



NUTRITION COACH

LEVEL 1

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_ LEVEL 1

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WELCOME!

Welcome to your educational journey towards the Nutrition Coach certification. I would like to thank you for choosing to take this course with us. We very much look forward to teaching you about nutrition and its importance to your clients and to yourself – physically as well as mentally. We employ a flexible teaching method. You can break down the course into small bits and take them at your own tempo.

Good luck.

Patrick Nielsen

MEET YOUR TEACHERS



RUNE DEGN
Teacher

My name is Rune, and I am a teacher at Træner Akademiet. I became a teacher because I want to help raise the standard of newly-qualified personal trainers, thus generally improving our ability in the industry to help clients reach their goal. It is important for me to ensure that my students get the best possible start as personal trainers. Therefore, it goes without saying that it is important to prepare them properly for this endeavour.

Apart from my work as a teacher at Træner Akademiet, I am a personal trainer at Fruerlund Studio, which is located in the centre of Aarhus. We employ a holistic approach with our clients, which may involve exercise, nutrition, sleep, stress management and mobility. Furthermore, I am in the process of taking my master's degree in sport at Aarhus University, which will be completed this summer.



**FREDERIKKE
VAGN-HANSEN**
Nutrition Coach

My name is Frederikke Vagn-Hansen, and I am a teacher at Træner Akademiet. I have a professional bachelor's degree in Global Nutrition and Health from VIA University College in Aarhus, which I completed in January 2017.

In addition, I hold a personal trainer certification, and I am trained in the concepts of Zumba, BodyCombat and BodyFlow.

Today, I work as a nutrition coach and personal trainer, teacher, online course manager and with various minor projects that pop up. I am enthusiastic about sharing my knowledge of health with as many people as possible, and I am therefore incredibly proud of being part of the passionate team behind Træner Akademiet. Here, we inspire as many people as possible, thus spreading the powerful message of adopting a healthier lifestyle.



CHAPTER 1

WHY WORK WITH NUTRIENTS?

CELLS - THE BODY'S BUILDING BLOCKS

After reading this chapter, you will gain an understanding of the structure of the cells, the organelles that can be found in cells, their individual function and, finally, how cells are essential for the body to function optimally.

ENERGY BALANCE

After reading this chapter, you will gain an understanding of how to calculate an individual's maintenance energy requirement, the relationship between theory and practice, and the factors that influence energy balance.

WHY IS IT IMPORTANT TO CONCERN YOURSELF WITH DIET AND NUTRITION?

Fuel for the body

Energy, well-being and digestion.

Health, body composition and performance

All three should be covered by a good nutrition plan for your client.

Prioritising one of these at the expense of the others may produce suboptimal results for the client.

LIMITING FACTORS

There may be several limiting factors that determine whether the client achieves their goals. Your most important role is to find these factors and "remove"/correct them. After that, the client's goals will be easier to achieve.

Limiting factors may include:

Genetics – this is something we have no influence over, but we can all improve relative to our starting point!

Physical activity level – how much, how often and how long? Activity burns Calories, which means we can eat more, or it can help maintain an energy deficit. Muscle mass versus fat mass.

Physiology – body composition

The mental part – their mindset

Diet



A SOUND DIET

1

Check the energy balance

- Calories in vs Calories out
- Energy deficit = weight loss
- Energy surplus = weight gain
- Calorie density = Calorie content in relation to the weight of a food item (foods with many Calories per 100 g = high Calorie density)

2

Ensures high nutrient density and low Calorie density

- Amount of minerals, vitamins and fibre compared to the total number of Calories in a food item.
- Therefore, a diet consisting of foods with high nutrient density and low Calorie density would be advantageous for the following reasons:
 - Easy to control caloric intake
 - Greater feeling of fullness for a longer time
 - Hard to overeat
 - Greater intake of vitamins, minerals, fibre and protein

3

Leads to improves health, body composition and performance

- Aesthetic results, reduces fat, increases muscle mass, increases insulin sensitivity, reduces the risk of diabetes, improves cholesterol levels and improves everyday/sport performance.
- It is not just about losing weight; it is about improving all other factors while you are doing it.

4

Goal based

- The plan the client follows – is it working or not?
- Test and re-test to track development
- Good nutrition = results



8 STEPS FOR EFFECTIVE NUTRITION COACHING

1 Preparing for the client

2 Collect information about the client

(eating habits, lifestyle, personality, body composition, etc.)

3 Evaluation of information

4 Make a plan for the client

5 Possible dietary supplements – recommendations

**# 6 Together, establish goals as well as
a strategy for execution**

7 Adjustments based on client results

8 Keep educating and helping the client

When evaluating a client's diet and lifestyle habits, it may be advantageous to use an overview of the various dietary factors that can be adjusted.

One of these overviews is a modified diet pyramid, as seen below in Figure 1.

As a coach, you can determine the client's "level" on the basis of what they tell you, i.e. where they are located on the pyramid. From this, you can also determine the client's starting point in the process.



FIGURE 1: THE NUTRITION PYRAMID.
REPRESENTS ALL THE FACTORS IN THEIR RESPECTIVE ORDER OF
IMPORTANCE TO ACHIEVE AN OPTIMAL DIET

CELLS

— STRUCTURE AND FUNCTION

A man weighing 75 kg consists of approximately 100 trillion individual cells, all of which must work together to create life. The way these cells work together determines, among other things, cellular and tissue responses, signal conduction through the body, tissue formation/growth, respiration, digestion, absorption, fluid secretion, waste secretion, blood and biochemical circulation, and cellular reproduction. Diet is an essential part of normal cellular function, as various nutritional deficiencies interfere with cell function. In general, we are one organism consisting of several systems, which can withstand heat, cold, wetness, dryness and too little or too much food. It can repair itself, reproduce and replace everything in order to stay alive and preserve what we call homeostasis, which refers to a state of balance in the function of the body. The atom is the smallest form of life. Atoms are so small that we cannot see them with the naked eye, and it is these atoms that make up all matter in the universe. Several atoms can form a molecule. Molecules and macromol-

ecules further form the cytoplasm of the cell, where the cell organelles are located. Cells have different functions and interact with each other, in order to ensure the optimal function of the body. Our tissue consists of groups of cells. There are four main groups of tissue: muscle tissue, connective tissue, nerve tissue and epithelial tissue. Muscle tissue forms skeletal muscles and the heart; connective tissue consists of joints, fascia and tendons; and nerve tissue makes up our brain and nerves. Among other things, tissue acts as a locomotive apparatus via our muscle tissue, and as communication between cells and the nervous system. Tissue forms our organs, such as the liver, kidney, spleen, appendix, pancreas, intestine, stomach and oesophagus. All these organs have specialised functions and are constituent parts of the organ system, where they communicate with each other and work together in order to optimise the body's functions. If we split the body up into organ systems, we see different systems each with different functions:

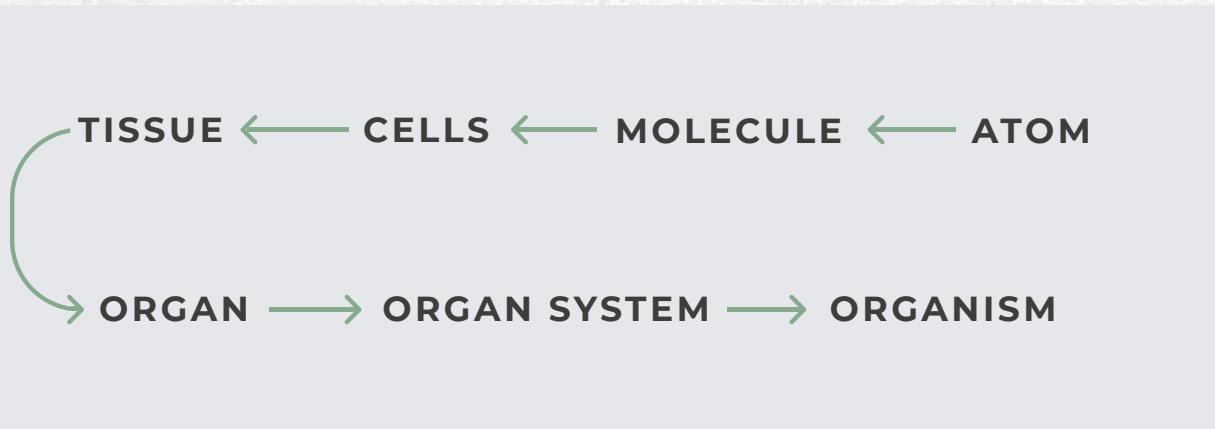


FIGURE 2: THE BODY'S
ORGANISATIONAL STRUCTURE



Epithelium (skin) system

- consists of skin, nails, hair and sweat glands, and it protects the body from external harm.

Muscular system

- produces movement (e.g. locomotion, pushes blood through blood vessels or pushes food through the intestines).

Skeletal system

- support system (bones, tendons, joints).

Nervous system

- brain and nerve pathways/tissues. Electrochemical cell communication. Signal system/messengers that send signals to create movement, thoughts, voluntary and involuntary activity.

Endocrine system

- hormonal system consisting of hormonal organs and glands, incl. the hypothalamus (controls hormones, metabolism, thirst, hunger, sexual behaviour, etc.), pituitary gland (creates GH, FSH, TSH, etc.), liver, pancreas, kidneys, adrenal gland, thyroid gland, etc. Factor in fertility (progesterone, cortisol and sex hormones).

Cardiovascular system

- heart, blood and blood vessels. Transports hormones, enzymes, nutrients, etc. around the body.

Immune system

- the body's defence against pathogens, tumour cells, viruses, bacteria, etc.

Respiratory system

- nose, trachea, lungs, etc. Ensures excretion of carbon dioxide and intake of oxygen.

Digestive system

- digests and absorbs food – the gastrointestinal tract (mouth, oesophagus, stomach and intestines), as well as gallbladder and pancreas. Breaks down and absorbs nourishment from what we consume.

The urinary system

- kidneys, ureters, bladder and other related organs and glands. Produces, stores and secretes urine.

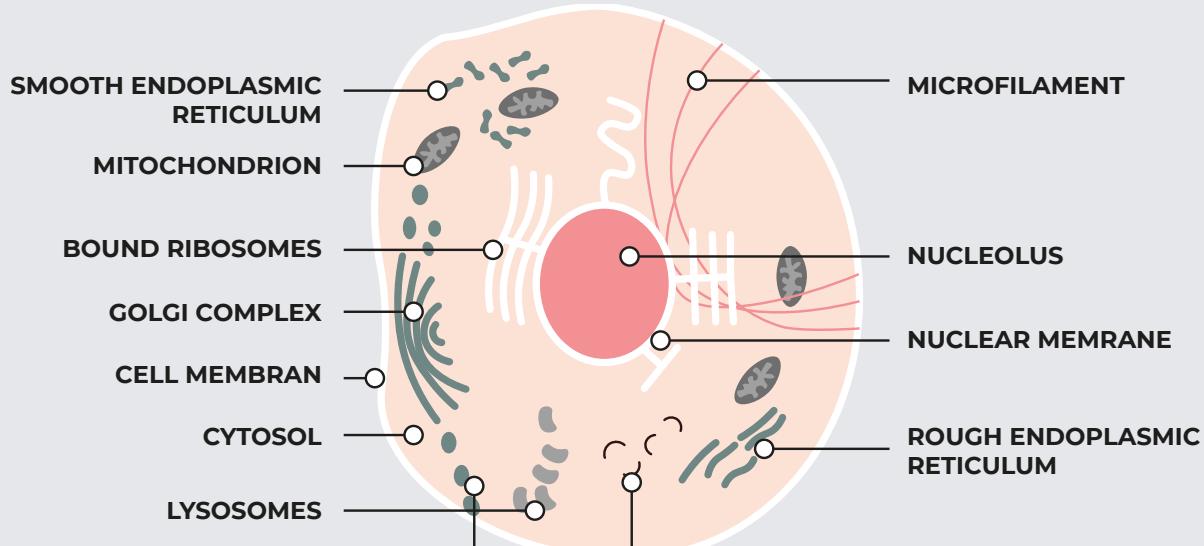
Reproductive system

- genitals and glands. Responsible for human reproduction.

CELLS

— CELL ORGANELLES

FIGURE 3: THE CELL AND ITS COMPONENTS



Tissue is formed from large groups of cells, where in each cell, there are several cell organelles (24 known), which include the Golgi apparatus and mitochondria. These organelles are located in the cytoplasm of the cell.

Plasma Membrane

Protective layer between the cell and its surroundings, which keeps important things inside the cell and dangerous things outside it. Consists of lipids, proteins and cholesterol (mostly phospholipids, which are two-headed, with a hydrophilic (for water) and a hydrophobic (against water) head). These form a membrane that offers protection and controls regulation in and out of the cell. Because of the cell membrane's

lipid structure, the fat we consume in our diet will influence the "transparency" of the cell membrane, i.e. how it can interact with other cells. A diet high in saturated fat makes the cell membrane more rigid, while a diet high in polyunsaturated fat increases the fluidity of the membrane. Since a cell membrane which has higher fluidity/transparency improves the health of most cell types, it is important to balance the intake of saturated and unsaturated fatty acids. This ensures that the communication between the cells is optimal.

Cytoplasm

The term for everything located within the plasma membrane and outside the cell nucleus. This is where all the cell

organelles are located. The gel-like mass where the cell organelles are found is called the cytosol. In addition to the cell organelles, the cytosol also contains enzymes and stored carbohydrates and fats (such as glucose and fatty acids). It is also in the cytosol that several different processes take place, including the anaerobic energy processes. Therefore, the cell's cytosol is very rich in glucose, which will quickly be broken down and used for energy production.

Endoplasmic reticulum

When our cell nuclei (DNA) send out a signal to make specific protein chains, the endoplasmic reticulum (ER) receives the signal and transports the necessary proteins to where they need to be.

Golgi apparatus

Prepares the newly-formed protein chains to leave the cell and be used in the body. The general energy and protein status in the body affects how well protein chains can be formed in this way. Therefore, eating too little and/or intaking too little protein over an extended period of time may lead to hormonal imbalances. The Golgi apparatus contains vesicles which transport the protein chains to the cell membranes to be released for further use.

Cell Nucleus

Contains our DNA (genetic material). This also acts as the basis for our protein chain production, where DNA acts as a kind of recipe. Each cell nucleus contains 46 chromosomes, made up of 22 identical chromosome pairs. The 23rd

pair is different and contains the sex chromosomes, one from your mother and one from your father.

Mitochondria

Converts proteins, carbohydrates and fats into energy. The energy contained in food can only be used when it is oxidised and the energy stored in the chemical bonds is released. The energy that is released then converts the mitochondria into ATP. Since ATP is what the cell uses as an energy source, most of the body's energy is produced in the mitochondria. The number of mitochondria in a cell is directly related to the activity in the cell. Physical activity can increase the number of mitochondria in muscle cells, which means more total energy production in the muscle. The higher the mitochondrial density, the more mitochondria per unit of muscle mass. This means more effective ATP production and can ensure improved performance.

Lysosomes

The cell's "rubbish bin". These will absorb and digest things that enter the cell which are not/cannot be used. They also help protect the cell from external elements. Contain enzymes.

Peroxisome

Same function as lysosomes; they dissolve dangerous things that enter the cell.

CELLS

— CELLULAR PROTEINS

The cell also contains several different proteins. These are transport proteins, receptors and enzymes.

Protein receptors

Located by the cell membrane and can respond to specific signals with specific responses, allowing selected molecules to enter the cell. If the receptor and molecule fit together, binding occurs, so that the signal can be sent from one cell to another. In addition, specific cellular changes may also occur; for example, when consuming food (especially carbohydrates), insulin will be secreted from the pancreas, signalling to the protein receptors that the cells must begin to absorb glucose from the bloodstream. Protein receptors respond by opening up multiple transport pathways in the cell membrane, where transport proteins can transport glucose into the cell.

Transport proteins

These are proteins in the cell membrane which are transporters of molecules and also enable transport of water-soluble substances in and out of the cell. For instance, this enables the transport of amino acids, glucose, vitamins and minerals into the cells, where they can perform their important functions.

The transfer of substances across the cell membrane can take place by one of the two following mechanisms: facilitated diffusion or active transport. Facilitated diffusion is where the transportation of a substance requires a "carrier molecule". This is necessary when it is not possible for a substance to diffuse by itself. Active transport is the movement of substances/particles from an area of low concentration to an area of high concentration. This requires both energy and enzymes.

Enzymes

These are the largest group of proteins in the body. Facilitates and increases the speed of almost all chemical reactions in the body. The amount of vitamins and minerals in the body is one factor that can influence the function of the enzymes. Enzymes work in such a way that they show their own "active sites", where they can be linked with specific molecules; just imagine a lock and key that fit together. Then the reaction can happen.

Coenzymes are non-protein molecules mainly composed of vitamins, which are important catalysts for performing the function of the enzymes.

ENERGY BALANCE

The following chapter describes energy balance, Basal Metabolic Rate (BMR), daily physical activity level (PAL) and diet recording. After reviewing this section, you should be able to explain:

Energy Balance • BMR • PAL

Energy balance is defined as the balance between intake and expenditure of energy. The energy balance is crucial because, roughly speaking, it determines whether we gain weight, lose weight or stay at the same weight. It should also be mentioned here that many other factors can have an indirect impact on energy balance, e.g. stress, sleep and digestion, to name a few.

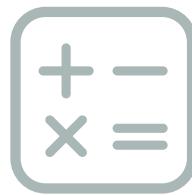
Energy intake takes place through ingestion of food containing carbohydrates, fats and proteins. Much of the energy we consume is spent on maintaining the body's functions. Energy expenditure consists of the Basal Metabolic Rate (BMR), the food's thermogenic effect and physical activity (exercise and NEAT). NEAT stands for Non-Exercise-Activity-Thermogenesis and covers all physical activity that does not fall under planned exercise. Therefore, NEAT is what you do in everyday life that requires energy but is not specifically exercise. For instance, walking, vacuuming, washing up, cycling to work, taking the stairs, etc. Should an energy imbalance occur, different things can happen in the body (see the box to the right).

In case of greater expenditure than intake (a negative energy balance), there will be a Calorie deficit, and the following may occur:

- #1 Decrease in weight
- #2 Drop in energy level
- #3 Reduced fat mass
- #4 Lean bodyweight is often reduced, which can affect performance (depends on the level of strength training)

In case of greater intake than expenditure (a positive energy balance), we would have a surplus of Calories, which may lead to the following:

- #1 Increase in weight
- #2 Increase or drop in energy level
- #3 Increase in lean bodyweight, which increases strength
- #4 Increase in fat mass, which may affect performance



BASAL METABOLIC RATE – BMR

BMR is the lowest energy consumption required to maintain vital functions in the body (NNR 2012, p. 161). Nordic Nutrition Recommendations 2012 (p. 171) shows a table for calculating BMR, where the calculation depends on gender and age.

Figure 4: Calculation of the basal metabolic rate based on bodyweight or both bodyweight and height

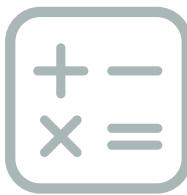
AGE Year	REE MJ/d based on weight	REE MJ/d based on weight and height
GIRLS		
<3	0.246 W - 0.0965	0.127 W + 2.94 H - 1.20
3-10	0.0842 W + 2.12	0.0666 W + 0.878 H + 1.46
11-18	0.0465 W + 3.18	0.0393 W + 1.04 H + 1.93
WOMEN		
19-30	0.0546 W + 2.33	0.0433 W + 2.57 H - 1.180
31-60	0.0407 W + 2.90	0.0342 W + 2.10 H - 0.0486
61-70	0.0429 W + 2.39	0.0356 W + 1.76 H + 0.0448 ^a
>70	0.0417 W + 2.41	
BOYS		
<3	0.255 W - 0.141	0.118 W + 3.59 H - 1.55
3-10	0.0937 W + 2.15	0.0632 W + 1.31 H + 1.28
11-18	0.0769 W + 2.43	0.0651 W + 1.11 H + 1.25
MEN		
19-30	0.0669 W + 2.28	0.0600 W + 1.31 H + 0.473
31-60	0.05292 W + 2.48	0.0476 W + 2.26 H - 0.574
61-70	0.0543 W + 2.38	0.0478 W + 2.26 H - 1.070 ^a
>70	0.0573 W + 2.01	

Example

BMR for an 18-year-old girl, 55 kg:
 $= 0.0465 \times 55 + 3.18$
 $= 5.57375 \text{ MJ} \times 1000 \text{ (to kJ)}$
 $5737.5 \text{ kJ} / 4.18 \text{ (to Calories)}$
 $\underline{\underline{= 1372.6 \text{ Calories}}}$

Example

BMR for an 18-year-old boy, 55 kg:
 $= 0.0769 \times 55 + 2.43$
 $= 6.659 \text{ MJ} \times 1000 \text{ (to kJ)}$
 $6659 / 4.18 \text{ (to Calories)}$
 $\underline{\underline{= 1593.6 \text{ Calories}}}$



PHYSICAL ACTIVITY LEVEL – PAL

PAL is defined as total energy expenditure minus BMR. In the Nordic Nutrition Recommendations (NNR) 2012 (p. 176) there is a table for calculating PAL. The table is based on everyday activities, and physical activity is added to this.

