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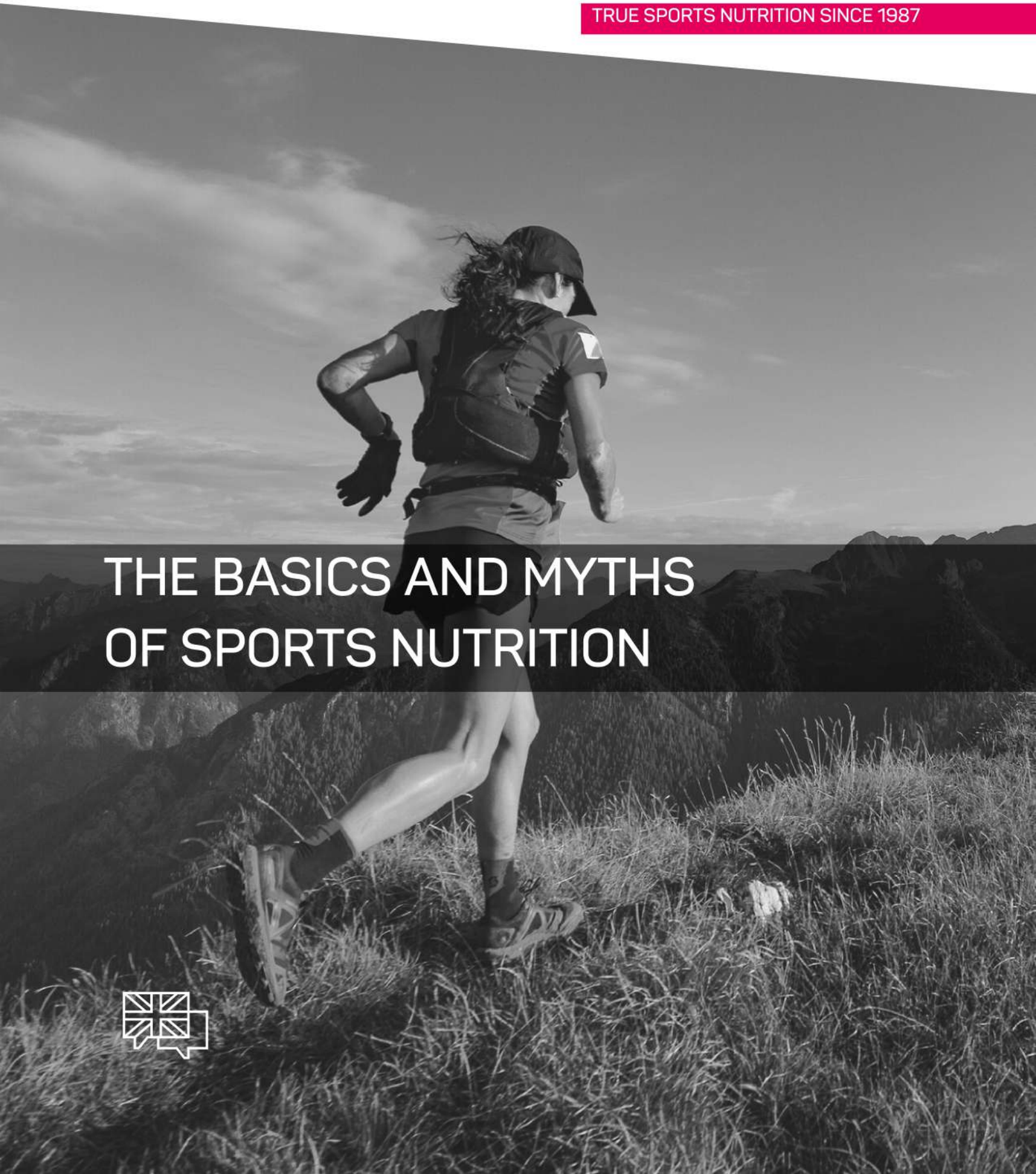

THE BASICS AND MYTHS OF SPORTS NUTRITION

PROLOGOUE

ROGER MILENK

Many athletes today know all kinds of things about their bike, their heart rate, and their wattage, but hardly anything about how best to feed their own engine.

