COGAP

MetaCheck

Gene Diet Complete

Your DNA
Your Diet

Expert Information

WE CARE FOR YOUR CHANGE

Individuality as a Solution

A sustainable and healthy diet in combination with exercise is the basis for health, performance and quality of life. It is essential to ensure an adequate supply of macro and micronutrients for various goals, such as maintaining weight or sustainable weight loss. However, this is not always possible because every person is unique and processes food differently. Therefore, the solution also lies in the individual consideration of each person.

Why does everyone process food differently?

In the course of evolution, humans have adapted to different living and nutritional conditions and genetically adapted their metabolism accordingly.

At the genetic level, small variants are found in the DNA, so-called polymorphisms, which differ between people and can influence metabolism in its efficiency in processing macronutrients (carbohydrates, proteins and fats) as well as calorie consumption during different sporting activities.

The term nutritional genetics (nutrigenetics) is also used in this context. CoGAP has defined four genetic metabolism types (Meta-Types). The genetic variations ensure, among other things, that each person processes the food they consume differently. An experience that you unconsciously notice every day when you are confronted with slimmer or stronger family members or friends.

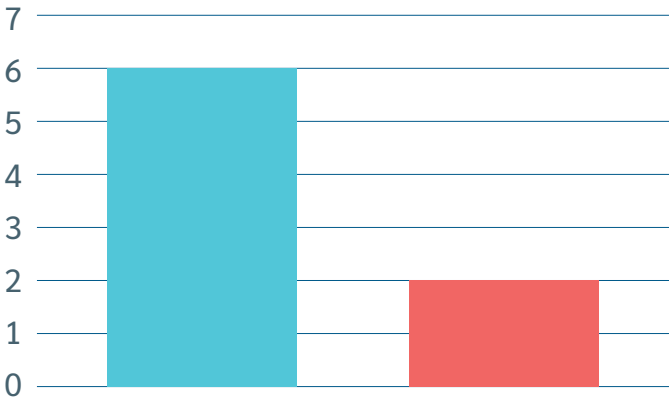
The Concept of the Gene Diet

The CoGAP metabolic analysis starts with these genetic variations. The goal is not a run-of-the-mill generic diet, but a diet which also considers your personal Meta-Type as defined by CoGAP and offers support through professional nutrition and exercise recommendations.

The CoGAP MetaCheck is a genetic metabolic analysis that determines the Meta-Type and its effects in those seeking advice. As a MetaCheck consultant, determination of the Meta-Types enables you to offer innovative nutrition and training advice.

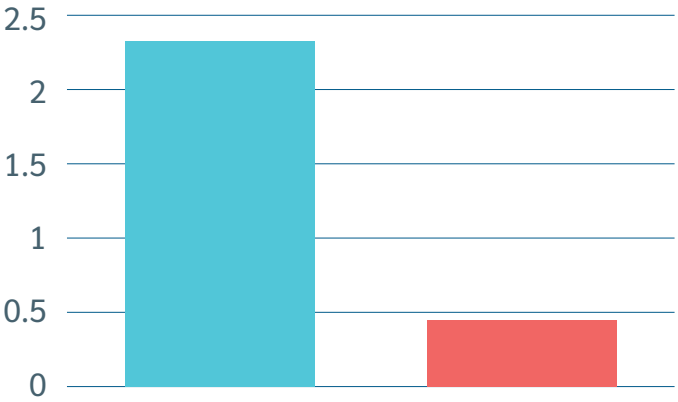
Retrospective studies have already been conducted in the USA(1) and at the Centre for Health at the German Sport University of Cologne(2). The connection between genetic predisposition and weight change has not yet been sufficiently established in clinical studies.
However, CoGAP is confident that a diet that corresponds to the genetic characteristics of the person seeking advice can achieve better results than a diet that ignores these physiological characteristics.

Weight reduction (kg) in 12 months



(1) Modified according to:
Nelson D. et al., (2010) Genetic Phenotypes Predict Weight Loss Success: The Right Diet Does Matter; NPAM March 2–4, 2010 I EPI March 3–5, 2010 I Hilton San Francisco Union Square I San Francisco, CA

BMI reduction in 6 – 9 months



(2) Modified according to:
Kurscheid T. und Loewe L., (2013); Vergleichsstudie: Effektivität der nutri-genetischen Analyse „CoGAP MetaCheck®“ zur Gewichtsreduktion; AdipositasSpektrum, Ausgabe 2/2013; S.10-16.

