent on the inhibition of phosphodiesterase, causing accumulation of cAMP, and the blockade of adenosine receptors (Munson, 1995), but Astrup et al. (1990b) notes that the exact mechanisms by which caffeine increases thermogenesis (which is effectively an increase in RMR and is generally measured by resting energy expenditure, EE) remain obscure.

There is general scientific consensus only over the facts that caffeine is indeed a thermogenic substance which increases RMR and lipolysis, and thus has potential for use in weight loss regimes, and much discussion over how this is actually mediated at cellular or intracellular level.

Practically, Astrup et al. (opus cit.) showed that ingestion of 100 mg caffeine by volunteers resulted in a significant increase in EE ($p < 0.05$ vs. placebo), and that this increase was due to increased oxidation of both carbohydrate and fat. In this study, caffeine had a pronounced impact on plasma glycerol and non-esterified fatty acids, both of which rose considerably, but little effect on glucose, indicating that lipolysis was increased substantially. Since lactate levels also increased, the authors speculate that the caffeine may have triggered the Cori cycle, which is a thermogenic cycle in muscle and adipose tissue that results in lactate as an end product. Astrup et al. (1992d) also note that, in humans, caffeine stimulates thermogenesis and lipolysis dose-dependently, and that the thermogenic effect may be related to both a skeletal muscle component and the extracellular fatty acid/triglyceride cycle. Broadly similar findings have been reported in rodents by, inter alia, Bukowiecki et al. (1983) and Cheung et al. (1988); in rodents caffeine promotes weight loss by reducing lipid stores through increased EE but without decreasing energy intake.

In relation to weight loss, Yoshida et al. (1994) showed that the body weight loss in obese women showed a significant correlation with their thermogenic response to caffeine, in other words that those who have the best response to caffeine also have the best rates of weight loss. Other recent studies of note are by Collins et al. (1994), which shows significant increases in RMR lasting several hours after ingestion of caffeine or smoking, with an additive effect of the two, and Tagliabue et al. (1994), who state "The ingestion of coffee is an everyday condition that increases the metabolic rate. The thermic effect of caffeine has been known since 1915 and has been extensively investigated in many recent papers".

During the last decade, much attention has been paid to the antioxidant properties of Green Tea. While “black” tea does contain virtually the same substances (Robinson et al., 1997), the antioxidant levels are lower than in Green Tea (Langley-Evans, 2000). EGCG (epigallocatechin gallate) is the main contributor to the anitoxidant properties. The antioxidant substances are readily absorbed and can significantly increase antioxidant avtivity in blood (van het Hof et al., 1999; Leenen et al., 2000).

Epidemiological studies have indicated close correlations between use of Green Tea and reduced mortality from a number of “diseases of civilization”. The strongest correlation reported was between Green Tea use and reduced risk of death from cardiovascular events (Kuriyama et al., 2006), though a benefical reduction of mortality from all causes was reported, particularly in women. The effect on mortality from cancer was not significant, though animal studies and theoretical considerations suggest that the incidence of at least certain types of cancer may be reduced by catechins from Green Tea (Zaveri, 2006; Cooper et al., 2005b). Benefits of Green Tea in cardiovascular disease have also been signalled by Cooper et al. (2005a).

Wolfram et al. (2006) comment on the traditional notion that Green Tea consumption benefits health and that the areas of cardiovascular disease and cancer have been subject to numerous studies. These Authors note that the anti-obesity effects of Green Tea are being increasingly investigated in cell, animal, and human studies. Green Tea, Green Tea catechins, and epigallocatechin gallate (EGCG) have been demonstrated in cell culture and animal models of obesity to reduce adipocyte differentiation and proliferation, lipogenesis, fat mass, body weight, fat absorption, plasma levels of triglycerides, free fatty acids, cholesterol, glucose, insulin and leptin, as well as to increase beta-oxidation and thermogenesis. Adipose tissue, liver, intestine, and skeletal muscle are target organs of Green Tea, mediating its anti-obesity effects.

Studies conducted with human subjects report reduced body weight and body fat, as well as increased fat oxidation and thermogenesis and thereby confirm findings in cell culture systems and animal models of obesity. However, they caution that more clinical work is required to confirm many of these findings.

Siddiqui et al. (2004), and Cabrera et al. (2006) also review the numerous health benefits that appear to be derived from consumption of Green Tea, referring to recent human studies which suggest that Green Tea may not only contribute to a reduction in the risk of cardiovascular disease and some forms of cancer, but also to the promotion of oral health and other physiological functions such as anti-hypertensive effect, body weight control, antibacterial and antivirasic activity, solar ultraviolet protection, bone mineral density increase, anti-fibrotic properties, and neuroprotective power.