Yet for many athletes in particular, the simplest way to optimize performance is through targeted nutrition.

Everyone knows what their own car needs in terms of fuel and often how much per kilometer. However, if the question arises regarding one's own body, then there is usually only a shrug of the shoulders. This is exactly where we would like to shed some light in the following chapters.

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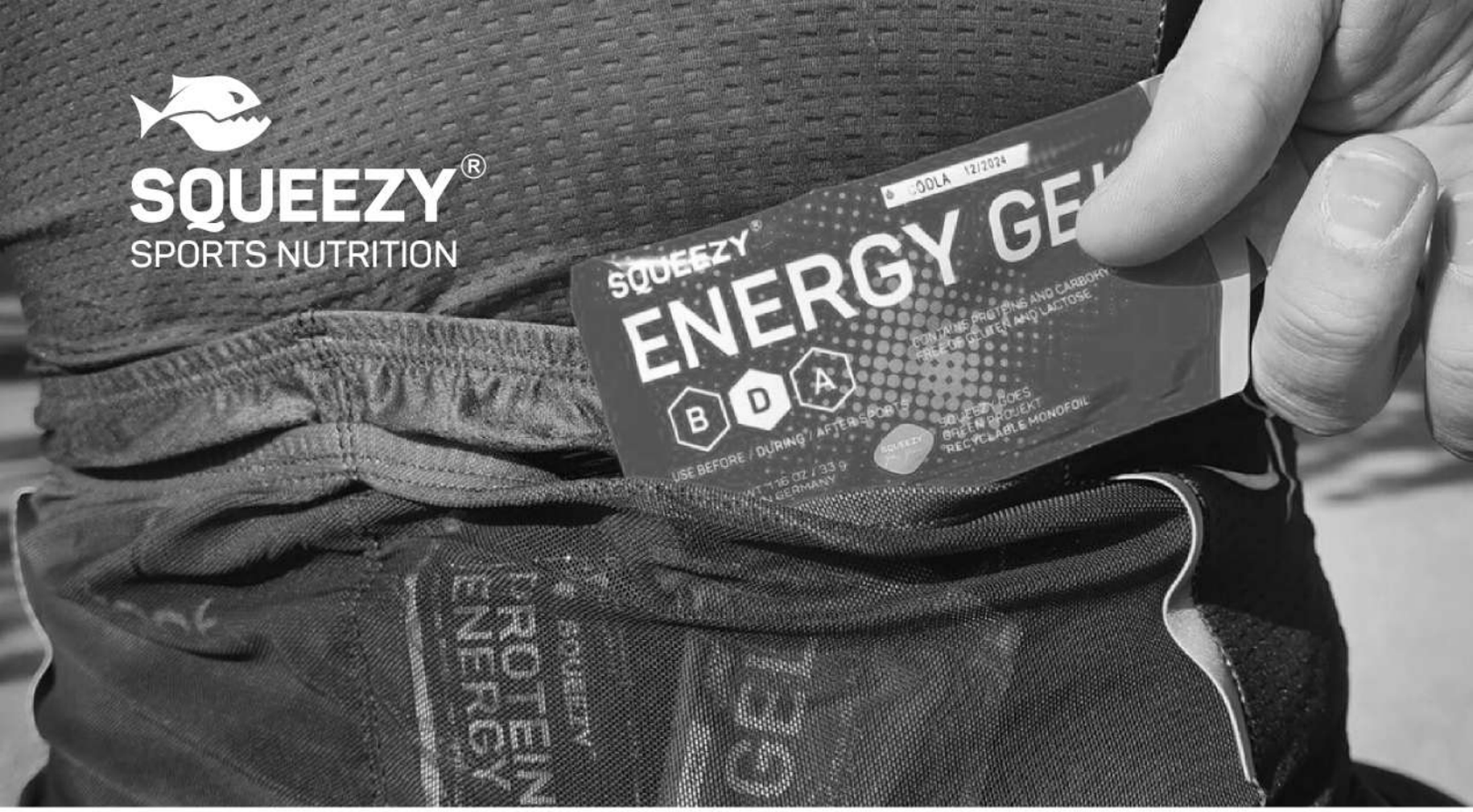

CHAPTER 1

THE MAGIC NUMBER 7

The week has seven days, there are seven wonders of the world, but also the seven virtues and the seven vices.
Of course, not to forget the darned seventh year of marriage and also in all world religions the seven plays an important role. What most people don't know - our food also consists of only seven food components. And some of these are particularly important for endurance athletes. More about this later.