The Different Meta-Types

CoGAP distinguishes four Meta-Types: Alpha (α), Beta (β), Gamma (γ) and Delta (δ). Each one of these Meta-Types processes the macronutrients in food differently.

α β γ δ

To optimise the nutrition plan, the following micronutrients and food components are taken into account in addition to the macronutrients:

Vitamins A, B9, B12, D, antioxidants and omega-3 fatty acids

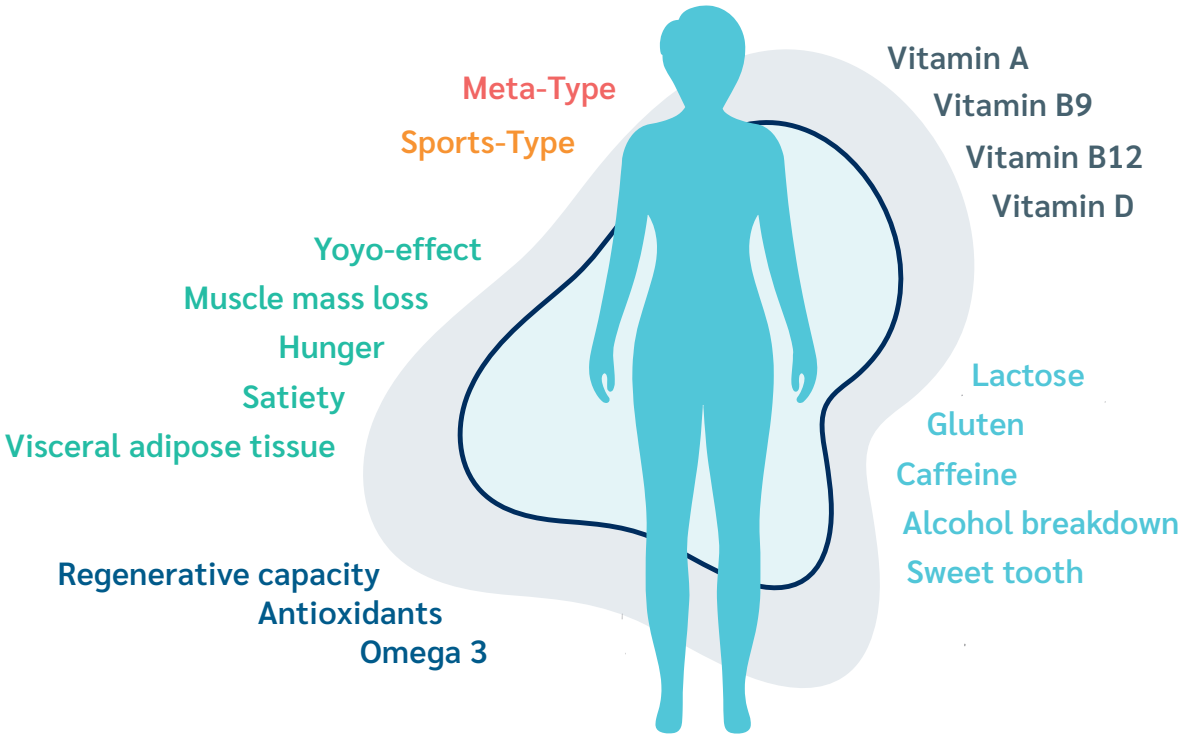
Caffeine, sweets, alcolhol, lactose, gluten

Sports Optimisation

CoGAP assigns each Meta-Type one of the two exercise variants, namely E for „Endurance“ or S for „Speed“. According to CoGAP, these exercise variants can result in different calorie consumption rates depending on the type of activity.*

The ability to regenerate is also considered in order to optimise the sports plan.

What is analysed?



