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GENOMETRY HEALTHY SPORT +

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Name	John Doe
Age	32
Analysis number	1
Date	05.04.23

Epigenetics – miRNA Analysis

Combined analysis of 8 different miRNAs, which assess the current fitness and health status.

These biomarker provide additional information about

- Nutritional status
- Hydration status
- Inflammation
- Risk of injury and regeneration ability
- Cardiovascular fitness / endurance
- Muscle status
- Exposure / stress level

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Genetics – SNP Analysis

FTO gene (weight loss)

ACE and ACTN3 (sport type)

BDNF (motivation)

ACTN3 (muscle damage)

Your analysis sample has been evaluated according to the latest scientific findings and the highest laboratory quality standards. The analysis of your data was then carried out by our employees and personally approved by our laboratory manager. We hereby send you your personal report, which we have generated individually for you. We thank you very much for your trust and look forward to questions and suggestions in order to continuously improve our service. We hope the analysis meets your expectations. Kind regards,

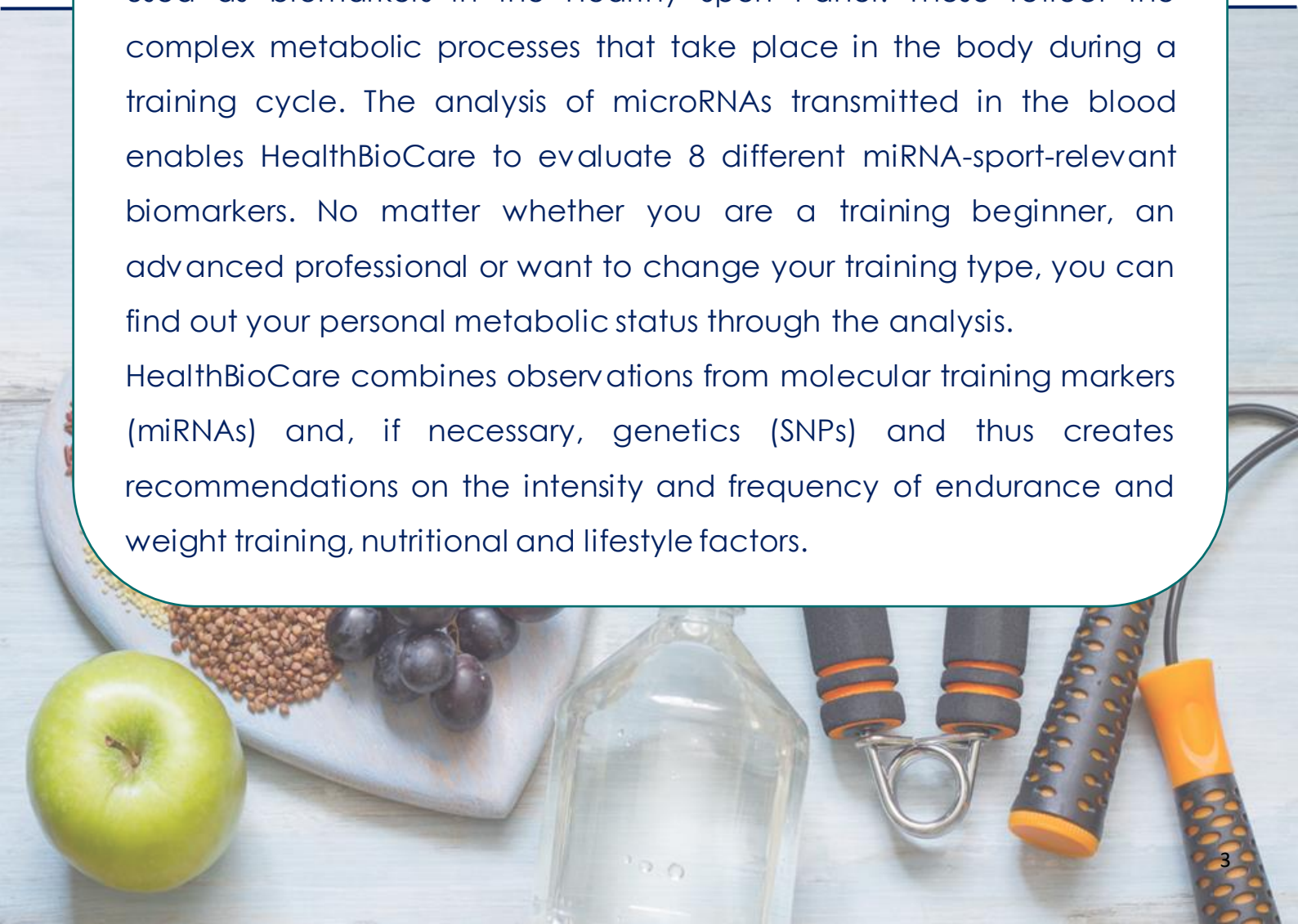
Your HealthBioCare team

Epigenetics – miRNA Analysis

Several studies have confirmed the positive effects of regular exercise on mental and physical health. The molecular mechanisms underlying exercise-related fitness in com bination with personal lifestyle have so far been difficult to analyze.

In a 2-year study with 160 participants, HealthBioCare tested over 460 different metabolic factors for their use as biomarkers. To investigate systemic and cellular changes, circulating microRNAs (miRNAs) are used as biomarkers in the Healthy Sport Panel. These reflect the complex metabolic processes that take place in the body during a training cycle. The analysis of microRNAs transmitted in the blood enables HealthBioCare to evaluate 8 different miRNA-sport-relevant biomarkers. No matter whether you are a training beginner, an advanced professional or want to change your training type, you can find out your personal metabolic status through the analysis.