7 FOOD INGREDIENTS

1. CARBON HYDRATES
2. PROTEINS
3. FAT
4. MINERALS
5. VITAMINS
6. FIBER
7. WATER

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CHAPTER 2

NOTHING WORKS WITHOUT ENERGY

When the tank of our car is empty, we are not surprised that we break down. This conclusion can also be applied to the human organism. Before we take a closer look at this, however, it makes sense to first get to know the primary sources of energy under stress.

For the athlete, two are particularly important:

FAT endogenous fat
GLYCOGEN converted carbohydrates contained in muscles and liver.

Let's start with the body's own fat. Two premises are interesting here:

1. the production of energy from the body's own fat is quite laborious and slow for our organism. This leads to the fact, that with increasing intensity in sports, the relative amount of fat used for energy production becomes smaller and smaller.

2. there is a nice bridge of thought here: "the fats burn in the oven of the carbohydrates". What is meant by this is that effective fat burning also requires a certain amount of glycogen in the stores. Theoretically, our body has enough fat reserves for energy production to ride almost the entire Tour de France (about 300,000kcal).

However, in doing so, we need filled glycogen stores on the one hand, and on the other hand, we must not then go too fast, which is not really fun. This brings us to the essential energy source for the endurance athlete: the glycogen stores and thus the carbohydrates. Here I would like to start with a comparison:

What good is the best sports car if I only get 200km on one tank of gas in everyday life?

This or something similar is also the case with our glycogen stores. Glycogen is stored in the human body only in the muscles and in the liver - about 1200-2000 kcal. By the way, it also pays off not to have abused alcohol.

Furthermore, we add two important factors:
1. our brain uses only glycogen as energy (important for concentration and motor skills).

2. a sharp drop in glycogen stores impairs or worsens the recovery phase and the immune system.

We conclude that:
1. on the one hand, the glycogen stores should be sufficiently filled before intensive and long loads (carboloading / pasta party).

2. on the other hand, it is important to consume carbohydrates even during intense endurance exercise, at least if it lasts longer than one hour.

The most important thing:
Even with glycogen stores filled to 100%, the energy is only enough for a maximum of 90 minutes at high intensity. Fortunately, we don't have to go to the gas station, but can supply the carbohydrates needed to replenish the glycogen stores during exercise with energy gels, energy bars or drinks.

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CHAPTER 3

VITAL SUBSTANCES - DO WE HAVE TO SWALLOW AS MANY PILLS AS THE PHARMACEUTICAL INDUSTRY WOULD HAVE US BELIEVE?

This chapter can fill entire books. Some claim that they have the right pill for all deficiencies, illnesses or performance slumps. On the other hand, there are those who firmly believe that a person only needs to eat enough fruits, vegetables and whole grains to be fully nourished.

As is so often the case, the truth probably lies somewhere in the middle. But let's take a closer look.

Nutrient deficiencies can have different causes:

1. an unhealthy, unbalanced diet.
2. certain forms of illness lead to a reduced absorption of the required nutrients.
3. an increased need due to strong stress, such as sports.

Since this section is aimed at athletes, we will not discuss the **first group of people** further at this point. Instead of, for example, fast food and potato chips with cola in the evening, a solution can be worked out very quickly by a simple change in eating habits.

For the **second group of people** and in case of ambiguity, it makes sense to consult a doctor with knowledge of nutrition. In most cases, a complete blood count will provide more clarity.

The **third target group** is interesting for us. Which minerals, vitamins, trace elements or amino acids are really important for endurance athletes and which ones should they substitute, if necessary, and above all, when?

The "when" can be answered quickly...

Let's take the car as an example again.
If you drive from Hamburg to Munich, you will only fill up with gasoline or diesel on the journey in a reasonably maintained car. Neither the brake fluid nor the radiator or windshield fluid are usually checked or refilled. It is similar with our body and it is even normally beneficial to act this way. During sport, the body only needs energy in the form of carbohydrates, water and, if necessary, sufficient sodium (table salt) and potassium. These ingredients are usually found in all common energy products.