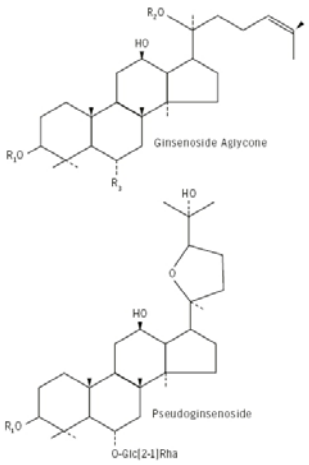
It is generally conceded that while most of the benefits attributed to Green Tea relate to the antioxidant components, some may be due to other substances, such as theanine (Cooper et al., 2005a), which may exert beneficial actions unrelated to antioxidant effects. In fact, the cholesterol-lowering effects of Green Tea may be due to oxidized catechins, that is, catechins which have already exerted their antioxidant actions and are no longer active as antioxidants. It has also been suggested for many years that biological antioxidants play important roles in retarding the process of aging and degenerative conditions, and it may be speculated, for example, that the protective effects of the Green Tea catechins against cardiovascular diseases may be due to prevention of oxidation of low density lipoproteins (LDL), since LDL oxidation reduces the biological functionality of the LDL fraction and may result in lipid deposition in arterial walls.

Asian Ginseng (Panax ginseng):

In China, the word ginseng is directly translated as "the essence of man", and it is sometimes referred to as a "Dose of Immortality". It is the most valued herb used in China, and is also widely used in other Asian countries. According to the Ben Cao Chien (attributed to the Emperor, Shen Nung, circa 3100 B.C.; substantially revised and enlarged by Li Shih-Chen, 1596), ginseng is able to "support the five visceral organs, calm the nerves, tranquilize the mind, stop convulsions, expunge evil spirits, clear the eyes and improve the memory".

Modern research (Liu and Xiao, 1992) has shown that ginseng contains a large number of active agents, acting on the central nervous system, cardiovascular system, endocrine secretion, immune function and metabolism, and that it also possesses biomodulation, anti-stress and anti-ageing activities.

The active principles (ginsenosides) are present in highest concentrations in the roots, and concentration increases with the age of the plant. Roots are harvested preferably from plants which are 4 years or more old. The ginsenosides have the general structures as shown.



While the total spectrum of activity of ginseng makes it a desirable herb for use as a general tonic, it also possesses some specific activities of value in both weight loss and sports nutrition.

Ng and Yeung (1985), for example, showed that it had insulin-like activity, or at least increased insulin secretion, thus facilitating the passage of metabolic substrates (sugars, free fatty acids, amino acids) across membranes. Huang (1993) also reports that ginseng increases cellular levels of cyclic adenosine monophosphate (cAMP) in some tisses, and promotes the oxidative phosphorylation of carbohydrate secondary to insulin release. These mechanisms would explain the metabolic enhancement often reported for ginseng. Other effects of value in nutrition include a cardiotonic effect (improved cardiac function), cerebral and coronary vasodilation, increased red cell production, possible antithrombotic action, and both blood pressure and blood cholesterol lowering effects (Huang, opus cit.). These effects only become significant with longer periods of administration, but acute administration of ginseng has been shown to prolong the survival of oxygen-depleted rats, indicating an increased efficiency of oxygen utilization in metabolic processes (Huang, opus cit.).

Ginkgo (Ginkgo biloba):

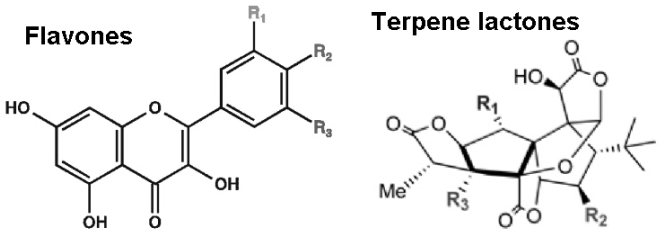
Also known as maidenhair tree or kew tree, the ginkgo is the world's oldest living tree species, and it can be traced back more than 200 million years to the fossils of the Permian period. It is the sole survivor of the family Ginkgoaceae. Individual trees may live as long as 1000 years. They grow to a height of a about 125 feet and bear fan-shaped leaves.

The species is dioecious; male trees more than 20 years old blossom in the spring. Adult female trees produce a plum-like gray-tan fruit that falls in late autumn. Its fleshy pulp has a foul, offensive odor and causes contact dermatitis. The edible inner seed resembles an almond and is sold in oriental markets. The gingko species was almost destroyed during the ice age but survived in China, where it was cultivated as a sacred tree and is still found decorating Buddhist temples throughout Asia. Preparations have been used as health remedies for more than a thousand years. Traditional Chinese physicians used ginkgo leaves to treat asthma and chillblains, which is the swelling of the hands and feet from exposure to damp cold. The ancient Chinese and Japanese ate roasted ginkgo seeds, and considered them a digestive aid and preventive for drunkenness.

The leaves are 1" - 2" long, oddly fan-shaped, slightly thickened, slightly wavy on broad edge, often 2-lobed with fine forking parallel veins but no midvein. A dull-light green turning yellow in autumn. The herb is usually the leaves, which are most active when picked in the Fall, though both the seeds and the leaves are used in Traditional Chinese Medicine. The leaves contain a number of active substances, and extensive research has shown that these substances can dilate blood vessels and improve the circulation.