HealthBioCare combines observations from molecular training markers (miRNAs) and, if necessary, genetics (SNPs) and thus creates recommendations on the intensity and frequency of endurance and weight training, nutritional and lifestyle factors.



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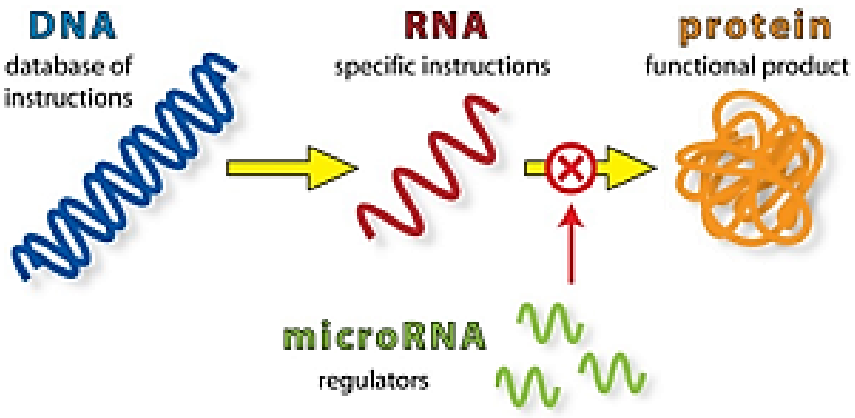
What are miRNAs?

Epigenetics – the molecular memory of environmental influences

How often the body reads genes varies widely and is influenced by environmental factors, diet and lifestyle. There are options that the information on the genes is not being used by the body. One reason for this are short pieces of RNA, the so-called miRNAs. These serve to regulate metabolic processes and can usually fulfill several functions at the same time. Fore example, more or less is produced by an enzyme or protein, as miRNAs can inhibit the production of proteins. These miRNAs can be measured. Environmental influences, diet and exercise can change these miRNAs and influence our body functions.



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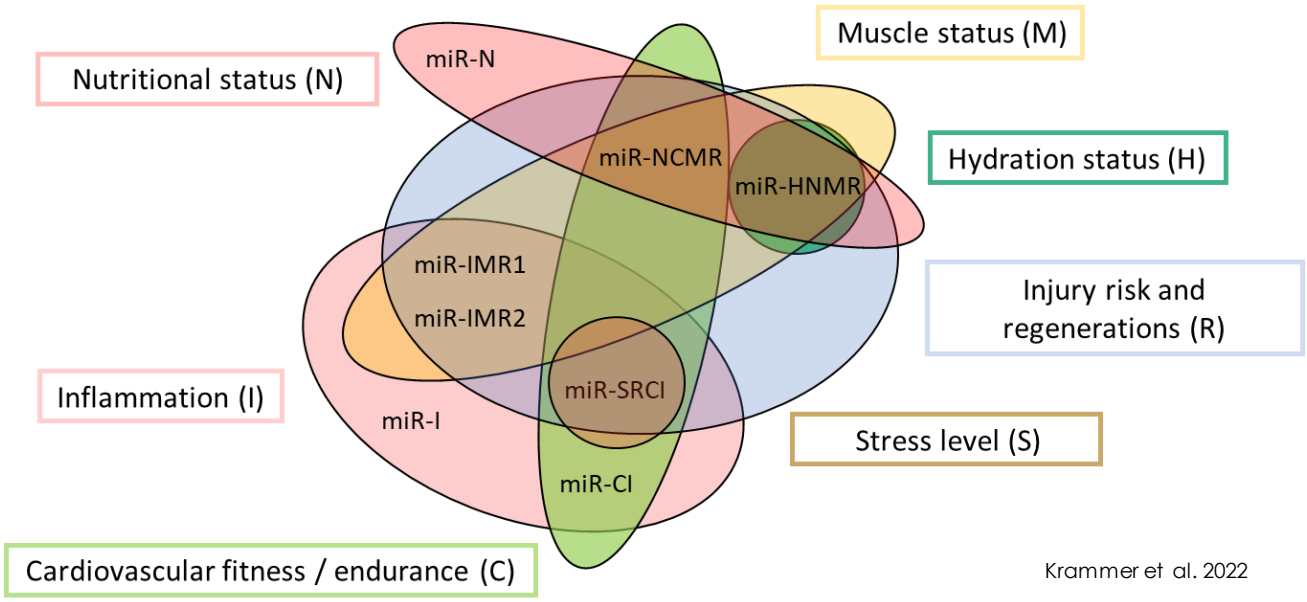
Epigenetics – miRNA Analysis

miRNAs – the HBC biomarker algorithm

By analyzing 8 different miRNAs, HBC can use an algorithm to give you personalized training, exercise and nutrition recommendations based on your cellular training level.
In this way you can optimize your training individually.



Krammer et al. 2022

Our 8 selected miRNAs provide information about the current state of your body using different algorithms and combinations. The figure above shows how the individual biomarkers (categories) are composed and what functions the respective miRNAs have. The miR-SRCI, for example, is used to assess your exposure / stress level, your cardiovascular fitness, your inflammation, as well as your risk of injury and your ability to regenerate.

Krammer, Ulrike DB, et al. "MiRNA-based "fitness score" to assess the individual response to diet, metabolism, and exercise." Journal of the International Society of Sports Nutrition 19.1 (2022): 455-473.

