Widespread Disease Diabetes Mellitus, Causes

(Translation from German, please excuse inappropriate wording)

Diabetes mellitus is not a new disease. It already existed during the ancient times to which the name “diabetes mellitus” derived from ancient Greek and Latin, meant “honey-sweet flow“. Of course nobody knew then that the problem was caused by the high concentration of glucose in the blood, but the audacious attempt to taste the urine of people suffering in this disease had proved that it tasted sweet.

It always comes to this disease when the glucose (dextrose) in the blood produced by food, can not be sufficiently utilized or consumed by the body as an energy source because of limited efficacy or insufficient amount of the hormone insulin. The resulting large amount of glucose in the blood and body tissues leads to various terrible damages.

If the body destroys its insulin-producing cells itself (autoimmune disease with only moderately pronounced hereditary penetrance; the causes are not sufficiently clear), so it comes abruptly to life-threatening conditions with clear symptoms of extreme thirst, fatigue and acetone smell in breath. Previously, this disease form led quickly to death. Today, affected people can have an almost normal life through multiple insulin injections daily. Because this rare form of diabetes mellitus occurs preferably at a young age, it was called „juvenile diabetes“. Today it is called diabetes mellitus type 1. This form of diabetes, as well as other forms even rarer (summarized in type 3), are not considered further in the following essay.

Hereafter, the type 2 diabetes mellitus, formerly known as „adult-onset diabetes“, which belongs to the lifestyle diseases and which spreads pandemic-like all around the world since several decades, will be discussed. An early discovered impaired glucose tolerance during pregnancy is known as gestational diabetes (diabetes mellitus type 4). This metabolic disorder can be interpreted (with the rare exception of a first-onset type 1 diabetes) as a special form of type 2 diabetes: Due to the hormonal changes during pregnancy, an already pre-existing, but still unobtrusive impaired glucose tolerance (or even a previously undetected overt diabetes) escalates and strikes the first time. This statement is supported by the fact that women, who were diagnosed with gestational diabetes, carry a significantly increased risk of developing type 2 diabetes in the following years to decades, then to a mostly chronic diabetes.

Already half of all adults living in China have impaired glucose tolerance and/or impaired fasting glycaemia (precursors of diabetes, formerly called undifferentiated prediabetes) or meet the criteria of an overt diabetes mellitus; half of all obese children living in Germany indicate an impaired glucose tolerance; about one-third of all pregnant American women have gestational diabetes; and more than half of all people living in Germany with more than 70 years of age, have impaired glucose tolerance and/or impaired fasting glycaemia or an already overt diabetes mellitus, which in many cases remains undetected.

The sooner and more intense diabetes appears in life, the more serious are the consequences – if there is no effective treatment counteracting this (with some nasty side effects and still reduced life expectancy). Frequent or constant high blood sugar levels (hyperglycaemia) damage nerves and blood vessels with the consequences of high blood pressure (hypertension), heart attack (myocardial infarction), stroke (cerebrovascular accident), retinal damage (retinopathy), kidney damage (nephropathy), sensory disturbances (polyneuropathy, mainly in the feet), circulatory disorders (ischemia, also primarily in the feet), erectile dysfunction, reduced wound healing, and

dementia (together with other factors). Furthermore, the risk for dangerous urinary tract infections and certain cancers are significantly increased.

The disease usually remains a long time unrecognized. Contrary to what many experts say, the untreated diabetes type 2 only causes increased thirst in a very advanced stage. Early symptoms are often unspecific and their origins unrecognized (although symptoms such as irritated, slightly inflamed mucous membranes in the genital area, frequent urinary tract infections, the increasing occurrence of nocturnal leg cramps, itchy, dry skin and painful fissures to the heel are quite well diabetes associated). The disease is discovered rather by the fact that the doctor determines the blood sugar, for clarification or diagnosis of various other diseases. As still often the case, if the doctor rely only on the fasting value determination and carry no glucose tolerance test, there remains a not negligible risk of further unrecognized diabetes. Without implementation of glucose tolerance tests, including the determination of glycated hemoglobin in the blood (HbA1c, value for the proportion of haemoglobin bound to sugar, the oxygen carrier and blood pigment of red blood cells, a measure of the mean blood glucose concentration of the last ca. 8 weeks and a measure of the risk to be a victim to the diseases listed above), the statistics need to be corrected with a high probability to even far worse.

