The Relationship between Food and Energy

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Overview

"The origin of illness is in food; diet is the main medicine."[1]

Tibb recognises the uniqueness of each individual. It believes that each person should take responsibility for one's own health and wellbeing, by choosing and regulating the type of food consumed, correct breathing, sufficient sleep, emotional management, exercise, elimination and other important lifestyle components.

The **human body** has a temperature of about 37 degree Celsius, and consists of 60-70% moisture. The structure of the human being has qualities of heat and moisture. Animals have overall qualities of between heat and dryness and dryness and heat; plants have cold and moist qualities, and minerals have qualities of cold and dryness.

Excessive intake of food and drink with the same qualities as the dominant qualities associated with a person's temperament will increase the respective humour the fastest and the most. For example: A person with a dominant Bilious (hot and dry) temperament will be much more affected by foods which have qualities of heat and dryness, such as chicken, onion and green and red peppers. Hot and dry foods which are pungent, spicy, seasoned or bitter, would also affect the Bilious temperament the most, because, of the qualities of heat and dryness.

The Glycaemic Index and the Glycaemic Load

Particular attention needs to focus on the glycaemic load. This incorporates the glycaemic index as well as the portion of food:

The glycaemic index: measures the blood glucose levels during two hours after consuming food. The speed at which a particular food increases the blood glucose level varies, for example: carbohydrates, such as white rice, causes a more rapid rise in blood sugar levels, whereas pasta and legumes results in a slower rise in blood sugar levels.

The glycaemic load: considers both the glycaemic index of a food as well as the serving size, in order to give a more practical indicator of the effect of that food on blood glucose.[2] Foods with a low glycaemic index are considered to be healthy foods, such as whole grains and cereals, fruit and vegetables and legumes.

- ***Whole foods:*** high in fibre, which are unprocessed, unrefined, real food and high in powerful anti-inflammatory plant chemicals called phytonutrients.[3]
- ***Monounsaturated fats:*** such as avocados, walnuts, almonds, pecans and Brazil nuts (also a plant-based protein source), rice bran oil, grape seed oil and walnut oil.
- ***Fruit and vegetables:*** such as green and bright coloured vegetables and fruits, such as blueberries, strawberries, broccoli, spinach, squash and carrots. These are rich in vitamins, minerals, fibre, antioxidants and phytochemicals.
- ***Protein sources:*** Nuts, lean poultry and fatty fish (includes omega-3 and protein). Plant-based protein sources are found in legumes, nuts and seeds, as well as soy and soy foods, such as tofu.
- ***Take probiotics*** ("good bacteria") daily to help your digestion to improve the healthy bacteria in your gut which reduces inflammation, such as Bulgarian yogurt.[4]

Elements in the body

There are six elements in the body which make up 99% of the body's mass:

1. **Oxygen** makes up 61% of the body's mass. Oxygen is essential to life as it is a component of DNA and most important compounds in the body. Oxygen is present in the body mostly as water so the actual amount may vary. **Water** makes up about 65% of the total body mass. On inhalation, oxygen is absorbed through the lungs and picked up by the iron in the red blood cells. From there, it is carried to wherever it is needed throughout the body.
2. **Carbon** makes up 23% of the body mass. Carbon's stability makes possible the long chains and rings of atoms that form everything from the DNA to the steroids and proteins in the body.
3. **Hydrogen** makes up 10% of the body mass, and it's most important role is as a component of water (H_2O). Water carries nutrients to the cells and removes toxins from the environment. Almost all reactions in the body take place in water. A person needs about 2.5 litres of water every day to keep healthy, unless it is medically contraindicated. About half of this comes from the liquids one drinks, and half from food. Without hydrogen, one would not be able to digest food. Hydrochloric acid is a compound of hydrogen and chlorine.
4. **Nitrogen** makes up 2.6% of the body's weight. It is a component of DNA, as well as haemoglobin that carries oxygen in the blood. It is also a component of amino acids that form enzymes and other proteins. Nitrogen is important for growth, especially during pregnancy. Although the air one breathes contains plenty of nitrogen, one does not absorb

it in this form. Instead, one gets most of the nitrogen from food. Many foods contain nitrogen, especially protein sources such as meat and dairy products.