All other nutrients and vital substances can and should be taken **before or after** normal stress during training or competition, the body has sufficient storage possibilities. A simple rule applies here in our body: the more dissolved particles are present in a gel or a drink, the higher the osmolarity and thus the time needed to absorb it.

"**A lot helps a lot**" is the **completely wrong** assumption here, because unnecessary amounts of minerals, amino acids and vitamins during exercise can lead to "congestion" and then rapid depletion (vomiting) is often the result. So it applies to the duration of the sport: Make sure that you really only take what you need during the load.

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CHAPTER 3 / II

VITAL SUBSTANCES - DO WE HAVE TO SWALLOW AS MANY PILLS AS THE PHARMACEUTICAL INDUSTRY WOULD HAVE US BELIEVE?

"**Which**" nutrients and vital substances is already somewhat more complex, therefore here only the concentration on the essentials:

Minerals
Anyone who quickly suffers from muscle cramps can certainly test the intake of additional magnesium. Here, there are still very contradictory study results to date. Because normally we take in enough magnesium through our food and an intake during exercise can quickly lead to diarrhea.
The most common cause of muscle cramps, on the other hand, is muscles that are not properly prepared and trained. Likewise, sodium deficiency can cause problems in athletes. Especially in endurance sports that involve a large amount of sweat loss, the additional intake of sodium is usually the right remedy against cramps.
As a guide, 1-2g of table salt (not sodium!) per hour can be considered. It should be remembered that sports drinks usually contain about 1g of table salt per liter. Gels also contain sodium or table salt. Important: 1g sodium = 2.54g table salt!

Vitamins
In winter, the substitution of vitamin D is certainly useful. Vegetarians and vegans should pay attention to vitamin B12. In case of a weak immune system, the intake of vitamin C, combined with zinc is useful. More about this in chapter 6.

Amino acids (Protein)
Vegetarians and vegans in particular should pay attention to the intake of the eight or nine essential amino acids (which cannot be produced by the body itself). Some proteins consist of more than 100 different amino acids.

If the substitution is done via protein products, then absolutely make sure that different protein sources (whey, soy, etc.) are available. In addition, the amount of protein should not exceed 1,5-2g per kg body weight, because especially the kidneys are very heavily loaded. Easier, also for our body, is the direct intake of the 8 or 9 essential amino acids. Here already approx. 5g of the essential amino acids per day are sufficient.

It can therefore make sense for athletes to supplement certain nutrients in a targeted manner. However, the basis should always be a deficiency or targeted prevention. A large blood picture gives here fast the first indications. However, some parameters are usually only tested under the personal request of the patient, such as the coenzyme Q10 status. I do not think it is wrong at all to consult a doctor and discuss the individual analysis possibilities.

Cramps and other problems are also caused by dehydration during sports: Here, the rule of thumb is that 0.75 - 1 liter of fluid should be supplied per hour.

Last but not least, a small but important note:

The oral intake of dietary supplements unfortunately by no means ensures that the nutrients absorbed actually enter the bloodstream, this is called bioavailability.
In most cases, a natural food has a clear advantage over a dietary supplement.
So it's better to cook for yourself instead of going to the pharmacy.

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CHAPTER 4

CARBOHYDRATES ARE NOT JUST CARBOHYDRATES - ESPECIALLY FOR ENDURANCE ATHLETES

Just as there is gasoline, super gasoline, or even kerosene, there is also an important source of energy for us - carbohydrates. Chemically, a distinction is made primarily between mono-, di- and polysaccharides.

What is this supposed to tell us?
Quite simply - monosaccharides are simple sugar molecules, such as simple glucose or fructose. They enter the bloodstream very quickly, thus increasing blood sugar and are metabolized accordingly quickly as an energy source. Now you might think that exactly this function is optimal for athletes, especially endurance athletes. This is not the case.

Because mono- and disaccharides not only quickly increase blood sugar, they also ensure that our pancreas releases a lot of insulin in a short time. The hormone insulin serves as a "cell opener" for glucose. With the high insulin level, the blood sugar is quickly lowered again, but unfortunately usually below the normal range, so that hypoglycemia and thus a sharp drop in performance is the result. Unless one would take a certain amount of sugar again very quickly.