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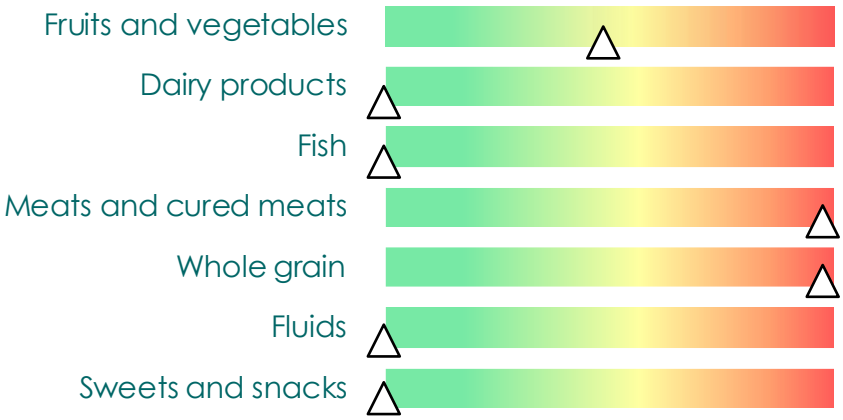
Evaluation of your diet and lifestyle questionnaire

Overwiew of your eating habits



Your diet was compared with the WHO recommendations, such as the food pyramid. The results of the nutrition groups are displayed in the traffic light system.

Your diet is relativ ely balanced. Reduce your meat consumption to under 6 serv ings a week. Increase your fruit and v egetable intake to 5 serv ings a day. Try to integrate more v egetables and seeds (husks) into your diet, also a daily consumption of whole grains would be beneficial.

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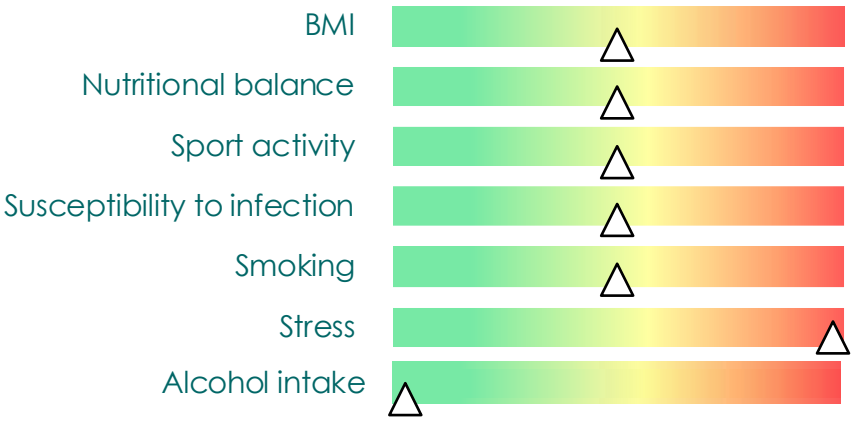
Evaluation of your diet and lifestyle questionnaire

Overview of your lifestyle parameters



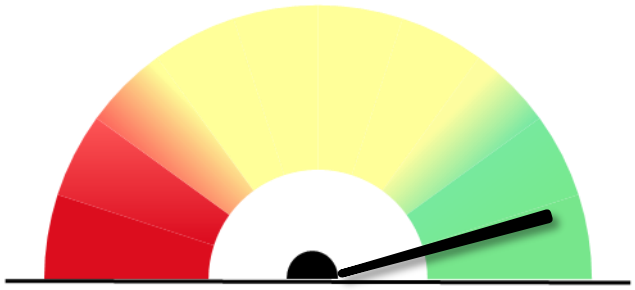
The sporting activity reflected here refers to the recommendations of the Federal Ministry for Defense and Sport and does not necessarily have to meet your personal needs.

Your lifestyle is relatively balanced. Focus on a more balanced diet. Try to lower your stress level, e.g. through mediation or autogenic training.

Fitness and health score

The fitness and health score provides an initial general assessment of your current cellular training, health and nutritional status.

The individual and combined consideration of the miRNAs provides information about nutrition (e.g. micronutrient status), inflammation, cardiovascular fitness, risk of injury, regeneration, muscle status, fluid balance and stress level and is explained in detail on the following pages.



Fitness and health score

The evaluation of your fitness and health score shows that you are in the optimal range. There is hardly any room for improvement. On the next few pages you will find out in which areas you may still be able to optimize and receive recommendations on how you can achieve or implement them.

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Nutritional status

The best nutrition for an athlete (see appendix) improves his performance and supports his regeneration. The combined analysis of 3 different miRNAs provides information about your vitamin and micronutrient requirements, as well as your nutritional status. And provides information about whether you are adequately supplied with the respective vitamins (B vitamins, such as cobalamin and folic acid) and nutrients (e.g. iron and magnesium) or whether you have an additional training-related requirement.

Nutritional status

Your value for the "nutritional status" biomarker is in an optimal range. They are well supplied with nutrients (vitamins and micronutrients). In order to maintain your good status, pay attention to the consumption of fruits and vegetables, as well as whole grain products, which are rich in B vitamins and micronutrients (magnesium, iron and zinc). Foods rich in vitamin B are mainly green leafy vegetables (such as spinach), magnesium, on the other hand, can be found in nuts and sunflower seeds, and zinc in dairy products (such as cheese) or legumes.

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Hydration status

During sporting activities, especially endurance training or training at high temperatures, there is a loss of fluid due to increased sweat production and increased respiration. Dehydration can impair your physiological body functions and reduce your athletic performance.

Hydration status

Your value for the "hydration status" biomarker is in the optimal range. In order to maintain your good status, you should nevertheless ensure that you drink at least 2 liters of fluids per day and that you also take in fluids during training sessions.

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Risk of injury and regeneration ability

There are so-called endogenous (without external influence, e.g. through overexertion) and exogenous (with external influence) injuries. Regeneration or recovery is important when preventing injuries. In the case of insufficient recovery / excessive demands on the body, stagnation or even a drop in performance occurs and the risk of injury increases. The combined analysis of 5 different miRNAs provides information about your current ability to regenerate and thus your risk of injury.