They can also prevent aggregation of blood platelets, which is one of the first stages in thrombosis. Practically, the improvement of the circulation resulting from ginkgo treatment, particularly in older subjects, can manifest as improvement in memory and brain function, improvement in vision (particularly in diabetic patients), or reduction in cramps in those suffering from poor circulation in the limbs. Ginkgo also appears to have antioxidant properties, and it has been suggested that use of natural biological antioxidants may slow the aging process.

The active substances in the leaves include flavone glycosides (quercetin and kaempferol are present) and terpene lactones (the ginkgolides):



The contents of active substances show seasonal variation, with highest levels in the autumn. Standardized extracts are often used instead of the powdered leaves.

Historically, Ginkgo is one of the oldest Chinese Traditional Medicines, and is apparently mentioned in the Ben Cao Chien as well as in other monumental works from the 15th and 16th Centuries (Lan Mao's Dian Nan Ben Cao and Liu Wen-Tai's Ben Cao Pin Hui Jing Yao).

In animals, ginkgo extracts have been shown to improve memory and learning ability in mice (Chen et al., 1991; Winter, 1991), increase the rate of inner ear recovery after experimental inner ear trauma in cats (Lacour et al., 1991), inhibit or decrease allergic manifestations in mice and rats (Zhang et al., 1990), improve nutrient utilization in pig aorta cells (Bruel et al., 1989), facilitate recovery from brain damage in rats (Attella et al., 1989) and protect against ischaemic brain damage in rats (Krieglstein et al., 1986).

In humans, Grassel (1992) showed that ginkgo extracts inproved mental performance in patients with cerebral insufficiency, while Raabe et al. (1991) showed that vision improved in elderly patients with cerebroretinal ischaemia after treatment with ginkgo extracts. In another study, elderly patients with mild to moderate memory impairment showed significant improvement in cognitive function after ginkgo treatment (Rai et al., 1991). Eckmann (1990) showed that symptoms associated with cerebral insufficiency (mainly depression) generally improved after treatment with ginkgo extract for 2 - 4 weeks, while Fünfgeld (1989) reported improved electroencephalographic patterns and clinical findings in patients with Parkinson's disease. Hofferberth (1989) reported significant improvements after ginkgo treatment in patients with psychotic syndromes associated with organic brain changes.

Colour vision defects in patients with diabetic retinopathy also diminished under ginkgo treatment (Lanthony and Cosson, 1988), while ginkgo extracts improved microcirculation in capillaries in both volunteers (Jung et al., 1990) and in patients with arteriosclerotic changes of extracranial brain arteries (Koltringer et al., 1989).

Huang (1993) also notes that Ginkgo may reduce blood pressure (a consequence of its vasodilatory effects), lower plasma cholesterol and aid in bronchodilation, while Hindmarch (1988) showed that even single doses of Ginkgo extract improved short term memory in healthy volunteers. Studies of the active ginkgolides have shown anti-thrombotic activity that apears to be effected through eicosanoid modulation (Braquet et al., 1990).

Very few side effects have been reported for ginkgo extracts, and none have been serious. Mild effects have included headaches and gastro-intestinal upsets.

It is generally considered that ginkgo may have value for those suffering from occlusive vascular disorders, both peripheral and cerebral, particularly where the reduction of blood flow has resulted in decreased function.

The antioxidant properties of the herb may also result in scavenging of free radicals and thus reduction in tissue damage associated with these agents (Barth et al., 1991; Otamiri and Tagesson, 1989; Pincemail et al., 1989). Free radical damage to the body is considered by some experts as a major contributor to the aging process.

Safety aspects:

As with all Dietary Supplements, users of this product should consult their health care provider if they are pregnant, lactating, or using prescription drugs. Very few herbs and botanicals have ever been subjected to formal safety studies, and the assessment of their safety is usually based on historical use and data on intake on normal diets.

Quercetin is widely distributed in nature, and together with representatives of other subclasses of flavonoids (flavones, flavanones, flavan-3-ols, isoflavones, proanthocyanidins and anthocyanidins) is found in a wide variety of foods and botanicals (USDA, 2002, 2003). It has been estimated that the total flavanoid intake per day in humans is between 1 and 2 grams (Haysteen, 2002), of which a substantial part is quercetin, depending on diet. There have been no studies performed which would indicate any safety hazards, and interactions of quercetin with other Dietary Supplements, foods or drugs have not been reported or suggested.

Green Tea can be consumed safely (McGuffin et al., 1997), though long-term use of fermented Black Tea is not recommended (opus cit.).

Ginseng is theoretically contra-indicated for hypertension (McGuffin et al., 1997), but more recent studies have shown either no effect (Stavro et al., 2006) or reductions in blood pressure (Han et al., 1998).