Figure 5: Calculation of physical activity over one week

	PAL
Bed-bound or chair-bound (not wheelchair)	1.1 - 1.2
Seated work with no option of moving around and little or no leisure activity	1.3 - 1.5
Seated work with some requirements to move around, and with some leisure activity	1.6 - 1.7
Work including both standing and moving around (eg. household, shop assistant) OR seated work with some requirement to move around with regular, almost daily, leisure activity	1.8 - 1.9
Very strenuous work or daily competitive athletic training	2.0 - 2.4

Note 1: Moderate leisure physical activity (e.g. brisk walking): 0.025 PAL unit increase for each hour per week. Note 2: Strenuous leisure physical activity (e.g. running, competitive football): 0.05 PAL unit increase for each hour per week.

Example:

45-year-old man who works with IT and sits down all day. Drives to work and generally does not do many daily activities that include a lot of movement. If you look at the chart, he will be between 1.3-1.5. We decide on 1.3. However, he runs 2x a week and does strength training 2x a week, for 1 hour duration each time.

Below the table in NNR 2012, you can see two notes that indicate how much extra physical activity counts. Both running and strength training add 0.05 PAL per day, which gives us 0.20 PAL that should be added to the original 1.3. This results in a PAL value of 1.50. To get our theoretical maintenance energy intake, multiply this value with the BMR.



CHAPTER 2

MACRONUTRIENTS

After reviewing this chapter, you will understand what macronutrients are, their function in the body and why they are essential for living.

MICRONUTRIENTS

After reviewing this chapter, you will understand what micronutrients are, their function in the body and why it is important to pay attention to them in your diet.

FLUIDS

After reviewing this chapter, you will have an understanding of what functions fluids have in the body and why water is essential for living.

MACRONUTRIENTS

The following section is about macronutrients and micronutrients. After reviewing this section, you should be able to explain:

- Each individual macronutrient
- What the individual macronutrients are used for in the body
- Micronutrients
- What the individual micronutrients are used for in the body

We meet our energy needs through the three macronutrients: carbohydrates, fats and proteins. They are all important for an optimally-functioning body, and all have different functions. NNR 2012 recommends the following distribution of the macronutrients.

GENERAL POPULATION	
MACRONUTRIENT	E%
Carbohydrates	45-60
Fats	25-40
Proteins	10-20

Figure 6: NNR recommendations on the distribution of macronutrients in the diet.

DIF recommends the following macronutrient distribution in the diet:

GENERAL POPULATION		ATHLETES	
MACRONUTRIENT	E%	E%	g/Kg
Carbohydrates	55-60	60-65	Ca. 8
Fats	Maks 30	22 - 30	-
Proteins	10-15	10-15	1,2 - 1,7

Figure 7: DIF recommendation on the distribution of macronutrients in the diet.

In the body you can find carbohydrates, fats and proteins, such as glucose, triglycerides and amino acids. The body uses countless processes to

turn these into energy. Below, you can find a review of the three macronutrients and their digestion.

CARBOHYDRATES

Carbohydrates are one of our three macronutrients. They contain 4.1 Calories per gram. Carbohydrates are found in foods such as rice, potatoes, pasta, fruit, juice, nuts, vegetables and breakfast products. Carbohydrates are important to include in the diet since they have the following functions in the body:

Energy for the central nervous system

- The brain uses glucose as its primary source of energy, so carbohydrates must always be available, since needless to say, the brain is quite important.

Anaerobic energy

- Production of energy from carbohydrates under conditions where oxygen is not present, typically explosive, short-duration training.

Aerobic energy

- Production of energy from carbohydrates under conditions where oxygen is present, e.g. during normal, daily activity or endurance training, such as running a marathon.

Glycogen stores in the body

Glycogen is the form in which we store carbohydrates inside cells and the liver. Glycogen is then ready to be converted to glucose when we need energy.

Readiness, "Feeling ready"

- Large energy deficit can slow down brain metabolism.
- Impaired memory, lack of problem solving, poor or depressed mood and lack of creative thinking.

Carbohydrates are subdivided into fast and slow-absorbing carbohydrates, according to their effect on the elevation of blood glucose (popularly called blood sugar) after ingestion.

When this increase in blood glucose is attributed to certain food, we get the glycaemic index (GI). This index is defined as the elevation in blood sugar (glucose in the blood) after consuming a given food containing 50 grams of available carbohydrate.

If GI is under 55, the foods are called low glycaemic, 56-69 indicates intermediate-glycaemic foods and a GI above 70 indicates high-glycaemic foods.

For example, white bread, white potatoes and sugar are high-glycaemic foods, while vegetables and whole grains are typically low-glycaemic foods. However, carrots are also a high glycaemic food, which is why there are exceptions in the GI table. It is also important to mention here that the GI measurements are made solely on the basis of ingestion of 50 g of carbohydrate of one particular food.

This means that in a meal with high-glycaemic foods, it is possible to balance the blood sugar effect by including low-glycaemic foods in the same meal.

CARBOHYDRATES

It is recommended to obtain your carbohydrates from unprocessed, slow-absorption foods, as these are digested and absorbed slowly in the body and will therefore help control blood sugar, insulin, energy and body composition. For example, wholegrain products. If the diet consists of large amounts of processed carbohydrate sources, it can lead to unstable blood sugar, elevated levels of triglycerides and LDL cholesterol in the blood, and to insulin resistance. In addition, an intake based primarily on unprocessed carbohydrates will increase the intake of micronutrients and fibre as well as lead to a better feeling of fullness and control of blood sugar. It is also recommended to intake a minimum of 25 g of fibre per day through your diet.

Carbohydrates are also subdivided according to chemical structure, into monosaccharides, oligosaccharides and polysaccharides.

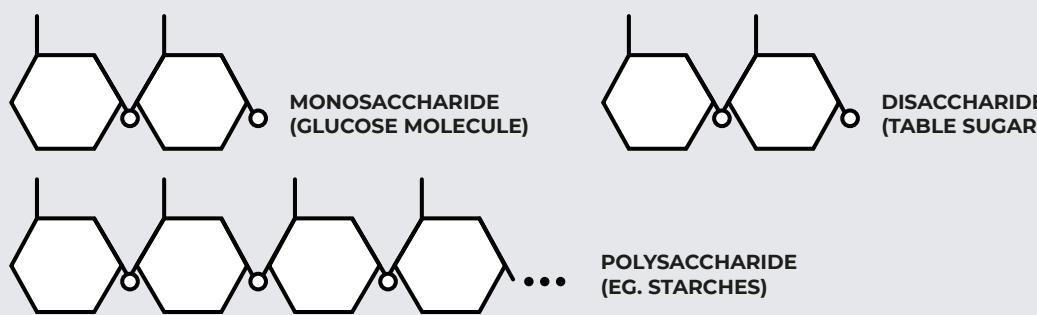
Monosaccharides are simple carbohydrates, in which the chain consists of only a single saccharide (carbohydrate).

Oligosaccharides are carbohydrate chains consisting of between 2 and 9 saccharides, while polysaccharides are more complex carbohydrate chains of 10 or more saccharides.

Glucose and fructose are the most common monosaccharides, lactose and sucrose are common oligosaccharides, while starch and some dietary fibres are common polysaccharides. All consumed carbohydrates are eventually converted into glucose in the body since it is only in this form that they can be used for anything functional.

The digestion of carbohydrates starts as soon as we put the food in our mouth. Here, the polysaccharides are broken down into smaller and simpler parts of carbohydrate chains by saliva. Approx. 20% of the breakdown can take place here. How close we get to the 20% breakdown depends on how long the food stays in our mouth. The more we chew the food, the longer it stays in our mouth and the closer we can come to the 20% breakdown.

FIGURE 8: THE STRUCTURE OF MONO-, DI- AND POLYSACCHARIDES



When the now smaller carbohydrate chains reach the small intestine via the oesophagus and stomach, they are broken down into maltose disaccharides; then, each maltose molecule is digested via maltase (enzyme) into two glucose molecules. The same thing happens with lactose and sucrose (sugar) disaccharides via the enzymes lactase and sucrase, which end up becoming glucose monosaccharides.

All of these monosaccharides, which are the end product of the breakdown, diffuse through the intestinal wall into the blood vessels, which transport them to the liver before entering the general circulation. The liver takes what it needs for glycogen storage and energy transfer, leaving the rest to pass as glucose monosaccharides. These monosaccharides are released into the blood circulation until they are absorbed into the cells. About 20 g of glu-

ose circulates in the blood per hour. If blood sugar drops below this level, the body uses the recently-consumed glucose to raise blood sugar and for new energy. If there is more glucose than necessary, the liver and muscles will absorb as much as they can. Prior to uptake, glucose molecules are bound together into glycogen, which is a chain of glucose molecules, through complex transport mechanisms. Glycogen is thus the form in which glucose is stored in the liver and muscles for energy-consuming activities. The liver can store 80-100 g of glycogen, while the muscles can store between 300-600 g of glycogen. These depots cannot store enough energy for even one day's energy consumption and must therefore be continuously replenished in order to maintain energy levels and performance. Based on NNR 2012 recommendations, the amount of carbohydrates in a daily diet can be calculated as follows:

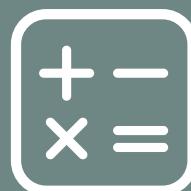
EXAMPLE

NNR 2012 recommends that 45-60% of the diet should consist of carbohydrates. For a man with a maintenance energy intake of 3000 Calories, it would mean the following = $3000 \times 0.45 = 1350$, $3000 \times 0.60 = 1800$.

Thus, he must have between 1350-1800 Calories from carbohydrates per day. To convert it to the number of grams of carbohydrate this is per day, the following calculation is used:

$1350/4.1$ and $1800/4.1 = 329-439$ g of carbohydrates per day.
He weighs 80 kg and will therefore need to have
 $329/80$ and $439/80 = 4.1-5.5$ g of carbohydrate per kg. bodyweight per day.

The body can use carbohydrates as an energy source.
Several different metabolisms can be used which can convert glucose into energy.
These are indicated in Chapter 4.



FATS

Fats are one of the three macronutrients and the most energy rich per gram. One gram of fat contains 9.1 Calories. In addition to energy, fat also supplies essential fatty acids and contributes to the intake and absorption of fat-soluble vitamins. Fat is found mainly in foods such as fish, avocado, eggs, oils, butter and nuts, and it has several functions in the body:

Energy source

- Fat is hugely potent as an energy source and is actually reused in the generation of energy, which is why you can get a lot of "mileage" out of fat. However, the breakdown of fat is a more difficult process than for carbohydrates, and therefore, fat is used primarily as an energy source under aerobic conditions.

Hormone balance

- Since fat is the building block for hormones, maintaining adequate hormone balance requires adequate fat intake.

Makes up the cell membranes

- The cell membranes are made up of phospholipids, which are a type of fat.

Makes up the brain and nervous system

- The brain consists of approx. 60% fat, and all the nerve pathways that send signals from the central nervous system to e.g. muscle cells are lined with a layer of fat, which facilitates the transport of the signals.

Transports fat-soluble vitamins K, E, D and A

- The fat-soluble vitamins can only be absorbed if fat is present to dissolve them and transport them out into the body. The simplest form of fat is a fatty acid. There are two types of fatty acids, saturated and unsaturated. Saturated fatty acids are further divided into mono and polyunsaturated fatty acids.

Saturated fatty acids are found in butter, meat, palm oil, cheese, and so on; they are found primarily in animal products but also in vegetable products.

Monounsaturated fatty acids are found in avocado, peanuts, nuts and olive oil, while polyunsaturated fatty acids are obtained from fish and flaxseed, among other things. The difference between fatty acids is the number of double bonds in the fatty acid chain, where the saturated ones will be completely "saturated" of double bonds.



If you look at unsaturated fatty acids, there will be "empty holes" between the double bonds. The individual fatty acids can combine to form triglycerides, which consist of three fatty acids and one glycerol molecule. Triglycerides are the most common form of dietary fat and fat stored in the body. Besides triglycerides, phospholipids and sterols are two other types of fat.

The cell membranes are made up of phospholipids, while sterols are cholesterol, which is used to produce hormones and vitamin D.

The balance between intake of saturated and unsaturated fatty acids is important for your health. NNR 2012 recommends the following distribution:

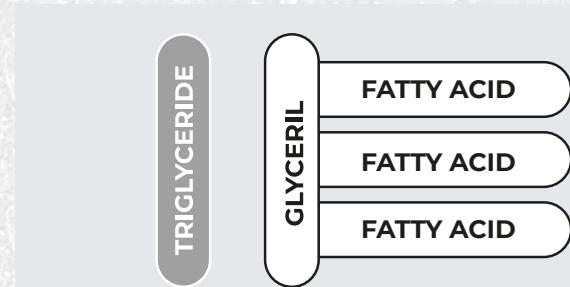


FIGURE 9: THE STRUCTURE OF A TRIGLYCERIDE

GENERAL POPULATION	
DISTRIBUTION OF FAT	E%
Saturated fat	< 10
Monounsaturated fat	10-20
Polyunsaturated fat	5-10
Trans fatty acid	As little as possible

Figure 10: NNR 2012-recomendation.



FAT

There are two types of cholesterol, high-density lipoprotein (HDL) and low-density lipoprotein (LDL). HDL and LDL are lipoproteins. HDL transports fatty acids and cholesterol from body tissues to the liver, and LDL transports fatty acids and cholesterol from the liver to body tissues. Since LDL transports fatty acids to body tissues for storage, an excess of LDL content will increase the risk of fat accumulation in the cells. Therefore, HDL plays a very important role, as it transports the fatty acids that LDL has left in the body tissue back to the liver for excretion. It is therefore important that the ratio between the two is not too great.

THE COMMON RECOMMENDATIONS

Total Cholesterol:
4-6 mmol/l

HDL:
1-2 mmol/l
(så højt som muligt)

LDL:
3-4 mmol/l
(jo mindre jo bedre)

Polyunsaturated fatty acids include both omega-3 and omega-6. A normal Danish diet usually consists of up to 10 times more omega-6 than omega-3. This can lead to inflammatory conditions in the body since this is the function of omega-6 (pro-inflammatory). Omega-3 is often referred to as healthy fat, with its positive effects on cholesterol, inflammation and metabolism. Just as it is important to balance saturated and unsaturated fat, it is also important to balance the polyunsaturated fats.

A skewed ratio of Omega-3 and 6 can lead to degraded cell quality. One of the reasons why a sufficient omega-3 intake is important is that the cell membrane becomes more "fluid", which means that signals from various processes in the body are easier to transport around.

For example, more "fluid" muscle cell membranes can mean increased insulin sensitivity. This information is especially important for overweight people at risk or already diagnosed with type-2 diabetes.

One branch of unsaturated fatty acids that we want to minimise is trans fatty acids.

Trans fatty acids are unsaturated fatty acids which have been processed. For example, they can be found in deep-fried food and industrial baked goods. These fatty acids can lead to fat deposits in blood vessels and cell membranes.

Where omega-3 will make the cell membrane more "fluid", making it easier to send signals that initiate beneficial processes, trans fatty acids will cause the cell membrane to become more "rigid". This is why fat deposits occur and thus increase the risk of cardiovascular disease, etc.

The digestion of fat takes place in the small intestine using bile, through the breakdown of triglycerides into fatty acids and glycerol. This process occurs when the pancreas secretes the enzyme pancreatic lipase, which splits the triglycerides by removing the three fatty acid molecules from the glycerol molecule.

After being broken down, the fatty acid molecules can diffuse through the so-called mucosa, which is a mucous membrane located internally, for instance on the small intestine.

Chylomicrons are a transport protein that transports and facilitates

fat through the cell wall and into the blood. The packed triglycerides, which are now circulating in the blood, are again broken down into free fatty acids and glycerol using the enzyme lipo-protein lipase. This allows them to pass through yet another cell membrane and into the body tissue. Here, they are oxidized and used for energy in muscle tissue or converted back to triglycerides and stored in adipose tissue.

When the body needs energy from fatty acids, there are several different metabolisms that can create this energy; these are described in more detail in Chapter 4.

PROTEIN

Protein is found in foods such as meat, eggs, nuts, fish, cottage cheese, beans and lentils. It contains 4.1 Calories per gram. Protein is the body's building block. Ingested protein is converted into amino acids in the body and is part of the build-up of tissue, both new tissue and, for example muscle tissue which sustains micro damage during exercise. In addition, amino acids are involved in processes involving hormones, enzymes and transport proteins. There is a total of 20 amino acids: 12 non-essential amino acids, which the body can synthesise on its own, and 8 essential amino acids that we must get from our diet. In order to get all 8 essential amino acids, it is important to vary protein sources.

Eggs
Milk products
Fish
Poultry
Meat
Beans and lentils

There are two different types of protein:

- Animal protein = meat, poultry, eggs, fish and milk products
- Vegetable protein = nuts, beans, grains, lentils, soy, etc.

The proteins from animal sources are also more readily absorbable by the human body, but that does not mean that one cannot live well on a vegetarian or vegan diet. It just means that it is important to pay extra attention to obtaining all the essential amino acids, and enough of them, through your diet. This can easily be achieved; it simply requires consuming several different protein sources.

Figure 11: Complete protein sources

Maize or rice + beans
Maize + peas
Lentils + bread
Cereals + milk or eggs
Potatoes + egg or milk

In general, animal protein has a higher content of essential amino acids than vegetable protein sources. Vegetables cannot provide sufficient protein on their own, and similarly, grains, seeds and nuts are not complete sources of protein either. They are important sources of protein, but they must be combined with other incomplete protein sources to meet the need for the 8 essential amino acids. Examples of complete protein sources are the following:

Digestion of protein

The primary digestion of proteins occurs only when they reach the stomach. Here, pepsin (a protein-splitting enzyme) and hydrochloric acid are excreted. The hydrochloric acid activates pepsin so that it can cleave the proteins into polypeptides and peptides. However, only a small portion of the peptide bonds manage to be cleaved by pepsin in the stomach.

Polypeptides and peptides are transported to the upper part of the small intestine, called the duodenum, where so-called pro-enzymes secreted by the pancreas provide further digestion. Pro-enzymes are activated by other enzymes and chemicals in the small intestine and enable the formation of enzymes which further digest the peptides.

The further digestion ends when enzymes break down polypeptides to peptides, into dipeptides and tripeptides and free amino acids, which are transported away for absorption. The peptides and free amino acids are absorbed in many different ways, all of which require energy. The amino acids fight for the same transport in the small intestine, which means that the branched chain amino acids (BCAAs) are absorbed faster than smaller amino acids.

Dipeptides and tripeptides are absorbed faster than individual amino acids, as they have different transporters than free amino acids. When amino acids and peptides are absorbed, they are either used as energy in the intestinal cells or to form new proteins, such as hormones or new digestive enzymes. In addition, they can also be transported to the liver. The liver is the primary site for the absorption of amino acids after a meal.

For every 100 grams of amino acids, 20 grams are released into the systemic circulation, 20 grams are used for protein synthesis and the remaining 60 grams are broken down in the liver to produce energy, glucose, ketones, cholesterol or fatty acids.

When the body needs energy for protein, there are several different metabolisms that can create this energy, which is described in more detail in Chapter 4.