Risk of injury and regeneration

Your value for the biomarker "risk of injury and regenerative ability" is in the optimal range. Nevertheless, make sure you have sufficient recovery phases between the individual training units in order to give your body the time to regenerate and build up performance. With sufficient recovery, your ability to concentrate is maintained and the risk of injury is minimized.

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Exposure / stress level

Stress is a disruption of the homeostasis of rest, can be triggered by muscle activity, temperature changes or emotions and increases energy expenditure. All actions taken to switch from rest to performance homeostasis are called stress reactions and serve to prepare the organism for physical stress. A distinction is made between eustress (stress corresponds to the ability to recover, performance is restored) and distress (disproportion, recovery is incomplete and the result is chronic fatigue (burnout) and a decline in performance).

Stress level

Your value for the biomarker "exposure / stress level" is in an average range. Try to minimize your stress and to extend / optimize your recovery phases. You can achieve this by reducing your daily workload, avoiding time pressure, resolving conflicts and periodizing your training. That means do not train the same amount every day, plan 1-2 training-free days / week and a recovery week every 2-4 weeks. In addition, you can strengthen your recovery phase by using relaxation techniques (e.g. autogenic training, biofeedback or "tea breaks").

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Cardiovascular fitness

Cardiovascular fitness refers to the efficiency with which the heart pumps blood and oxygen around the body. Good cardiovascular fitness enables athletes to exercise longer, lower the risk of cardiovascular disease and osteoporosis, support weight loss and improve their physical conditions. The combined analysis of 3 different miRNAs, which correlate with the VO2max and the genetic predisposition for endurance performance, provides information about your current cardiovascular fitness and endurance performance.

Cardiovascular fitness

Your value for the "cardiovascular fitness" biomarker is in the optimal range. To maintain your good status, keep your current cardio training program.

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Inflammation

Exercise can prevent inflammation because regular exercise increases anti-inflammatory immune cells (regulatory T cells), reducing the risk of cardiovascular diseases and diabetes. On the other hand, during physical exertion the body releases more stress hormones / inflammation markers (such as adrenaline, noradrenaline and cortisol), with which the body normally gets along well. If, however, there is sustained elevated levels of these hormones (especially cortisol), due to excessive stress, this can also have some negative effects (e.g. sleep disorders, poor concentration, reduced muscle build-up, etc.). The combined analysis of 5 different miRNAs provides information about possible inflammatory processes in your body.

Inflammation

Your value for the "inflammation" biomarker is outside the optimal range. To strengthen your immune system and reduce inflammation, pay attention to your regeneration (adequate sleep), diet (especially the adequate intake of vitamin C and zinc, as well as fruits and vegetables such as broccoli and citrus fruits), relaxation (avoidance of Constant stress), exercise (to a moderate extent, if necessary, you do too much sport) and intestinal flora (intake of whole grain products / fiber promote the positive intestinal bacteria, which produce immune-promoting short-chain fatty acids).

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Muscle status

The quality of the skeletal muscle tissue (size, composition, metabolic capacity) is an essential aspect of athletic health and performance. The strength, speed, exhaustion and endurance of an athlete are influenced by the muscle status or the fatigue and recovery status of the muscle. Insufficient recovery from muscle damage caused by exercise also leads to impaired performance. The combined analysis of 4 different miRNAs provides information about your current muscle status and health.

Muscle status

Your value for the "muscle status" biomarker is in the optimal range. To maintain your good status, keep your current weight training workload.

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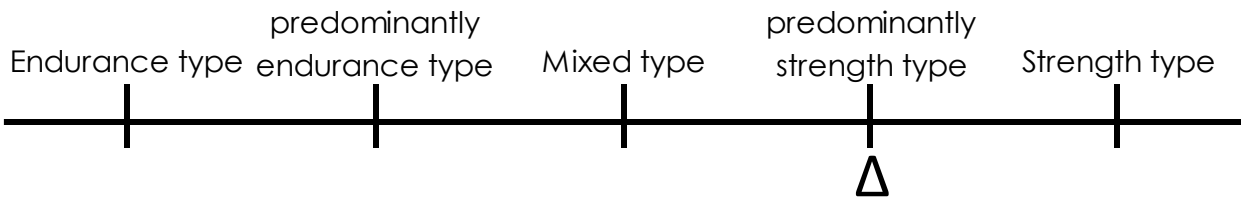
SNPs - Results

The *FTO* gene gives an indication of how easily you can or cannot lose weight while exercising.

Influence of sport on body weight

The analysis of your FTO gene has shown that you can find it difficult to lose weight with exercise alone. You should therefore maintain a calorie deficit in addition to exercise for successful weight loss.

The *ACE* and *ACTN3* genes indicate whether you are genetically more the strength or endurance type.



Based on the SNP analysis of the ACE and ACTN3 genes, you are predominantly the strength sports type. Strength sports such as weightlifting, power triathlon (powerlifting: squats, bench press and deadlift) or bodybuilding are particularly suitable for you.

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SNPs - Results

The *BDNF* gene provides an indication of how motivated you are to exercise.

Motivation to do sports

The analysis of your BDNF gene has shown that you have no increased motivation to do sports.

The *ACTN3* gene also provides an indication of how high your risk of muscle damage and injury is.

Risk of muscle damage

Analysis of your ACTN3 gene has shown that you have a low risk of muscle damage. However, be sure to warm up before training and then cool down and / or stretch afterwards.