According to McGuffin et al. (1997), Ginkgo may potentiate the action of mono-amine oxidase inhibitors, but there have been no studies reported that support this speculative contention. There have been rare mentions of internal bleeding when Ginkgo was combined with “blood thinners” such as aspirin or coumadin (and even ibuprofen). Ginkgo has anti-platelet activity and hence could prolong the time it takes to form a blood clot at the site of damaged tissues, but it does not seem to affect the coagulation system. In fact, recent studies have indicated that Ginkgo biloba does not influence the clinical effect of Warfarin (Bal Dit Sollier et al., 2003). Additional studies also failed to show any effect of Ginkgo on platelet function or coagulation time (Engelsen et al., 2003; Jiang et al., 2005).

McGuffin et al. (1997) do not report pregnancy as a contra-indication for the use of Green Tea, Ginkgo or Ginseng, but as noted, consumers of Dietary Supplements should consult a health care professional if they are pregnant, lactating, or using prescription drugs.

23 July, 2009.

Dr. Dennis Jones,
M.A. (Cantab.), Ph.D. (Cantab.), C.Sci.,
C.Chem., FRSC(UK), C.Biol., M.I.Biol.

Alexander, S.P., 2006, Flavonoids as antagonists at A1 adenosine receptors. Phytother. Res., 20, 1009 - 1012.

Antal, M., Regöly-Méreim A., Biró, L., Arató, G., Schmidt, J., Nagy, K., Greiner, E., Lásztity. N., Szabó, C., Péter, S. and Martos, E., 2008, [Effects of oligofructose containing diet in obese persons]. Orv. Hetil., 149, 1989 - 1995.

Arner, P., 1993, Adenosine, prostaglandins and phosphodiesterase as targets for obesity pharmacotherapy. Int. J. Obesity, 17, S57 - S60.

Astrup, A., Toubro, S., Cannon, S., Hein, P. Breum, L. and Madsen, J., 1990b, Caffeine: a double-blind, placebo-controlled study of its thermogenic, metabolic and cardiovascular effects in healthy volunteers. Am. J. Clin. Nutr., 51, 759 - 767.

Astrup, A., Breum, L., Toubro, S., Hein, P. and Quaade, F., 1992a, The effect and safety of an ephedrine/caffeine compound compared to ephedrine, caffeine and placebo in obese subjects on an energy restricted diet. A double blind trial. Int. J. Obesity, 16, 169 - 277.

Astrup, A., Buemann, B., Christensen, N.J., Toubro, S., Thorbek, G., Victor, O.J. and Quaade, F., 1992b, The effect of ephedrine/caffeine mixture on energy expenditure and body composition in obese women. Metabolism, 41, 686 - 688.

Astrup, A., Toubro, S., Christensen, N.J. and Quaade, F., 1992d, Pharmacology of thermogenic drugs. Am. J. Clin. Nutr., 55, 246S - 248S.

Astrup, A. and Toubro, S., 1993, Thermogenic, metabolic, and cardiovascular responses to ephedrine and caffeine in man. Int. J. Obesity, 17, S41 - S44.

Attela, M.J., Hoffman, S.W., Stasio, M.J. and Stein, D.G., 1989, Ginkgo biloba extract facilitates recovery from penetrating brain injury in adult male rats. Exp. Neurol., 105, 62 - 71.

Bal Dit Sollier, C., Caplain, H. and Drouet, L., 2003, No alteration in platelet function or coagulation induced by EGb761 in a controlled study. Clin. Lab. Haematol., 25, 251 - 253.

Barth, S.A., Inselmann, G., Engemann, R. and Heidemann, H.T., 1991, Influences of Ginkgo biloba on cyclosporin A induced lipid peroxidation in human liver microsomes in comparison to vitamin E, glutathione and N-acetylcysteine. Biochem. Pharmacol., 41, 1521 - 1526.

Beatty, E.R., O'Reilly, J.D., England, T.G., McAnlis, G.T., Young, I.S., Halliwell, B., Geissler, C.A., Sanders, T.A.B. and Wiseman, H., 2000, Effect of dietary quercetin on oxidative DNA damage in healthy human subjects. Br. J. Nutr., 84, 919 – 925.

Bischoff, S.C., 2008, Quercetin: potentials in the prevention and therapy of disease. Curr. Opin. Clin. Nutr. Metab. Care, 11, 733 - 740.

Boer, V. C. J., de, 2007, Towards functional effects of polyphenols. Modulation of energy metabolism revealed. Thesis, Wageningen Universiteit (Wageningen University), Wageningen, Netherlands.

Braquet, P., Laurent, J.P., Rolland, A., Martin, C., Pommier, J., Hosford, D. and Eaanu, A., 1990, From ginkgolides to N-substituted piperidonothiene diazepines, a new series of highly potent dual antagonists. Adv. Prostaglandin, Thromboxane, Leucotriene Res., 21B, 929 - 937.

Bruel, A., Gardette, J., Berrou, E., Droy-Lefaix, M.T. and Picard, J., 1989, Effects of Ginkgo biloba extract on glucose transport and glycogen synthesis of cultured smooth muscle cells from pig aorta. Pharmacol. Res., 21, 421 - 429.