Optimisation of the formation of new proteins requires that the protein balance is positive. This will be the case if the protein synthesis is higher than the protein breakdown, which requires an adequate intake of protein from the diet. This results in a positive net protein synthesis, which will mean muscle growth.

Protein synthesis is a term for the process where proteins are formed from amino acids. Exercise stimulates protein synthesis positively, which allows for more protein creation = more muscle mass. However, protein breakdown will also be greater the more muscle mass we gain. Protein degradation is a term for the protein that is broken down in the body; like protein synthesis, this process takes place continuously.

PROTEIN

To understand the use of protein in the muscles, we must first understand the structure of muscles. Each muscle consists of a mass of fascicles, which in turn consists of muscle fibres/muscle cells. Each muscle cell is made up of myofibrils, which in turn consist of myofilament. The myofilaments are what we are interested in. The myofilaments are made up of two proteins: myosin and actin. This structure is called a sarcoma, and it generates contractions in the muscles. The two proteins work together in what is known as the cross-bridge cycle, where actin and myosin bind to each other and pull the muscle further and further together. In this process, the proteins are traumatized, i.e. micro injuries. During the recovery period, the damage is repaired when protein

synthesis is initiated. In the protein synthesis, the muscle cell takes amino acids from its amino acid pool and, through a process involving DNA and a replication, new protein structures are formed, i.e. new myosin and actin structures.

These create new sarcomeres in the myofilaments and thereby increase the muscle size. This means that you do not get more muscle cells in connection with hypertrophy (increasing the size of the muscle), instead you get more sarcomeres, which make the muscle fibres bigger. If you stop exercising, over-train or get too little protein, the protein synthesis and the myosin and actin contained in the muscle are reduced, so the muscle becomes smaller.

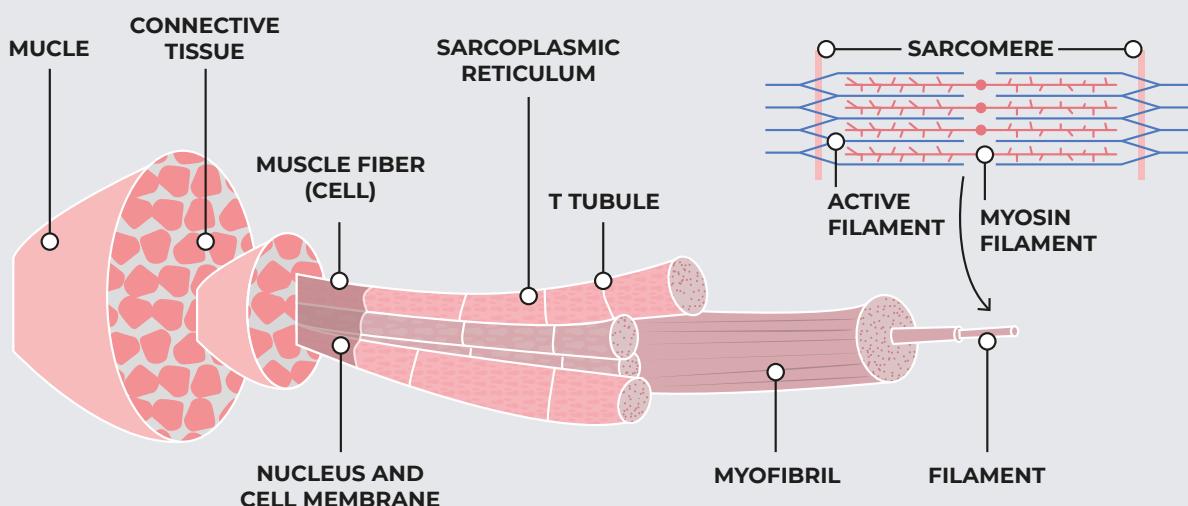
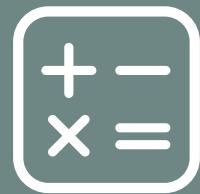


FIGURE 12: THE STRUCTURE OF A MUSCLE



Minimum protein intake for sedentary healthy adults is 0.8 g per kg bodyweight per day. This amount covers the basic daily need for protein.

When we start moving (as we often do in everyday life), it requires more protein.

DIF recommends 1.2-1.5 g protein/kg bodyweight per day for a person who is active in endurance sports, and 1.2-1.7 g protein/kg bodyweight per person per day for strength and explosive training.

For a 65 kg woman who strength trains, it is equivalent to an intake between:

$$\begin{aligned} &= 65 \times 1.2 = 78 \text{ g protein} \\ &= 65 \times 1.7 = 110.5 \text{ g protein} \end{aligned}$$

Previously, the attitude was that a high intake of protein had a negative effect on the kidneys, in part because deamination and transamination produce ammonia as a residual product.

Ammonia is converted to uric acid and excreted via the kidneys, which was previously suspected to have a harmful effect. However, studies now show that, for people with healthy kidneys, the effects are only positive, of course to a certain extent (which has not yet been found).

MICRONUTRIENTS

VITAMINS

Vitamins and minerals are both micronutrients, i.e. nutrients that are important as supplements to the macronutrients. None of these are direct energy sources, and they are required in small amounts in the body. However, they are still necessary for different processes in the body to function properly.

Vitamins

Vitamins are chemical substances that are important in relation to growth, digestion, energy transfer and optimal functioning of the nervous system. One of the most important functions our vitamins have is that they act as a co-factor for enzymes, which means that they make sure that the body's enzyme system works. They are necessary for proper absorption and utilisation of the energy we consume. Vitamins are essential in the diet, as we cannot synthesise a sufficient amount in our body. A varied diet consisting of good, ideally organic foods will ensure an adequate intake of vitamins. In addition, the absorption depends on a number of factors, including the effectiveness of our digestive system and how the food is prepared. The term bioavailability is used to describe the degree of nutrients available for absorption and use in the body. Generally speaking, nutrients in food have a certain bioavailability in a raw state, but we can do different things to increase bioavailability. If our digestion does not work optimally, the absorption rate can be reduced very quickly. For example, not chewing food adequately and therefore not starting the carbohydrate breakdown with salvia

amylase, having too low (or too high) levels of gastric acid or having some kind of intestinal disease.

In addition, bioavailability can be increased through cooking and preparation. For example, the bioavailability of the antioxidant lycopene (which, among other things, gives tomatoes their red colour) is increased by heating. You should be aware that you can both reduce and increase the availability of specific nutrients. For example, if you boil food, you can increase the bioavailability of some vitamins and minerals, but through over-preparation, you will lose a large part of the water-soluble vitamins. So, pay attention to the overall output. Another example is refined wheat flour in relation to whole-wheat flour.

Vitamins can be either fat or water-soluble. Vitamins K, E, D and A are all fat-soluble and are usually found where the cell stores fat, for instance in the cell membranes. For optimum absorption of the fat-soluble vitamins, fat must be present. This means that a very low-fat diet may contribute to a deficiency in these vitamins. On the other hand, fat-soluble vitamins can be stored in the body if we get more than we need. It is both an advantage and a disadvantage.

We can save for a rainy day, but if we consume excessive amounts of fat-soluble vitamins over a long period of time, we run the risk of achieving toxic levels in the body, which can damage internal organs, tissues, etc.

Vitamins B and C are water soluble and are not stored in large quantities, as water is constantly consumed and excreted. These vitamins are more sensitive, and foods quickly lose large amounts of B and C vitamins, e.g. through boiling, where the boiling water dissolves the vitamins.

All vitamins are important since a lack of even a single vitamin can induce a state of imbalance in the body. Therefore, it is also important to eat varied, as we thereby ensure that all vitamins are consumed through the diet.

The water-soluble vitamins help control cholesterol (B3), break down glycogen (B6), form new proteins (B9), convert fats and amino acids into building blocks (B12), facilitate cell division of red blood cells etc. (B12), and act as antioxidants (C).

The fat-soluble vitamins facilitate protein synthesis (A), increase intestinal calcium uptake (necessary for use of calcium in the bones and teeth) (D), regulate blood calcium levels (D), regulate glucose tolerance (D), act as antioxidants (E) and assist in the blood clotting process of wounds as well as the uptake and binding of calcium in the bones (K).



MICRONUTRIENTS

— MINERALS

Minerals

Minerals are the building blocks of various structures in the body; among other things, they are foundations for teeth and bones and help to construct other cells and enzymes. This means that minerals, if not used as building blocks in the body, help vitamins to

function optimally. Like vitamins, they are essential in the diet, as they too cannot be synthesised in the body. A varied diet consisting of good, and ideally organic, foods will ensure an adequate intake of minerals.

There are many minerals; however, some are more important than others, and there are 11 minerals that are most important for optimal function of the body:

Calcium, iodine, iron, magnesium, phosphorus, copper, potassium, sodium, chromium, selenium and zinc.

1

CALCIUM

beans, broccoli, nuts

Shapes teeth and bones, regulates muscle contractions.

2

IODINE

seafood, potatoes, eggs

Hormone regulation (thyroid hormone).

3

IRON

tuna, spinach, beans

Forms haemoglobin, myoglobin and assists with energy transport.

4

MAGNESIUM

avocado, banana, nuts, beans

Plays an important role in the body's metabolic processes. Better sleep. Prevents muscle soreness and cramps and assists in muscle recovery. Muscle contractions occur when calcium is released inside the muscle cells.

Magnesium does the opposite and counteracts contractions when released into the muscles. Therefore, the muscles begin to relax, which will result in a "calmness" in the body and more optimal opportunities for good recovery.

PHOSPHORUS

5

whole grains, eggs, bananas, almonds

Forms bone structure, essential for energy transfer, hormone and enzyme production.

COPPER

6

cashews, chocolate, cocoa powder and crab

Plays a part in the regulation of protein synthesis via transcription factors.

POTASSIUM

7

squash, tomato, potatoes, artichokes, banana

Maintains the membrane potential across the cell membrane, which ultimately prevents the cells from absorbing water, the cell membranes from rupturing and the cell dying.

SODIUM

8

whole grains, vegetables, low fat meat, nuts and grains

Maintains the membrane potential across the cell membrane, which ultimately prevents the cells from absorbing water, the cell membranes from rupturing and the cell dying. Assists in the absorption of amino acids, glucose and water.

CHROME

9

broccoli, whole grains, meat, apple, banana

Improves the effect of insulin and assists in glucose and fat metabolism.

SELENIUM

10

seafood, brown rice, quinoa, walnuts, milk

Interacts with nutrients involved in the balance of antioxidants in the cell.

ZINC

11

sesame seeds, crab, beans, cashews, almonds, peas

Contributes to growth, development, neurological function, reproduction and immune function.

Among other things, helps regulate the secretion of hormones and cell signals.

FLUIDS

All cells contain water, and water makes up nearly 60% of our total bodyweight. The amount of water in the body depends on fat and lean body-weight and on how well hydrated we are. Adipose tissue contains only 25% water, while muscle cells contain 75% water and blood contains 83% water.

The water found in the body is divided into intra- and extracellular fluid. "Intra" means inside the cell while "extra" means outside the cell. The intra-cellular fluid exists within cell membranes and constitutes 2/3 of the water in the

body, while the extra-cellular fluid is found outside the cell membranes and constitutes the remaining 1/3.

Water performs many important functions in the body, including for transport, acting as a catalyst, lubricant, solvent and temperature regulator, and assisting with anabolic processes. In other words, water helps ensure optimal use of the nutrition the body receives, so that the body works optimally.

Fluid balance is like energy balance = intake vs. use

We lose fluids constantly, via respiration, urine, faeces (defecation) and sweat (evaporation), and at the same time, fluid is replenished through the food and drink we ingest.

Loss of fluid through respiration is between 0.4-0.5 ml/hour/kg of bodyweight, which would be between 670-840 ml every 24 hours. For everyday activity, loss of fluid through sweat is minimal, but with physical activity, the fluid loss can multiply. To maintain fluid balance, it is important to intake the amount of fluid which is lost.

About 1L fluid is obtained through diet every day, of course depending on the composition of the diet. If we eat lots of fruit and vegetables, we will ingest more fluid than through fatty foods such as nuts.

To calculate our fluid intake, the following calculation can be used:

- #1 80-110 ml per 100 Cal of BMR
- #2 40-50 ml per kg bodyweight
- #3 0.033 L per kg bodyweight

Now we know how much water we need to intake every day. It is important to remember that just 1-2% weight loss due to fluid loss leads to a significant drop in performance.

To avoid this, the body has some defence mechanisms, e.g. we become thirsty when it is warmer or when we sweat a lot.

The problem is that the thirst only occurs when the 1-2% weight is lost through fluid loss, which means that we will already experience reduced performance. It is therefore important to drink water even if you are not thirsty to avoid dehydration.

An easy way to check if we are getting enough fluid is to look at your urine when you are in the bathroom. Clear urine indicates too much fluid in too short a time, while dark urine indicates too little fluid. Light yellow urine indicates sufficient fluid. However, remember to continue to intake water for the rest of the day after the time you checked.





CHAPTER 3

DIGESTION AND ABSORPTION

After reviewing this chapter, you will understand how the food we consume is digested, absorbed and eventually used for various functions of the body.

We will review the various stages of digestion and how they each contribute to the most effective use of the food we consume.

ENERGY SYSTEMS

After reviewing this chapter, you will understand how the body generates energy for the processes that require it. You will learn about the different ways energy can be created, depending on the intensity of work.

DIGESTION AND ABSORPTION

Most of the food we eat is composed of many different and large chemical structures. The best known nutrients are macronutrients, which consist of carbohydrates, proteins and fats, and micronutrients, which consist of vitamins and minerals. Therefore, in order for the food we consume to be used in the body, it must first be broken down into smaller parts.

From the second we put food in our mouth (and sometimes even when we start thinking about food), the body begins to process it so that it can be

later used for essential survival functions. The body has a built-in system that aims to ensure that the things we consume can ultimately be used. This system is called the digestive system or gastrointestinal tract, and it consists of the mouth, oesophagus, stomach and intestine. It functions as a system that coordinates and controls what the body needs to use from our diet and what needs to be excreted. When the food is broken down into smaller parts, it is absorbed from the cells along the last part of the gastrointestinal tract and sent on to the liver.

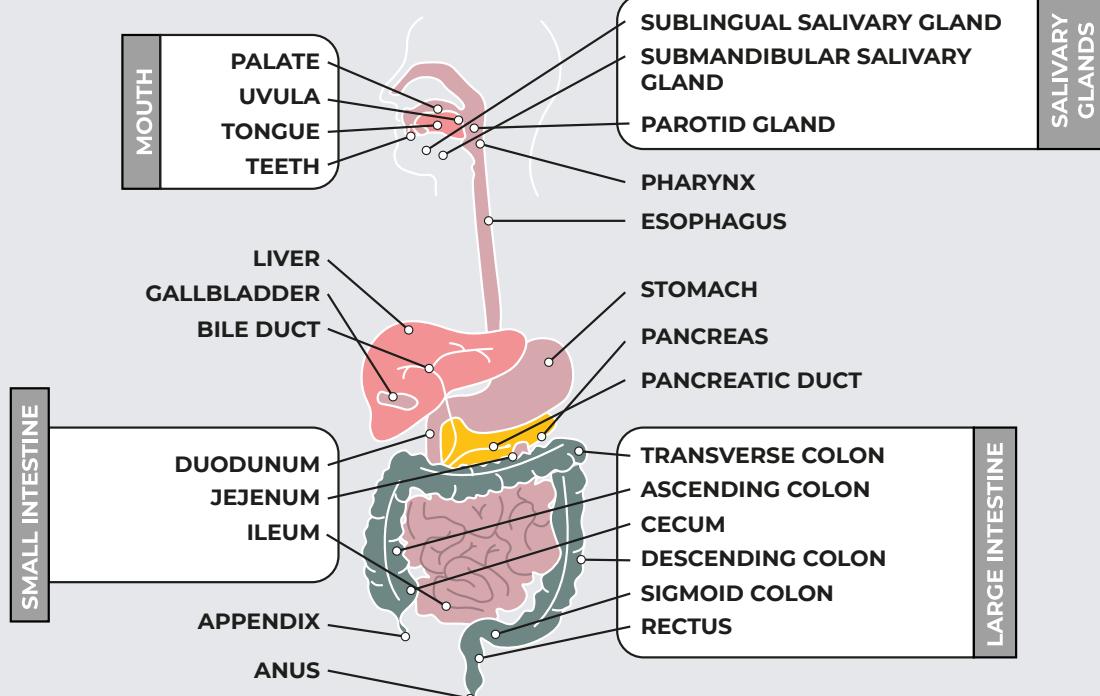


FIGURE 13: THE DIGESTIVE SYSTEM

Once the liver has processed the food, it is either transported through the body via the blood and used for energy production and storage or excreted as faeces (defecation).

If we go deeper and look at the individual steps, we begin by putting food in our mouth and chewing. Here, enzymes are secreted from the salivary glands, which mix with the food, and a soft mass of partially chewed food is formed. The food is swallowed and transported into the stomach via the oesophagus, which triggers the secretion of enzymes in the stomach, and these enzymes help to further break down the food.

The stomach is the first major stage of digestion, and it begins to digest the soft mass of partially chewed food into smaller pieces of partially digested food, which is called chyme.

Due to the thick outer surface of the stomach, where only things like water, some vitamins and alcohol can penetrate into the general circulation, minimal absorption of food occurs in the stomach.

The stomach is therefore more of a digestive organ than a nutrient-absorption organ. In addition to this, the stomach also acts as protection against foreign microorganisms. During digestion, the pH of the stomach approaches 1, making the environment more acidic.

The gastric acid helps with the breakdown of food, but it also destroys many of the bad bacteria that might end up in the stomach when we eat.

From the stomach, the nutrients/food are transported to the small intestine, where they are absorbed by intestinal cells called enterocytes. The intestines have a surface area the size of a tennis court, which means that it takes a long time to absorb the nutrients.

In order for the enterocytes to have time and opportunity to come into contact with the nutrients, they must be transported slowly through the intestines. If this does not happen, the nutrients will be transported through the intestines without being absorbed and excreted via defecation.

Once the nutrients have been absorbed into the blood circulation, they are transported to the liver. The liver assesses what has been absorbed and whether it should continue in the general circulation or be broken down further.

After the liver has decided what to do with the nutrients, most of them will be transported to the cells, and only lipids (fat), which do not dissolve in blood, are not transported freely. Fat is instead carried by different types of cholesterol (HDL, LDL).

DIGESTION AND ABSORPTION

In order for us to use the nutrients, they must be delivered efficiently to the places where they are needed. The liver, muscle tissue, adipose tissue and the brain are all important places for nutrient absorption.

The liver also helps ensure that there is the right amount of carbohydrates/glucose in the blood (carbohydrate homeostasis). It can seize excess glucose and store it as glycogen in the cells or in its own liver cells, for later use. If blood glucose is low, it can take stored glucose and use it in the general circulation.

The liver also synthesises several different amino acids (proteins), both for structure and for general circulation. These amino acids can also be converted to non-protein substances. They can become hormones or be transaminated to acetyl-CoA and then converted to glucose or fat if needed by the body. These nutrients can then be transported to fat or muscle cells. It is also in the liver that fatty acids are converted to stored triglycerides. In a low carbohydrate diet, the liver will need to metabolise a lot of fat, which is why ketones will form, which among other things, are an alternative energy source for the brain.

Amino acids, glucose as well as fatty acids are important for optimal muscle tissue function. Once the nutrients have passed through the liver, glucose can be absorbed into the muscle cells and used for the production of energy (ATP) or stored as glycogen. Amino

acids can be used for the synthesis of new proteins, while fatty acids can be used as energy in the muscle cells, either as storage in intramuscular triglycerides or as structure for the plasma membranes. Adipose tissue can use both glucose and fatty acids for storage of energy.

In order for all this digestion and absorption of consumed food to occur, the body needs to know what to do with the nutrients. Here, the endocrine system is a vital part of digestion. The endocrine system, also called our hormone system, is a chemical signalling system that identifies changes in the body and then tells the body how to respond. For example, the endocrine system is used to tell the pancreas that insulin must be excreted because food is being consumed, which must be absorbed into the cells.

Just as the endocrine system is a vital part of digestion, so is the nervous system.

