# Energy metabolism and milieu therapy:

# new scientific findings

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All living organisms use ATP (adenosine triphosphate) for the chemical conversion of energy. Green plants capture the sun's energy by means of photosynthesis and use it to produce the carbohydrates, fats and proteins which provide food for humans and animals.

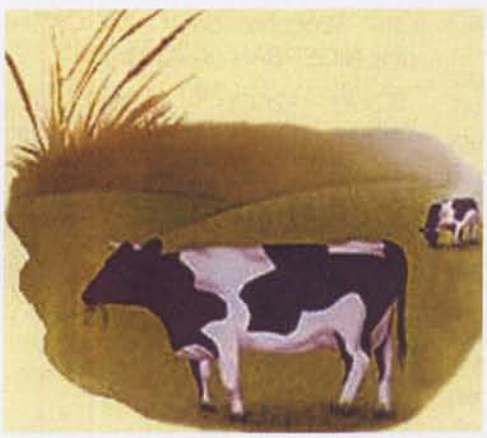
These nutrients are broken down during metabolic processes and the energy obtained from them is stored in the form of ATP. Illustration 1 is taken from the website of the Nobel Foundation (www.nobel.se) and shows the nutritional "cycle" as we know it today.

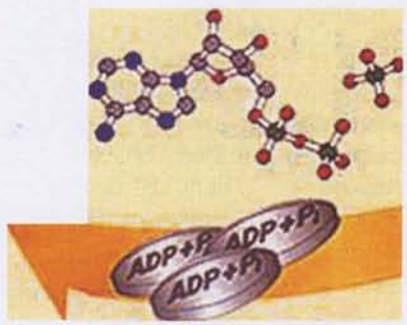
This diagram shows the very involved, indirect and wasteful way in which human beings obtain energy from animal protein. This type of human nutrition probably only arose on a large scale during the course of the last Ice Age, when there were not sufficient plants available to provide food for people.

Of course grass, which can be utilised well by cows and other herbivores, is very bad for human food. However, under today's climatic conditions – which allow lush plant growth in many climate zones – direct consumption of plants would be a solution to many global food problems.

In this way, for example, an acre of land which was planted with oats intended directly for human consumption would produce 8 times more protein and 25 times more energy than via the indirect route through cattle.

2000 years ago the earth was inhabited by approx. 300 million people, and it was another 1800 years before the population had grown to 1 billion. However, the addition of another 5 billion people to bring it up to today's 6 billion only took 12 years, and conservative estimates show that if the present population growth rate is maintained, the earth will have a population of 9 billion people by the year 2050. Each time the population doubles, agriculture needs to

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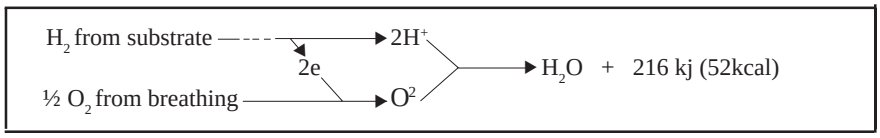
produce 4 times as much, we need 6 times as much energy, and global economic strength needs to increase by a factor of 8. But according to investigations carried out by the FAO over the past 30 years, the actual current rate of growth is miles away from these figures.

In future good drinking water will also become scarce for the world population. Some 9000 litres of water are needed to produce 450 g of beef; but only just over 500 litres are needed to produce a loaf of wholegrain bread of the same weight. Almost half the water used in the USA is used to produce animal feeds and not directly for human food.

So for the future it is an absolute necessity that we find a sensible and economic way of handling the existing resources. At the same time a holistic regulatory method must be used in the treatment of chronic diseases. The course followed by conventional medicine up to now – that of suppressing the symptoms of disease – is no longer acceptable for the future in economic terms.

## Basic principles of energy metabolism

In biological systems energy is obtained by the gradual oxidation of different intermediates (substrates) during metabolism. In the initial stage of biological oxidation the substrates are dehydrogenated, i.e. hydrogen is removed from them. This hydrogen and/or its electrons is/are then transferred by means of a chain of enzyme systems which take place one after another. Only in the final stage does oxidation take place; this involves the oxygen from breathing which accepts the electrons from the hydrogen, forming water. Energy is released during the formation of this water. The very complex interaction of enzyme systems during biological oxidation is called the „respiratory chain“. Illustration 2 shows the empirical formula for obtaining chemical energy (from E. Buddecke: “Grundriss der Biochemie“ [ “Outlines of Biochemistry“], Verlag de Gruyter, 8th edition, 1989).