5. **Calcium** accounts for about 1.4% of the body mass. Calcium is a metal, and the most abundant metal in the body. It is mostly found in bone, and it also controls cell division, aiding in the conduction of nerve impulses and contraction of muscles, and keeping blood pH stable. It is also important for blood clotting.
6. **Phosphorus** makes up about 1.1% of the body mass. In the form called white phosphorus, it is highly flammable and poisonous. Luckily, in the natural world phosphorus is found only in the form of phosphate, which is a phosphorus atom bonded to four oxygen atoms. Although it is a small component of DNA, phosphorus is found in the body mostly as calcium phosphate in bone. Phosphorus also makes it possible for the body to move. When the energy molecule, adenosine triphosphate (ATP), releases a phosphate molecule, this creates the energy needed for contracting muscles. The body creates, uses and recycles about one kilogram of ATP every hour.[5]

Carbohydrates

The body is reliant on good sources of carbohydrates, proteins, lipids and fats, as well as vitamins, minerals and water, for the production of energy and maintenance of health and wellbeing of the body.

In Tibb ***carbohydrates*** have an overall quality of ***moistness,*** but with degrees of heat or coldness, and the least amount of dryness. The Bilious/Melancholic or Melancholic/Bilious temperaments would benefit the most from carbohydrates due to their inherent overall qualities of dryness; whereas the Phlegmatic/Sanguinous or Sanguinous/Phlegmatic temperaments would benefit the least, due to their overall qualities of moistness. The latter should therefore not eat too many carbohydrates, as an excess of moistness will result in a qualitative imbalance of the humours.

Carbohydrate metabolism begins with digestion in the small intestine where monosaccharides are absorbed into the bloodstream. Carbohydrates are one of three macronutrients that provide the body with energy (proteins and fats being the other two). The body depends on carbohydrates as its primary energy source. It is recommended that 55-60% of caloric intake come from carbohydrates.

Glucose, a sugar molecule or carbohydrate, combines with ***oxygen*** to produce ***carbon dioxide, water,*** and ***adenosine triphosphate*** (ATP).

ATP is the energy necessary for living cells to function, while carbon dioxide and water are waste products of this chemical reaction.

$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ + energy (ATP).

A simple sugar molecule is made up of 6 atoms each of carbon and oxygen and 12 atoms of hydrogen ($C_6H_{12}O_6$).

Simple carbohydrates

The chemical compounds in carbohydrates are found in both simple and complex forms. Simple carbohydrates are simple sugars which are composed of monosaccharides or disaccharides. Disorders of carbohydrate metabolism include diabetes mellitus, lactose intolerance and galactosaemia; the latter which is a genetic disorder resulting from defective galactose metabolism.[6]

- **Monosaccharides** (single sugar units) include glucose, fructose and galactose:
  - ***Glucose*** is the most common type of sugar and the primary form of sugar that is stored in the body for energy. It is particularly significant in diabetes.
  - Carbohydrates are made up of: carbon, hydrogen and oxygen.
  - ***Fructose*** is the primary sugar found in fruits, honey and high-fructose corn syrup (in soft drinks).
  - **Galactose** is less likely to be found in nature, and it combines with glucose to form a disaccharide lactose, or milk sugar. Fructose and galactose are metabolised to glucose for use by the body.
- **Disaccharides** include sucrose, maltose and lactose:
  - ***Sucrose*** is formed when glucose and fructose are linked by an alpha bond. It is found in sugar cane or sugar beets, and it is refined to make granulated table sugar. Alpha bonds are digestible by the human body, whereas beta bonds are more difficult for the body to break down.
  - ***Maltose*** (malt sugar) is composed of two glucose units linked by an alpha bond. It is produced from the chemical decomposition of starch, which occurs during the germination of seeds and the production of alcohol (beer and malt liquors).
  - ***Lactose*** is a combination of glucose and galactose. As it contains a beta bond, it is harder to digest large quantities. Effective digestion requires a sufficient amount of the enzyme ***lactase,*** which breaks down lactose into simpler sugars that can be absorbed by the intestine. Lactose intolerant people do not have lactase, and they cannot digest it, leading to digestive problems.
- ***Oligosaccharides*** are made up of two to ten monosaccharides, and have two monosaccharides linked with either an alpha or a beta bond.