The nervous system also acts as a signalling system that directs nerve tissue, smooth muscle and other organs to move and help the digestive system to digest the food.

INSULIN OG DIABETES 2

When we eat and drink, the insulin hormone is released, which controls the transport of glucose into the cells, where it can be used for energy or stored. Insulin is formed in the pancreas beta cells and is released into the blood, where it first and foremost acts on the absorption of glucose into muscle, adipose tissue, liver and heart cells.

In some people, this regulation is partially compromised, and we do not know with certainty why this is so. Some of the factors that play a role are hereditary factors, being overweight and a low level of physical activity. When this regulation does not act as it should, it results in insulin resistance, metabolic syndrome and type 2 diabetes.

When the body no longer reacts as it should to insulin, this is called insulin resistance. This means that the body must produce more insulin in order for the glucose to be absorbed in the cells.

At some point, the pancreas will no longer be able to handle the increased insulin production, which results in glucose accumulating in the blood. This leads to metabolic syndrome and, in the worst case, to type-2 diabetes.

During metabolic syndrome, an abnormally high level of glucose can be found in the blood, though not high enough to be called type-2 diabetes. Furthermore, there will be an increase in cholesterol and other fatty substances in the blood, which damage the body's arteries. Similarly, high levels of insulin affect the kidneys' ability to convert salt, which can result in an increase in blood pressure.

It is interesting to talk of these lifestyle diseases because much of it can be prevented and treated with the right diet and increased physical activity. In some cases, medical treatment may be necessary.



COMMON DISEASES/PROBLEMS IN THE DIGESTIVE SYSTEM

When you have clients, you may encounter some who suffer from various digestive problems. The following is an introduction to some of the common diseases and problems people may have with the digestive system.

ULCERATIVE COLITIS

Occurrence: 3-4 out of 1000 people

A chronic inflammation of the large intestine, where mucous ulcers are formed. The inflammation causes more frequent emptying of the colon and can thus cause diarrhoea. The wounds in the mucosa bleed and emit mucus and pus, resulting in bloody stools.

Some of the problems that Ulcerative Colitis can cause are reduced appetite, fatigue, weight loss, anaemia (lack of blood) and loss of nutrients that the body should have retained.

Some people experience symptoms most of the time. For them, the recommendation is surgery to remove the entire colon. If the symptoms are

less severe and frequent, medication is recommended.

Many patients experience worsening of symptoms when certain foods are consumed, so as a coach you should be attentive and potentially avoid such foods.

Since these foods can vary greatly, you will need to examine each client individually and, using their food diaries, discover what foods are causing the symptoms.

CROHN'S DISEASE

Occurrence: 2 out of 1000

The disease is related to Ulcerative Colitis but can occur anywhere in the gastrointestinal tract. The inflammation is chronic, and wounds are formed all the way through the intestinal wall, i.e. both on the outside and inside. It results in a red, swollen, painful area that can bleed. Inflammatory nodes and scar tissue tend to form, which can narrow the bowel, making food and nutrient absorption more difficult.

Typical disorders of the disease are abdominal cramps, diarrhoea (with or without blood), lack of appetite, fatigue, nausea and weight loss.

The disease is kept in check with medication, and surgery takes place only in cases of serious blockages that prevent food from passing. Additionally, it is very important for Crohn patients to ensure that they have a nutritious diet with enough Calories, due to the reduced intestinal absorption. However, high caloric intake may be difficult in combination with possible reduced appetite. It is important that you are aware of this as a coach. In addition, supplementation of iron, B12-vitamin, multivitamins, potassium, calcium and magnesium may be necessary.

IRRITABLE BOWEL SYNDROME (IBS)

Occurrence: approx. 15% of Denmark's population experiences periodic symptoms, while far fewer suffer from it chronically and therefore have not been diagnosed with it.

Despite the name, recent studies have shown that irritation can occur throughout the gastrointestinal tract. The disease is caused by a disorder in the intestine and causes a lot of discomfort.

Typical problems are pain and discomfort in the abdomen, irregular stool pattern and the abdomen being bloated throughout the day. Passing wind often helps with the pain, while specific foods and mental challenges, such as stress and anxiety, can aggravate the symptoms.

There is no treatment of the problem as such, apart from discovering which foods trigger it. Typical foods may be cabbage, beans or onions, but this is different from person to person. One way to find the culprits may be to keep a food diary and a symptom diary. This allows you to compare and perhaps find patterns between the time when you eat a particular food and then subsequently experience symptoms. Many people benefit from following the Low FODMAP diet. HUSK can also have a good effect on constipation. Laxatives should be avoided as much as possible.

LEAKY GUT SYNDROME

A condition where small gaps occur between the enterocytes, allowing free passage for larger molecules and toxins to pass through the intestinal mucosa and into the bloodstream. This can result in inflammation (inflammatory conditions), allergic reactions, autoimmune disease and intestinal mucosa breakdown.

Typical symptoms in leaky gut are fatigue, joint and muscle pain, food intolerance, abdominal pain, bloating, diarrhoea, etc.

Often, there are foods that make the symptoms worse, and similarly, excessive intake of a food that is not tolerated can help develop leaky gut, e.g. a person who is lactose intolerant and consumes a lot of milk products. In addition, leaky gut may be caused by

inflammation when microorganisms such as bacteria, viruses or parasites end up in the gut for different reasons. Other causes may include a high consumption of alcohol, arthritis medication (NSAIDs, e.g. Ibuprofen) and antibiotics.

Leaky gut also results in poorer uptake of vitamins and minerals, so you must take care that people with the disorder are not in deficit of important nutrients.

Treating leaky gut involves avoiding the above causes. A healthy diet without processed foods. As natural as possible. In addition, you should supplement with a good intake of vitamins and minerals as well as probiotics, for the reconstruction of the intestinal mucosa.

GASTRIC ACID - TOO LITTLE AND TOO MUCH

Most Danes have experienced too much gastric acid typically after a very large and/or very fatty meal. In such cases, too much gastric acid is formed, which can result in acid reflux. Typical causes are intake of too much junk foods, large amounts of red meat or very refined carbohydrates. However, problems can also occur with medication, especially pain medication.

If you have problems with too much gastric acid, you can try to change your dietary habits and, initially, supplement with over-the-counter medicines.

Insufficient gastric acid is more severe because it can result in food (especially proteins, vitamins and minerals) not being absorbed properly and in difficulty fighting harmful bacteria.

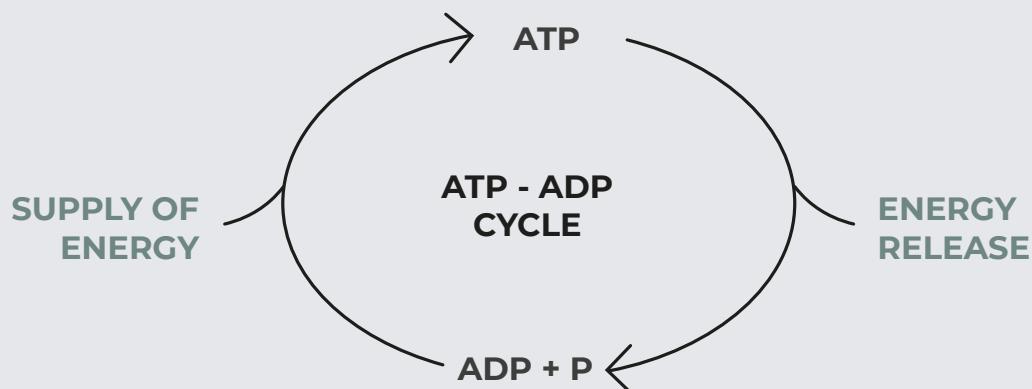
Symptoms of insufficient gastric acid are decreased appetite, bloating, burning and heartburn after food intake, constipation and pain in the oesophagus.

The best treatment for insufficient gastric acid is to take digestive enzyme supplements, preferably pepsin, which breaks down protein and helps restore normal balance.

ENERGY SYSTEMS

Once the nutrients have been digested and absorbed and the liver has sent them out into the general circulation, they can be used for several different things, e.g. energy production, storage for future energy production, incorporated as part of the body's structural components or they can be expelled from the body (e.g. as defecation). First, we will address energy production. When we talk about energy production, the first and most obvious thing to mention is adenosine

triphosphate (ATP). ATP is a molecule that supplies energy and is needed for virtually all energy-intensive processes in the body. It is used in skeletal muscle for movement, contractions in the digestive muscles, production of enzymes and for the formation of more ATP. We therefore need a constant supply of ATP, which can come from freshly consumed food or stored energy in the form of triglycerides or glucose.



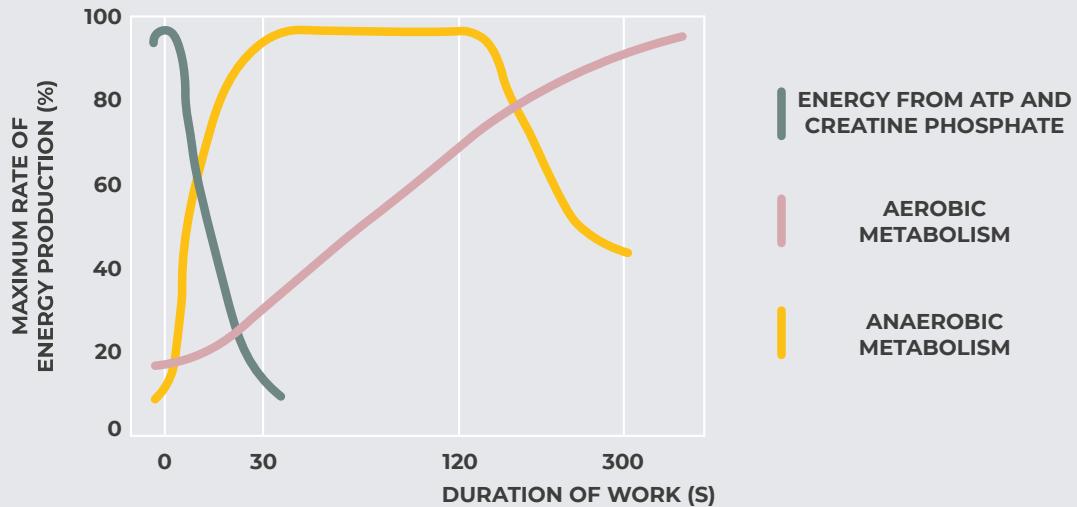
When the bonds in carbohydrate, fat and protein molecules break, energy is released. The same happens when an ATP bond is broken. Here, in addition to the released energy, adenosine diphosphate (ADP) + phosphate (P) are left, which float around the cell's cyto-

plasm and can again be used to create ATP. Since we only have enough ATP for a few seconds of work, the leftover ADP + P is converted into new ATP via the energy from the bonds in the nutrients. This process is constantly happening.

FIGURE 14: SUPPLY AND CONSUMPTION OF ENERGY

Three general energy systems help create the energy that we use in our daily lives. How big a part each system

contributes depends on what percentage of maximum oxygen uptake we are working with.



THE ATP-PCR SYSTEM

max. approx. 20-30 seconds

If an athlete has to sprint 100 meters or lift a heavy weight, there must be an immediate energy supply.

This energy comes from the intramuscular phosphate, ATP and creatine phosphate (PCr), and the process takes place in the cytosol of the cell.

One kilogram of muscle contains 3-8 mmol of ATP and 4-5 times more PCr. Each time the process is performed, one ATP molecule is formed. For example, this means that the energy stores are just enough to sprint for 5-8 seconds or run at a marathon pace for 20-30 seconds. After 20-30 seconds the stores will be completely empty.

ANAEROBIC LACTATE SYSTEM

max. approx. 60-180 seconds

In order to keep up the intensity during short-duration training, a quick re-synthesis of phosphate must take place. The energy for this comes mainly from the breakdown of the stored muscle glycogen via anaerobic glycolysis, which means that ATP is formed without oxygen but also forms lactate. Each time the process is performed, the result is 2 ATP molecules. For example, the energy generated anaerobically for ATP recovery via glycolysis is sufficient for an athlete to swim

100 m or can be used at the end of a 400 m race. As with the above energy system, this also occurs in the cytosol of the cell. The amount of lactate that is formed and removed during physical activity varies depending on whether you are trained or untrained. Trained individuals will be able to train at higher intensity before starting to form lactate. At light and moderate intensity, the body will be able to generate energy without generating lactate (aerobic glycolysis, fat and protein metabolism).

AEROBIC SYSTEM

> 180 seconds

If an athlete continues training with maximum effort for more than three minutes, energy will come primarily from the aerobic metabolism. At this point in training, the athlete will at some point reach steady state, which is where there is a balance between the energy requirement in the muscles and the ATP production in aerobic metabolism. Here, oxygen-consuming reactions will generate energy for physical activity. The lactate that is produced is either oxidised or turns into glucose. There are two processes in the aerobic system:

Krebs Cycle (Citric Acid Cycle CAC) aka (Tricarboxylic acid cycle TAC)

- Creates ATP from glycolysis and from pyruvate
- Regenerates 1 ATP molecule, generates 2 CO₂ molecules and releases 8 hydrogen ions for each cycle

Electron Transport Chain

- The hydrogen ions from the Krebs cycle bind to the chemicals NAD⁺ and FAD⁺ in the mitochondria and are introduced into the electron transport chain. Ultimately, the electron transport chain creates 32 ATP molecules per glucose molecule.

Both processes take place in the cell's power centres, which are called mitochondria.

So, you can clearly see that oxygen-demanding processes produce a far greater yield. Unfortunately, the process is also lengthy and therefore not suitable when there is a need for instant energy.

On the other hand, it is a "waste of resources" to exhaust the short-term systems during slower-pace, longer-term activities.



CHAPTER 4

METABOLISM

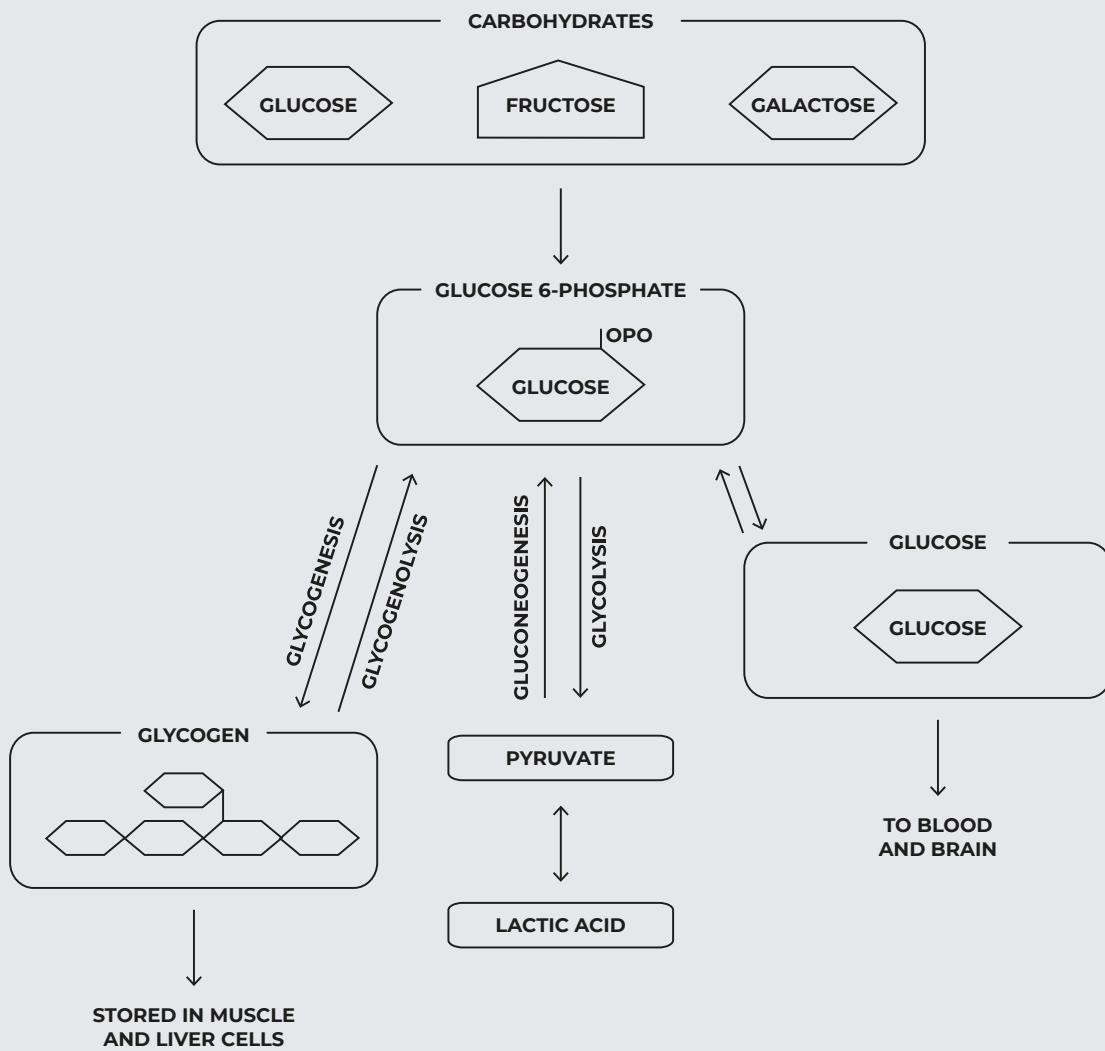
After reviewing this chapter, you will have an understanding of how the body can generate energy from glucose, amino acids and fatty acids. You will also learn how the body can adapt to different intake of macronutrients.

METABOLISM

The body must, constantly use energy, which it gets from food or, more specifically, the macronutrients we con-

sume. There are several ways in which this energy generation can take place.

FIGURE 16: METABOLISM OF CARBOHYDRATES



CARBOHYDRATE METABOLISM

If the body needs energy from consumed carbohydrates, there are 5 different ways to do this:

GLYCOGENESIS	KREBS CYCLE
GLYCOGENOLYSIS	ELECTRON TRANSPORT CHAIN
GLYCOLYSIS	GLYCONEOGENESIS

GLYCOGENESIS Glucose til glycogen

Glycogenesis takes effect when we are in state of rest or when we consume large amounts of carbohydrates, which results in a spike in blood sugar, which needs to be lowered.

Glycogenesis occurs when a series of enzymes reshape the glucose molecules so that they can bind to long chains of glycogen and are stored in cells, primarily in the liver and in the muscles. When we store glucose as glycogen, it means that we have a stock available for when our blood sugar drops or when we need energy to perform movement.

Glycogenesis is stimulated by the hormone insulin, which is secreted by the pancreas when blood sugar rises to stimulate the uptake and storage of glucose.

GLYCOGENOLYSIS Glycogen til glucose

When the energy requirement is high, e.g. during intense physical activity, glycogenolysis occurs, which is the cleavage of glucose molecules from the glycogen molecule. In order for this cleavage to occur, the enzyme glycogen phosphorylase is activated, which binds a phosphate group to a glucose molecule, and this destroys the bond that holds glucose on the glycogen molecule. Now, the glucose + phosphate molecule can be used either as energy (via glycolysis to ATP) or it can become free glucose in the liver. Here it can be used as fuel/energy for the brain, as the brain can only use glucose as an energy source. When the brain does not have enough glucose from the last meal, the liver is used as reserve storage. Glycogenolysis is stimulated to take place via the hormones glucagon and epinephrine. Glucagon is excreted from the pancreas by low blood sugar and stress. Epinephrine is excreted from the adrenal gland in response to stress. Both hormones function to stimulate the breakdown of glycogen into glucose to provide energy.

GLYCOLYSIS

Glucose til pyruvat

Breakdown of glucose into two pyruvates. The glucose that undergoes glycolysis can come from the blood or from stored glycogen. The glucose-6-phosphate created when glucose is released from glycogen is what carries out glycolysis. Via several steps, where enzymes assist with breakdown and catalysis, glucose-6-phosphate forms, splits into two and turns into pyruvate. During this process, hydrogen ions are released, which can cause fatigue if not collected. The hydrogen ions are picked up by NAD⁺, which is why it becomes NADH. The hydrogen ion on NADH needs to be released for glycolysis to continue, which is why it combines with pyruvate and turns into lactate or is passed on to the Krebs cycle,

where it is converted to Acetyl-CoA and converted to ATP. The speed at which glycolysis should take place determines which of the two options is used. If the energy requirement is high, hydrogen will combine with pyruvate and turn into lactate. This also allows NAD⁺ to be resynthesized, the glycolysis to continue to generate ATP, and the hydrogen ions to be sent out of the cell before they are depleted. If the energy requirement is low, the hydrogen ions will be passed on to the electron transport chain to create ATP.