Some doctors renounce with the determination of the fasting value (who would like to visit the doctor without having breakfast early in the morning, and possibly have to wait a long time there) and are satisfied with the so-called opportunity glucose (opportunity blood sugar). If this value is too high by definition, diabetes can be predicted, but the chance that the critical period is captured, to which the blood sugar peak appears after eating (40 to 80 minutes thereafter), is very low. Such methods are more reminiscent of „Russian roulette“ than an analytical scientific approach.

The defined blood sugar limits (internationally not uniform; the World Health Organization defines a higher fasting value than the American Diabetes Association or the German Diabetes Society) do not take the patients' age into account – well, in order not to complicate matters. The same limits apply for 80 years old, as well as for the 20 years old, although actually the average blood glucose levels over the course of life in healthy individuals substantially change too. The fasting value increases only slightly, while the postprandial blood glucose values (values after food intake) increase much more. This fact often would reveal that at an early age by high postprandial, or highly fluctuating, but not yet pathological values, if a person carries a high risk in itself to even become a diabetic. The timely counteraction through lifestyle changes could prevent the disease development in many cases. Unfortunately, the time in general and the interest for such subtleties (and often the expertise) are inadequate in medical practices.

The insulin resistance (reduced insulin effectiveness) rushes years ahead of impaired glucose tolerance. Long before the glucose tolerance disorder becomes visible, the still healthy pancreas "is fighting“ by overproduction of insulin (hyperinsulinemia) against an excessive blood sugar concentration. Even through the measurement of insulin and glucose concentrations in the blood after a twelve-hour fasting (HOMA-Index, essentially a multiplication of these two values), the development of diabetes could be identified in a very early stage. Nevertheless, such an investigation with additional costs is not common. („The child must have fallen first into the well.“)

Insulin release is influenced by several hormones, such as of the stress hormones adrenaline and cortisol, which also results in a significant impact of psychological factors for the blood sugar concentration. This is not about a "mistake“ of nature, but also helps to release glucose reserves in stressful situations, increasing the spontaneous performance required to survive („fight or flee“). This only becomes a health problem, when internal or external stress is constantly present.

And now to the actual topic of this essay, namely the causes of this widespread disease: There is no doubt that nature has not equipped over 50% of humanity with a more or less pronounced genetic defect in the metabolism of carbohydrates. And undoubtedly the genetic conditions in previous centuries were the same as today. Genetically "weaker" people also existed at that time, but despite this weakness, with few exceptions they were able to complete their lives without diabetes. (Thus an "individual case" was the ingenious composer Johann Sebastian Bach, eating too much during creation of his great works – preferably high-carbohydrate food – and moved too little: he went blind as a result of severe diabetes mellitus.) Of course the impact of this weakness intensifies with increasing life expectancy, but do not explain the pandemic-like spread of the disease affecting people already in younger and middle age. It is therefore obvious that something must have gone wrong with the lifestyle of modern societies. In contrast to earlier times, the following major changes in the lifestyle of people living today can be seen obviously:

1. Improper nutriment by extremely mechanically and thermally processed food
2. Supernutrition by an oversupply of food throughout the whole year
3. Lack of physical activity at occupation and leisure through various technical achievements

To point 1

The staple food cereals (by breeding high-carbohydrate sweet grasses, including millet, corn and rice) are extremely mechanically processed by modern technology. By heating together with water, another thermal process of macerate occurs (gelatinization). Because of the thereby greatly enlarged contact surface for the digestive enzymes, both cause an extremely rapid degradation of complex carbohydrates to a basic building block of carbohydrates, the glucose, and their introduction into the bloodstream, which needs a correspondingly dramatic insulin response.