Complex Carbohydrates

Complex carbohydrates are composed of polysaccharides, and are simple sugar units in long chains, called polymers. Foods include potatoes, beans and vegetables. The most important ones in nutrition are: starch, glycogen and dietary fibre.

In order for the body to use carbohydrates for energy, food must undergo **absorption** and **glycolysis.** Complex carbohydrate molecules, of which starch and glycogen are the digestible forms, are made up primarily of multiple glucose molecules linked together by alpha bonds.

Starch (often in seeds) is the form in which plants store energy and consists of two types: amylose and amylopectin.

- Starch is the main type of digestible complex carbohydrate.
- Enzymes in the stomach and intestines separate individual glucose molecules from one another early in the digestive process, releasing the sugar to be absorbed by the bloodstream. The body can either distribute the glucose to areas that need energy, or it can store the glucose, in the form of glycogen, in the liver and the muscles.

Glycogen is the polysaccharide that is used to store energy in both humans and animals. It has more highly branched chains, which allows the bonds to be more quickly broken down by enzymes.

Dietary fibre is a complex carbohydrate, a polysaccharide that is not digested by the small intestine; instead, it passes to the colon unchanged.

Most of the major tissues (e.g. muscle, liver, and kidney) are able to convert glucose, fatty acids and amino acids to acetyl-CoA. However, the brain and nervous tissue depends almost exclusively on glucose.

Acetyl coenzyme A (**acetyl-CoA)** is an important molecule in metabolism, which is used in many biochemical reactions, as it is central to the balance between carbohydrate and fat metabolism for energy supply.

Blood sugar levels are controlled by 3 hormones: ***insulin, glucagon*** and ***epinephrine:***

- In the liver and muscles, most of the glucose is changed into glycogen by the process of **glycogenesis (anabolism).**
- ***When concentrations of glucose in the blood are low,*** the liver ***converts glycogen*** and ***fat*** (and in their absence, protein) into ***glucose*** by epinephrine and glucagon hormones, in a process called **glycogenolysis (catabolism).**
- ***When blood glucose levels are high,*** the liver reverses the process, and instead ***stores carbohydrates, fats*** and ***proteins.*** Insulin is secreted by the pancreas if the glucose levels are too high, stimulating the transfer of glucose into the cells, especially in the liver and muscles.
- In a person without diabetes, a rise in blood amino acid concentration occurs as a result of protein metabolism. This stimulates the secretion of both glucagon and insulin, so that the blood sugar remains stable.
- In a person with diabetes, the release of glucagon without insulin, or with impaired insulin, can cause the blood sugar to rise precipitously several hours after a high protein meal.

The most pressing need of all cells in the body is for an immediate source of energy. Some cells such as brain cells have severely limited storage capacities for either glucose or ATP. It is for this reason that blood must maintain a fairly constant supply of glucose.

Proteins

The basic difference between proteins and carbohydrates is that while carbohydrates are made out of simple sugars (carbon, hydrogen and oxygen); ***proteins are made from amino acids*** (carbon, hydrogen, oxygen, nitrogen and sulphur). The nitrogen is a basic component of the protein's amino acids, and accounts for 13-20% of the total mass.

In Tibb ***proteins*** have an overall of ***dryness,*** with degrees of heat or coldness, and the least amount of moistness. The Phlegmatic/Sanguinous or Sanguinous/Phlegmatic temperaments would benefit the most from proteins, due to their inherent overall qualities of moistness; whereas the Bilious/Melancholic or Melancholic/Bilious temperaments would benefit the least, due to their overall qualities of dryness. The latter should therefore not eat too many proteins, as an excess of dryness will result in a qualitative imbalance of the humours.