KREBS CYCLE AND THE ELECTRON TRANSPORT CHAIN ACETYL-COA FOR ATP, CO₂ AND H₂O

All the macronutrients can be converted to Acetyl-CoA, transported to the cell's mitochondria and used to create ATP. Acetyl-CoA is the "access molecule" to the Krebs Cycle, so everything that has to pass through must be converted to Acetyl-CoA.

In glycolysis, pyruvate is the final product. Much of this pyruvate is converted to Acetyl-CoA in the mitochondria of the cell. The amount of conversion is determined by the energy requirements. At high energy requirements, a small proportion of pyruvate will be converted, and at low energy requirements a high rate of pyruvate will be converted to Acetyl-CoA.

GLYCONEOGENESIS

Non-carbohydrate til glucose

Should the energy requirement be high without an adequate amount of glucose to supply energy to the brain, the body has other ways of restoring glucose. Since our central nervous system functions only on glucose, it is essential to keep the supply of glucose to the brain sufficient to survive. Via glycogenolysis,

glucose from stored glycogen in the liver can be transported into the blood, which can be used for the brain. Should the glycogen concentrations in the liver be low, the body will instead create glucose from non-carbohydrate substances. This process is called glycogenesis, i.e. the creation of new glucose.

FAT METABOLISM

If the body needs to use energy from consumed fat, there are 6 different ways to do this:

TRIGLYCERIDE AND FATTY ACID MOBILISATION	FATTY ACID SYNTHESIS
BETA OXIDATION	TRIGLYCERIDE SYNTHESIS
KETONES	CHOLESTEROL SYNTHESIS

TRIGLYCERIDE AND FATTY ACID MOBILISATION

When energy is needed

- it is taken from adipose tissue

Fatty acids are the nutrients that are most involved when energy requirements are low, like for normal daily activities, when we perform work for a long period at a low intensity, like walking or running, or during breaks between high-intensity workouts. Fatty acids are stored in various tissues (such as the liver, muscle tissue and adipose tissue) as triglycerides, consisting of three fatty acids, as well as a glycerol molecule. Triglycerides must be broken down into fatty acids before they can be used in the body. The breakdown of triglycerides occurs via a process called lipolysis, which is the cleavage of fatty acids by an enzyme from the cytosol of the cell. Triglycerides are broken down into two things: three free fatty acids and one glycerol

molecule. If the energy is to be used in the tissue where the breakdown has occurred, the glycerol molecule will be transported over to glycolytic degradation, while the fatty acids will be further degraded via beta-oxidation.

Should energy be needed elsewhere in the body, fatty acid mobilisation and glycerol will be released into the blood via fatty acid mobilisation. Fat mobilisation is stimulated by high concentrations of the hormones adrenaline, noradrenaline, growth hormone and glucagon, all with the same task of informing the fat cell that the muscle lacks energy.

BETA-OXIDATION

Fatty acids to acetyl-CoA

As mentioned above, fatty acids must go through beta oxidation before they can be used as energy. Here, the fatty acids are broken down to acetyl CoA. Since fatty acids are long chains of carbon-hydrogen bonds, fatty acids can produce a large amount of Acetyl-CoA. When two bonds are split, NADH and FADH are formed, which transport the hydrogen ions to the electron transport chain where ATP is formed.

There are significantly more ATP molecules obtained from a fatty acid molecule (129) than a glucose molecule (38). However, fat oxidation, and thereby ATP formation, can only occur if there is oxygen present. This is also why this process is called an aerobic process. Should the necessary energy transfer be higher than the availability of oxygen, e.g. in high-intensity work, the body will instead use glucose as fuel.

KETONES

Form at low intake of carbohydrate acetyl-CoA and are used as energy for the brain and muscle tissue

Should the carbohydrate intake in the diet be insufficient to meet the needs of the central nervous system, the liver can form so-called ketones. This typically occurs during fasting, famine or very low carbohydrate intake.

We start to form ketones when too many Acetyl-CoA enzymes are created during energy production via fat in the cells.

Fat molecules cannot penetrate the barrier between the bloodstream and the brain, which is why ketones have to be formed as an alternative source of energy for the brain and the central nervous system.

As there are not enough oxaloacetate molecules (a form of carbohydrate) available to run Acetyl-CoA through the Krebs Cycle, the liver instead forms ketones from the excess Acetyl-CoA.

FATTY ACID SYNTHESIS

Formation of fatty acids from other nutrients

Although the fat we consume through our diet contributes to most of the body's stored fat, other nutrients can also become fat through fatty acid synthesis. If we consume more protein or carbohydrate than we can use,

either via combustion or conversion to storage in the cells, the excess amount is converted into fatty acids, which can be stored as fat. This synthesis usually occurs in the liver, but it can also occur in the adipose tissue.

TRIGLYCERIDE SYNTHESIS

Creation of triglycerides for storage or energy

In the synthesis of triglycerides, which consist of three fatty acids on a glycerol molecule, several breakdowns and combinations may occur before the triglycerides can be used in the cell. Chylomicrons are a mixture of fat and protein molecules. Chylomicrons are found in the enterocytes, and their function is to transport triglycerides across the intestinal wall. Fatty acids that are synthesised in the liver are called lipoproteins.

These two circulate in the body and can be absorbed into the cells via an enzyme called

lipoprotein lipase. This enzyme is necessary since triglycerides in this form have difficulty passing through the plasma membrane of the cell and being absorbed into the cell. Lipoprotein lipase breaks down the triglycerides into three single fatty acids and a glycerol molecule, so that they can be absorbed into the cell. After being absorbed in the cells, they can either be used as energy or converted back into triglycerides and stored for later use.

CHOLESTEROL SYNTHESIS

from Acetyl CoA

Cholesterol has several important functions in the body, including in the absorption of dietary fat, synthesis of steroid hormones and the function of the plasma membrane of the cell. We get some cholesterol from the food we consume; but most of it is actually

synthesised in the body. In the body, cholesterol can be synthesised in several different places from Acetyl-CoA. Among others, the liver and small intestine contribute to the formation of the cholesterol that is synthesised in the body.



PROTEIN METABOLISM

Proteins are vital to us, as amino acids that make up proteins play a role in everything from structure for hormones to enzymes and transport. The most well-known and common way of referring to protein is within muscle

building, which is a very popular topic among exercise enthusiasts. Broadly speaking, the body has three different ways to use ingested protein.

AMINO ACID "POOLS"

AMINO ACID CATABOLISME

DEAMINATION/TRANSAMINATION

AMINO ACID "POOLS"

A collection of essential and non-essential amino acids in the cell. These "pools" exist in several parts of the body and act as a store of amino acids. They respond to various stimuli, such as hormone activation, and at the same time, to the formation of enzymes, muscle

tissue, hormones, etc. Should there be excess amino acids when the body needs energy, the amino acids can be used to create other nutrients. These amino acid pools must be replenished at all times with new protein, which is why it is also essential to intake protein in your diet.

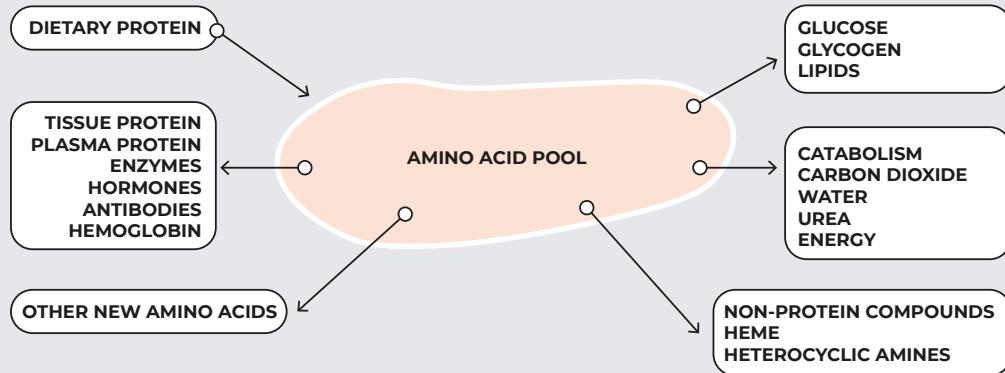


FIGURE 17: AMINO ACID METABOLISM/POOLS

AMINO ACID CATABOLISM

Breakdown of protein structures, either to form new protein structures, for energy or for non-protein molecules.

Amino acids (proteins) are constantly broken down and re-synthesised, with some amino acids being lost during these processes.

Due to the short lifetime of amino acids, the body can constantly adapt and synthesise the best possible proteins for the "job" that needs to be done.

In amino acid "pools", some amino acids, such as branched chain amino acids (BCAAs), will wait to be re-synthesised to new proteins, but before there is time for this to take place, they may be catabolised.

When proteins are broken down to create energy to make ATP, the nitrogen group in the amino acid must be removed. Afterwards, it binds to hydrogen and is transported out of the body.

The remaining parts of the amino acid, which consist of a carbon and hydrogen chain, are used for energy transfers to ATP via processing in the liver.

The liver can then use some of the amino acids, deaminate or catabolise them and then use them for gluconeogenesis, fat synthesis, energy transfer to ATP, etc.

DEAMINATION OR TRANSAMINATION

The process takes place when we consume more protein than we can absorb.

Excess amino acids are cleaved, whereby an amino group is removed so that the remaining amino acid is used to replenish energy stores, i.e. either it is stored as carbohydrate or fat.

Deamination and transamination also form the residual product ammonia/uric acid, which is excreted via the kidneys.

Ammonia is toxic to the human body, so there has been some concern about the extent to which a high intake of protein could harm the kidneys in the long run.

However, recent research has shown no harmful effects to the kidneys despite intakes of up to 3 grams of protein per kg bodyweight per day, even though this is significantly more than the recommended intake from DIF.



CHAPTER 5

DIET RECORDING

After reviewing this chapter, you will gain an understanding of how to record your clients' food intake and of the advantages and disadvantages of each method. This includes factors to which we must pay special attention when recording the diet of our clients.

SPECIAL GROUPS

_ THE ELDERLY, PREGNANT WOMEN, YOUNG PEOPLE

After reviewing this chapter, you will have an understanding of how diet should be tailored to special groups, such as the elderly, pregnant women and young people, as well as what you need to be aware of and how to do this optimally.

DIET RECORDING

In order to gain an insight into the client's food habits, the following methods can be used:

Diet recording

You need to ask about the client's diet on a typical weekday, including when, what and how much. When are the meals consumed, what do they consist of and how much of the various foods are consumed? Every meal is thoroughly discussed, and everything is included and written down. Then, inquire into the client's diet on weekends using the same method.

A method such as diet recording requires good memory on the part of the client, and it can often be difficult to remember everything they consumed during the course of a day. If you get the feeling that the client has good control of their intake, this may be a simple and effective method to gain insight into their diet.

However, there may be a margin of error with clients whose food intake is associated with many feelings. For various reasons, such clients may therefore keep secret certain foods they consume, underestimate the unhealthy foods they eat or exaggerate their healthy food intake.

24-hour recall

This is where you ask about the client's intake of food and drink for the last 24 hours (the previous day), requesting as much precision as possible with respect to quantities. The method is

good because it forces the client to recount a specific day, and therefore, it's more difficult to embellish the truth. The method is also easy to perform and only requires pen and paper.

A possible disadvantage is if you do this on a day that was special for the client in one way or another. However, pay close attention to whether it is objectively a "special" day, or if the client is trying to justify the intake of foods they perceive as "forbidden" or unhealthy.

Dietary measurement

Here, the client writes down everything that is consumed, for example two weekdays and two weekend days. The client writes down every time something is consumed. This presents a very accurate picture of the client's diet since everything is written down while fresh in memory. The pitfalls may be that the client does not write everything down, especially items like sweets, cake, etc., and thus will end up painting an unrealistically healthy picture. There is also the possibility that the increased awareness of their diet leads the client to, consciously or subconsciously, make improvements, thereby also presenting a somewhat distorted picture of reality. In addition, it is also a time-consuming method for the client since it involves writing things down several times over four days.

SPECIAL GROUPS

— CHILDREN

All people are different and therefore it is of the utmost importance that we always provide individual guidance and never lump everyone together. When we work with dietary guidance and coaching, there are therefore some specific groups where certain factors

are particularly important to be aware of. Below, we will look at:

- Children
- Pregnant women
- The elderly
- Clients who want to increase muscle mass



When working with coaching children, there are often a lot more things to focus on than with an adult. First and foremost, there is the definition of when a child is normal, underweight or overweight. The very first thing you can do is look at what the child looks like. Is there some extra puppy fat? Is the child very thin? Does the child look healthy? Next, you can measure child's weight in two different ways:

BMI can be calculated, though with somewhat different limits than for adults. Children are categorised as overweight at the 90th percentile, so a BMI of about 22.5 will be the threshold for children, whereas it is usually 25 for adults.

In addition, growth curves can be used. Here you measure the children's growth in height and weight and see if the curve follows a steady increase. If the child suddenly gains weight or loses weight, there will be a disruption in the curve. Small fluctuations are not alarming, but if the curve moves beyond 2 lines on the graph, action must be taken. This means that the curve is relative. Therefore, if a child is born very heavy or big, you will not have the same level of alarm if the graph is generally high. The same applies to very small children who do not subsequently grow as fast.

SPECIAL GROUPS

_ CHILDREN

Dietary intervention

When guiding children in lifestyle and diet, a whole host of factors need to be taken into account. Some of the things that may affect why a child has an unhealthy weight include: the environment, family habits, genetics, what the child likes to eat, family socioeconomic status, activity level, leisure interests, epigenetics (maternal lifestyle during pregnancy) and mental state.

Children typically conform to their parents' cooking and eating habits as well as to their social life at school and to the leisure activities with which they want to fit in. Therefore, you will often be required to bend the general rules we have concerning healthy eating and lifestyle and to adapt to the child to a greater degree.

First and foremost, you should ensure that the family takes an active part in the lifestyle change, otherwise not much will usually happen. In addition, you must have a good picture of the child's environment.

IMPORTANT POINTS ATTENTION WHEN GUIDING CHILDREN

#1

Include the child's entire environment, family, school, leisure facilities, etc.

#2

Adapt the coaching towards changing thought patterns and habits rather than specific diet plans – this applies to children as well as the family and possibly other available environmental influences.

#3

Do not categorise food items as prohibited and permitted. It can trigger the child to eat more of the forbidden foods and, when this happens, it may also lead to a bad conscience and low self-esteem. Instead, make restrictions on when the child may eat these things, e.g. Friday sweets, no restrictions at birthday parties, etc.

#4

Try to create structure and a set number of mealtimes for the child, so that they eat at certain times instead of snacking continuously.

Physical activity

Do not underestimate the effect of physical activity on a child in relation to healthy dietary habits. Today, more and more, children are interested in computer games, tablets and phones, so it is important to make sure that children are also active. It will not only contribute to successful weight loss, but also promote their health, confidence, energy, body awareness and strength.

The Danish official recommendations are that children should be active for a minimum of 60 minutes a day at least at a moderate intensity. This can include fitness, strength training, running, sports and play. However, few children get particularly excited at the prospect of excessively-planned exercise, so it may be a good idea to be creative with how physical activity is introduced. Examples of physical activity that many children would think is cool include football with friends, play in bouncy castles, playlands, trampoline parks, recreational activities involving physical activity, a trip to the playground or just a walk in the garden, where the parents might even play along.

Strength training is also important for children to make them stronger later in life. However, you should take care with respect to when to include actual strength training in their guideline. For overweight children, this can be a good thing as they will often be able to use their weight to show that they are stronger and therefore experience

a success. It can be tremendously powerful in relation to a child's confidence and self-worth. Unfortunately, not everyone will find strength training particularly interesting, and so it should probably be camouflaged in other activities, such as climbing trees, games involving different forms of resistance, throwing and catching movements or similar. It is important to be aware that strength training and impact training appear to have a positive effect on bone density. Therefore, contrary to what many people believe, children can benefit greatly from lifting heavy things or jumping high and frequently.



SPECIAL GROUPS

PREGNANT WOMEN

First and foremost, a pregnant woman needs to understand that the lifestyle before and during pregnancy will impact the child. We call this epigenetics. It is an expression of everything we inherit which is not due to changes in our DNA. In other words, things that affect our organism, but which are not part of our DNA.

Epigenetics can be greatly influenced by the mother carrying the child. Therefore, it matters what she eats and how much, whether she smokes and whether she exercises.

For example, a foetus that has received too little nutrition will be programmed to absorb as much as possible to meet its needs. This function will continue to exist throughout life, which in many cases will result in an overload of the body and therefore promote weight gain.

Weight gain during pregnancy

Weight gain in the region of 12 kg is recommended during pregnancy, with a maximum of 16 kg. Excessive weight gain will increase the risk of pregnancy diabetes and birth complications. Too little weight gain often results in a low birth weight for the child and therefore an increased risk of cardiovascular disease, high blood pressure and type-2 diabetes.

BODY TISSUE	WEIGHT IN GRAMS
Foetus	3300
Placenta	640
Amniotic fluid	800
Uterus, breast, blood	2800
Extracellular fluid	1500
Apidose tissue	3300
Total	12,340

Figure 18: Weight of extra body tissue during pregnancy



ENERGY REQUIREMENTS DURING PREGNANCY

As energy requirements increase during pregnancy, it is recommended to increase intake during the three trimesters of pregnancy by the following amounts::

1st trimester

430 kJ/103 Cal per day

2nd trimester

1375 kJ/329 Cal per day

In addition, the recommendations increase from 0.8 g of protein per day to 1.1 g of protein per day. PLUS physical activity.

3rd trimester

2245 kJ/537 kcal per day

During breastfeeding

2490 kJ / 496 kcal per day

(Note that you should not increase your food intake here since there will usually be increased fat mass from pregnancy, which can provide the extra energy).

It is important to point out that the extra Calories should not come from foods that are more energy-dense, like sweets, cake, animal fat, etc. It is simply a case of consuming larger quantities. This means the macronutrient distribution should not deviate from the norm.

SPECIAL GROUPS

PREGNANT WOMEN

There are certain micronutrients that are important to pay attention to:

Folic acid

Significantly reduces the risk of the development of spina bifida in the child. Also called folic acid or folate. 400 micrograms daily are recommended, optimally taken 3 months before pregnancy occurs and during the first 12 weeks of pregnancy.

Omega-3 fatty acids

Important for the child's brain and eye development. The recommendations are usually 250 mg EPA and DHA (both are omega-3 fatty acids); during pregnancy it is recommended to increase this by 200 mg DHA, i.e. a total of 450 mg daily by DHA and EPA.

Iron

Helps increase blood flow, as both mother and foetus must have adequate blood flow. It is recommended to take 40-50 mg of iron daily from week 10 of pregnancy until birth.

Pre and probiotics

May have a positive effect on the intestinal system of both mother and child. However, it is possible that a supplement is not needed, as this can be obtained through the diet, especially from yogurt and other milk products.

Calcium

Important for the bone health of the mother. The foetus will take what it needs. 500 mg calcium per day is recommended.

Vitamin D

Important for the bone health of the mother as it promotes the absorption of calcium. Be aware that vitamin D is fat-soluble and therefore should not be taken in excessive amounts. A daily intake of 10 micrograms is recommended.

In addition, there are a number of things that should not be consumed during pregnancy:

Vitamin A

Too high doses increase the risk of foetal malformations and the risk of vitamin A poisoning during breastfeeding. Reduce intake so this that it is only obtained from food and from pregnancy multivitamins. This applies both during pregnancy and also during breastfeeding, as vitamin A is fat-soluble and can be excreted through the milk, which may lead to poisoning of the baby in severe cases.

Pesticides and PCBs

For example, can be found in the fat deposits of poultry and fish.