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Epigenetically Active Plant Ingredients – Based on your Analysis

Active ingredient		Marker	Occurrence or activated by	Amount to be consumed	Comment
Capsaicin	✓	**Fat burning miRNA (miR-IMR2)**	Peppers and chili peppers	0.8 to 1.5 mg capsaicin / day or 1 g chilli powder	Capsaicin is fat-soluble and has an analgesic and blood circulation-promoting effect
Betaine		**Muscle gain miRNA (miR-HNMR)**	Quinoa, white goosefoot, broccoli, spinach, beetroot	500 to 2000 mg betaine / day	Betaine has a protective effect against arteriosclerosis and hypertension and can also be synthesized by the body itself
Celastrol		**Muscle vitality miRNA (miR-NCMR)**	Thunder duke vine (a plant native to East Asia)	30 mg celastrol / day	Celastrol has an antioxidant and ant-inflammatory effect and is available as capsules or drops
Curcumin		**Mind miRNA (miR-N)**	Tumeric	max. 300 mg curcumin / day e.g. 5 to 10 g tumeric powder	Take with balck pepper (piperine) and oil. Pregnant or breastfeeding women and patients with gallstones are advised not to take curcumin
Epigallo-catechin gallate (EGCG)		**Sport & Lifestyle reflective miRNA (miR-I)**	Unfermented tea e.g. white or green tea	max. 800 mg EGCG / day e.g. 1 cup of green tea contains approx. 165 mg EGCG	Piperine (pepper), vitamin C and fish oil improve bioavailability (effect)
Genistein	✓	**Cell renewal miRNA (miR-CI)**	Soybeans, kidney beans, chickpeas, dark chocolate	40 to 80 mg red clover extract / day e.g. max. 4 cups of red clover tea	Extracts are more effective than red clover tea powder: pour 4 to 6 teaspoons of fresh blossoms into 250 ml of water, stepping time approx. 10 minutes
Kaempferol	✓	**Overreaching miRNA (miR-SRCI)**	Red grapes, gingko, grapefruit, broccoli, brussels sprouts, potatoes, onions, pumpin, cumcumber	200 to 600 mg kaempferol extract / day	Kaempferol has an antioxidant, anti-inflammatory and analgesic effect and is available as capsules or powder
Proantho-cyanidin	✓	**Fitness miRNA (miR-IMR1)**	Elderberries, cranberries, wild blackberries, rosehips, grape seeds	36 mg proanthocyanidin / day	The shell, core and pips in particular contain high levels of proanthocyanidins

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Epigenetically active plant substances – based on your analysis

Active ingredient		Marker	Occurrence or activated by	Amount to be consumed	Comment
Quercetin		**Sport & Lifestyle reflective miRNA (miR-I)**	Onion, capers, lovage, choves	at least 200 mg quercetin / day e.g. 125 g capers or 500 g onions	Quercetin is heat sensitive
		Mind miRNA (miR-N)			
Resveratrol		**Muscle gain miRNA (miR-HNMR)**	In the skin of grapes, raspberries, cranberries, red currants and strawberries	150 mg trans-resveratrol / day	The amount of resveratrol is very difficult to cover throug diet
		Mind miRNA (miR-N)			
	✓	**Overreaching miRNA (miR-SRCI)**			
Selenium	✓	**Fitness miRNA (miR-IMR1)**	Meat, fish, eggs, dairy and grain products	60 µg / day for women 75 µg / day for lactating women 70 µg / for men	Selenium primarily protects cell membranes and plays a role in DNA synthesis, cell division and cell growth
Sulforaphane		**Sport & Lifestyle reflective miRNA (miR-I)**	Cruciferous plants, such as cabbage and broccoli, especially in the broccoli sprouts	25 mg sulforaphane / day e.g. 250 g broccoli	Only steam the broccoli briefly or enjoy it raw, otherwise there will be less sulforaphane
Vitamin D3	✓	**Overreaching miRNA (miR-SRCI)**	Cod liver oil, herring, salmon, sardines, oysters, tuna, mackrele, veal, chicken eggs	100 µg / day (4.000 IE)	Vitamin D3 is fat-soluble and is best taken with oil and with a meal
Zinc	✓	**Muscle vitality miRNA (miR-NCMR)**	Meat, dairy, whole grains	7 to 16 mg / day	In addition to its role, in the immune system, zinc is also involved in cell growth and wound healing, a high phytate intake can impair zinc absorption

✓ Based on your epigenetic sports analysis, we recommend that you increase your intake of the substances marked in the table