Proteins are vital to basic cellular and body functions, including:

- Cellular regeneration and repair;
- Tissue maintenance and regulation;
- Hormone and enzyme production;
- Fluid balance, and the
- Provision of energy.

The body is constantly renewing and repairing tissues. The amount of protein needed to build new tissue or maintain the structure and function depends on the rate of renewal or the stage of growth and development, for example: The intestinal tract is renewed every couple of days; whereas blood cells have a life span of 60-120 days. An infant uses as much as one-third of the dietary protein for the building of new connective and muscle tissues.

Proteins are amino acids which are bound together by a peptide linkage. Gastric secretion of hydrochloric acid is necessary for the digestion of proteins, sterilisation of stomach contents, and assimilation of elements, such as calcium and zinc. A low pH is required for the release of vitamin B12 from food.

Good sources of protein include high quality protein: meat, poultry, fish, milk, egg and cheese; as well as low-quality protein: legumes (navy beans, pinto beans, chick peas, soybeans and split peas).

- The first step in protein metabolism is to break down proteins into amino acids, which are absorbed into the bloodstream.
- The second step is to break down the amino acids into their constituent parts – catabolism. This removes the nitrogen or amino group from the amino acids, by a process called deamination.
- Deamination breaks the amino group down into ammonia and the 'carbon skeleton', which is composed of carbon, hydrogen and oxygen.
- Ammonia is converted to urea, filtered through the kidneys, and excreted in urine.
- The 'carbon skeleton' can be used either for protein synthesis, energy production (ATP), or converted to glucose by gluconeogenesis.

The majority of protein digestion occurs in the duodenum and jejunum, which is influenced by the pancreatic enzymes of trypsin, chymotrypsin, proelastase to elastase and polypeptidase. Protein is further broken down into dipeptides and tripeptides, and then into amino acids by enzymes, called peptidases, which are on the microvilli of the duodenum and jejunum. It is vitally important that only amino acids be absorbed into the body, as a dysfunctional gastrointestinal system will cause the absorption of a peptide or whole protein, which may lead to serious immunological disturbances, such as a leaky gut or an irritable bowel disorder.

Amino acids

Amino acids are the basic components of hormones. The endocrine glands secrete hormones into the bloodstream to regulate bodily functions and processes, such as insulin, which is secreted by the pancreas, and which lowers blood glucose levels after meals.

Enzymes

Enzymes are composed of large protein molecules which play an essential role in kinetic and biological reactions. These protein molecules catalyse chemical reactions of other substances, without it being destroyed or altered on completion of the reactions.[6] All chemical reactions that occur during the digestion of food and the metabolic processes in tissues require enzymes.

Fluid balance

Proper fluid balance is maintained between cells and extracellular space by blood protein molecules, such as albumin and globulins. Proteins are present in the capillary beds, which are one-cell thick vessels that connect the arterial and venous beds. Because of their large size, proteins cannot flow outside the capillary beds into the tissue. Blood fluid is pulled into the capillary beds from the tissue by oncotic pressure, in which the pressure exerted by the protein molecules counteracts the blood pressure. The lack of blood proteins results in clinical oedema, because there is insufficient pressure to pull fluid back into the blood from the tissues.

Lipids

Most cells are able to store fatty acids, which can be directly transported in the bloodstream. If the body does not have enough cells to store fatty acids, the body is able to generate special 'adipocytes', which forms adipose tissue. This is stored around the thighs and the stomach. Fats contain mostly carbon and hydrogen, some oxygen and sometimes other atoms. The main sites of triglyceride synthesis are the liver, adipose tissue, and intestinal mucosa.

In Tibb ***fats*** have an overall quality of ***heat,*** with degrees of moistness, and the least amount of dryness and coldness. The Melancholic/Phlegmatic or Phlegmatic/Melancholic temperaments would benefit the most, due to their inherent qualities of coldness; whereas the Bilious/Sanguinous or Sanguinous/Bilious temperaments would benefit the least, due to their overall qualities of heat. The latter should therefore not eat too much fat, as an excess of heat will result in a qualitative imbalance of the humours.