Mercury and lead

General heavy metal poisoning, of which there is often a risk when ingesting certain types of fish. Avoid fish from the top of the food chain, like swordfish, tuna, halibut, salmon, etc.

Alcohol, mature/mouldy cheeses + raw bean sprouts

Liver

High in vitamin A.

High caffeine content

Coffee, tea, cola and other drinks that have a high caffeine content.

Unpasteurised milk and juice

Risk of listeria, among other things.



Physical activity

For pregnant women, the recommendations for physical activity are very much based on the level of exercise that the person engaged in prior to pregnancy. When you become pregnant, you have to be really good at listening to the body, but generally you can continue with the level of exercise you were doing before pregnancy. However, it is important to be aware that pregnancy is probably not the time to make a lot of progress in your training. The keyword is maintenance. Quite practically, there are some exercises where you lie on your stomach which become difficult or directly impossible to do. Exercises where you lie on your back, from the 2nd trimester onwards, should also be avoided because you can shut off the blood supply to the foetus. Core training (training of the muscles around the abdomen and back) should also be done gently. If you do a lot of sit-ups

Raw meat and raw eggs

Salmonella, E.coli

Tobacco

Nicotine induces blood vessel contraction and therefore prevents optimal blood flow from the placenta to the foetus.



or exercises that generally require a large amount of tension in the abdomen, the risk of Rectus Diastase (split abdominal muscles) increases. Here, the connective tissue is being forced to expand between the abdominal muscles, and when the space between the abdominal muscles reaches 2 fingers widths, it is referred to as Rectus Diastase. It usually contracts again, but if you continue to do a lot of core training, you increase the risk of the condition persisting. Rectus Diastase results in two things: decreased stability and support around the core as well as a tummy that looks like a small pot belly/pregnant tummy.

In addition, the body requires a different energy level to keep it going, so speed, strength and endurance will usually be somewhat negatively affected. Therefore, the best advice is to listen carefully to what the body is saying.

SPECIAL GROUPS

— THE ELDERLY



Our body develops with age, and from about the age of 30, cell breakdown in the body begins to exceed cell formation. Therefore, a gradual decline in the size and efficiency of our organs is experienced.

Some of the areas where we see a decline are:

- Muscle mass and strength
- BMR
- Blood circulation in the heart
- VO₂max
- Bone Mass - NOTE that women's bone mass drops significantly more than men's
- In general, poorer health because our immune system becomes less effective

Decline in these areas can also be considered the speed at which we age.

There are three things that determine this speed: genetics, lifestyle and environment.

The hereditary things that influence our ageing process are gender, family life span, metabolism and the degree of ability to produce HDL. It is very difficult to do anything about our genetics.

On the other hand, we can influence our way of life and partly our environment. Environment includes our financial situation, educational level, the ability to receive help from the health care system, a safe environment and a number of psychosocial factors.

The most important influence comes from our lifestyle. It is important to remember that although you may have good genetics, a bad lifestyle can reduce your life span and, conversely, a healthy lifestyle can extend your life span despite poor genetics. Lifestyle factors that influence the rate of ageing are eating habits, physical activity and the use of substances (alcohol, drugs, tobacco).

Dietary habits among the elderly

When advising older people on nutrition, there are a number of things to be aware of. First and foremost, their daily energy expenditure drops. At the same time, their nutrient needs remain the same, so it is important to make sure they get all the nutrients they require. At the same time, many elderly people experience a decline in their appetite. Therefore, supplements will be particularly relevant for most older people.

Fluid intake is also a typical problem among the elderly, and this can be due to several reasons. First of all, the feeling of thirst diminishes with age. In addition, fluid balance also typically decreases with age (in tandem with lower muscle mass and higher fat mass), which makes it more difficult to compensate for fluid deficiency via fluid intake. However, certain more conscious reasons may be in play, for example because the elderly person might avoid drinking out of fear of having to urinate more often, especially during the night, or that they do not want to be a nuisance to caretakers, family members, etc. Whatever the reasons, it is important to discover and work with them since low fluid balance can help increase mental confusion, constipation and cognitive challenges.

Dietary Recommendations

As the muscle mass of the elderly decreases, it is important to get enough protein. In connection with physical activity, this should contribute towards increased/maintained muscle mass.

In relation to protein, special attention should be paid to the following groups who are at risk of low protein intake: people with generally low energy intake, limited food budget, lactose intolerance and people who simply have difficulty chewing, e.g. meat. Fat intake should probably be slightly reduced, as studies show possible prevention of overweightness, cardiovascular disease and certain types of cancer. In addition, a reduction in fat in the diet will also make room for more complex carbohydrates and more nutrient-dense foods to better meet the nutritional need.

The focus should be on complex carbohydrates as they are more nutrient dense. In addition, the fibre can reduce the risk of bowel cancer and cardiovascular disease, reduce cholesterol levels and prevent constipation.

Some of the nutrients that are especially important to focus on with the elderly are vitamin D, calcium, iron, zinc, magnesium, vitamin E, folic acid, B6 and B12 vitamins.

Elderly people often have inadequate gastric acid, which can significantly reduce the absorption of nutrients, so older people may be able to handle slightly higher intakes of many micronutrients to compensate for the lack of uptake. Alternatively, you could try to promote gastric acid production.

SPECIAL GROUPS

— THE ELDERLY

In general, you should be aware of the following when training older people:

WARM UP

Thorough warm up is required (10-15 min) - The elderly experience increased muscle and joint stiffness.

MOBILITY TRAINING

Mobility training should be included (5-10 min) - can be done by executing full ROM in exercises or doing dedicated mobility exercises.

STRENGHT TRAINING

Strength training should be built around multi-joint exercises focusing on the large muscle groups.

FITNESS

Fitness training should be done at moderate intensity – older people will run out of breath faster since their VO₂max is typically significantly reduced.

BALANCE TRAINING

All workouts should include balance training, as balance deteriorates significantly with age and balance training can prevent falls.

IN GENERAL

The exercises should be functional. From a purely practical perspective, good training will make daily tasks easier, improve sleep, improve mental state, increase strength and induce hypertrophy and reduce bone loss.

SPECIAL GROUPS

— INCREASE MUSCLE MASS

Although most associate nutrition advice with weight loss, there will also be clients who want to increase their weight or muscle mass.

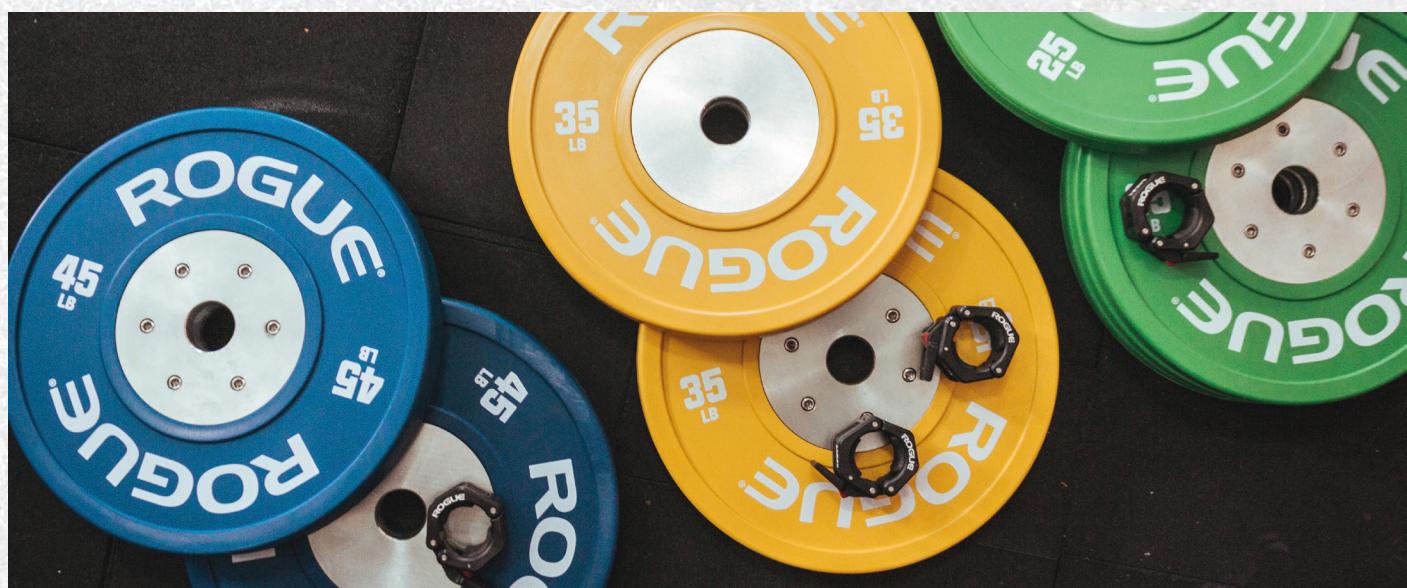
When the goal is to gain weight, a caloric surplus is required, i.e. consuming more food than what is being burned. However, weight can be increased in several ways, and it is therefore important to ensure a balance in intake that supports weight gain in muscle mass and not fat mass. In addition, it is very difficult specify numbers because everyone is different, both in terms of starting point, metabolism, training experience, etc.

As a rule of thumb, untrained individuals should not exceed a Calorie surplus of max 500 Cal. per. day. With trained

clients you need to be even more precise so as to get as close to 0 as possible; therefore, somewhere between a 1 and 250 Cal. surplus is usually enough.

Studies indicate that it can be advantageous if the extra Calories come from protein, which also makes sense, as amino acids are the building blocks of the muscle cells.

If a client' caloric surplus is too high, there is a risk that the weight gain will consist of an increase in fat mass, which is rarely desired, either from a health or aesthetic perspective.





CHAPTER 6

DIET TRENDS

After reviewing this chapter, you will have an understanding of the dietary trends in our society right now, what they consist of and why it is important to understand them.

SUPPLEMENTS

After reviewing this chapter, you will have an understanding of what supplements are, what they are used for and what works and does not work.

DIET TRENDS

Just as there are trends in music, film and clothing, there are also trends within diet and nutrition. As we gain knowledge in the field as well as of matters that affect different people, lots of different trends appear, which are derived from one other as supplements, responses, etc. From the 1980s until now, we have believed in everything from diets that argued for

low fat to low carb and high protein to veganism. Most clients seeking a diet and lifestyle coach have already tried a lot of these trends and diets.

Here we review 3 of the major trends that have had a major impact on the health scene in Denmark over the past 10-15 years. Besides these, there are also a whole range of diets etc.





LOW CARB HIGH FAT

LCHF, as it is also called and abbreviated, began to gain popularity during the '00s. Perhaps to counteract the trend that was seen throughout the 80's and 90's, where everything had to be as low in fat content as possible. Suddenly, a world of knowledge about fat opened up, and the focus was on the good properties of fat.

The general principles of LCHF are:

- The diet pyramid is turned upside down:
more fat and less carbohydrate
- Vegetables are consumed which grow above ground
 - Meat (from poultry, game and fish) and eggs
 - Fatty dairy products
 - Butter, coconut oil and olive oil are used for frying
 - Some nuts and berries are consumed

One of the benefits of trying the LCHF diet should be to enter ketosis. This is a condition where the body simply lacks carbohydrates for energy and therefore begins to burn fat instead. The process can be hard for many to achieve and causes flu-like symptoms, headaches, the return of old injuries, etc. However, it is apparently worth all the hassle, as many people experience great mental clarity, high levels of energy, great mental energy and weight loss once they reach the ketosis stage. There is no evidence for the mental results, but the physical effects are however documented in several studies. Here it is found that not only does weight decrease, which could very well be due to a caloric deficit, but several health factors improve also. Among other things, a decrease in triglyceride levels, LDL cholesterol and blood sugar has been found, as well as an increase in HDL cholesterol.

LCHF has gained several big supporters, the largest in Denmark is probably Jane Faerber, who is behind the website www.madbanditten.dk.



THE PALEO DIET

The Paleo, or Stone Age diet as it is also called, also began to flourish in the late 00s. Since Paleo is somewhat similar to LCHF, Paleo may well be considered as belonging to the "LCHF diets".

As the name suggests, the concept originates from how man ate in the Stone Age. The purpose of the diet is to return to nature and eat what we are genetically built to eat.

The general principles of the Paleo diet are:

- Live as in the Stone Age
 - Lots of meat
 - High fat content
 - Organic foods
- Eat greens that grows above ground
 - Eat fish, eggs and fruit
- Berries and nuts can be consumed in smaller quantities
 - Seek out natural fat
 - Avoid processed foods
- Exclude the following: sugar, cereals, poor quality fat and artificial sweeteners

The Paleo diet is still not entirely backed by evidence, but there are studies that show that the diet can have a positive impact on type-2 diabetes, blood sugar sensitivity and dysfunctional metabolism.

The Paleo diet also has many supporters, the best known of which in Denmark is probably Chef Thomas Rode, who has been head chef at the Michelin restaurant Kong Hans Kælder and has appeared in several television programs.



DETOX DIETS

Detoxing is a widely discussed phenomenon. Although probably most prevalent in more alternative-thinking health circles, most of us have heard of or perhaps even tried some form of detox diet. The purpose of a detox was initially the idea that a particular diet could "detoxify" the body by facilitating the flushing of accumulated waste. However, that theory was derailed pretty quickly since the body already has its own waste separation processes (the kidneys, for example). Today, detox diets are being marketed more as ways to "reset", e.g. digestion, sugar cravings or the like, or as an effective and motivating starting point for weight loss.

Detox diets can be very different, e.g. water diets, juice diets or a sugar free week.

HERE IS AN EXAMPLE OF A 4-DAY DETOX DIET:

However, there are many variations available on the web.

Day 1: "Restoring order with digestion"

Focus on omega-3 and antioxidants. Eat only vegetables, no meat.

Day 2: "Intestinal flora"

Include milk products, like A38

Day 3: "Stomach ready for animal protein"

Still focus on omega-3. Intake fish, flax seeds, chia seeds, etc.

Day 4: "General digestion"

A step closer to normal. Include whole grains and eggs.

There is no evidence that detox diets can eliminate toxins and waste in the body. However, for many people, there may be something mental about going "all in" for a period of time, or the feeling of "resetting" the body after a stressful period (e.g. Christmas) and "preparing" yourself to get back in the saddle. Unfortunately, these plans are never long-term and therefore should not be used as a golden rule or long-term lifestyle. Furthermore, there are direct health risks associated with some of the very hardcore detox diets, e.g. water diets and juice diets. The risk of deficiency in nutrients, fibre and general energy is very high.

DIETARY SUPPLEMENTS

The upper part of the modified diet pyramid (cf. section 1) is dietary supplements. If energy balance, macro and micronutrients and meal timing are all under control, supplements will be the icing on the cake. In other words, this is where the last few percent can be obtained in terms of strength and muscle mass and therefore also performance. Today, there are countless supplements that, according to the companies, should all have a huge effect. The best known supplements are creatine, protein powder, BCAAs and caffeine (pill form). These, and others, will be reviewed in this section.

The section is based on a major review by Valenzuela et al. (2018) (1), which examined available literature on supplements and what potential positive effects these have on strength and muscle mass. Depending on the strength of the findings from the literature, each supplement was rated with an A, B, C or D. An A means that it can be recommended, B indicates caution, while supplements scoring a C or D cannot be recommended.

Creatine

When our muscles work, ATP is used to create movement. However, the body's ATP stores are low, which is why they only last for 2-3 seconds of work. After that, the body has to break down other substances in order to recover ATP, and of these, creatine phosphate is the fastest to break down. Our stocks of creatine phosphate and the breakdown of this creatine phosphate is enough for 10-15 seconds of muscle work, after which

fats and carbohydrates must be broken down to restore ATP. The speed of the breakdown drops, which means that we cannot work at the same high intensity as with creatine phosphate.

The intake of creatine can therefore increase the stores in the body, and we can thus work at a higher intensity over a longer period. The cheapest and most effective creatine supplement is called creatine monohydrate, and therefore, this is the best option to invest in.

Creatine monohydrate has been shown in literature to be able to increase performance and muscle growth while decreasing muscle atrophy during immobilisation. Performance increased providing that the selected exercise type lasted less than 3 minutes. In addition, two meta-analyses by Lanham et al. (2015) (2,3) on both squat and bench press strength showed an increase from creatine intake.

When using creatine, it is important to drink enough fluid to avoid the risk of stomach cramps and not to ingest too much creatine, which can cause diarrhoea and nausea. Therefore, it is a good idea to split creatine intake over several meals and to take it together with meals if diarrhoea and nausea are experienced. You can start taking creatine in two ways:

- With a so-called loading protocol, where 0.3 g per kg bodyweight is consumed per day for 5-7 days; this is then followed by at least 0.03 g per body-weight per day.

- Without a loading protocol where 0.03 g per kg bodyweight is consumed per day.

For a man of 67 kg, this means 20 g per day in the loading phase and a minimum of 2 g per day afterwards. Common to both ways of doing this is that you do not need to take a break with creatine at any time. Creatine was categorised as A and can therefore be recommended.

Caffeine

Caffeine is something most people know from coffee, cola or energy drinks. It is a stimulant that stimulates the nervous system, which secretes more adrenaline and noradrenaline. These bind to adenosine receptors. ATP stands for Adenosine Tri Phosphate, and when this is broken down, it creates energy and the by-product adenosine. This adenosine binds itself to adenosine receptors, which we will feel as increased fatigue. Caffeine takes adenosine's place, binding itself to the receptors, and when this happens, we do not experience the same degree of fatigue. This can then allow you to work longer, lift more pounds in an exercise or run further. Caffeine is thus not a supplement that provides energy, but merely hides the lack of energy/increased fatigue.

Most literature on caffeine finds positive effects to both muscle endurance and muscle strength, although the effect varies depending on training experience and whether the upper or lower body was tested. The effect of caffeine is evident in literature, but not at the level

where it justifies that everyone should take it. It is still just a supplement to a good diet and exercise, but it is cheap supplement which may be worth taking particularly if you like the taste. Caffeine was categorised as A and is therefore recommended.

Protein (powder)

Protein intake increases protein synthesis and lowers protein breakdown, increasing muscle mass and strength. Therefore, protein supplements may be effective for increasing muscle mass and strength, though only if your diet does not provide an adequate protein level. Should this be the case, protein supplementation will not be necessary.

The average Dane consumes 1.1 grams of protein per kg of bodyweight per day, which is enough to meet the protein needs of persons who are not in training. For strength-training individuals, a large meta-analysis on exercise and protein intake has shown that people should consume at least 1.6 g protein per kg bodyweight per day for optimal muscle building in connection with strength training. However, more than 1.6 g of protein per kg of bodyweight may be consumed per day since the meta-analysis found optimum consumption to be between 1.6 and 2.2 grams of protein per kg bodyweight per day.

So, if this level of intake is achieved, protein supplementation will not be necessary. Protein supplements were categorised as A and are therefore recommended. The one reservation was

DIETARY SUPPLEMENTS

that if enough protein is obtained from food, protein supplements become superfluous.

Omega-3 fatty acids

We cannot produce omega-3 fatty acids in the body, which is why it is an essential nutrient that we need to obtain from our diet. We can get these fatty acids from fatty fish like salmon. Omega-3 fatty acids include ALA, which for example, is found in flaxseed. In the body, ALA is converted to EPA and DHA, with which the most physiological effects of omega-3 fatty acids are associated. EPA and DHA are converted into signalling chemicals with an anti-inflammatory effect and which, among other things, regulate the immune system and the metabolism. In case of inadequate intake of omega-3 fatty acids or too little omega-3 versus omega-6, it may make sense to supplement with omega-3 fatty acids. Omega-3 fatty acids lower levels of triglycerides, both in healthy individuals and people with elevated levels of triglycerides (5). At the same time, some studies have shown that omega-3 fatty acids can lower blood pressure in people who already have high blood pressure (6).

Omega-3 fatty acids are categorised as A and are therefore recommended.

BCAAs

BCAAs are Branched-Chain-Amino-Acids and consist of three essential amino acids, leucine, isoleucine and valine. The body cannot produce them, so they must be consumed through the diet. Leucine is one of the three and usually

the best known, as it directly stimulates protein synthesis.