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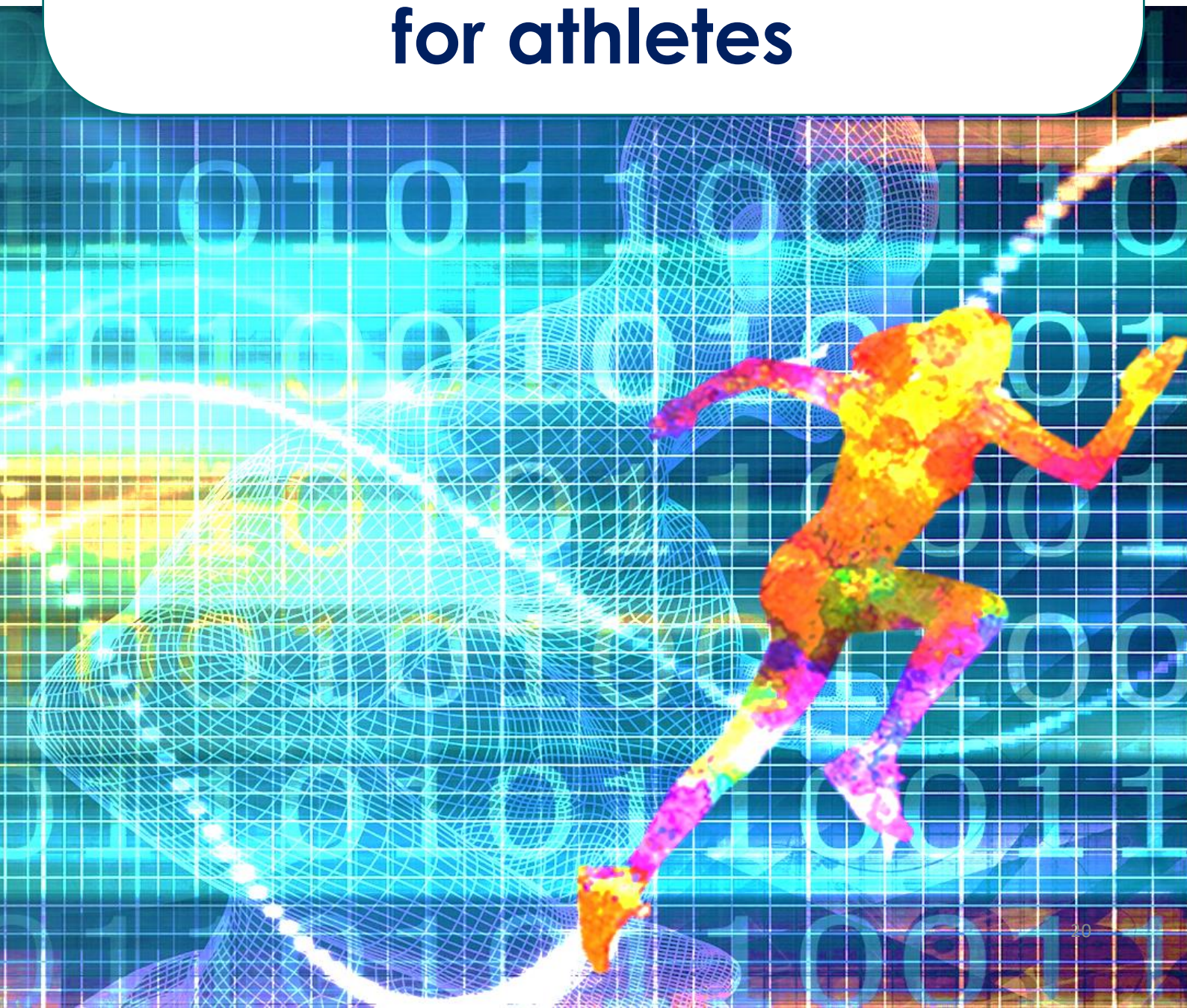
Nutrition recommendations for athletes



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Contents

Carbohydrates

In addition to fats and proteins, carbohydrates (= saccharides) form the largest usable and non-usable (roughage) portion of food. They play a central role as primary energy sources for cells and the central nervous system and as energy suppliers for the muscles during physical exertion. With increasing exercise intensity, the proportion of carbohydrates in the provision of energy increases, while that of fat decreases. However, their storage capacity in the body is limited[1].

Carbohydrate storage of an endurance athlete (approx. 75 kg)

ENERGY SUBSTRATE	AMOUNT (IN GRAMS)	ENERGY (IN KCAL)	PHYSIOLOGICAL PECULIARITY
BLOOD GLUCOSE	4 – 6	20 – 24	Mental willingness to perform
LIVER GLYCOGEN	100	400	Blood sugar level → Brain
MUSCLE GLYCOGEN	400 – 500	1.600 – 2.000	Fast source of energy for active muscles
SUBCUTANEOUS FAT TISSUE	7.000 – 8.000	63.000 – 72.000	Slow but long-term source of energy
INTRAMUSCULAR LIPIDS	250 – 600	2.250 – 5.400	Lipid stores in the muscle

Table 1. Carbohydrate stores: data according to JEUKENDRUP et al. 1998[2] and SYLOW et al. 2017[3]

Carbohydrates and intensive endurance training:

Adequate carbohydrate intake ensures the athlete's ability and willingness to perform. Continued training with a chronically low carbohydrate intake leads to impaired training performance and adaptation, as well as an increased tendency for symptoms of fatigue (e.g. due to depleted glycogen stores and impaired protein balance)[4].

Carbohydrate intake during endurance exercise:

If there is a lack of carbohydrates, there will be a drop in performance and the catabolic metabolism will increase. During exposure, the uptake and oxidation rates are limited. The absorption and oxidation rate can be increased by an increased intake of "multiple transportable" carbohydrates (e.g. maltodextrin and fructose)[5].

Recommended carbohydrate intake during physical exertion:

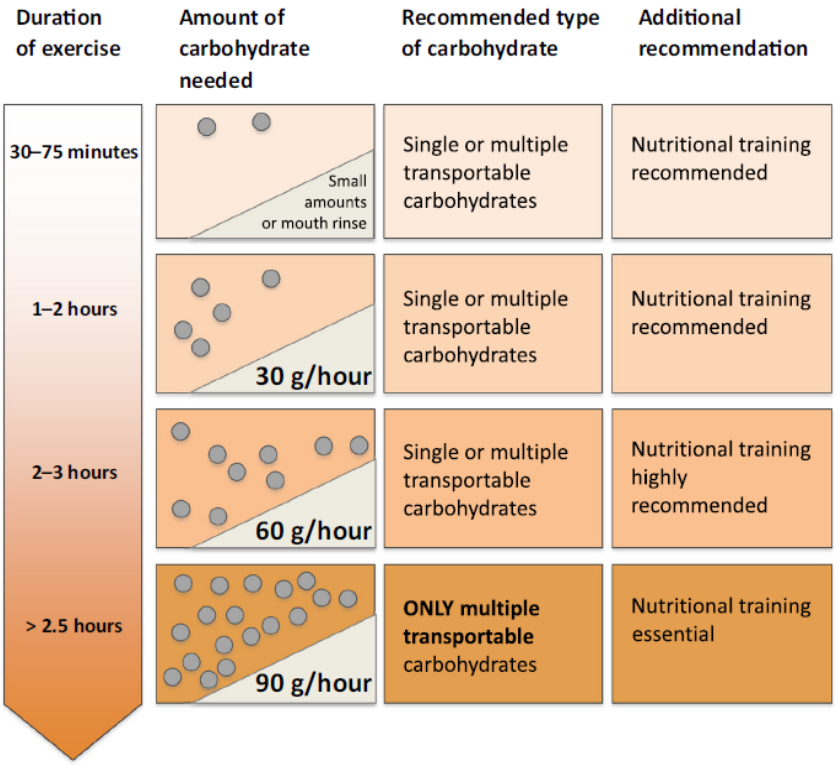

Table 2. Carbohydrate intake during exercise: These recommendations are for well-trained athletes. For beginners, these might need to be adjusted downwards[6].

Carbohydrate supply and regeneration:

Complete regeneration of muscle glycogen after exercise takes about 24 hours, depending on the degree of muscle damage. The "anabolic window" (0 - 4 hours after training) should be used for rapid and targeted replenishment. During the "anabolic window" there is, for example, an increased insulin effect and improved glucose transport into the muscle cells. About 1 g of carbohydrates per kg of body weight / per hour in the first 4 hours is recommended[4].

Recommended carbohydrate intake during physical training:

DAILY SCOPE OF TRAINING	RECOMMENDED CARBOHYDRATE INTAKE	EXAMPLE FOR 75 KG
Low - moderate	3 – 5 g / kg BW / Tag	225 – 375 g / day
Medium (from approx. 1 h)	5 – 7 g / kg BW / Tag	375 – 525 g / day
High (approx. 1 – 3 h)	6 – 10 g / kg BW / Tag	450 – 750 g / day
Very high (approx. > 4 – 5 h)	8 – 12 g / kg BW / Tag	600 – 900 g / day

Table 3. Recommended carbohydrate inteke: references from BURKE et al. 20117 and BURKE et al. 2017[4]; BW = body wight

Fats

Fats are among the basic nutrients of humans and are required, among other things, as energy suppliers, protective cushions for internal organs and "solvents" for fat-soluble substances (some vitamins). A distinction is made between storage fat (long-term energy reserve via fat oxidation for endurance sports) and structural fat (essential components of all body cells).

Fat oxidation during exercise is influenced by several factors[8,1,9,10]:

- **Training status: E**ndurance training (interval and continuous method) increases fat oxidation through various mechanisms (e.g. improved oxygen uptake and increased mitochondrial density) and thus "spares" the glycogen stores.
- **Exercise intensity:** with increasing intensity, fat oxidation decreases.
- **Duration of exercise:** the oxidation of fat increases with increasing duration.
- **Nutrition:** high carbohydrate intake and full glycogen stores reduce fat oxidation.
- **Gender:** Females show a higher rate of fat oxidation, increased mitochondrial density, and increased mitochondrial oxidative capacity.

In addition, endurance training has significant health-promoting effects, e.g. on blood lipids and insulin sensitivity. Studies have shown that 2 to 4 hours of aerobic exercise per week increases HDL cholesterol by approximately 2-3 mg/dL and reduces triglycerides by 8-20 mg/dL[11]. Endurance-trained individuals showed increased turnover (enhanced energetic utilization and re-synthesis) of intramuscular lipids, which may have a positive impact on insulin sensitivity[12].

Possible dietary interventions to increase the utilization of fats[13,14,15,16]:

- **Caffeine:** has a performance-enhancing effect, exhibits short-term thermogenic effects, increases resting metabolic rate, and increases free fatty acid release.
- **Green Tea (EGCG):** Possibly has the potential to increase lipid metabolism and may help shed body fat and body weight. However, the evidence regarding fat oxidation and practical relevance is still insufficient.
- **Carnitine Supplementation:** Carnitine plays a role in transporting fatty acids between the cytosol and mitochondria. Studies show isolated positive results, but overall controversial and insufficient.
- **Long-term increase in fat content ("fat loading"):** can trigger metabolic adaptations in the muscle (higher fat oxidation rates). But due to suboptimal training adaptations (no improvement in performance, poorer oxygen utilization) and impairment of muscle glycogen breakdown during intense exercise, this is not recommended.
- **Temporary manipulation of carbohydrate availability** (see "train low, compete high" digression)**:** Studies suggest that fat oxidation is increased during submaximal exercise, following low-glycogen training.

Proteins

Proteins consist of amino acids. There are 21 different amino acids in total, 8 of which are essential for the human body because it cannot produce them itself. One of the main tasks of proteins is the construction and renewal of endogenous proteins. They also have a variety of functions, e.g. as structural, transport, hormone or enzyme proteins.

