PROTEINS: THE DISREGARDED KEY TO BETTER HEALTH

A lot of people suffer from a chronic protein deficiency, which all too often leads to a number of health complaints. Food alone is not always the answer, but thanks to the latest nutritional research there is now a solution.

By Dr. Heinz Reinwald

Joie de vivre for young and old alike: hop till you drop if the body has enough protein!

Simply put, proteins provide the fundamental building material for the entire body: about half the body mass that does not consist of water consists of protein. Most people these days are suffering from a lack of protein, but addressing the situation simply by eating plenty of meat, fish and milk products may lead to liver and kidney failure. There is only one product in the world that supplies the body naturally with all eight of the amino acids that it cannot produce itself—and without harmful side effects!

Hardly any other foodstuff has generated so many misunderstandings as protein has. While enthusiasm on the subject of micronutrients knows no bounds and not a day goes by without reports on the advantages of various vitamins, minerals, trace elements or phytonutrients, there is little clarity about protein. The notion of carbohydrate and fat metabolism is familiar to many, less so that of protein; despite the growing number of nutrition experts and a certain "fashion" to provide amino acid supplements, there is still a long way to go in terms of understanding the more recent international research results. For example, no difference is drawn between the nutritional value and digestibility of proteins. There is equally little agreement over the daily recommended requirement in terms of energy maintenance for the average person or energy supply for professional athletes and those in manual labour.

Nevertheless, proteins take a leading nutritional position. Almost all the vital substances needed by our body are converted into peptides or proteins from various amino acids (AA). Amino acids are the fundamental building blocks of life; they are transported via the blood to those parts of the body where they are converted and incorporated into the body's own protein (organ tissue such as skin, musculature, liver cells, enzymes, etc.). Amino acids also form the basis for hormones (e.g. insulin, glucagon) or neurohormones (serotonin, melatonin), as well as scleroproteins (collagen, elastin, keratin), structural proteins (actin, myosin), plasma protein (globulin) or transport proteins such as albumin and haemoglobin. Furthermore, they are important for the production of male and female hormones and the maintenance of a healthy libido.

In addition, they are the foundation for our immune defence system (antibodies, blood clotting factors). Proteins are also required as reserve substances for energy supply in case of hunger. The body regenerates them principally from musculature, the spleen and the liver, where in times of hunger—and also in cases of fad diets or fasting remedies—they are used to supply energy

through gluconeogenesis (generation of glucose). Every day the body produces between 80,000 and 120,000 different enzyme connections by stringing together different amino acid molecules and "converting" them into molecular chains of body protein.

Our modern form of nutrition and stressful lifestyle do not always guarantee that we consume and/or make use of all the essential amino acids in sufficient quantities. Our protein requirement is seriously underestimated: as we age, or in times of illness or stress, the body's ability to absorb nutrients decreases (leading to impaired digestion, a diminished ability to detoxify and the inability to utilise protein). But the amino acid needed to overcome disease can increase to levels similar to what is required by a top sportsman.

A particular consideration is the nitrogen waste produced through protein food. This consists of the waste products generated by the metabolism of protein (ammonia, urea), which must be disposed of by the liver and kidneys. Only experts understand these connections, and little of this knowledge has entered public awareness. However, the subject of nitrogen waste and its dangers is neglected, even fatally downplayed, in sport and dietary nutrition (the Stone Age Diet, Low-Carb Diet, Montignac) by particular interest groups. The health consequences can be fatal, and not only for people suffering from liver and kidney disease.

At least in extreme sports such as bodybuilding, the protein requirement is well recognised: the recommended intake is based on verifiable practical knowledge and therefore differs considerably from the guidelines of an average nutritionist or the recommendations of the German Society for Nutrition (DGE), or its US equivalent, the Food Standards Agency (FSA).