Today's food is permeated with extracts of high-carbohydrate concentrations freed from roughages and fibers. Modern foods contain large quantities of sugar and „modified" starch (e.g. in ready meals and puddings), glucose syrup (e.g. in ready meals, ice cream and cake), maltose (e.g. in ready meals, bread and biscuits colored with malt syrup) and other carbohydrates that are even metabolized to glucose much more quickly than flour products.

So rapidly digestible carbohydrates are also in all sugary drinks. Whether (natural) fruit juices, sugary soft drinks, sweetened dairy drinks, many beers (especially malt beer and alcohol-reduced beers, manufacturing dependent), to all these applies that the sugar contained in them is extremely fast absorbable due to lack of adequate roughage or fiber, and lack of plant cell walls that must first be broken up, which consequently increases the blood glucose concentration too abruptly and for many people, extremely high.

The result is, denatured products digested so quickly to glucose (beginning already in the mouth) and transferred from the small intestine into the blood, that the necessary insulin production in many, particularly older people, is inadequate and thus temporarily the blood sugar reaches harmful high values. If this frequently happens, the metabolic control loops of the body are increasingly desensitized over time and cause finally permanently high blood glucose values. The resulting insulin resistance compensates the body initially and partially through increased insulin secretion (hyperinsulinemia, see above), until due to chronic overload, comes finally to exhaustion and permanent damage to the insulin-producing cells (ß-cells of the islets of Langerhans) and thus no longer reversible manifest diabetes mellitus.

Humans, however, are only designed to take the food from nature without further processing and this neither excessively crushing (mechanical treatment), nor this heat (thermal treatment) and, to

cover the additional required fluid intake with water. The ingestion of highly processed flour products (e.g. from the usual low-fiber and low-roughage, ultra-fine-grained white flour), extracted or artificially produced, fiber-free and roughage-free materials such as sugars and starches and sugary drinks lead to high metabolic stress with the risk of glycemic overloads and the consequences thereof. One consequence of such an overload usually appears already after a few hours: If reserves are still available, the blood sugar concentration subsequently decreases sharply because of overreaction of pancreas and this produces premature renewed hunger, despite of previous abundant ingestion - a crucial factor for the development of obesity.

Some experts argue that in this respect the Asians are genetically worse than the Europeans, because in Asia the spread of diabetes is found even higher than in Europe. However, if you are watching people while eating, for example, in the emerging countries of Southeast Asia or even in southern China, doubts about this statement must be given. The less wealthy people there (and this is by far the majority) get the bulk of their energy intake from rice, which is eaten preferably honed, polished and soft boiled. The so prepared food, consisting mainly only of highly pretreated starch grains (as already predigested), overwhelm the metabolism of many people in particularly, to which the suspicions are confirmed that the real cause of the higher incidence rates is the continued and excessive high glycemic load and not less favorable genetic predisposition.

Many diabetics avoid sugar, but consume freely low-fiber and low-roughage, extremely flour- or starch-rich products, not noticing that almost every form of carbohydrates is metabolized into glucose. Contrary to the general opinion table sugar (sucrose) has a lower glycemic burden than extracted starch (e.g. potato starch, corn starch or rice starch), glucose or glucose syrup, maltodextrin (almost tasteless filler in many finished products and recently even in stevia sweeteners), rice syrup, rice noodles, rice cakes, popcorn or corn flakes (e.g. cereals). Polished and soft cooked rice causes (based on the dry weight) almost the same increase in blood sugar like table sugar. The German name „Zuckerkrankheit“ („sugar disease“) can easily mislead – it should better be called „carbohydrate disease“. This statement is corroborated by the fact that China's population has a very high incidence rate of diabetes mellitus, but on the other hand, the local sugar consumption per capita is still below the world average.