Procedure

Consultation and taking of a sample (cheek swab)

Sending the sample to the lab

Analysis and delivery of the results

Follow-up consultation

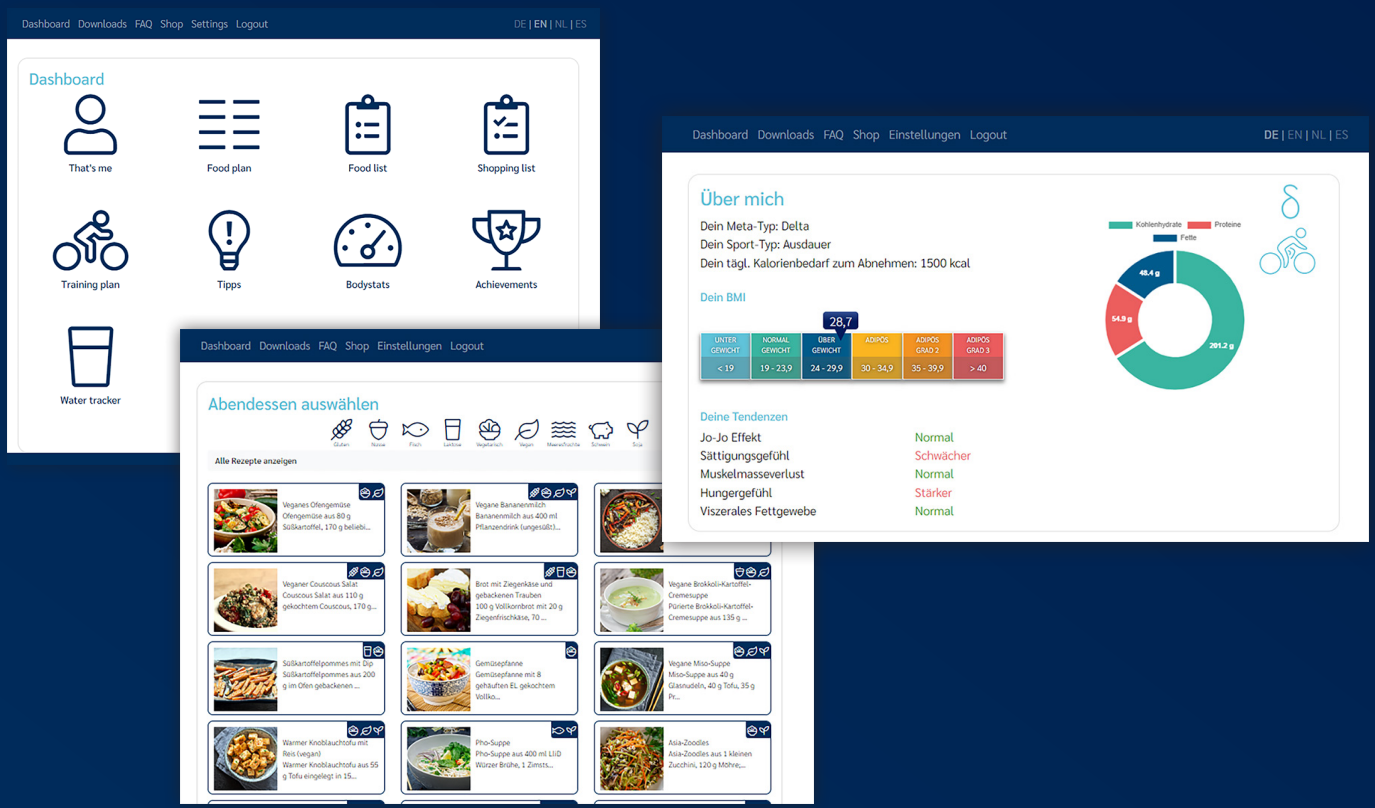
The Analysis Result

- Simple and clear presentation for those seeking advice
- Individual nutrition and training recommendations considering personal goals and characteristics (gender, age, height and weight)
- Nutrition list
- Access to web-based MetaCheck App
- MetaShakes according to the Meta-Type
- 5 other important weight loss factors such as the yo-yo effect, muscle mass loss, hunger, satiety, and visceral adipose tissue
- Vitamins, antioxidants as well as alcohol, lactose and gluten intolerance

The MetaCheck App

**The exclusive online portal www.metacheck-portal.de is optimized for smartphones and can be used comfortably on the mobile phone or tablet like a web-based app.
The following functions are available:**