*Illus. 2: Empirical formula for the respiratory chain*

The enzymes involved in the transportation of hydrogen and electrons and the co-substrates of the respiratory chain are redox systems whose electrical potential can be determined in experiments.

In mammalian cells the respiratory chain is localised in the inner membrane of the mitochondria. These organelles may therefore also be described as the “power stations“ of the cells.

The enzymes transferring the hydrogen and electrons can be divided into five complexes. Complexes I, III and IV are each linked with a system of proton transport. These „proton pumps“ are arranged in such a way that hydrogen ions (protons) can only be pumped in one direction. As a result of this process an electrical voltage (potential difference) is built up across the mitochondrial membrane.

Finally, the fifth complex contains a proton channel formed from water-repellent proteins to transport hydrogen ions ($H^+$ ions) back to the mitochondrial matrix.

As a result of the transportation of the hydrogen and/or its electrons through the enzymes of the respiratory chain, the energy obtained is not released suddenly in the form of an explosion but is released in smaller quantities. Also, the energy is not only released in the form of heat but can also be stored in the form of chemical energy (ATP) to be used as and when required. There is therefore a close link between consumption of oxygen and the formation of ATP.

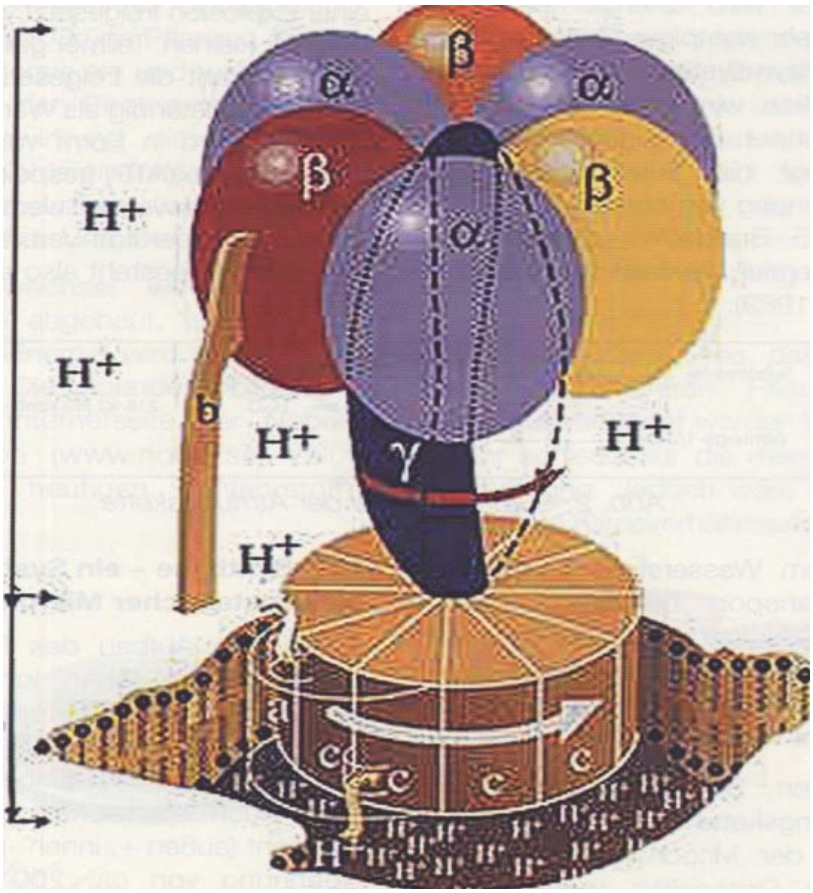
## ATP synthase – a system of electrostatic micro-motors

The building up of the proton gradient between the inner and outer side of the mitochondrial membrane results not only in a pH difference of 1.4 units but also in a electrochemical gradient (outside +, inside -) with a potential of approx. 200 mV. The energy obtained from this is used for the synthesis of ATP from ADP (adenosine diphosphate) and inorganic phosphate.

The enzyme which catalyses this synthesis is called ATP synthase. This enzyme is part of a fundamental method of energy storage, and it has a very similar chemical structure in bacteria, plants, animals and human beings.

The way this enzyme functions has only recently been explained by P.D. Boyer (USA), J.E. Walker (UK) and J.C. Skou (Denmark) who were awarded the 1997 Nobel Prize for Chemistry for their work.

The structure of the great enzyme complex of ATP synthase (approx. 500 kD in size) is shown in Illustration 3 (taken from the website of the Nobel Foundation www.nobel.se).