At this point, a brief reference to one of the fastest growing diseases in our western society: Diabetes Mellitus Type 2.

The high proportion of mono- and disaccharides in our everyday food leads to a blood sugar spiral in many people. After ingestion, blood glucose rises rapidly, insulin is secreted, blood glucose then drops back below the normal curve, and the ravenous hunger attack sets in again.

This up and down and the constantly high amount of insulin can lead after years to insulin resistance, the beginning of diabetes. It is not without reason that common sugar is now called a drug by nutritionists.

Back to the athlete: Today, people are increasingly relying on polysaccharides, mostly maltodextrin, in sports nutrition products for endurance athletes. These are multichain carbohydrates that are metabolized more slowly. Especially for endurance athletes it is recommended to pay attention to a healthy mixture of carbohydrates, whereby the majority should always consist of the medium- and long-chain carbohydrate polymers. This minimizes the risk of hypoglycemia. A small proportion of monosaccharides, mostly glucose (= dextrose) or fructose , nevertheless provides a quick energy boost.

Again, an important note
Many people suffer from fructose intolerance. Often this has not even been recognized or shows up only at a high load during sports. Typical signs are gastrointestinal problems during exercise. Here it is important to use products (gels, bars and drinks) that do not contain fructose.

How many carbohydrates, when and how you should consume them, more about this in the next chapter.

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CHAPTER 5

WHAT QUANTITY?
WHEN, HOW AND WITH WHAT?

With regard to the many recreational / amateur and hobby athletes I have met over the past 30+ years, I must say that this is where most mistakes are made. Starting with the faction that thinks they can train for hours without supplying energy in GA2 mode (basic endurance 2 - i.e. approx. 70-80% of the max. heart rate) or even more intensively, to those who take in everything at the supply points at the cycling marathons or competitions that only fits in somehow. Later, however, they have to realize that some or even all of it wants to go back up again.
Let's get to the important facts at this point.

In the following, we now assume a medium to high intensity during training or competition (GA2 up to competition-specific endurance performance, also called WSA) and this also for longer than for max. 60-90min. For a load within the GA1 training there are other premises, which will be discussed in chapter 7.

It makes sense to divide the intake of carbohydrates into three categories:

- before the load
- during the load
- after the load

Of course it is smart to make sure that at the beginning of an exertion the glycogen stores in muscle and liver are sufficiently filled.
Not without reason there are the so-called pasta parties one day before big events. Likewise, there are also "carboloading" products on the market that are supposed to serve the same purpose.

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CHAPTER 5 / II

WHAT QUANTITY?
WHEN, HOW AND WITH WHAT?

So instead of starving yourself in order to save some weight for the competition, you should fill your stores with sufficient carbohydrates in the days before. In particular, the evening before the long, hard training session or the competition should be the focus for hobby athletes.

Let's move on to perhaps the most important phase - the duration of time during exercise.
Here there are simple basic rules regarding the amount of carbohydrates:

- 30-60g for the recreational athlete at medium intensity per hour.
- 60-80g for the ambitious athlete per hour
- 80-100g for the professional athlete per hour

Important: Here we are talking about the amount of carbohydrates, not the total amount of a gel, bar or drink.

In this respect, it makes sense to take a closer look at the products in advance and calculate the number of carbohydrates per gel, bar or the amount of drink per hour.

Whether gel, bar, fruit gum or a drink is to be preferred is up to each athlete. Of course, gels, drinks and fruit gums are much less of a burden on the digestive tract and can be converted into energy more quickly by the body than solid bars. What is more important is the amount of carbohydrates contained.

Equally important: Always consume enough water, because the body is further deprived of water when carbohydrates are added.

A clue: for 4-8g of carbohydrates, the body generally needs about 100ml of water.

Here again, "too much" does not increase performance, but may even lead to a dropout; too little can very quickly lead to a drop in performance. Hard to believe, but true: There is hardly a professional athlete who can consume more than 100g per hour of carbohydrates. This still represents a bottleneck for overall performance.