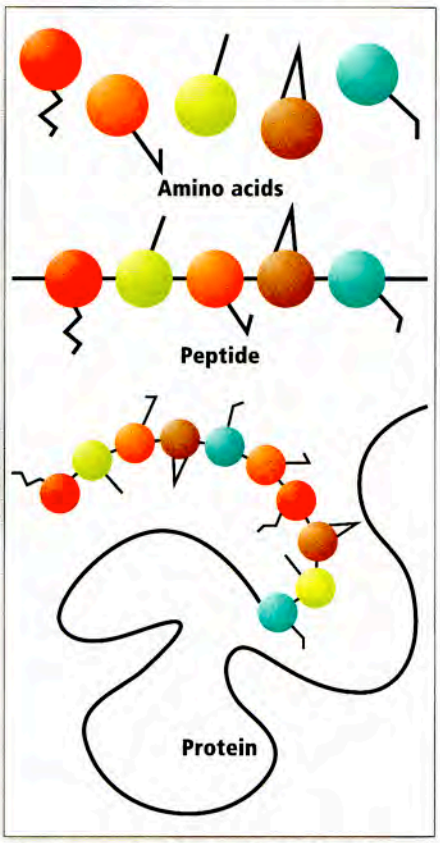
Nutritional knowledge is not merely in hot demand with regard to the recommended protein requirement for health or sporting performance, but also as regards the potential dangers of an increased protein intake—particularly if we are talking about an inferior protein source, such as those found in modern protein supplements. Countless branches of the economy make their money by marketing these cheap products. Having fallen ill and lacking knowledge as to how such poor health came about, those that regularly consume such products in large amounts are warmly welcomed by our ill-health industry as a good source of income. Dr. Bircher-Benner[1] pointed out this situation as far back as 1938, remarking that, "it would appear that man's most terrible enemy, an enemy unrecognised and unseen, and an enemy that brings about such tremendous suffering, is faulty nutrition."

But even high-quality protein sources for human consumption such as lean fish, meat and poultry must be carefully considered. Already at the dawn of the 19th century, health problems had become apparent in the case of excessive and unbalanced protein intake among trappers and pioneers in the USA. Their only food source over the long winter months was protein-rich, low-fat wild meat that was also rich in essential fatty acids. Yet in ignorance they neglected to first eat the alkaline-rich offal that any wolf or lion would have done to balance the acid from consuming muscle flesh; instead they took their fill from the plentiful lean meat. Their instinct for the right food had long degenerated and native knowledge was apparently ignored.

One look at history is enough to understand the consequences of a prolonged excess burden on the liver and kidneys, without the need for "scientific studies": in ancient times a popular form of death sentence was to administer muscle meat to prisoners without any alkaline food to balance it!

Proteins Consist of Amino Acids

What are proteins? Proteins consist of small building blocks called amino acids. These amino acids consist of four chemical elements—carbon, nitrogen, hydrogen and the oxygen atom—and are used by the human body to make thousands of different proteins that perform different functions. For example, the first complex protein discovered in 1851 by Otto Funke is the transport protein haemoglobin—the ferreous blood pigment of red blood cells (erythrocytes). It consists of more than 1,800 amino acid bonds. Macrophages (white blood cells), T-helper cells or glutathione (the vital antioxidant active in cells) also consist of amino acids. Amino acid groupings are only referred to as proteins by the scientific community if the complex comprises more than one hundred amino acid compounds; fewer than a hundred amino acid compounds are labelled peptides.



The increasingly complex structure of amino acids, peptides and proteins.

In total there are twenty proteinogenic amino acids. The body can synthesise twelve of these on its own; the other eight must be introduced through food. This is why they are also called the eight 'essential' amino acids.

The 8 Essential Amino Acids

These are L-Isoleucine, L-Leucine, L-Lysine, L-Methionine, L-Phenylaline, L-Threonine, L-Tryptophan and L-Valine.

In digestion, the body breaks down any proteins introduced through food with the help of enzymes (pepsin, trypsin, chymotrypsin). In the ideal case of optimal digestion, all the amino acids are assimilated by the blood and can be used by the body to build body protein. The constructive eight essential amino acids, along with the other amino acids produced by the body, form the structural foundation of our organism as well as all life-supporting molecules. This process is called body protein synthesis.

Proteins Form the Structure of Our Body

The term *protein* was derived from the Greek word *protos* (first, most important) or *proteuo* (I take first place) by Jöns Jacob Berzelius in 1839. As a mentor and friend of Gerard Johannes Mulder, he had been present at Mulder's discovery of protein's molecular structure as the standard "basic material" (using the german word "Grundstoff") and suggested the term 'protein'. With this word, the two scientists wished to emphasise the great significance of proteins for life.