*Illus. 3: The two sub-units ($F_0$ and $F_1$) of ATP synthase*

A comprehensive overview of the structure and function of ATP synthase is given in an article by M. Yoshida, E. Muneyuki and T. Hisabori: „ATP synthase – a marvellous rotary engine of the cell", Nature Reviews, Molecular Cell Biology, Vol. 2, 2001.

According to new scientific opinion, the enzyme can be regarded as a complex of **two micro-motors**: the **$F_0$** motor driven by protons and the **$F_1$** motor driven by ATP. The physical rotation during enzymatic catalysis is a newly discovered phenomenon that is not known for any other enzyme to date.

The $F_0$ motor is situated in the mitochondrial membrane and contains the proton channel; the $F_1$ motor contains three catalytic areas á , ß and ã) which manage enzymatic reactions. According to the latest findings, the two motors rotate in opposite directions.

The $F_0$ motor is very similar to the so-called „Wankel motor" which was invented by the German engineer Felix Wankel in 1957 and which has been used commercially in the building of cars by the Japanese firm Mazda since 1967. The motor is small, lightweight, runs quietly and is of very simple construction. It converts fuel directly into rotational energy.

When protons flow through $F_0$ a turning moment is produced as in an electric motor, and this causes the whole object to rotate. More or less ATP is released depending upon the speed at which this little $F_0$ motor rotates (i.e. according to the level of acid formation) (Elston et al., Nature 391, 1998). The difference in potential energy which flows in the form of protons across the mitochondrial membrane through this motor is sufficient to produce 3 molecules of ATP from 12 protons. This is a very high degree of efficiency.

According to natural healing concepts, the enzyme combines the two aspects of yin and yang in one unified system. Presumably the ATP synthase in the form of an electrostatic motor is also an important link between the material level of human existence and the higher vital energetic plane.

According to **Harold Saxton Burr**, who taught anatomy and neuroanatomy at the famous Yale University School of Medicine in America for over 43 years, each living being is surrounded by an electrodynamic field (the so-called „L-field") which can be measured with the aid of a modern electrostatic voltmeter (Harold S. Burr: „Blueprint for Immortality: The Electric Patterns of Life", The C.W. Daniel Company Ltd., 6th edition, 2000). This electrodynamic field controls and directs important metabolic processes and can be used for the diagnosis of diseases in human beings, animals and plants.

It can therefore be assumed that the electrodynamic field of a person has a direct influence on his energy metabolism!

## Regulation of cell respiration

The production of ATP is slowed down when there is a surplus of energy. In situations where the amount of ATP is high and the concentrations of ADP are low, the consumption of oxygen drops to 5–10 % of the maximum value. When there is a very large surplus of ATP the flow in the respiratory chain can even be reversed.

If energy stored in the form of ATP is needed for metabolic process, ATP is once again broken down by enzymatic action. The breakdown occurs as the molecules of the $F_1$ motor change their formation and the r.p.m. of this motor is increased.

In addition, the breaking down of ATP is influenced by the pH value. With an acid pH value of 6.5, the breakdown is hampered, but the breakdown is not hampered when the pH is alkaline.

This means that where the connective tissue is highly acidic, this interferes with both the breaking down of ATP and the utilisation of the stored chemical energy.

Furthermore, respiration and the formation of ATP can also be controlled by regulating the other enzyme complexes of the respiratory chain.

## Regulation of the energy metabolism using SANUM remedies

SANUM remedies are eminently suitable for regulating the energy metabolism.

Best of all is CHRYSOCOR. This injection preparation activates the metabolism as a whole and especially the respiratory processes in the cells.

The carbon-based acids in the homeopathic remedies SANUVIS (lactic acid), CITROKEHL (citric acid) and FORMASAN (formic acid) regulate in particular the function of the connective tissue, with SANUVIS having a specific effect on the acid-base balance and CITROKEHL on cell respiration. According to Reckeweg, FORMASAN is an important means of re-stimulating the connective tissue in illnesses of the cellular stages (e.g. chronic susceptibility to infection, asthma, degenerative illnesses and those where tumours are present). These preparations are mostly given as injections or in the form of drops to regulate the energy metabolism.

ALKALA N and T also regulate the acid-base balance and provide the bases (alkalis) which are needed in the event of general over-acidity of the connective tissue, whilst the bacterial immune modulator UTILIN "S" is capable of "unlocking" blockages of the connective tissue metabolism and the change of microbial stage.

It goes without saying that the other SANUM remedies can also contribute to the regulation of the energy metabolism by normalising the microbial symbiosis within the organism.

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