At this point, an example calculation. Baseline:
1.200kcal stored as glycogen (without carboloading).

Energy consumption per hour in intensive endurance sports: 800kcal- > without using the body's own fat, the energy tank would be empty after 1 1/2 hours.

Intake of carbohydrates per hour under load = max. 100g = 400kcal

Overall conclusion: on longer, more intense sessions (>GA1) we also need to be able to draw on the body's own fat reserves, which is why basic endurance training is so important. In addition, we must already supply carbohydrates every hour from the beginning.

Example after 3 hours of intensive training-load:
1.200kcal glycogen stored in muscles and liver (no carboloading in front of the load)
1.200kcal intake (max. 3x100g carbohydrates in 3 hours)

Total: 2.400kcal which we have as a energy source

Intensive training-load for 3 hours:
Kcal consumption of the body: 3x 800kcal = 2.400kcal

Without a certain percentage of fat metabolism, our system will break down.

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CHAPTER 6

THE OPEN WINDOW EFFECT- NOT AN OPERATING SYSTEM BUT VERY IMPORTANT AFTER THE SPORT

Rarely is a risk so close to an opportunity.

Let's start with the risk.
For years, scientific studies have repeatedly shown that we have an increased susceptibility to infection after strenuous training sessions or after competitions - also called the open window effect. This "immunological gap" is unavoidable and increases as the intensity of exercise increases.

The Chance
On the other hand, studies have proven that our cell doors are very wide open for max. one hour after strenuous training sessions. Recent studies even talk about only half an hour. We are talking about the cell doors of our body cells.

The Result
If we consider both, a simple conclusion emerges. We should take in important nutrients after strenuous units or competitions already within the first 30 minutes after finishing. Because in this time our body can absorb the nutrients much faster and easier.

First and foremost, these include:
- Carbohydrates to fill up the glycogen stores
- Amino acids and proteins for the muscles
- Vitamins and minerals to strengthen the immune system, especially vitamin C and zinc.

Whether this is done through the intake of suitable foods or through special recovery products and dietary supplements is up to each individual. Foods that are more difficult to digest certainly have the disadvantage of not being absorbed within the first 30 minutes.

At this point an important note:
The less we end the exercise with a deficit in energy supply, the smaller is normally also the "immunological gap". For this reason alone, it makes sense to supply sufficient carbohydrates during exercise.

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CHAPTER 7

WEIGHT REDUCTION FOR ATHLETES - BASICS AND COMMON MISTAKES

The power-to-weight ratio, i.e. horsepower per kg of car weight, is not only important for cars, but also for endurance athletes such as cyclists or trailrunners, for example.
If you consider that you definitely have to pedal 5 watts more per kg of body weight on steeper inclines from approx. 7%, then it quickly becomes clear why mountain specialists are often real "hungry hooks". For example, 10 kg more body weight means about 50 watts more power to be put on the pedals. The situation is similar for the uphill run.

But how do I manage to reduce my weight without losing strength and vitality?
Let's start with the "worst case scenario" - the zero diet. Because based on this example, some basic knowledge can be conveyed very quickly.

If we as humans do not consume any more energy over a longer period of time, our body reacts extremely intelligently, it gradually reduces the largest energy consumer. These are our muscles. The extracted protein is converted into energy. This also reduces the basal metabolic rate, i.e. the required number of kcal per day, because less muscles also means less basal metabolic rate. If we start to return to the usual eating habits after such a diet, we get the well-known JoJo effect. One weighs at the end even more than before.
At this point it should be clear to everyone that there is hardly a worse solution for an endurance athlete, because actually we want to weigh less, but in no way lose muscle. So the point is to reduce the "problem areas" and thus the fat.

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CHAPTER 7 / II

WEIGHT REDUCTION FOR ATHLETES - BASICS AND COMMON MISTAKES

To put it in a nutshell: It's not so much about weight loss as it is about reducing body fat.
How do you reduce body fat without reducing muscle mass? To answer that, you need to know a few key things.