- **Creation of individual nutrition plans**
- **Meta-Type appropriate recipes with labeling of allergens, vegan and vegetarian dishes**
- **Individual tips for changing your diet**
- **Tracking of body values**
- **Creation of a drinking log**
- **Meta-Type food list (with filter function red-yellow-green)**
- **Interactive grocery shopping list from the food list**
- **Sports exercises for your sports type including recommendations for EMS training**
- **List of successes - including some surprises as a reward**

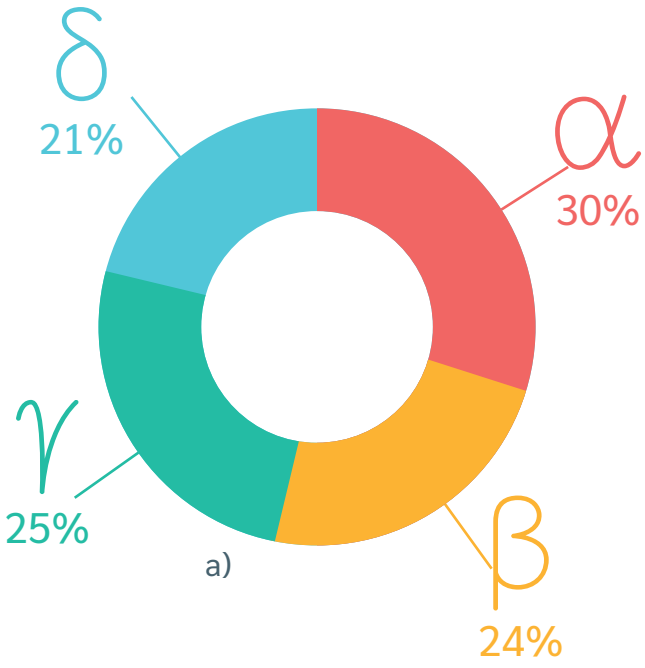


Population Genetic Study: Distribution of Meta-Types in Europe

There is no general „one-size-fits-all“ weight loss formula.

The Fresenius University of Applied Sciences and the Center of Genetic Analysis and Prognosis investigated the distribution of the CoGAP Meta-Types in the European population as part of a large scientific study.[3] In this study a possible correlation of the different Meta-Types and Sport-Types with demographic data, such as age, gender and BMI, has been analyzed.

To achieve the highest significance for the study, the anonymized data of 16,641 randomly selected MetaCheck results from different European regions were used. The results show that the four different Meta-Types Alpha, Beta, Gamma and Delta, are relatively evenly distributed in the population (Fig. a). On the other side there are significant differences in the Sport-Types E and S (Fig. b). The Sport- Type E is almost twice as common.



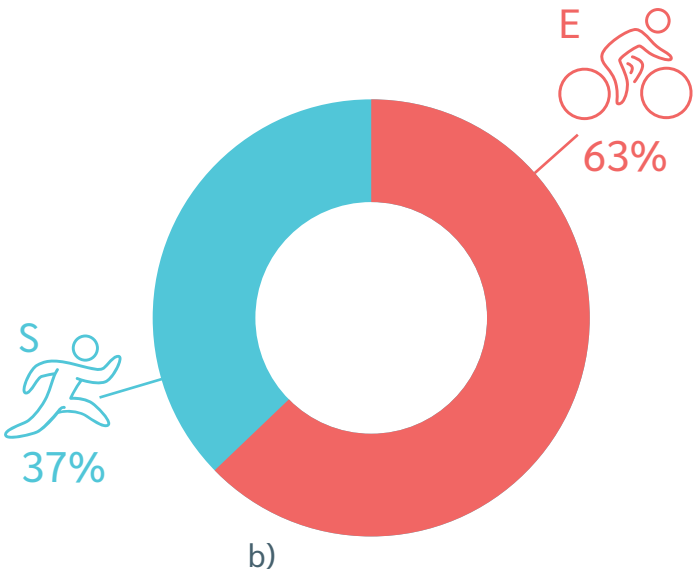


Fig. a) Distribution of the different Meta-Types in the European population.

Fig. b) Distribution of the two different Sport-Types E and S in the European population.