Bukowiecki, L.J., Lupien, J., Folléa, N. and Jahjah, L., 1983, Effects of sucrose, caffeine, and cola beverages on obesity, cold resistance and adipose tissue cellularity. Am. J. Physiol., 244, R500 - R507.

Chen, C., Jin, R.M., Li, Y., Sheng, Y., Zhou, M., Chen, S. and Zhou, Z., 1991, [Improvement of memory in mice by extracts from leaves of Ginkgo biloba L.]. Chung Kuo Chung Yao Tsa Chih (CHINA), 16, 681 - 683.

Chen, Y., Xiao, P., Ou-Yang, D.S., Fan, L., Guo, D., Wang, Y.N., Han, Y., Tu, J.H., Zhou, G., Huang, Y.F. and Zhou, H.H., 2009, The simultaneous effects of flavonoid quercetin on the activities of CYP1A2, CYP2A6, NAT2 and XO in healthy volunteers. Clin. Exp. Pharmacol. Physiol., Feb 10. [Epub ahead of print]

Cheung, W.T., Lee, C.M. and Ng, T,B., 1988, Potentiation of the antilipolytic effect of 2-chloroadenosine after chronic caffeine treatment. Pharmacology, 36, 331 - 339.

Cheuvront, S.N., Ely, B.R., Kenefick. R.W., Michniak-Kohn, B.B., Rood, J.C. and Sawka, M.N., 2009, No effect of nutritional adenosine receptor antagonists on exercise performance in the heat.
Am. J. Physiol. Regul. Integr. Comp. Physiol., 296, R394-401.

Collins, L.C., Cornelius, M.F., Vogel, R.I., Walker, J.F. and Stamford, B.A., 1994, Effect of caffeine and/or cigarette smoking on resting energy expenditure. Int. J. Obesity, 18, 551 - 556.

Cooper, R., Morre, D.J. and Morre, D.M., 2005a, Medicinal benefits of green tea: Part I. Review of noncancer health benefits. J. Altern. Complement. Med., 11, 521 - 528.

Cooper, R., Morre, D.J. and Morre, D.M., 2005b, Medicinal benefits of green tea: part II. review of anticancer properties. J. Altern. Complement. Med., 11, 639 -652.

Da-Silva, W.S., Harney, J.W., Kim, B.W., Li, J., Bianco, S.D., Crescenzi, A., Christoffolete, M.A., Huang, S.A. and Bianco, A.C., 2007, The small polyphenolic molecule kaempferol increases cellular energy expenditure and thyroid hormone activation. Diabetes, 56, 767 - 776.

Davis, J.M., Murphy, E.A., Carmichael, M.D. and Davis, B., 2009, Quercetin increases brain and muscle mitochondrial biogenesis and exercise tolerance. Am. J. Physiol. Regul. Integr. Comp. Physiol., 296, R1071 – R1077.

Dorta, D. J., Pigoso, A. A., Mingatto, F. E., Rodrigues, T., Prado, I. M. R., Helena, A. F. C., Uyemura, S. A., Santos, A. C. and Curti, C., 2005, The interaction of flavonoids with mitochondria: effects on energetic processes. Chemico-Biological Interactions, 152, 67 – 78.

Dulloo, A.G., Seydoux, J. and Girardier, L., 1991, Peripheral mechanisms of thermogenesis induced by ephedrine and caffeine in brown adipose tissue. Int. J. Obes., 15, 317 - 326.

Dulloo, A.G., 1993, Ephedrine, xanthines and prostaglandin inhibitors: actions and interactions in the stimulation of thermogenesis. Int. J. Obesity, 17, S35 - S40.

Eckmann, F., 1990, Hirnleistungsstörungen - - Behandlung mit Ginkgo-biloba-Extrakt. Zeitpunkt der Wirkungseintritte in einer Doppelblindstudie mit 60 stationären Patienten. Fortschr. Med., 108, 557 - 560.

Edwards, R.L., Lyon, T., Litwin, S.E., Rabovsky, A., Symons, J.D. and Jalili, T., 2007, Quercetin reduces blood pressure in hypertensive subjects. J. Nutr., 137, 2405 - 2411.

Egert, S., Wolffram, S., Bosy-Westphal, A., Boesch-Saadatmandi, C., Wagner, A.E., Frank, J., Rimbach, G. and Mueller, M.J., 2008, Daily quercetin supplementation dose-dependently increases plasma quercetin concentrations in healthy humans. J. Nutr., 138, 1615 - 1621.

Engelsen, J., Nielsen, J.D., and Hansen, K.F., 2003, [Effect of Coenzyme Q10 and Ginkgo biloba on warfarin dosage in patients on long-term warfarin treatment. A randomized, double-blind, placebo-controlled cross-over trial]. Ugeskr. Laeger., 165, 1868 – 1871.

Evans, P.D., Robb, S., Cheek, T.R., Reale, V., Hannan. F.L., Swales, L.S., Hall, L.M., and Midgley, J.M., 1995, Agonist-specific coupling of G-protein-coupled receptors to second-messenger systems. Prog. Brain Res., 106, 259 - 268.