The three main forms of fat found in food are: ***glycerides*** (triglyceride), the form in which fat is stored for fuel; ***phospholipids,*** and ***sterols*** (cholesterol). Fats are metabolised in the small intestines as the enzymes of the stomach cannot break down the fat molecules. Fat must be broken down into smaller particles to enable the water soluble digestive enzymes to work on the surface through a process called emulsification. The majority of emulsification occurs in the duodenum with the aid of bile which is secreted by the liver. Bile breaks down fat into smaller molecules, allowing lipase enzymes to attack the surface. Pancreatic lipase splits triglyceride molecules into fatty acids and two monoglycerides.

The main pathways of lipid metabolism are:

a) ***Lipolysis*** (fat breakdown) and beta-oxidation occurs in the mitochondria. It is a cyclical process in which two carbons are removed from the fatty acid per cycle in the form of acetyl CoA, which proceeds through the Krebs cycle to produce: ATP, CO_2, and water.
b) ***Ketosis*** occurs when the rate of formation of ketones by the liver is greater than the ability of tissues to oxidise them. It occurs during prolonged starvation, and when large amounts of fat are eaten in the absence of carbohydrates.
c) ***Lipogenesis*** (formation of fat) occurs in the cytosol.

The Role of Fats and Lipids in the overall functioning of the body

Saturated fatty acids can increase cholesterol levels in the blood, which may result in clogging of arteries and, ultimately, heart disease. Lipids that are derived from animals contain a higher amount of saturated fats, except for fish, which, for the most part, contains unsaturated fat – they are solid at room temperature.

Saturated fats include: butter, milk, cheese, coconut oil, cream, egg yolk and fatty meats.

Unsaturated fatty acids are derived from plant sources – they are liquid at room temperature. Certain unsaturated fatty acids are essential amino acids.

Polyunsaturated fatty acids include: vegetable oils (safflower, corn, cottonseed, soybean, sesame and sunflower), and fish, such as salmon, tuna and herring.

Functions of Fats and Lipids

- Fats are the body's energy provider and energy reserve – maintains temperature.
- Fats and lipids are involved in the production and regulation of steroid hormones.
- Steroid hormones regulate sexuality, reproduction, development of sex organs, and regulate water balance.
- Maintains nerve impulse transmission, memory storage and tissue structure.
- Lipids are the major component of cell membranes.
- Lipids are required for the absorption of fat-soluble vitamins.
- Essential fatty acids regulate blood pressure, and help to synthesise and repair vital cell parts.

Vitamins

Vitamins are chemical compounds that are required for normal growth and metabolism. There are 13 vitamins which are divided into two groups:

- ***4 fat-soluble vitamins*** – vitamins **A, D, E** and **K.**
  - Fat-soluble vitamins are less readily excreted from the body than water-soluble ones, and can accumulate to excessive, even toxic levels.
- ***9 water-soluble vitamins*** – vitamin **B's** and vitamin **C**
  - Cooking or heating destroys the water-soluble vitamins more readily than fat-soluble ones.
  - Water-soluble vitamins can become depleted more quickly, leading to vitamin deficiencies if those nutrients are not replaced regularly.
  - Vitamin deficiencies can result from inadequate intake, but also from other factors, not related to intake, for example:
    - Vitamin K and biotin are produced by bacteria that live in the intestines, and antibiotics can deplete these vitamins.
    - Deficiencies can also result from disease, pregnancy, drug interactions, as well as in new-borns, as they lack the necessary intestinal bacteria.

Minerals

Minerals are inorganic compounds, whereas carbohydrates, proteins, lipids and vitamins are all organic compounds. They do not yield any energy. Minerals are not readily destroyed by heating or cooking of food, but they can leak out into the liquid or water that the food is cooked in, thereby reducing the mineral content if the liquid is discarded.

In Tibb ***minerals*** have an overall quality of ***cold and dryness.*** The Sanguinous temperament would benefit the most from minerals due to the overall quality of heat and moistness; whereas the Melancholic temperament would benefit the least form minerals due to the overall quality of cold and dryness. The latter should therefore not have too many minerals in their diet, as an excess of cold and dryness will result in a qualitative imbalance of the humours.