BCAAs have been shown to stimulate protein synthesis and reduce protein degradation better than both carbohydrates and placebo, but less than whey protein. Whey protein also contains BCAAs, as do meats, eggs and dairy products. Therefore, if sufficient quantities of these foods are consumed, at least 1-1.5 grams of protein per kg body-weight per day, it will most likely make isolated supplementation with BCAAs redundant.

However, it may be beneficial for sick people or the elderly to take BCAAs, as they sometimes will have difficulty consuming sufficient amounts of protein through their regular diet. In such cases, the BCAAs would help preserve as much muscle mass as possible and thereby also everyday functionality.

BCAAs were categorised as B: might have an effect (with reservations).

Beta-alanine

Beta-alanine is a dietary supplement that can be purchased as pure powder, tablets or in pre-workout supplements to use before a workout. Beta-alanine is an amino acid, i.e. derived from protein. It consists of carnosine and histidine.

Carnosine is found in the muscles, but also in some parts of the nervous system. When the muscles work, it acts as a buffer in the muscles. The internal environment of the muscle becomes more acidic during muscle work be-

cause of the accumulation of hydrogen ions. Here, carnosine will bind to these hydrogen ions, and fatigue can thus be delayed.

As beta-alanine is in demand in muscle cells, it will inhibit our production of carnosine. By supplementing with beta-alanine, the production of carnosine should be boosted.

Beta-alanine can be very useful, for example during high volume strength training with short breaks. Here, muscle fatigue will be high enough so that the beta-alanine will have an effect and more repetitions can be performed. Research has shown that muscle endurance, both static (7) and dynamic (8), can be improved with beta-alanine. Beta-alanine does not seem to make you stronger (9), but appears to increase exercise volume (10), which may therefore help to increase muscle mass.

Beta-alanine was categorised as B: may have an effect (with reservations).

Glutamine

Glutamine is the most common amino acid in the body, especially in muscle tissue. It is a non-essential amino acid, which means that the body can synthesise it. At the same time, glutamine can also be used to restore glucose in the body, via gluconeogenesis.

Glutamine is found in several different foods, and particularly in eggs, dairy products and nuts. Glutamine is thus something that the body itself can

synthesise, and we can get it from our diet. Research has also shown that, for healthy people, there are no performance-enhancing properties of glutamine when used as a dietary supplement along with exercise (11).

Where glutamine can be of benefit is for very sick people. Here, the consumption of glutamine increases greatly because the immune system uses glutamine as a fuel. In the tissues of the body, proteins are constantly broken down and built up, while continuously being released and absorbed into the blood. The problem then is that the immune system uses all the glutamine in the blood, and so glutamine from muscle tissue as well as other tissues is moved to the blood. This is a limiting factor for protein generation due to the small amount of amino acids left to synthesise proteins. Muscle loss may then increase the risk of death and disability (12).

Glutamine is categorised as C, which is why it is not recommended if you are healthy.



NUTRITION COACH

LEVEL 2

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_ LEVEL 2

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MEET YOUR TEACHER



SØREN FRUERLUND
EDUCATION MANAGER
& TEACHER

My name is Søren Fruerlund, and I am responsible for education as well as teaching at Træner Akademiet. I am certified as a personal trainer, physical massage therapist, manual therapy (RAH treatment), CHEK IMS Level 1-4, CHEK Holistic Lifestyle Coach Level 1 and 2 and more. In addition, I am affiliated with CHEK Academy as a mentor for the students. It is important to me that I share the knowledge that I acquire and have experience with. If our goal is to help people, it is important to pass on this knowledge to future coaches and trainers so that, together, we can help even more individuals. That is why I am part of Træner Akademiet. We want to offer our participants the experience that we take them seriously and help them in the best possible way. In addition to my work at Træner Akademiet, I am the head coach and owner at Fruerlund Studio, which is centrally located in Aarhus. Our work there is broad since we work with a holistic solution. We often collaborate with clients who have tried many programmes and treatments in the past. Our clients are often referred from physiotherapy or specialist physicians. I want to do my best to ensure that everyone has a good and educational experience at Træner Akademiet.



CHAPTER 1

After reviewing this chapter, you will gain a deeper understanding of the various diets.

You will gain a greater understanding of when the various diets can be used.

INDIVIDUAL DIETARY GUIDANCE

As a Nutrition Coach you will come into contact with many different types of people, so it is important that you can quickly switch from client to client and never use a “one-size-fits-all” approach.

Instead, we need to make an individual assessment of what works for each individual.

Generally, it is not a good idea to go out and praise a specific diet or lifestyle, but instead try to tailor a completely personal guide and coaching for that particular client. However, there are a lot of methods out there, and it is perfectly fine to be inspired.

Many clients will come to you and tell you that they know of one or more of the diets mentioned below, and they might even have an interest in trying some of them.

In such cases, it may be beneficial to have in-depth knowledge of the various methods and whether or not it will actually be a good idea for a client to try them out. For example, LCHF might just be right thing for the next client who walks through your door.

First and foremost, we must always rely on our knowledge and never agree to an idea that is inappropriate for the client or even potentially harmful. But there is certainly the potential that specific lifestyles or diet types can inspire or contribute towards solutions for different clients.





The following is a review of some of the current and popular lifestyles in Denmark and of the groups of clients that could potentially benefit from these. If you need a recap on the different dietary options, they can be found in Level 1, Chapter 6.

NOTE: Remember that there is no right and wrong. All people are individuals, so the following information is not an answer list. You should always follow up with a client and see if it works for them. Various factors come into play, including: family matters, environment, past eating habits, fitness level, personal preferences, etc. Besides, it does not have to be either-or. You can certainly find inspiration in the different nutritional approaches. For good communication and to give the client the sense that they are part of the decision, the proposals should be presented for what they are – i.e. suggestions. There is no right or wrong method, and it is important that the client does not get the impression that foods have to be classified as forbidden and allowed.

LOW CARB HIGH FAT

Low Carb High Fat may be very beneficial for some people, but it is probably a particularly good option for people with allergies or intolerance to gluten, and often it also relevant to people who are sensitive to blood sugar fluctuations. For example, this could be diabetics or people at risk of developing type-2 diabetes. It can also be for clients who have major problems with what most people describe as sugar cravings or sudden drops in energy¹.

By eating Low Carb High Fat, you avoid grain products, which some people have trouble digesting in larger or smaller quantities. This can become apparent in symptoms such as constant bloating, feelings of heaviness in the body and a lack of energy¹. So, if this is something you suspect, LCHF could be an option.

In relation to clients with blood sugar fluctuations, the exclusion of carbohydrates, especially the fast-digesting

types, combined with a higher intake of fat and protein, may lead to far lower blood sugar fluctuations, which will result in a greater sense of satiety.

If you propose LCHF to a client, be aware that their fat sources should come from foods containing primarily unsaturated fat. These can be sources such as fatty fish, nuts, avocado and good oils. Also, make sure the client gets plenty of greens in their diet.

Clients who want to reduce their consumption of animal products, i.e. Meat, dairy products, etc. will find it harder to stick 100% to a LCHF diet without getting too much fat, so there may be better solutions for such clients.

¹ Note that such clients could suffer from leaky gut as mentioned in Level 1, Chapter 3.



PALEO DIET

Paleo is about returning to our ancestral roots and eating as we did in the Stone Age. It is a 100% natural lifestyle, where processed products are excluded, and therefore, it will be an interesting method to challenge clients who largely live on processed foods but who would like to learn to live and eat more naturally.

However, it is important to be aware of the client's day-to-day energy and the time they have available, as a 100% paleo diet can quickly lead to a bit more preparation in the kitchen than if processed foods are included. Therefore, it is perhaps a better choice for a single person than for a single mother with 3 children and full time work.

Although studies still show results both for and against, there is some evidence that a paleo diet may be beneficial for insulin sensitivity, and therefore, it could be an option for type-2 diabetics etc.

Whether it is beneficial also depends on the clients starting point. The paleo diet is very low in sugar or fast-digesting carbohydrates, which tend to cause our blood sugar to rise rapidly and potentially fall again quickly. These large fluctuations over time are not good for our insulin sensitivity, as mentioned in Level 1.

With a paleo diet that excludes most fast-digesting carbohydrates and instead includes a higher degree of blood sugar stabilising energy from protein and fat, the diet may potentially have a beneficial effect on stabilising blood sugar. It might therefore not trigger our insulin secretion as much as a diet rich in sugar and processed foods.

Paleo should be reconsidered if the client wants to reduce their intake of animal products, but it is possible with good dietary planning.



DETOX DIETS

If you embark on a detox diet, you should be aware that there are many different degrees and methods. So, if you are looking to find inspiration in a detox diet, start by asking yourself if it makes sense. Does it meet the basic nutritional requirements? And what does it promise? Realistic results that make sense?

Because there are different ways to detox, begin by asking yourself (or the client if they come up with the proposal) what they would like to achieve through this process. It is not appropriate to put a client with strong convictions with respect to food (and perhaps minor eating disorders) on a detox diet. This increases the risk that they will get a taste for a very extreme way of living. Therefore, since we want the best for the client, you should include this in your considerations.

Detox diets should not be done with a goal of cleansing or rapid weight loss, but rather with a desire to get a boost or a fresh start. For example, if a client has issues with respect to eating sweets or the like, it can sometimes make sense to “reset” the sugar craving over a short period of time. Sometimes it can result in some weight loss, which can then motivate the client and offer a fresh start, but you should always be careful about promising too much. It is better for the client to be pleasantly surprised than disappointed because promises were not fulfilled.

Another alternative where a so-called “detox” could be an option might be

with a client where weight loss has plateaued. Usually, one of two things are responsible for this weight loss plateau (provided that the client’s mental state is fairly stable, i.e. they do not suddenly experience a large amount of stress, lack of sleep or similar lifestyle factors). First, you typically want to check if the client has lost a lot of weight and therefore has a lower maintenance energy requirement or if there is a need to increase exercise or NEAT.

When we lose weight and weigh less, the body requires a lower amount of energy and to perform everyday tasks and workouts. Therefore, the maintenance energy requirement drops and will automatically move closer to the caloric intake that may have been calculated at the beginning.

This means that the weight loss will slow down progressively and may at some point come to a standstill. Therefore, it is important to continuously adjust. This is especially true in connection with major weight loss. Either with respect to energy intake (quantities, compositions) or energy consumption (NEAT, training). If the equilibrium intake is checked and is fine, a weight plateau can also be somewhat metabolic. Our metabolism is designed to protect us. Therefore, clients who undergo major weight loss over a short period of time will sometimes hit a wall, simply because our metabolism drops in intensity. Our metabolism has been developed through generations to decrease in intensity in the event of



lack of food or famine if we are not eating enough. This means that weight loss will actually, sooner or later, be counteracted by our metabolism.

You might have a client where nothing really happens, and the client may need a boost to help with weight loss and motivation. This is where a detox can be an option. A detox diet can sometimes be effective in giving the metabolism a boost. Sometimes it can result in minor weight loss and boost

the client's motivation towards something different and exciting. Note that the benefit of a detox may be the variation.

An example of a mild "detox" or booster, if you prefer that word, could be the exclusion of all cereals, sugars and the like for 7-10 days. For many, it will produce effective results and also provide a physical and mental break from the lifestyle change or diet plan that they have been doing recently.

FASTING

It has become popular to fast in various ways, e.g. the 5:2 diet, 6:1 diet, intermittent fasting (for example, where you fast for 16 hours a day and then eat within a period of 8 hours). For this method to make sense, it means no over-eating during the period when you eat while also maintaining a healthy, varied and versatile diet.

Fasting may be an option depending on the specific client.

Among other things, fasting has been shown to have a positive effect on our digestive system, so if you have a client with a bowel disease, e.g. IBS or colitis crohn, then different types of fasting may in some cases provide relief and also potentially improve the conditions associated with the client's disease in general. In fact, a study has shown that fasting has a positive effect on 7 out of 10 symptoms in subjects with IBS, including abdominal pain.

On the other hand, be careful about suggesting specific diets for clients with type 1 diabetes, as problems in stabilising the client's blood sugar could occur.

If you have a client who feels they have a very strong focus on food in their daily life, fasting can be a two-edged sword, so be aware of which type client you are dealing with here.

On the one hand, in some clients it may help to shift focus away from food and the feelings associated with it, as

they only have to focus on what to eat during certain periods. At other times, the client will be in fasting periods which do not involve food, thus allowing the client to think about other things. The people who have positive experiences with fasting also often describe increased energy and mental clarity, which are of course highly desirable.

Unfortunately, the limited access to food also has the potential to make food an even greater focal point for the client, which in the worst cases may lead to obsessive thoughts and over-eating during periods where they are allowed to eat. So it is of great importance that you can read your client and be able to understand their personality and relationship with food before putting them on a diet that includes fasting². A good idea for ensuring your client's well-being is to have follow-up meetings at short intervals in the beginning.

When a fasting diet ends or there are breaks between fasting days, energy intake should be in focus. Especially if the client wants to lose weight. During periods of less food, the body will slow the metabolism as a defence mechanism, and if you eat as much food as before, you risk gaining weight. This is yet another reason why you should follow-up with the client at short intervals in the beginning.

² More on this under Perception Coach

OTHER DIETS

Naturally, there are many different diets and lifestyle choices that you might try with your client. No matter what, the most important thing is to understand the client's wishes and needs. Be open minded if a client suggests a diet you do not already know. You might gain new interesting knowledge relevant to you, as a Nutrition Coach, if you spend some time researching the available information, studies and evidence and whether a diet provides a solution and could have positive

effects. Then you can always return to the client with your professional opinion the next time you meet.

You can also read more about the mentioned diets online, and if you get a client who has a specific, challenging condition which goes beyond what has been presented in this compendium, you might find answers to other specific questions/benefits and disadvantages in relation to specific health conditions.





CHAPTER 2

AWARENESS OF CHOICES

In order to have an incentive to follow diet plans and advice, an understanding of our choices and their consequences needs to be relatively clear. Therefore, in this section, we will take a closer look at the health profile for the Danes from 2017 and consider what consequences this may have on the cooperation that should exist between the nutrition coach and the client.

After reviewing this chapter, you will gain an understanding of the reflections concerning awareness of choices.

You will gain an understanding of how important it is to choose the right strategy for each client.

SUCCESS BY MAKING CHOICES

When choosing a diet or seeking inspiration from a diet, consider the extent to which results are achieved from making choices. If a desired weight loss is achieved with LCHF, is it because of the macronutrient composition or could it be due to less energy from fast-digesting carbohydrates? Note that it is possible to have a high intake of fast-digesting carbohydrates while maintaining the distribution. It just requires greater amounts of protein and fat. The reason why it may be worth considering whether the critical factor in achieving the desired goal is the addition or the restriction is so as to be aware of the nuances involved.

Paleo and LCHF are diets which limit fast-digesting carbohydrates. If you have a client whose diet record shows that a large part of their intake is from fast-digesting carbohydrates, then this will limit their normal consumption of such carbohydrates. For these clients, you may find that one diet may be just as good as any other, as it is not necessarily about Paleo vs. LCHF, but simply that the foods responsible for large parts of their energy are minimised.

It may also be that you get clients who have leaky gut or IBS, and by going on diets like LCHF or Paleo, they suddenly minimise their intake of foods to which they have developed an intolerance. It may be that their intake of alcohol or gluten is reduced. Also note that gluten may play a role for some people in relation to leaky gut³. The reason why it is important to be aware of the choices that produce results is that it allows

you to remove restrictions with respect to following a diet 100%. It may be that the diet works, but if the client finds it challenging to implement, then it may be a good idea to take that diet as a starting point and experiment from there. An example could be starting with LCHF.

After some time, the client may miss eating bread. It is widely used in Danish culture during social events, which is why the LCHF diet may be very restrictive at social events for some people. To meet the client's needs, you might add bread, though only gluten-free. If the client does not experience any setbacks due to the addition of bread to their diet, it is most likely that the client's previous positive response was due to the gluten or the reduced quantity.

The same can be said for alcohol. They might miss alcohol. Often, it is associated with social contexts in many cultures. If your approach is a Paleo diet, alcohol does not generally have a place in it. If the client has previously had a high intake of alcohol, then it may have affected their gastrointestinal function, metabolism and their weight. With a Paleo diet, alcohol has been limited or removed, which is why there is a general improvement in energy levels,

weight and perhaps gastrointestinal function. In many cases it can also be a combination of both the choice and the restriction that improves health. As a Nutrition Coach, it is just import-

ant that you bear in mind what factors may be involved. This will also let you know what you can adjust later in the process.

The same effect will apply to a detox diet. It may be that clients will experience more energy and feel fresher. The reality for many will most likely be that their intake of vitamins and minerals

is much higher than usual. When they get their vitamin and mineral needs from their diet, they will naturally feel more energetic. This might also mean that they may not need other food to act as a pick-me-up. Again, their improvement will come down to the choices that were made.

³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3384703/>



THE NATIONAL HEALTH PROFILE

— 2017

20.3% and 11.6% of men and women respectively have unhealthy diet patterns. In this case, an unhealthy diet pattern is defined as follows: "They generally have very unhealthy dietary habits, typically with a low intake of fruit, vegetables and fish, as well as a high intake of fat, especially saturated fat. The group is characterised by the fact that they follow few or none of the dietary advice of the Danish Veterinary and Food Administration, and there is a great need for improvement."⁴

Of those with unhealthy diet patterns, the study shows that 50.8% of men and 65% of women want to eat healthier. Even though one might assume that clients who approach a Nutrition Coach are looking to make changes, this may nonetheless affect the success rate of the client.

Since our diets also depend on social events, such as family, friends and traditions, this will often play a role. When the social circle of a client does

not want to change their dietary habits, which are defined as unhealthy, it will mean that your client will have to be more aware in social contexts. It might require the client to inform the people close to them of what they want or they may have to contribute to the cooking themselves. As mentioned earlier, you should be aware of the extent to which the dietary changes impose limits on the client socially, as this can have a significant impact on the long-term effect.

600g of fruit and vegetables daily?

It is safe to assume that it is well known that the official dietary guidelines (Kostråd) recommend adults and children over 10 years to consume at least 600 g of fruit and vegetables daily. If we look at the statistics, only a few people manage to do so⁵.

⁴ Den nationale sundhedsprofil

[The national health profile] 2017 table 4.3.3. p. 80

⁵ Den nationale sundhedsprofil

[The national health profile] 2017 p. 81

Proportion of men and women who do not live up to the official recommendations regarding fruit and vegetables (%)

AGE	16-24	25-34	34-44	45-54	55-64	65-74	>75	ALL
MEN	90,8	91,6	92,6	93,2	93,2	93,4	93,2	92,5
Number of respondents	7308	7383	10227	14337	14817	15404	8442	77918
WOMEN	86,7	87,3	86,6	86,9	86,5	88,0	89,9	87,3
Number of respondents	9569	9980	13197	17373	16734	16224	9475	92552

However, if it is well known, why are the numbers above 85%? The same would apply to smoking, where 18.5% of men and 15.4% of women smoke. This is despite the fact that it is well known that smoking has a significant negative side effect on public health. And since 15 February 2012, "scary images" became mandatory on the packages. The number of daily smokers has decreased by 0.1% from 2013 to 2017⁶. One thought could be that we have not become less informed but that, in spite of more information, we have become less healthy. And even though we know about the official dietary recommendations [Kostråd] we do not

want to make any changes.

Therefore, we circle back to the concept that, as a nutrition adviser, you provide information about – and not judge – the consequences that the client's own choices may have on the client's health and desires. It is important that this communication is neutral and not judgmental. Being neutral is about choice of words, tone and body language. The type of communication between the client and the Nutrition Coach is very important.

⁶ Den nationale sundhedsprofil
[The national health profile] 2017 p. 54, table 4.3.1.



DIET PLANNING

When designing your diet plan, it will help to begin with the client's current habits. For many people, this can make it easier to implement. Also note that this can be advantageous with respect to adding elements from a diet.

In order to allow the client to participate in the decisions and take responsibility, consider whether you want to present various options and let the client choose between them. This means that you will not be dictating certain choices, but that the client will consciously choose what should be implemented.

Also, make sure that the diet plan is designed for the individual. This means that it should be clear and under-

standable. Even though you may have two clients with identical needs, it may well be necessary to present things entirely differently.