David Raubenheimer, a food researcher and biologist at the University of Auckland, has highlighted the fact that there is an evident 'protein hierarchy' in human nutrition,

[1] The Swiss physician who first developed muesli (known in German-speaking countries as Bircher Müsli)

which leads us to satisfy our appetite for protein before anything else. Although the amount of protein in food is tiny in comparison to fats and carbohydrates, the protein requirement for the human body takes priority. This should come as no surprise, since **the building blocks of protein, amino acids, are involved in almost all vital functions in the human body: cell regeneration, enzymes, hormones, bones, cartilage, hair and nails, tendons and ligaments. As scleroprotein, they supply the collagen of our skin; as structural protein they supply our muscles; and as transport proteins (haemoglobin) they supply our blood.**

Proteins are a vital component of our nutrition. Not only do they contribute to the regeneration of the body's muscle and tissue cells, build and regulate hormones and enzymes and control metabolism, they also form the **basis of our immune system and immune defence** by helping us to ward off disease.

Proteins provide the basic building material for our entire organism. As already mentioned, about half of the body mass that doesn't consist of water consists of proteins. Most proteins in our body are continually rebuilt, broken down and renewed, which is why our body must form thousands of proteins every day in order to replace those that have undergone this process.

The more active a person is and/or the higher his stress levels (perhaps through illness or top-level sporting performance), the quicker protein is broken down and the more new protein is required to replace it. Unlike carbohydrates (glucose) or fat, amino acids can only be stored short-term. The body's own pool of amino acids is available for a maximum of two to three hours, so the body needs replenishment several times a day.

Many People Have an Increased Protein Requirement

Many people have a much higher protein requirement than normal. Endurance athletes and those under great strain—whether through work, top-level sport or illness—may suffer from an increased degeneration and/or alteration of their lean body cell mass as well as wear or wasting. For this reason, they need more protein to compensate for the increased cell metabolism and to prevent injuries.

The *American Society for Nutrition* (ASN) points out that **athletes** who perform elevated strength, endurance or resistance training need more than twice as much protein per day as normally active people to guarantee cell regeneration and repair: their maintenance requirement is already higher.

Protein-rich food burdens the metabolism because only a small part of this amino acid can be processed by the body. The rest becomes waste.

Enhancing performance goes hand-in-hand with an increased protein intake—we call this additional protein requirement the 'performance requirement'.

However, it isn't just athletes that need more protein. **Middle-aged** or **older people** find themselves in a stage of intensified degenerative process: there is a fifty per cent reduction in the production of the gastric acid initially needed to digest protein effectively (with the help of pepsin). This slows down protein digestion, and the breakdown processes start to overcompensate. The liver and kidneys' detoxifying performance also lessens with age, while bowel function frequently worsens—also as a result of increasing akinesia (lack of body movement). Social exclusion, loneliness, a diminished sense of smell and taste or even dental problems often lead to a smaller appetite and/or a restricted food intake and thus to breakdown processes due to a lack of protein. Infectious diseases and chronic degenerative illnesses—frequently the result of protein deficiency symptoms—can also further intensify the breakdown of lean body cell mass (mass from living cells, muscles, organs, bones, antibodies, enzymes, etc.).

Children and adolescents need more protein because their bodies are in a growth phase i.e. there is an increased need to build new cells, new tissue and other "building materials" in the body. This also goes for **pregnant women**, who must provide for an additional life, and **lactating mothers**.

Those on a **weight-loss diet** also need sufficient protein. As a result of the reduced food intake, dieters experience precisely the opposite and essentially generate a "state of starvation" in the body. This leads to a loss of lean body tissue and, as consequence, to a kind of weight reduction that is unfortunately misleading. Instead of fat and water, the body lives off its own cell tissue in order to supply itself with sugar (energy), a process known as gluconeogenesis. This leads to a vicious circle as our lean body mass (primarily muscles) consumes caloric energy. If we exhaust this lean tissue, our caloric basal metabolic rate is also lowered. Returning to normal eating habits at the end of a diet thus results in a surplus of calories that are not used, but stored as fat tissue. This phenomenon is known as the infamous **yo-yo effect**.

Menopausal women with imbalanced hormones also have an increased protein requirement, as do patients recovering from **operations or illness** as well as anyone that wants to help **improve their immune system**.

Insufficient Protein Supply Can Harm Our Body

To maintain our health and fitness to the optimum we must consume enough protein every day through food in order to compensate for the breakdown of body cell mass. Consuming too little protein or the incomplete digestion of food protein can not only lead to the breakdown of lean muscle mass and impaired metabolic processes (controlled with the help of proteins), but also to water retention and other protein deficiency symptoms. The incomplete breakdown of food protein—for example due to hyperacidity in the small intestine—is not merely a frequently-overlooked reason for protein deficiency, but one of the causes of stomach, bowel diseases and an imbalanced large intestine (dysbacteriosis).