Fünfgeld, E.W., 1989, A natural and broad spectrum noötropic substance for treatment of SDAT - - the Ginkgo biloba extract. Prog. Clin. Biol. Res., 317, 1247 - 1260.

Gomez-Pinilla, F., 2008, Brain foods: The effects of nutrients on brain function. Nat. Rev. Neurosci., 9, 568 – 578.

Grassel, E., 1992, Einfluss von Ginkgo-biloba-Extrakt auf die geistige Leistungsfähigkeit. Doppelblindstudie unter computerisierten Messbedingungen bei Patienten mit Zerebralinsuffizienz. Fortschr. Med., 110, 73 - 76.

Han, K.H., Choe, S.C., Kim, H.S., Sohn, D.W., Nam, K.Y., Oh, B.H., Lee, M.M., Park, Y.B., Choi, Y.S., Seo, J.D. and Lee, Y.W., 1998, Effect of red ginseng on blood pressure in patients with essential hypertension and white coat hypertension. Am. J. Chin. Med., 26, 199 - 209.

Havsteen, B.H., 2002, The biochemistry and medical significance of the flavonoids. Pharmacol. Ther., 96, 67 - 202)

Hindmarch, I., 1988, Activity of Ginkgo biloba extract on short-term memory. In "Rökan (Ginkgo biloba), Recent results in Pharmacology and Clinic". Fünfgeld (Ed.), Berlin, Springer Verlag, 321 - 326.

van het Hof, K.H., Wiseman, S.A., Yang, C.S., and Tijburg, L.B., 1999, Plasma and lipoprotein levels of tea catechins following repeated tea consumption. Proc. Soc. Exp. Biol. Med., 1999, 220, 203 - 209.

Hofferberth, B., 1989, Einfluss von Ginkgo-biloba-Extrakt auf neurophysiologische und psychometrische Messergebnisse bei Patienten mit hirnorganischem Psychosyndrom. Ein Doppelblindstudie gegen Plazebo. Arzneimittelforschung, 39, 918 - 922.

Huang, K.C., 1993, The Pharmacology of Chinese Herbs, 21 - 45, 173. CRC Press, Boca Raton.

Jacobson, K.A., Moro, S., Manthey, J.A., West, P.L. and Ji, X.D., 2002, Interactions of flavones and other phytochemicals with adenosine receptors. Adv. Exp. Med. Biol., 505, 163-71.

Jacobsen, K.A. and Gao, Z-G,, 2006, Adenosine receptors as therapeutic targets, Nature Rev. Drug Discov., 5, 247 – 264.

Jiang, X., Williams, K.M., Liauw, W.S., Ammit, A.J., Roufogalis, B.D., Duke, C.C., Day, R.O. and McLachlan, A.J,, 2005, Effect of ginkgo and ginger on the pharmacokinetics and pharmacodynamics of warfarin in healthy subjects. Br. J. Clin. Pharmacol., 2005, 59, 425 - 432

Jones, D., Gresham, G.A. and Howard, A.N., 1969, The aetiology of yellow fat disease in the wild rabbit. J. Comp. Path., 79, 329 - 334.

Jung, F., Mrowietz, C., Kiesewetter, H. and Wenzel, E., 1990, Effect of Ginkgo biloba on fluidity of blood and peripheral microcirculation in volunteers. Arzneimittelforschung, 40, 589 - 593.

Koltringer, P., Eber, O., Klima, G., Rothlauer, W., Wakonig, P., Langsteger, W. and Lind, P., 1989, Die Mikrozirkulation unter parenteraler Ginkgo-biloba-Extrakt-Therapie. Wien. Klin. Wochenschr., 101, 198 - 200.

Kuriyama, S., Shimazu, T., Ohmori, K., Kikuchi, N., Nakaya, N., Nishino, Y., Tsubono, Y. and Tsuji, I., 2006, Green tea consumption and mortality due to cardiovascular disease, cancer, and all causes in Japan: the Ohsaki study. J. Am. Med. Assoc., 296, 1255 - 1265.

Langley-Evans, S.C., 2000, Antioxidant potential of green and black tea determined using the ferric reducing power (FRAP) assay. Int. J. Food Sci. Nutr., 2000, 51, 181 - 188.

Leenen, R., Roodenburg, A.J., Tijburg, L.B., and Wiseman, S.A., 2000, A single dose of tea with or without milk increases plasma antioxidant activity in humans. Eur. J. Clin. Nutr., 54, 87 - 92.

Lines, T.C. and Ono, M., 2006, FRS 1000, an extract of red onion peel, strongly inhibits phosphodiesterase 5A (PDE 5A). Phytomed., 13, 236 - 239.

Liu, C.X. and Xiao, P.G., 1992, Recent advances on ginseng research in China. J. Ethnopharmacol., 36, 27 - 38.

Loke, W.M., Hodgson, J.M., Proudfoot, J.M., McKinley, A.J., Puddey, I.B. and Croft, K.D., 2008, Pure dietary flavonoids quercetin and (-)-epicatechin augment nitric oxide products and reduce endothelin-1 acutely in healthy men. Am. J. Clin. Nutr., 88, 1018 - 1025.