You might have to implement the plan in small steps, starting with the most important ones – the ones of greatest importance. If this is still a major change, you may want to start with the easiest change that will lead to success. The feeling of success and positive reinforcement can be a decisive factor – especially at the beginning of a process. If the client quickly feels that results are inadequate and that the changes are too difficult, motivation will drop fast.



NUTRITIONAL ADVICE

When advising our clients, we should be aware of a range of factors. When we look at coaching and guiding other people, one of the most prominent theories is the Self-Determination Theory (SDT)⁷. It is based on the notion that it is important that the person with whom you are dealing has competence, autonomy and relatedness. If the motivation is extrinsic (external) rather than intrinsic (internal), then regulation must also take place in accordance with this.

If the client's motivation is external, adjustments will be made here. They may want to lose weight to make their family happy (external), and they then seek a Nutrition Coach (external) to make changes (regulate it). This takes away some autonomy from the client and the motivation is external.

If the motivation is that they want to feel better about themselves, the client will have more autonomy. The client

can certainly seek tools from you as a Nutrition Coach, but they use them to make changes themselves, and there is more autonomy. They look for causality or causes internally. This is also why it may be important to give the client choices regarding their diet plan.

For some clients, it may be beneficial to answer to an authority, but you should remember that your collaboration is about the client and not about the client meeting the standards you set as a Nutrition Coach. By setting a framework where the client is held responsible by you, more emphasis is placed on external motivation and there will be less autonomy. Even if the client had come with internal motivation, the focus will be changed. Therefore, it is important to make it clear from your communication that you are not setting standards, but that the client feels that they are making the choices themselves.

An example of being held responsible is agreeing that they will lose 0.5 kg by next week, whereupon we weigh them to see if they lived up to the agreement. There are a number of things in this sentence that we need to look at:

#1

Does the client have the competences/tools

#2

Control with respect to authority – the removal of autonomy

#3

The external motivation

NUTRITIONAL ADVICE

As a Nutrition Coach, it is your job, together with the client, to provide the right tools which the client will learn to use. If you have not provided the client these tools or tested them, you will put more pressure on the client. The client may doubt their own competences – perhaps reinforced by the fact that they have repeatedly tried to make changes without the success they had been hoping for.

Although there are arguments that it may motivate them to stick to an agreement – or a directive – the motivation will be external. In the presentation above, it is not clear that it is for the client's sake. Especially not if the phrase "if they lived up to the agreement" is used. If you, as the Nutrition Coach, have dictated the nutrition plan, then it will deprive them of self-determination, which simply underlines that you are the authority. This will lead to a situation where things are done for your sake. Keep in mind that guilt and shame can quickly become part of such contexts.

If you want to create a relatively fixed framework, an alternative could be to start by giving the client some tools to implement. Then you could ask the client what they would like the focus to

be until the next session or feedback. An alternative could also be that you start by being completely open, without giving them any tools – without asking directly what they want to focus on during the following week. However, this requires greater self-awareness, which is why you should take into consideration how much responsibility the client is ready to take.

Returning to autonomy, you can ask the client what they think is the easiest – or most important – thing to change. Here your knowledge is important since, based on your professional skills, you can determine what will have the greatest effect according to the client's wishes. This also gives the client competences – and the feeling that they have the competences.

If the client comes up with areas that he or she wants to focus on, the next step will be strategies. What is required to make it easiest to follow?

⁷ Edward L. Deci & Richard M. Ryan (2000) The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior, *Psychological Inquiry*, 11:4, 227-268,



4 STEPS FOR EFFECTIVE NUTRITION COACHING

As we have discussed, it is important to always:

- #1** ... discover their intrinsic motivation
- #2** ... give them competences
- #3** ... ensure a high degree of autonomy for the client
- #4** ... make it as easy as possible for the client

DIET PLANS

If the client's goals require a restrictive intake, a diet plan may be a good idea. The client may be vegetarian, vegan or have allergies and intolerances. In such cases, it may make even more sense to create a diet plan, as food selection is limited. You might also consider recipes for the client to make the diet plan more manageable. In terms of imple-

mentation, you should also consider the importance of the initiatives in relation to a number of factors. These include availability, preparation, budget, preferential foods, storage, frequency of meals, social relations and traditions, closed diet plan, open diet plan and inspiration for meals.

AVAILABILITY

Where do you get the ingredients and how easily available are they? Consider looking at where the client shops, or alternatively, look at which stores are on the client's daily routes. If your diet plans contain ingredients or foods that are difficult to obtain in a regular supermarket, this could be an obstacle.

PREPARATION

Look at how long your client usually spends on cooking and how much time they are willing to spend. They may be willing to spend 60 mins every night on cooking, but if they are currently spending less than 15 mins or ordering take away, then you should consider whether 60 min for preparation is realistic. You could start by choosing dishes that are (roughly) suitable relative to their current time availability. Next, you can also take a look at what equipment is available. If the client needs to spend a long time and obtain extra equipment, this would mean a greater change in their habits and may therefore be harder to implement.

BUDGET

Of course, budget is also a factor. Consider this generally in terms of diets and diet plans. Another consideration might be looking at food waste, as it can be financially beneficial to make dishes that can be frozen without losing flavour.

FREQUENCY BETWEEN MEALS

The number of meals during the day will not be a particularly important factor for the average Dane. It will not usually matter if it is 3 or 5 meals. Therefore, look at how mealtimes fit into the client's everyday life. This is where inspiration can be found with respect to designing a meal plan. Fasting will work for some. It is about looking at the client's everyday life and finding solutions together.

SOCIAL RELATIONS AND TRADITIONS

Morning meetings, Easter lunches, summer parties, Christmas lunches and sweets every Friday are often important part of the culture at workplaces and within families. Social traditions have a big impact, so it is not unusual to see diet plans being overlooked if these traditions are not taken into account. If the diet plans are "closed" and strict, it will lead to notions such as right and wrong or that you are "on" or "off" the diet. As social relations and traditions are of great importance, it could mean that many will choose the "wrong" and "deviate" from the diet plan so that they are no longer "on" it. It becomes black and white, and leads to thoughts like, "It doesn't matter since I am not sticking to it anyway".

DIET PLAN - CLOSED

A closed diet plan means that the diet plan must be followed and there may not be any deviations. This indicates that there is a right and wrong diet plan. A strict diet plan is somewhat more difficult to adhere to in a daily life with social events and traditions – even if they are taken into account. A strict diet plan also deprives the client of autonomy, which as mentioned earlier, is an important factor.

DIET PLAN - OPEN

An open diet plan is more of a guideline for structure and mealtimes. Therefore, it is important that this gets communicated properly since it places more responsibility on the client. An open diet plan can be made very similar to a closed diet plan, depending on the goal. If the goal requires elite level performance in the sports world, the "open" part may be minimal. It may be necessary to maintain the macronutrient distribution when one food is exchanged for another. A more open plan would mean that the daily intake of Calories should be observed.

MEAL INSPIRATION

An even more flexible approach to diet plans could be meal inspiration, if the client wants this. This places more responsibility on the client, which is why it is important that you give the client the right tools to manage this responsibility in the best way possible⁸. If we look again at the fact that 85% of Danes do not follow the relatively simple advice to consume 600 g of fruit and vegetables a day, it can be argued that coaching and the right tools are more important. It is therefore important to hand responsibility back to the client while providing the right tools.⁸ **Further knowledge on this is provided in the Perception Coach course**



CHAPTER 3

After reviewing this chapter, you will be able to help your clients with goal setting and planning. You will be even more aware of the difference between and the importance of subjective and objective goals.

INTERMEDIATE GOALS/GOALS

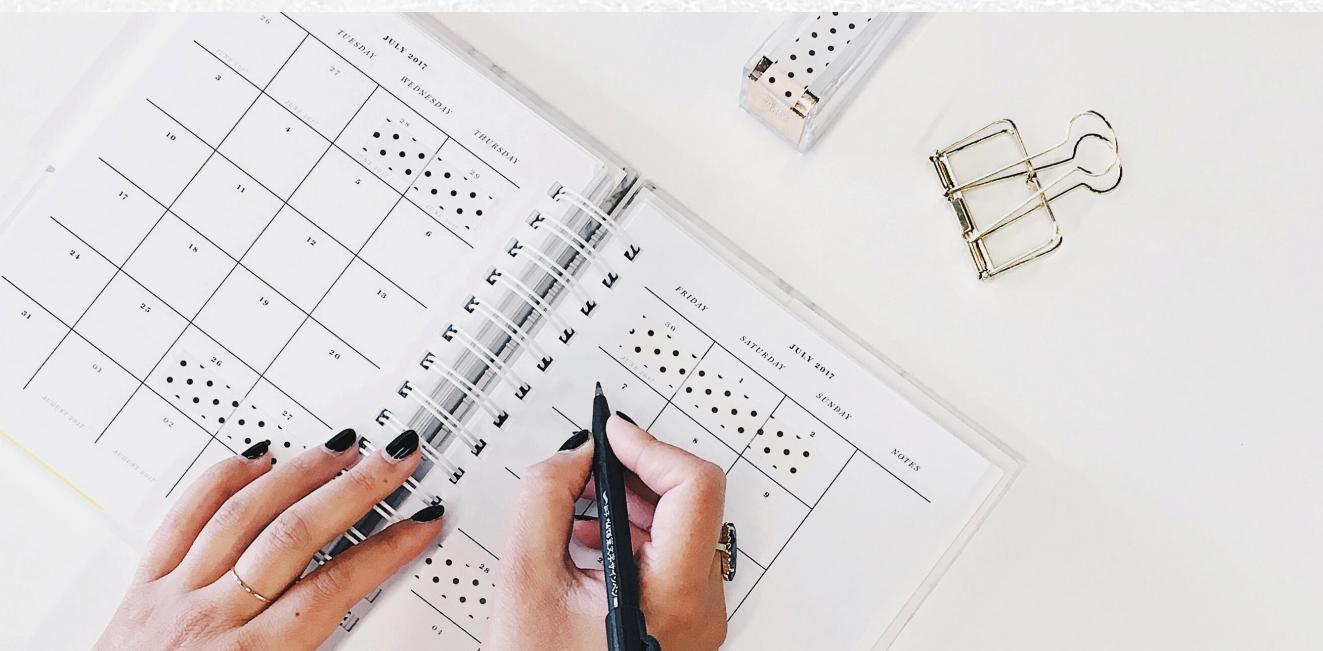
Now that we have discussed intrinsic motivation, it follows that we should discuss goals. A goal is what they want to achieve, and this goes hand in hand with motivation. Note, however, that the intrinsic motivation is often subjective, and they need something more objective to relate to. For instance, the client may want more energy and a higher self-esteem, while also dropping 15 kg. The subjective part will be more energy and higher self-esteem, while the 15 kg of weight loss is the objective part – the part that is measurable. Before you begin to deal with the objective, you should also understand what is most important for the client.

If the client does not quite know, you can ask what's most important:

1. Getting more energy and better self-esteem at the same weight as now.

2. Losing 15 kg and retaining the same energy level and self-esteem as now.

The client may see the objective and subjective as two goals that go hand in hand, but it is important that you make the client realise what is of most value to them. The area which has the greatest value should have the greatest focus. Here at Level 2, we focus primarily with the objective. In the Perception Coach course, we take a much deeper look at the subjective part.

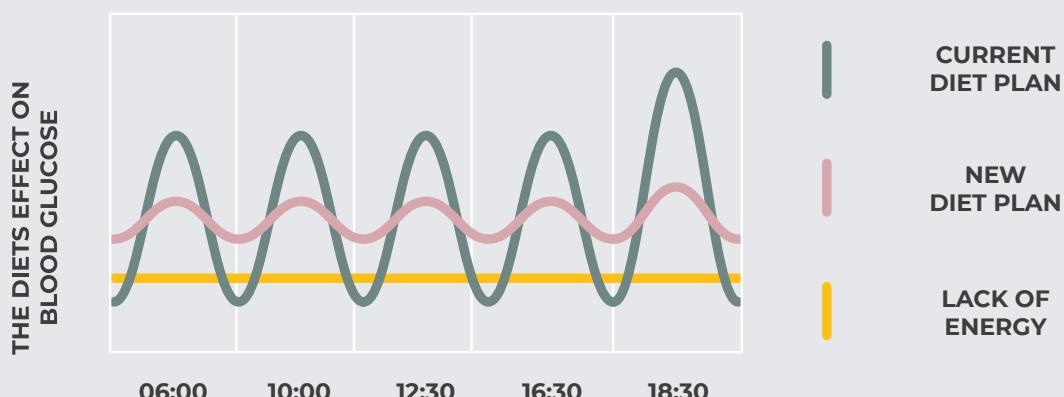


PLANNING THE COURSE OF EVENTS

As mentioned earlier, we should first and foremost give clients the right tools. This refers to the knowledge that they need with respect to the new dietary measures, whether it is a diet, diet plans or dietary advice. It can involve macronutrients – what are carbohydrates, fats and proteins and where can they be found? Be sure to simplify it to a level the client will be able to understand. It is about the client acquiring knowledge so they are able to

follow the plan you created together. It is therefore important that you ensure that your knowledge is good and comprehensive to such an extent that allows you to explain it simple terms.

For many clients, it can be helpful if you can draw and explain, so they have something visual to relate to. You might draw a blood sugar chart to compare the effect of their current diet to the new one. An example could be:



This demonstrates what their day currently looks like based on the information they have given you. The red line indicates where the blood sugar is low enough to detect a lack of energy.

The black line shows their current blood sugar fluctuation. The green line demonstrates what their new diet plan or lifestyle will do.

This also clarifies to the client what reaction patterns they may have, and it may be a way to initiate a dialogue about what can be done to change their meals so that they shift towards the green line.

FIGURE 18: THE EFFECT OF THE DIET ON BLOOD GLUCOSE

PLANNING THE COURSE OF EVENTS

If they have type 2 diabetes or are at risk, it may also be relevant to explain the function of insulin relative to the blood sugar graph.

All of this should be discussed at the level necessary for the client. Consideration should also be given as to where their interest lies. Teaching or coaching them on the effect of various initiatives will create awareness and give them competences. This will only strengthen their autonomy, as they now feel that they understand the implications of their choices.

It also means that their inner motivation is strengthened. This knowledge is related to their motivation and goals.

When teaching and implementing, you should also be mindful of how many tools and strategies you provide the client. If your client has previously tried diets or diet plans, it would make sense to ask what it was that made them stop. It is important that you are aware of any pitfalls.

It is also relatively normal to go all-in, which means changing everything at once. One example is that you go all-in with a diet. As mentioned earlier, for some it may be a good way to break a negative pattern, but you should also be aware of how to find a long-term solution afterwards.

If you do not choose a diet but go with the open diet plan or inspiration for meals, you may want to start with a

few meals. As mentioned, it could be the easiest meal or the one that would have the best effect.

It could also be an inspiration for a diet. Perhaps the client finds LCHF appealing, but they cannot see how it could function in everyday life at work. You can then ask the client if it would be an idea to use some of the principles for some of the meals. If the client answers yes, then the next obvious question will be where it will be easiest to implement. The week's task for the client would be to implement an LCHF-inspired meal every day.

All principles concerning competencies, autonomy, intrinsic motivation and transparency are present in this approach. You may find that the client thinks it is "too easy", as they have often found it to be difficult. In some cases, it may be important to emphasise to the client that it is a good thing if they think it is easy.

Note that the above can be part of an intermediate goal of the objective. Perhaps the client wants LCHF all day, but an intermediate goal might be one meal a day. For some it will be more and for others less. Leave it up to the client. Gradually, you can increase the number of meals in relation to the new diet.

WEIGHT AND CM

Another approach to the objective intermediate goal may be the scale or a measuring tape. Weight is more relevant to clients for whom weight is more important than aesthetics. If aesthetics is more important, the measuring tape may be more important.

When using a tape measure or the scales, you should be aware whether the client weighs himself or if you will do it. If measurements and weighing are done by you, you should ensure that there is a minimal degree of external motivation to do just that. There can be advantages to you doing it, as you can discuss the result immediately afterwards, and from a purely practical perspective, it is easier if you handle the measuring tape.

Another way to track progress might be something like the client's desire to fit in an old pair of pants which has become too tight. Weight is of course a factor, but the size of the thighs, hips and waist are the most important thing in relation to this goal. You should

be aware that a dietary change can alter the gastrointestinal flora, which may be why the waistline measurements vary in relation to the health of the organs⁹.

Therefore, it is also important that you are aware if the client is bloated. This is especially noticeable for women during certain times in their menstrual cycle. They may have a slight increase in weight during ovulation or premenstrually. It is also not unusual for their waistline to increase during this time. Therefore, you should consider how often you want to weigh and measure clients for whom this could be relevant. Weekly can be challenging as their menstrual cycle could play a role. If you measure 1x per month, it should be at the same time in their menstrual cycle..

⁹ "Symptoms of Visceral Disease, A study of the nervous system in its relationship to clinical medicine", by Francis Marion Pottenger





CHAPTER 4

After reviewing this chapter, you will realise that humans are complex and that there are many factors that are crucial to their subjective and objective goals. You will become familiar with many factors and why it is important to teach this to the client.

ADAPTION

When guiding and coaching our clients, it is important to constantly engage in a dialogue about their current status. Adjustments will always have to be made – especially at the beginning. As you are familiar with many of the factors that come into play, it also means that there are many factors that can be adjusted. Perhaps you took into consideration relations and traditions in October and November, but now December is here, with its Christmas treats, lunches, etc. Now you may need to use new strategies, though it is possible for the same strategy to work year-round.

When we start with intermediate goals – which could involve the implementation of specific meal times – then it is important to check the status of the strategy. Client feedback may indicate that it is not working and that it is

impossible for the client to implement it in their daily life. In such cases, you need to find a new strategy. Sometimes you may choose to stick to the strategy if you know that there may be a delayed effect. Perhaps the client does not feel any difference in weight or energy levels, but at the same time it has “only” been a week! Perhaps this week has been very stressful for the client at work. In such cases, the client may simply have to stick to it. If the client persists and does not experience a difference over an extended period of time, then you should consider whether to include other factors or whether the strategy should be changed. Keep in mind that certain changes, diets etc. work really well for some yet not at all for others. Therefore, listen to the client’s feedback, and compare that to the factors that were involved.

An example could be...		
GOAL	STRATEGY	FEEDBACK
Increased energy and a smaller waist	50% of the morning meal is fat and protein	After 14 days: no difference – the trousers feel tighter

The client now feels further away from the goal of getting a smaller waist, and there is no difference in energy levels. That can lower the client’s motivation of continuing with the strategy. It may seem that the only thing that has changed is the diet and that you are

further from the goal. This presumes that the diet is actually the only thing that has changed. That presumption will probably arise because that is the only change the client is aware of. But there can be a lot of factors that come into play. On the next page, we will look at these factors.

INCREASED CAL. INTAKE DURING THE DAY	OTHER MACRO NUTRITIONAL COMPOSITION
BLOATED DUE TO IRRITATION/ INFLAMMATION IN ORGANS	INCREASED STRESS LEVEL
MENSTRUAL CYCLE	ALTERED LIQUID INTAKE
LESS SLEET /QUANTITY AND/OR QUALITY)	LESS EXERCISE

The client may not see these factors as essential to the goal. Therefore, it is important that, from the beginning, you implement strategies which make it clear that there is no linear causality when it comes to health. Changing a meal is not the only important factor; instead, there are many aspects that affect their experience. You are just trying to start with the diet to see what effect it will have. You can then make adjustments if you find that it has not had adequate effect.

If all surrounding factors have changed, it will be difficult to establish the effect of an individual factor. In this case, the diet. In the same way that we examine which strategy has the best effect for the diet, we should also examine what other areas influence the client's goal.

Let us end on a metaphor: If you are carrying a heavy backpack filled with stones and want more energy, would you remove the lighter or heavier stones? Most will hopefully remove the heaviest stone. But sometimes, you have to remove some of the lighter stones to reach the heaviest.

Discover your client's greatest obstacle in achieving their goals, and work with it. Find the easiest solution to build up competences, a high degree of autonomy and a high level of self-esteem in order to be able to remove the greatest obstacles. Keep an eye out for the heaviest rock in each individual client's backpack¹⁰.

¹⁰ Further knowledge on this in the Perception Coach course

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