An insufficient protein supply may cause us to experience "protein hunger". If this occurs, we eat more and automatically consume more calories than we need—as well as additional carbohydrates and fat, which are richly available in many foods. **A lack of protein combined with an excessive supply of sugar and fat is therefore another important reason for the increase in obesity.** And a vicious cycle of insufficient supply and weight gain arises. Raubenheimer calls this the Protein Leverage Effect, which when inverted, also **supports more rapid weight loss.**

A **daily protein supply** is therefore required to maintain or normalise the cell regeneration process as well as body protein synthesis—we describe this as the maintenance requirement. An insufficient protein supply either causes cells to die off without being regenerated, or the breakdown of lean muscle mass and cell tissue in order to sustain the essential repair services and other vital functions in the body. This is particularly evident in wasting diseases such as end-stage AIDS and cancer, as well as Parkinson's, in which our body "eats itself" or "borrows" amino acids from other bodily functions in order to provide the immune

system, which is working flat-out, with the necessary amount of amino acids.

Athletes and sportsmen who don't have enough amino acids to ensure the required alteration, breakdown and regeneration processes in cell metabolism will lose muscle mass and strength instead of building these up, thus increasing the risk of injury.

It is irrelevant how an insufficient protein supply occurs—whether due to a diet, illness, voluntarily neglecting meals, poor nutritional choices or a forced lack of food, etc. An insufficient protein supply in terms of the eight essential amino acids endangers our health and leads to adverse effects in the following areas:

- Bone cell synthesis
- Production of red blood cells (erythrocytes)
- Regeneration rate of heart cells
- Neurotransmitters/mood
- Immune function/antibodies
- Enzyme production and enzyme function/hormone production
- Elasticity of the skin/muscle tone
- Organ function/pH balance
- Mobility/joint function/growth
- General well-being/endurance/stamina

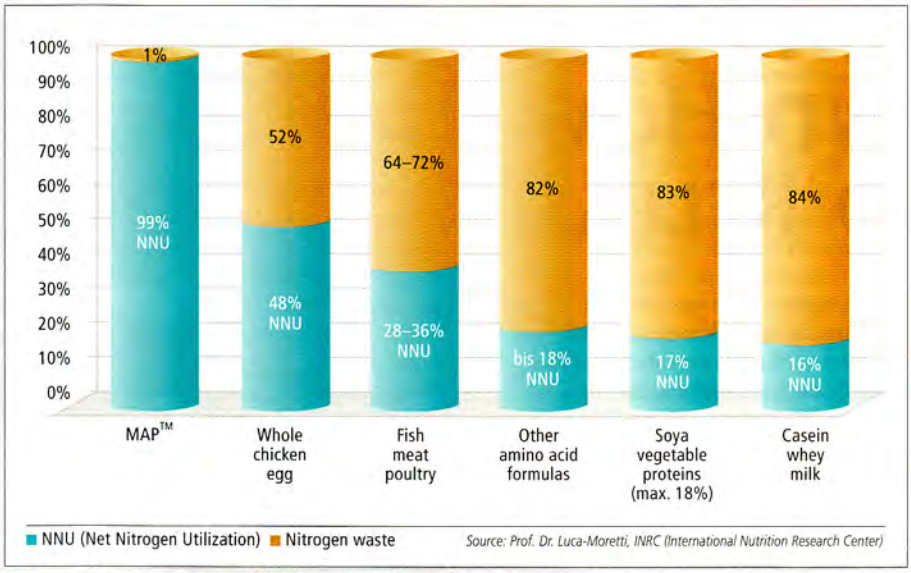
Protein deficiency often goes unnoticed. At first glance, the protein level in the usual blood count is normal. However, a closer investigation of the blood serum reveals that many people have too low a level of amino acids. Even smaller deficiencies in the protein supply may considerably intensify the effects of a disease. As a result there are hardly any vegetarians or vegans who do *not* suffer from a lack of protein, since vegetable proteins only have a maximum nutritional value of 18 per cent, expressed as Net Nitrogen Utilisation (NNU). This means that most of these proteins will end up as nitrogen waste. Most are even lower.