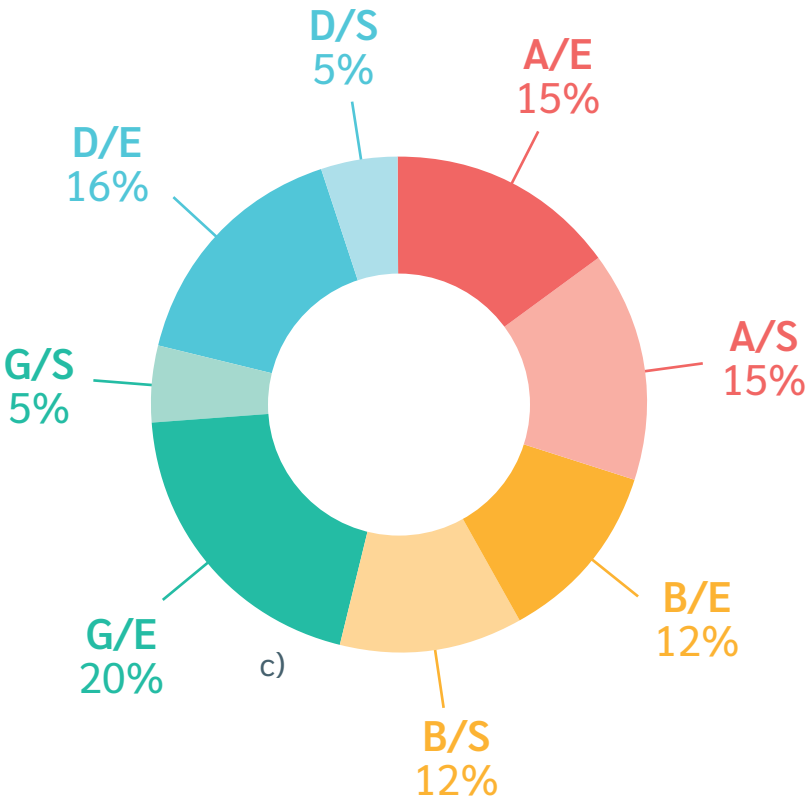


Fig. c) Distribution of the different Meta- and Sport-Type combinations in the European population.

Currently, worldwide the most recommended method of losing weight is the reduction of carbohydrates or a „low-carb diet“ in combination with endurance sports. This advice would be equivalent to the Meta-Type Beta and Sport-Type Endurance, which only applies to 12 % of the European population (Figure c.). If 100 people follow a low-carb diet and endurance sports program, only 12 of them will actually lose weight with long-term success.

The results of the study also showed that there is no correlation between the different Meta-Types or Sport-Types and the factors age, gender or BMI of the participants. This shows that the individual Meta-Types and Sport-Types cannot be related to a higher risk of developing overweight. In addition, the Meta-Types and Sport-Types are completely gender-, size- and age-independent.

The study results illustrate that general recommendations, such as „low-carb“ are not useful for everyone to lose weight. In fact, there is a great need for individualized weight-loss therapies based on the patient’s personal traits and especially based on their Meta-Types. Therefore, it is necessary to focus on the genetics of each individual, when creating a weight loss program.

(3) Geibel, R. C., et al., (2017) Analysis of the distribution of metabolic types (Meta-types) in the European populationand their association with demographic data. Int. J. Curr. Res. 9, 60257–60262.

The Advantages of the Concept

For you as a consultant

- Simple handling of the test
- Clear presentation of the results for communication to the person seeking advice
- Basis for nutritional therapy
- Entry point for differential diagnostics
- Innovative service for patient loyalty
- High acceptance (45%)[4] of personalised nutrition

For those seeking advice

- Customised nutrition and sports recommendations
- Prevention of possible nutritional deficiencies
- Weight loss concept based on a single genetic test carried out at the beginning
- Guidance for a long-term change in diet
- Easy to understand evaluation
- Free access to the MetaCheck portal

(4) Roosen J. et al., (2008); Consumer Demand for Personalized Nutrition and Functional Food; Int. J. Vitam. Nutr. Res., 78(6); S. 269-274.