Functions of minerals include involvement in:

- Nervous system functioning;
- Cellular reactions;
- Water balance in the body, and
- Structural systems, such as the skeletal system.

There are 16 essential minerals, which are divided into two groups: ***Macro minerals*** are needed in high quantities, which are measured in milligrams to grams, including calcium, phosphorus and magnesium; and ***micro minerals*** are needed in smaller quantities and are measured in micrograms and milligrams, including copper, chromium and selenium.

A lack of calcium and magnesium may cause severe conditions and diseases:

- Increase in vascular tension and a lower muscular contraction threshold. This results in an increased risk of cardiovascular disease in terms of arrhythmia, muscular contraction, and a decreased fibrillation threshold, which may cause sudden death.
- A lack of calcium induces a deficiency in the bone reservoirs, with consequent brittleness of the bones, and an increased risk of fractures from osteoporosis.[7]

Water

It is important to maintain the ideal moisture content in the body (the body contains 60-70% moisture) as water is responsible for every aspect of the body's functioning:

- Required for all chemical reactions in our cells;
- Regulates body temperature;
- Promotes healthy skin;
- Natural lubricant for joints;
- Essential for proper circulation of blood and lymph in the body, and flexibility of the blood vessels;
- Helps with digestion of food and absorption of nutrients, and
- Removes waste from the body, including toxins (acid waste), in particular from the digestive tract.

In Tibb ***water*** has an overall quality of ***cold and moistness.*** The Bilious and Sanguinous temperaments would benefit the most from cold water, due to their qualities of heat; whereas the Melancholic and Phlegmatic temperaments should rather have warm water, due to their overall qualities of coldness. The amount of water to be consumed would depend upon the medical conditions, as a person with congestive cardiac failure should have a limited water intake. However, as one sweats a lot in the heat, more water should be consumed. As a rule of thumb, a minimum of 8 glasses of water should be sufficient.

Dehydration may occur when the cells of the body do not get hydrated enough, leaving them in a weakened state, and vulnerable to disease processes. Inadequate water intake may cause kidney stones and kidney failure as a result of dehydration.

How to Boost Metabolism

Food and drink

Eating a good breakfast stimulates the metabolism, and foods which are high in fibre and protein sustain energy for a longer period of time. The body burns up to twice as many calories digesting protein as it uses for fat or carbohydrates as it is high in amino acids, making one feel fuller for longer. The faster the metabolism, the more calories are burnt off. Replace carbohydrates with protein-rich foods, such as lean beef, turkey, fish, tofu, nuts, beans, eggs and low-fat dairy products.

Eating regular snacks during the day maintains blood sugar levels and regulates the metabolism. Crash diets slows metabolism as muscle tissue is also lost, while the body also prepares itself for ‘starvation’ by storing fat for reserves. Chewing one’s food many times before swallowing will save the body’s energy stores and speed up metabolism.[8]

Eating foods out of season confuses the humours and burdens the metabolism,[1] therefore eating seasonal foods are better for one’s health. The quality and quantity of food has a direct impact on the quantity and qualities of the humours produced by the body. Digestive enzymes and metabolism are increased by foods and spices which have qualities of heat, such as cumin, ginger, cinnamon, chicken, lamb, and mustard, as examples. Spices such as red or green chilli peppers contain a chemical compound called capsaicin, which temporarily boosts the resting metabolic rate. Chilies are excellent source of Vitamin, A, B, C and E with minerals like molybdenum, manganese, folate, potassium, thiamine, and copper. Chili contains seven times more vitamin C than orange.[9]

Green tea is not only rich in immune-boosting antioxidants; it also aids digestion and controls blood sugar. Green tea contains caffeine and catechins (a powerful antioxidant) which speed up the metabolism for hours after drinking it.[8] As the body requires water to burn calories, mild dehydration will slow down the metabolism. Therefore drink plenty of water, including fresh fruit and vegetables which naturally contain water.