When Protein Becomes a Problem

Although we consume plenty of protein every day, regrettably our body is not in a position to digest everything fully and thus use it for protein synthesis. Digestibility is not equated with the nutritional value of protein (NNU). The nutritional information given on a food label may indicate ten grams of protein in a food or supplement, but our body will not absorb all of this: as a rule, between five and twenty per cent is assimilated; the rest is burned as energy, measured in calories or joules, as well as excreted as nitrogen waste such as ammonia and urea. **This is one of the most serious issues, since nitrogen waste is toxic and always burdens the detoxifying liver and kidneys.**

An increased protein intake with a relatively low nutritional value and correspondingly high nitrogen waste can have severe consequences in people and animals: excretion problems, impaired kidney and liver function or even 'protein shock', allergic reactions and much more. In people with diminished kidney function, the amount of nitrogen waste produced by food protein damages the kidneys—and not only that. According to the *American Association of Kidney Patients*, about twenty million people in the USA have limited kidney function without being aware of it. The high toxic load caused by nitrogen waste may therefore burden the organs considerably, as well as lead to weakened kidney function.

All amino acids that cannot be used for body protein synthesis i.e. to build new cells are converted to energy and broken down. This produces ammoniac (NH_3), a toxic gas that occurs in the body largely (>99%) in its ionised form as ammonium ion (NH_4^+) and is bound to other elements. It is then converted to urea in the liver and excreted through the kidneys like the remaining nitrogen waste. Liver failure causes a dangerous increase in the level of ammonia in the blood, with the corresponding symptoms of toxification. Kidney failure will also poison the body, which is why liver and kidney dialysis to detoxify the blood is a common procedure today.



Ratio of Net Nitrogen Utilization (NNU) to nitrogen waste in food proteins in comparison to the MAP® food supplement developed by Prof. Dr. Lucà-Moretti.

Actual Protein Nutritional Value (NNU)

Let us take a hen's egg as an example of a good protein source for humans. Although it has the highest nutritional value of any food protein—48 per cent of its nutritional value contributes to protein synthesis—it nonetheless produces 52 per cent nitrogen waste. Ironically, the frequent use of pure egg white to build up muscle mass and avoid the egg's fat content has precisely the opposite effect: egg white only has an NNU of 18 per cent, the remaining 82 per cent is nitrogen waste. In casein, milk, whey and soya the balance is also very poor: these release between 83 and 84 per cent nitrogen waste and only provide 17 per cent for body protein synthesis.

Plants generally have a low protein value of a maximum of 18 per cent NNU, i.e. a maximum of 18 per cent of amino acids are processed anabolically (used for cell build-up); the remaining protein amount undergoes a catabolic process, which is to say it metabolises into nitrogen waste. A similar situation occurs with common amino acid food supplements or infusions, which also have a maximum protein nutritional value of 18 per cent.

Traditional nutritional science and medicine reach their natural limits here. Our fast-living world demands a higher maintenance requirement for a modern human as well as an increased performance requirement. And thus arises a vicious circle, which cannot be broken without side effects by the usual intake of food protein. More nutritional protein usually means more nitrogen waste and an increased burden on the organs, to say nothing of the usual dietary supplements based on casein, whey or soya and their low nutritional value and massive nitrogen waste. Some amino acid formulas do not even administer all eight essential amino acids at once, so these manufacturers are way behind the research results of Prof. Dr. Rose—who discovered the last essential amino acid, threonine—as well as those of Block and Mitchell from 1946-1949.

The Master Amino Acid Pattern (MAP)—a Protein Revolution

Over 31 years of research work, Prof. Dr. Lucà-Moretti discovered that all living organisms, including human beings, have their own **characteristic amino acid pattern**, a so-called "**master pattern**", to achieve optimum protein synthesis. In order for the body to synthesise protein, i.e. to use the amino acids for cell metabolism, **all eight essential amino acids must be available at the same time and exactly in accordance with the structure of the body's specific amino acid pattern. Only then—when all eight are available at the same time and in the correct ratio—can they be used optimally by the body to repair and build new cells. In all other cases, the body cannot form any body protein from the nutrients. The amino acids then become catabolic i.e. begin to break down and in doing so they produce toxic nitrogen waste and energy.** The more the ratio of the eight essential amino acids deviates from the optimal pattern, the smaller the protein nutritional value or NNU, and the higher the amount of nitrogen waste and vice versa. ■