MacRae, H.S. and Mefferd, K.M., 2006, Dietary antioxidant supplementation combined with quercetin improves cycling time trial performance. Int. J. Sport Nutr. Exerc. Metab., 16, 405 -419.

Madrigal. L. and Sangronis, E., 2007, [Inulin and derivates as key ingredients in functional foods]. Arch. Latinoam. Nutr., 57, 387 - 396.

Magkos, F. and Kavouras, S.A., 2005, Caffeine Use in Sports, Pharmacokinetics in Man, and Cellular Mechanisms of Action. Crit. Rev. .Food Science Nutr., 45, 535 – 562.

Mandelker, L., 2008, Introduction to Oxidative Stress and Mitochondrial Dysfunction. Vet. Clin. North Am. Small Anim. Pract., 38, 1 – 30.

Matthews, W.B., 1983, The autonomic nervous system, in Oxford Textbook of Medicine, Ed. Weatherall, D.J., Ledingham, J.G.G. and Warrell, D.A., 21.23, Oxford University Press, Oxford, New York, Toronto.

McAnulty, S.R., McAnulty, L.S., Nieman, D.C., Quindry, J.C., Hosick, P.A., Hudson, M.H., Still, L., Henson, D.A., Milne, G.L., Morrow, J.D., Dumke, C.L., Utter, A.C., Triplett, N.T. and Dibarnardi, A., 2008, Chronic quercetin ingestion and exercise-induced oxidative damage and inflammation. Appl. Physiol. Nutr. Metab., 33, 254 - 262.

McGuffin, M., Hobbs, C., Upton, R. and Goldberg, A., 1997, American Herbal Product Association's Botanical Safety Handbook: Guidelines for the Safe Use and Labeling for Herbs of Commerce. Boca Raton, FL: CRC Press.

Melzig, M,F., 1996, Inhibition of adenosine deaminase activity of aortic endothelial cells by selected flavonoids. Planta Med., 62, 20 - 21.

Melzig, M.F. and Franke, S., 1995, [The effects of various flavonoids and phenolcarboxylic acids on adenosine deaminase in cultured endothelial cells][Article in German]. Pharmazie. 50, 510 - 511.

Moon, Y.J., Wang, L., DiCenzo, R. and Morris, M.E., 2008, Quercetin pharmacokinetics in humans. Biopharm. Drug Dispos., 29, 205 - 217.

Nakayama, K. and Katayama, S., 2005, [Osteoporosis and intake of carbohydrates]. Clin. Calcium, 15, 680 - 683.

Ng, T.B. and Yeung, H.W., 1985, Hypoglycemic constituents of Panax ginseng. Gen. Pharmacol., 16, 549 - 552.

Otamiri, T. and Tagesson, C., 1989, Ginkgo biloba extract prevents mucosal damage associated with small-intestinal ischaemia. Scand. J. Gastroenterol., 24, 666 - 670.

Ou Ming, 1989, Chinese-English Manual of Common-Used in Traditional Chinese Medicine; Guangdong Science & Technology Publishing House and Joint Publishing (H.K.) Co., Ltd., Hong Kong.

Parnell, J.A. and Reimer, R.A,, 2009, Weight loss during oligofructose supplementation is associated with decreased ghrelin and increased peptide YY in overweight and obese adults. Am. J. Clin. Nutr., 89, 751 - 759.

Perez-Vizcaino, F., Duarte, J., Jimenez, R., Santos-Buelga, C. and Osuna, A., 2009, Antihypertensive effects of the flavonoid quercetin. Pharmacol. Rep., 61, 67 - 75.

Pincemail, J., Dupuis, M., Nasr, C., Hans, P., Haag-Berrurier, M., Anton, R. and Deby, C., 1989, Superoxide anion scavenging effect and superoxide dismutase activity of Ginkgo biloba extract. Experientia, 45, 708 - 712.

Quindry, J.C., McAnulty, S.R., Hudson, M.B., Hosick, P., Dumke, C., McAnulty, L.S., Henson, D., Morrow, J.D. and Nieman, D., 2008, Oral quercetin supplementation and blood oxidative capacity in response to ultramarathon competition. Int. J. Sport Nutr. Exerc. Metab., 18, 601 - 616.

Raabe, A., Raabe, M. and Ihm, P., 1991, Therapieverlaufskontrolle mittels automatisierter Perimetrie bei chronischer zerebroretinaler Mangelsversorgung älterer Patienten. Prospektive randomisierte Doppelblinduntersuchung mit dosisgestaffelter Ginkgo biloba Behandlung (EGb 761). Klin. Monatsbl. Augenheilkd., 199, 432.

Rai, G.S., Shovlin, C. and Wesnes, K.A., 1991, A double-blind, placebo controlled study of Ginkgo biloba extract ('tanakan') in elderly outpatients with mild to moderate memory impairment. Curr. Med. Res. Opin., 12, 350 - 355.