According to research, the regular consumption of omega-3 fatty acids reduces the risk of becoming obese and stimulates the secretion of leptin, a hormone that helps regulate metabolism. Omega-3's also reduce hunger pangs and improve blood sugar and insulin levels.[8]

Sleep

Not getting enough sleep slows down metabolism, therefore a good night's sleep is needed, in accordance with one's temperament' requirements. Research suggests that chronic partial sleep loss may increase the risk of obesity and diabetes via multiple pathways, including an adverse effect on parameters of glucose regulation, including insulin resistance, a dysregulation of the neuroendocrine control of appetite, leading to excessive food intake and decreased energy expenditure.[10]

Exercise

While every pound of muscle uses about 6 calories a day just to sustain itself, each pound of fat burns only 2 calories daily. Strength training activates muscles, whereby speeding up metabolism.

The best way to burn up calories is through aerobic exercises, such as walking, swimming and cycling, as well as strength training, such as lifting weights and high intensity exercise regimes. However, the extent on the exercise regime is dependent on one's temperament, as exercise produces heat, which, during prolonged exercise, will then result in a loss of moisture and increase in dryness and ultimately also in cold. For example, a person with a Bilious temperament, who has qualities of heat and dryness, will be most affected by prolonged exercise, than a Sanguinous temperament that has qualities of heat and moistness.

It is necessary to replace the loss of water from the body after exercising to avoid loss of electrolytes and dehydration.

Laugh a lot!

A little laughter may go a long way. Scientists have found that as little as ten minutes of laughter per day can burn energy.[11]

Conclusion

The relationship between food and energy includes a balance of the correct proportion of elements in the body, as well as food and drink in accordance with the ideal qualitative state of an individual's temperament. Other lifestyle factors also impact on the ability of the body to maintain correct metabolic functioning, especially the absorption and assimilation of nutrients and elimination of waste products.

Whole foods, fruits and vegetables, monounsaturated fats and certain protein sources have a low glycaemic index which is considered to be healthy for the body, and which maintains a balanced amount of glucose for energy production.

References

1. Chishti, G.M. (1991). *The Tradtional Healer's Handbook. A Classical Guide to the Medicine of Avicenna.* USA: Healing Arts Press.
2. Warshaw, R.D. (2010). *What Do Glycaemic Index and Glycaemic Load Mean?* [Online]. Available http://www.diabeticlivingonline.com/food-to-eat/nutrition/what-do-glycemic-index-and-glycemic-load-mean
3. Bauer, B. (2013). *Buzzed on Inflammation. Mayo Clinic Health Letter.* [Online]. Available http://healthletter.mayoclinic.com/editorial/editorial.cfm/i/163/t/Buzzed%20on%20inflammation/
4. Jetvig, S. (2013). *Anti-Inflammatory Foods.* [Online]. Available http://nutrition.about.com/od/dietsformedicaldisorders/a/antiinflamfood.htm
5. National Research Council Canada. (2011). [Online]. Available http://www.nrc-cnrc.gc.ca/eng/dimensions/issue7/science_activity_transcript.html
6. Saunders. (2007). *Dorland's Illustrated Medical Dictionary.* USA: Elsevier.
7. Rylander, R. (2008). *Drinking water constituents and disease.* Nutr. February 2008 vol. 138 no. 2 423S-425S. [Online]. Available http://jn.nutrition.org/content/138/2/423S.full
8. Global Healing Center. (2008). *Natural tips for boosting your metabolism.* [Online]. Available http://www.globalhealingcenter.com/natural-health/tips-for-boosting-your-metabolism/
9. Chilli website. (2014). *Benefits of chilli.* [Online]. Available http://www.chilly.in/chili_benefits.htm
10. Knutson, K.L.; Spiegel, K.; Penev, P., & Van Cauter, E. (2007). *The Metabolic Consequences of Sleep Deprivation.* Sleep Med Rev. Jun 2007; 11(3): 163–178. [Online]. Available http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1991337/
11. Schwecherl, L. (2012). *11 science-backed ways to boost metabolism.* [Online]. Available http://greatist.com/health/11-scientifically-proven-ways-boost-metabolism