The MetaShake as a Meal Replacement

The revolutionized meal replacement

The MetaShake is a meta-type-appropriate and unique meal replacement that takes individual genetic predispositions into account. It makes it easier to lose weight in the turbulent and time-consuming everyday life! Especially in stressful situations, it is an excellent alternative to your meta-type-appropriate meals.

What are the benefits of the MetaShake?

The MetaShake, with real vanilla, contains no additives and is also lactose-free, gluten-free and suitable for vegetarians. With its high fibre content, the shake ensures long-lasting satiety and natural digestion. It also contains all the necessary vitamins, minerals and nutrients that the body needs as part of a balanced and meta-type-appropriate diet.

How to use the MetaShake?

To reduce weight, two complete meals a day can be replaced with the individualised MetaShake, for example breakfast and dinner. To maintain weight, one meal a day can be replaced. Preparing the shakes is child‘s play. Simply add a sachet containing 60 g of powder to 200 ml of water and shake well in a shaker cup. The shake is ready to drink and can be savoured to the full.

Breakfast

Lunch

Dinner

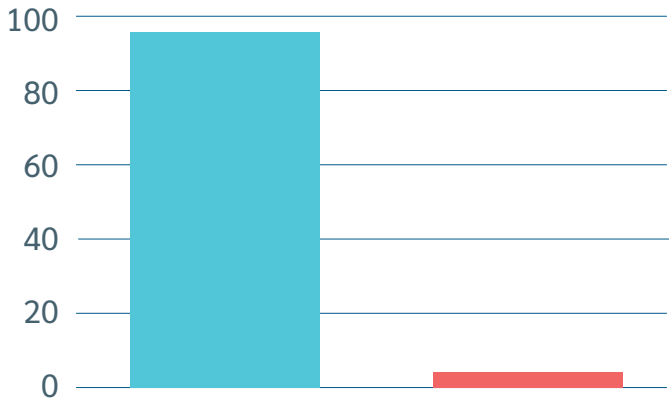
Many recipes at:
www.metashake.de/rezeptideen

MetaCheck – The Original

In 2016, an empirical study evaluated the sustainability of weight reduction with MetaCheck. Quantitative surveys were evaluated to determine how sustainable the success of weight loss with the MetaCheck is. Moreover, the study investigated if the MetaCheck consultants regard the aspect of genetics as a useful addition to their consultation.

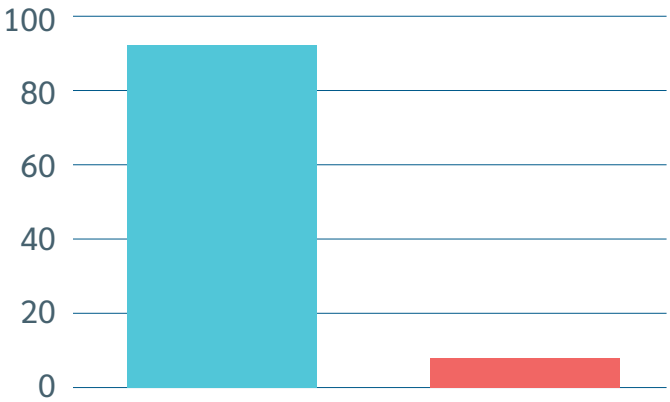
Almost 96 % of all MetaCheck consultants stated that the MetaCheck analysis is a useful addition to their competent nutritional consultation. Furthermore, 87 % of their customers felt more comfortable after a change in their diet according to their Meta-Type. 91 % of the customers stated that they were able to maintain their new weight[(5)].

The MetaCheck as a useful addition to nutritional counselling (%)



(5) Modified according to:
Oezueak O. et al., (2016) Überprüfung der Effektivität und Nachhaltigkeit einer Gewichtsreduktion auf Basis der genetischen Stoffwechselanalyse MetaCheck, medical fitness and healthcare, 16(2); 62 - 69.

Receipt of the newly achived weight (%)



(5) Modified according to:
Oezueak O. et al., (2016) Überprüfung der Effektivität und Nachhaltigkeit einer Gewichtsreduktion auf Basis der genetischen Stoffwechselanalyse MetaCheck, medical fitness and healthcare, 16(2); 62 - 69.