Reiter, M., Rupp, K., Baumeister, P., Zieger, S. and Harréus, U., 2009, Antioxidant effects of quercetin and coenzyme Q10 in mini organ cultures of human nasal mucosa cells. Anticancer Res., 29, 33 - 39.

Robinson, E.E., Maxwell, S.R. and Thorpe, G.H., 1997, An investigation of the antioxidant activity of black tea using enhanced chemiluminescence. Free Radic. Res., 26, 291 - 302.

Schulz, H.U., Schürer, M., Bässler, D. and Weiser, D., 2005, Investigation of pharmacokinetic data of hypericin, pseudohypericin, hyperforin and the flavonoids quercetin and isorhamnetin revealed from single and multiple oral dose studies with a hypericum extract containing tablet in healthy male volunteers. Arzneimittelforschung, 55, 561 - 8.

Spencer, J.P.E., Kuhnle, G.G.C., Williams, R.J. and Rice-Evans, C., 2003, Intracellular metabolism and bioactivity of quercetin and its in vivo metabolites. Biochem. J., 372, 173–181.

Stavro, P.M., Woo, M., Leiter, L.A., Heim, T.F., Sievenpiper, J.L. and Vuksan, V., 2006, Long-term intake of North American ginseng has no effect on 24-hour blood pressure and renal function. Hypertension, 47, 791 - 796.

Stevenson, D.E. and Hurst, R.D., 2007, Polyphenolic phytochemicals - Just antioxidants or much more? Cell. Mol. Life Sci., 64, 2900 – 2916.

Stewart, L.K., Soileau, J.L., Ribnicky, D., Wang, Z.Q., Raskin, I., Poulev, A., Majewski, M., Cefalu, W.T. and Gettys, T,W., 2008, Quercetin transiently increases energy expenditure but persistently decreases circulating markers of inflammation in C57BL/6J mice fed a high-fat diet. Metabolism, 57, S39 - S46.

Tagliabue, A., Terracina, D., Cena, H., Turconi, G., Lanzola, E. and Montomoli, C., 1994, Coffee induced thermogenesis and skin temperature. Int. J. Obesity, 18, 537 - 541.

Toubro, S., Astrup, A., Breum, L. and Quaade, F., 1993, Safety and efficacy of long-term treatment with ephedrine, caffeine and an ephedrine/caffeine mixture. Int. J. Obesity, 17, S69 - S72.

Tian, W.-X., 2006, Inhibition of fatty acid synthase by polyphenols Curr. Med. Chem., 13, 967 - 977)

USDA, 2002, Agricultural Research Service. 2002. USDA-Iowa State University Database on the Isoflavone Content of Foods, Release 1.3 - 2002. Nutrient Data Laboratory Web site: http://www.nal.usda.gov/fnic/foodcomp/Data/isoflav/isoflav.html

USDA, 2003, USDA Database for the Flavonoid Content of Selected Foods

de Vrese, M. and Schrezenmeir, J., 2008, Probiotics, prebiotics, and synbiotics. Adv. Biochem. Eng. Biotechnol., 111, 1 - 66.

Wang, L., Lee, I.M., Zhang, S.M., Blumberg, J.B., Buring, J.E. and Sesso, H.D., 2009, Dietary intake of selected flavonols, flavones, and flavonoid-rich foods and risk of cancer in middle-aged and older women. Am. J. Clin. Nutr., 89, 905 - 912.

Williams, C.M., Couch, M.W., Thonoor, C.M. and Midgley, J.M., 1987, Isomeric octopamines: their occurrence and functions. J. Pharm. Pharmacol., 39, 153 - 157.

Winter, E., 1991, Effects of an extract of Ginkgo biloba on learning and memory in mice. Pharmacol. Biochem. Behav., 38, 109 - 114.

Wolfram, S., Wang, Y. and Thielecke, F., 2006, Anti-obesity effects of green tea: from bedside to bench. Mol. Nutr. Food Res., 50, 176 – 187.

Yang, Y.T. and McElligott, M.A., 1989, Multiple actions of β-adrenergic agonists on skeletal muscle and adipose tissue. Biochem. J., 261, 1 - 10.

Yoshida, T., Sakane, N., Umekawa, T. and Kondo, M., 1994, Relationship between basal metabolic rate, thermogenic response to caffeine, and body weight loss following combined low calorie and exercise treatment in obese women. Int. J. Obesity, 18, 345 - 350.

Zaveri, N.T., 2006, Green tea and its polyphenolic catechins: medicinal uses in cancer and noncancer applications. Life Sci., 78, 2073 - 2080.

Zhang, H., Xu, L., Jin, Q., Zhou, L. and Cheng, P., 1990, [Anti-anaphylactic pharmacological action of water-soluble constituents of Ginkgo biloba L. episperm]. Chung Kuo Chung Yao Tsa Chih (CHINA), 15, 496 - 497.

Zhou, G., Sebhat, I.K. and Zhang, B.B., 2009, AMPK activators - Potential therapeutics for metabolic and other diseases. Acta Physiol., 196, 175 – 190.