Gründe für den Mehrbedarf an Proteinen bei körperlichem Training:

- Training-induced regeneration of endogenous proteins for the growth of muscle fibers, mitochondria, enzymes, etc.
- Increased maintenance requirements due to increased protein turnover (ensures plasticity; see excursus "protein turnover")
- Regrowth after exercise-induced muscle damage
- Additional requirements can be covered by natural nutrition
- Timing and distribution of protein intake important
- Net protein balance = protein synthesis - protein breakdown

Protein intake, recovery, and adjustments to strength and endurance training[17,18,19]**:**

- Training-induced regeneration of proteins in the muscles, e.g. mitochondrial proteins, myofibrils and metabolic enzymes, form the basis for training adjustments.
- Protein intake close to training accelerates the availability of essential amino acids and activates anabolic signaling pathways. This leads to increased muscle protein synthesis ("anabolic window").
- With increasing training status, timely protein intake after training becomes more and more important.
- Furthermore, the efficiency of muscle protein synthesis decreases with age ("anabolic resistance"). But even in older people, exercise increases the anabolic effects of protein intake.
- Efficiency to stimulate muscle protein synthesis: whey > casein > soy protein

Dose-response relationship and muscle protein synthesis[20,21,22]**:**

- For a maximized muscle protein synthesis, the intake of 20 - 25 g of protein is necessary close to the training.
- In general, a slightly higher intake (> 25 g) is recommended for intensive full-body strength training and for older people. However, a protein intake of ≥ 40 g showed no other beneficial effects on muscle protein synthesis.
- Early intake of 25 g of protein after training accelerates the availability of essential amino acids in the blood and muscles. As a result, anabolic signaling pathways and muscle protein synthesis are increasingly activated. Possible mechanisms involved are increased insulin effectiveness and increased blood flow to the muscles.
- Furthermore, a study23 showed that early and then repeated intake of 20-25 g protein at regular intervals after training stimulates muscle protein synthesis best (dose of 4 x 20 g protein).
- Another study24 showed that a combined intake of 0.4 g protein/kg bodyweight/hour and 1.2 g carbohydrate/kg/hour after endurance training had the best effects on muscle glycogen resynthesis and muscle protein synthesis.

Resistance training, energy deficit and increased protein intake::

During an energy deficit to reduce body fat percentage, there is also a loss of lean body mass. The combination of strength training and increased protein intake of around 1.6 g protein/kg body weight/day appears to be sufficient to counteract this loss of muscle mass[25].

Recommended protein intake during physical training:

TRAINING TYPE AND TRAINING LOAD	RECOMMENDED PROTEIN INTAKE	EXAMPLE FOR 75 KG
ENDURANCE TRAINING FROM APPROX. 3 H NET WEEKLY TRAINING TIME	≥ 1,2 g / kg BW / day	90 g / day
ATHLETIC ENDURANCE TRAINING	1,6 – 1,7 g / kg BW / day	120 – 128 g / day
STRENGTH TRAINING (TRAINING STRUCTURE)	1,5 – 1,7 g / kg BW / day	113 – 128 g / day
ZEITNAHE NACH DEM TRAINING	approx. 0,25 – 0,40 g / kg BW	ca. 19 – 30 g

Table 4. Recommended protein intake: references according to PHILLIPS 2014[26], McGLORY et al. 2017[27], CLOSE et al. 2016[28] and VAN VLIET et al. 2018[29]; BW = body weight

Digression: Example of sports science advice

Triathlet (approx. 27 years):
78 kg; 1,83 m;
basal metabolic rate of 1900 kcal;
Medium physical activity occupation (PAL = 1.6);
Endurance training of 8 h (net weekly training time);
strength training of 0.75 h, average total daily energy expenditure of 3900 kcal

Energy intake and breakdown of macronutrients on a training day (approx. 1.5 hours of running at moderate intensity, total daily energy expenditure of 4050 kcal):

	CARBOHYDRATES	PROTEINS	FATS
G / KG BODY WEIGHT	7,5 g	1,6 g	1,8 g
AT 78 KG	585 g	125 g	138 g
ENERGY PERCENT 6 AMOUNT	58 % (2340 kcal)	12 % (500 kcal)	30 % (1210 kcal)

Table 5. Example of nutritional recommendation: Source: Script "Molecular-physiological aspects of sports nutrition" 2019 by Mag. Oliver Neubauer

Digression: train low, compete high[30]

The filling level of the glycogen stores influences the training-related activation of signaling pathways (e.g. AMPK, PGC-1a) in the muscles. Some studies show partially increased training adaptations with occasional training in glycogen deficiency. Especially in untrained people or beginners, molecular adaptations and a clearer increase in performance occur[31].

- Train low does not mean chronically low carbohydrate intake
- Rather: individually adapted, periodic integration of individual train low units into basic endurance training
- Or morning fasted training (decreased liver glycogen) or second training session after moderate carbohydrate intake (decreased muscle glycogen)
- Possible relevance in high-performance endurance training
- Additional performance improvements more difficult to achieve in trained individuals.
- Unsuitable for higher intensity workouts
- Important: Recommendations for daily carbohydrate intake remain valid

Example model for periodic carbohydrate intake in competitive sports:

	CHO Feeding Schedule			
Training Session	**Pre-Training Meal**	**During Training**	**Post-Training Meal**	**Evening Meal**
Day 1: 4-6 hours high-intensity session consisting of multiple intervals >lactate threshold	**HIGH**	**HIGH**	**HIGH**	**LOW**
Day 2: 3-5 hours low-intensity steady state session at intensity < lactate threshold	**LOW**	**LOW**	**HIGH**	**HIGH**
Day 3: 3 hours high-intensity session consisting of multiple intervals > lactate threshold.	**HIGH**	**MEDIUM**	**HIGH**	**MEDIUM**
Day 4: < 1 hour recovery session at intensity <lactate threshold	**LOW**	**LOW**	**HIGH**	**HIGH**

Table 6. Periodized Carbohydrate Intake: The model is based on an elite endurance athlete (e.g., road cyclist) training once a day for four consecutive days[32].

Digression: protein turnover

When older proteins are broken down, they need to be replaced (protein synthesis). This concept is called protein turnover, and different types of proteins have very different turnover rates. A balance between protein synthesis and protein breakdown is required for good health and normal protein metabolism. More synthesis than breakdown indicates an anabolic state that builds lean tissue, while more breakdown than synthesis indicates a catabolic state that "burns up" lean tissue[33].

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Good success and motivation!