Scientific Basis

As part of the MetaCheck, a complex calculation of genetic interactions is carried out in which only those genes are taken into account whose proof of effect fulfils the high criteria of our scientists. Only metabolic gene variants are analysed in the laboratory which, according to our research, cover different areas such as carbohydrate, fat or vitamin metabolism and can be assigned to the individual meta-types. In addition, the gene variants that may be responsible for gluten or lactose intolerance are analysed.*

Selection of the Analysed Genes

These include in particular metabolic genes of which we are convinced, that they

- are involved in the weight control system,
- that their effect on the body can be positively influenced by a change in nutrition or behaviour and
- differ significantly from person to person.

In addition to the genetic analysis, a comparison is made with scientific studies[6] that must meet the following quality criteria:

- Replicability of study results
- Sufficient number of study participants
- Significance (significance level)
- Validated study methods

Based on these criteria, the following genes were identified after careful valuation of the relevant studies and included in the CoGAP MetaCheck analysis.*

(6) www.cogap.de/referenzen.pdf

The Specific Genes

The **ApoA2** gene encodes apolipoprotein II (apo-II), which is the second most common protein of HDL particles in the body. Changes in the gene lead to an above-average weight gain through absorption of fats.

The **FABP2** gene affects the resorption and oxidation of fats and can lead to insulin resistance. Changes in the gene cause firmer bonds to fatty acids, which greatly affect the absorption of fatty acids in the body. This causes increased absorption of fatty acids in the small intestine, so that extra weight gain is more likely when fatty foods are consumed.

The **FTO** gene is largely expressed in the hypothalamus and in the Langerhans islets of the pancreas. Overexpression of the gene leads to a regulation of energy intake, without being associated with a sense of satiety. Changes in the gene also have an effect on fat burning during repetitive movements. In the presence of such variants of the gene, higher calorie consumption can therefore be achieved through endurance sports.

The **ADRB2** gene encodes a receptor that plays an important role in the conversion of fat molecules into energy. Therefore, the ability to break down fat from fat cells depends heavily on this gene. Furthermore, in certain variants of this gene, endurance sports can be used to reduce weight more quickly and efficiently.

The **ADRB3** gene is mainly expressed in fatty tissue and is involved in the regulation of lipolysis and thermogenesis. Changes in the gene can cause deterioration of lipolysis and reduced fat burning during endurance sports.

The **PPARG** gene plays a central role in the processing of fat molecules. It also has a major effect on glucose insulin metabolism. Certain changes in this gene therefore promote weight gain when carbohydrates and fats are consumed.

The **IL-6** gene encodes a type of cytokine that performs various functions during inflammation and maturation of B-lymphocytes. Carriers of certain variants of the IL-6 gene are more likely to gain extra weight as a result of an inflammatory signal transduction during absorption of carbohydrates.

The **IGF2** gene encodes the protein insulin-like growth factor 2, which is very similar to insulin. It acts as a growth factor and plays an important role in the differentiation and growth of cells. This also includes muscle growth, for example.

The superoxide dismutase 2 protein encoded by the **SOD2** gene is one of the antioxidant enzymes and converts superoxide anions to hydrogen peroxide. Superoxide (or free radicals) in turn is very reactive. If it is not converted by SOD, it can damage the entire tissue due to its reactivity. Antioxidants play a particularly important role in this case.

The protein encoded by **TNF** is a multifunctional cytokine (signalling substance) and, like IL6, plays a role in inflammatory reactions. These in turn can influence the ability to regenerate. It also regulates cell proliferation, cell differentiation, cell death and the release of other cytokines.

The **CCR2** protein is a chemokine receptor to which chemokines (small signalling molecules) bind. In response to this, chemotaxis (cell movement in the direction of a substance) of monocytes occurs, which in turn play a role in inflammatory reactions and influence the ability to regenerate.

The **CYP1A2** protein is an enzyme of the cytochrome P450 superfamily. These catalyse many different reactions that are associated with the metabolism of drugs or medicines as well as the synthesis of cholesterol, steroids and lipids. CYP1A2 in particular metabolises oestrogens and caffeine, among other things.