The most important key function in advance:

A diet can only be based on a hypocaloric diet. This means that less energy is taken in through food than is consumed.
Next, we now come to the important key hormone: the body's own insulin. As we learned in Chapter 4, insulin is the door opener for cells. Unfortunately, however, this is also a form of one-way street.
In other words, high levels of insulin in the blood also mean that fat burning, that is, the extraction of energy by using our fat reserves, cannot take place. This quickly makes it clear that an important prerequisite for fat burning is a low level of insulin in the blood. This in turn means that we must keep our blood sugar constant.

Here, science has provided us with a simple solution when it invented the glycemic index. This states that the higher the blood sugar rises after eating a food, the higher the GI (glycemic index).

CHAPTER 7 / III

WEIGHT REDUCTION FOR ATHLETES - BASICS AND COMMON MISTAKES

Dextrose (glucose) with the number 100 was set as the standard. If one wants to keep the blood sugar and thus unnecessary insulin peaks low, one must pay attention to take food and beverages with low GI. Here I recommend to argue more near with the LOGI method or to look directly times into the book 'LOGI Guide" by Dr. Worms.

By the way, who does not know them, the people who consume only very little, but very regularly throughout the day and who complain, nevertheless, not to lose weight.

In the morning the jam on a small white flour roll, at the work a Cappuccino with a teaspoon sugar, at noon beside the light salad a Cola and in the afternoon to a small Keks again a Espresso with sugar..... the Insulinpeaks (points) are pre-programmed and the high Insulinspiegel permits over the day distributed no more fat burn. Over years this nourishing habit can lead then even to the diabetes type 2.

Let's summarize a few important points for clarification:

- In order to reduce or make the unnecessary fat pads disappear, we must take in less energy than we consume.
- In doing so, we must take care to keep our blood sugar as constant as possible so that we remain in fat burning mode for a long period of time.
- In addition, foods or special diet products with a very low glycemic index can be used.
- To protect the muscles, it is useful to take amino acids or protein products, especially in the evening.

I always have a nice image in mind: Thousands of years ago, we ran after food, sometimes with bows and arrows, and were happy when there was something to eat. Today, food runs after us on every street corner and at every opportunity, and the sugar content has grown many times over. Our bodies are not adapted to this and we are now experiencing the negative consequences.

CHAPTER 7 / IV

WEIGHT REDUCTION FOR ATHLETES - BASICS AND COMMON MISTAKES

A few more important notes:
Muscle is heavier than body fat. Exactly this fact leads many a person to the wrong conclusion. If we do sports during the diet and supply ourselves very well with the required amino acids, it may well be that we have lost e.g. 3 kg of fat, but at the same time have gained 2 kg of muscle mass. The delta of only 1 kg is therefore misleading here.

If you want to do it right, take a BIA measurement (Body Impedance Analysis) for help. Some doctors, fitness studios and pharmacies offer this service. It is important to take at least one initial measurement, one intermediate measurement and one final measurement. During the BIA measurement, the body is divided into its three main components, i.e. the percentage of muscle mass, fat and water is measured. This is the best way to keep track of whether you are on the right track even during the diet. Please do not rely on the simple, cheap scales with fat analysis, here the fluctuations are sometimes very high.

Light does not automatically mean healthy and light.
By this I mean the extremely widespread use of artificial sweeteners. Current studies even show that some people react here with a higher insulin rejection as well. I don't even want to go into the many critical studies on aspartame and other artificial sweeteners at this point.

LAST BUT NOT LEAST, WE COME BACK TO CHAPTER 5 AGAIN

Of course, GA1 training is particularly suitable for reducing the "problem zones", because especially in the GA1 range it is also about the activation and training of fat burning in our metabolism. Here we can indeed train without energy supply for a few hours, but the body's glycogen stores should at least be reasonably filled.
Training should not be too long, but above all not too intense.
During fasting training, if it is too intense or too long, the body uses our antibodies as an energy source. That our antibodies are important building blocks of our immune system, I probably do not need to explain here. Not to forget the problem for women on their hormon system, because of high levels of cortisol.

This brings us to the end of our little guide - I hope it was a little helpful and free of scientific, difficult to understand formulations and content.

In the end, I would like to emphasize once again that nature still provides us with everything necessary to pursue our sport with a lot of fun and strength.

Less industrial sugar and fast food, more healthy vegetables and fruit are important cornerstones of our diet. Not only for our sport, but also for our health.

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