The protein encoded by **BCMO1** is a key enzyme in the metabolisation of beta-carotene to vitamin A. It catalyses the oxidative cleavage of beta-carotene into two retinal molecules. Vitamin A metabolism plays an important role in vital processes such as vision, embryonic development, cell differentiation and skin protection.

The **MTHFR** gene encodes a protein that is well characterised for its role in the utilisation of folic acid and vitamins B6 and B12. It catalyses the conversion of 5,10-methylenetetrahydrofolate into 5-methyltetrahydrofolate, a co-substrate for the remethylation of homocysteine to methionine.

The **FUT2** gene encodes an enzyme that is important for the final step in the synthesis pathway of the soluble ABO blood group antigen. It is also involved in cell-cell interaction, cell surface expression and cell proliferation. Polymorphisms of this gene are associated with different vitamin B12 levels.

The **GC** gene encodes a protein that belongs to the albumin gene family. It is a multifunctional protein that is found in plasma, in cerebrospinal fluid and on the surface of many cell types. It binds to vitamin D and its plasma metabolites and transports them to the target tissues.

The **CYP2R1** gene encodes a protein from the cytochrome P450 superfamily of enzymes. The cytochrome P450 proteins are monooxygenases that catalyse many reactions in the metabolism of drugs and are involved in the synthesis of cholesterol, steroids and other lipids. This particular enzyme is a microsomal vitamin D hydroxylase that converts vitamin D into the active ligand for the vitamin D receptor.

The **SLC2A2** gene encodes an integral plasma membrane glycoprotein of the liver, beta-islet cells, intestine and renal epithelium. The encoded protein mediates facilitated bidirectional glucose transport. Due to its low affinity for glucose, it has been proposed as a glucose sensor, whereby polymorphisms can influence the craving for sweets.

The so-called tag SNPs **DQ2.5** and **DQ8.1** are being investigated for gluten intolerance. These are known variations that are inherited in combination with certain HLA alleles. The presence of the mutated form of a tag SNP is a clear indication of the presence of the HLA allele in question, but is not 100% proof.

The **LCT** gene encodes the enzyme lactase, which enables the digestion of lactose in milk and other lactose-containing products. Polymorphisms in this gene are associated with lactase persistence, where intestinal lactase activity is maintained into adulthood. In turn, the absence of these polymorphisms can lead to lactose intolerance in adulthood.

The **ALDH2** gene encodes a protein that belongs to the family of aldehyde dehydrogenase proteins. Aldehyde dehydrogenase is the second enzyme in the most important oxidative pathway of alcohol metabolism. Known polymorphisms can lead to impaired alcohol metabolism.

The evaluation of the data is carried out using a specialized bioinformation evaluation software. For each person seeking advice, their respective Meta-Type and an appropriate exercise variant is determined for weightloss. The results of the analysis do not allow any conclusions to be drawn about family relationships.*

Your Partner for Personalized Health

The Centre of Genetic Analysis and Prognosis – or **CoGAP** – is a company based in the heart of Cologne.

The work of CoGAP is dedicated to the development of genetic analyses in the health care sector in collaboration with the **University of Cologne** as well as **the Fresenius University of applied sciences**. The aim is to contribute to improving the general level of health in the population and to enable people to live a healthy lifestyle into old age.

Thus, as a MetaCheck consultant, CoGAP offers you the opportunity to carry out state-of-the-art genetic analyses for personal health. The aim of the cooperation is to make scientific findings in human genetics available to healthy people in everyday life in the form of genetic analyses. Such personalized health should allow everyone to tailor their health and well-being according to their individual genetic predisposition.

* Please note that our CoGAP MetaCheck concept includes genetics as a further component of a conventional weight loss concept. However, the connection between genetic predisposition and weight change has not yet been scientifically proven. not yet sufficiently proven. However, we are convinced that we can offer you a personalised and successful diet and training programme based on the CoGAP MetaCheck® genetic diet.

** The results of the studies must be validated in further scientific studies. Please note that the CoGAP MetaCheck concept is aimed at a long-term and permanent change in diet over a period of 12 months. Shorter study results therefore have only have limited significance.

*** The genes analysed have different constellations, which are assigned to the individual meta-types. They do not allow any conclusions to conclusions about relationships. No statements are made about disease risks either. The sample material is destroyed after analysis!

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