Also, each still healthy person should take food with highly enriched and concentrated carbohydrates or sugary drinks only in small quantities. This applies even more to the already sick people, but also in favor of a higher protein intake (unless renal insufficiency) and fat intake of oils with high levels of unsaturated fatty acids (therefore no palm oil, palm kernel oil or coconut oil) should consume no more than 30% of energy from carbohydrates, while the percentage proportion of carbohydrates is not so important, but their naturalness is crucial (treated either mechanically or thermally, extracted or enriched). Preferably only slightly heated wholemeal (or “raw“ oatmeal), vegetables, mushrooms, fruits, unsweetened dairy products, nuts, fish, native vegetable oils and small amounts of eggs and low-fat meat products prevent or slow down the development of diabetes significantly. It should be noted in this context that in literature frequently recommended so-called “glycemic index“ to assess the glycemic burden caused by a food is completely impractical and even misleading. Much more useful, because much more meaningful, is the so-called “glycemic load“.

To point 2

In former times it was completely normal that many people no longer found sufficient food in winter and early spring months, and often had to go hungry. The small belly, perhaps acquired in summer and autumn, disappeared and the metabolic system was able to recover. Such times, exist no longer in most societies. People are constructed that they eat as much as possible with abundant

food supply. This concept had proven itself in former times in order to increase its chances of survival during subsequent famine. However, people have to counteract this instinct today through self-discipline, to which the majority, insufficiently succeed (and apparently this has little to do with intelligence). Nature evolved another concept for most birds. They are rarely fat even with excessive food supply. The reason is simple: with obesity, they fail to make a fast start or take off, and the bird is more an easy prey to its predators. Inevitably, therefore a different approach in evolution had to be established in birds, in which the principle of the higher chance of survival with fat reserves during times of famine got into background.

But the continual abundant food intake too often leads to excessive blood sugar levels (glycemic overloads). The body does not take a sufficiently long period of rest and it also favors a desensitization of metabolic control loops (insulin resistance and damage to the ß-cells). The stored belly fat is just the visible external result. The organs behind also become fat (visceral fat), what the function of the liver (there is glucose stored as glycogen) and pancreas (there is blood glucose concentration „measured“ in the ß-cells and the insulin produced accordingly) worsens.

Definitely, humans are created to stay unscathed during moderate hunger periods. At such times there are even regeneration processes with a reduction in insulin resistance and a partial recovery of already damaged ß-cells.

There is a close correlation between the weight of a person, more precisely the BMI (Body Mass Index), taking into account the waist circumference, and the risk of developing diabetes. People with ideal weight (BMI < 22; waist circumference < 80 cm for women, < 94 cm for men) are diagnosed rarely, even with unfavourable genetic constellation, whereas with increasing obesity increases disproportionate the risk dramatically. (The BMI is evaluated individually, because it does not take into account the proportion of muscle mass and the largely genetically determined fat distribution, whereas the abdominal fat respectively the visceral fat represents the highest risk, „apple shape“.)

Although not part of the subject, it should be noted at this point that being overweight greatly increases the risk for various other diseases. Nevertheless, the media proclaim from time to time geared towards the media: “thickness live longer!“. This thesis is not scientifically sustained. A risk assessment is based on scientific statistics. Of course there are many people who are lucky enough genetically, despite severe excess weight to stay healthy and the statement that people with slightly overweight have better chances to survive during serious illness or surgery, is also correct. Apart from that, such media-looking statements are at the same level, such as: The former German Chancellor Helmut Schmidt, who became 96 years old and everyone knows him as a heavy smoker, is a proof that smoking can not be too harmful.

To point 3

In earlier times, most people had to work a lot harder physically to survive than it is today. The resulting „energy hunger“ of the body cells increased significantly the receptiveness of glucose, so that conspicuously smaller quantities of the hormone insulin were required. This did not keep only blood sugar at a low level, but also protected the insulin-producing ß-cells of the pancreas.

Especially after eating, any physical activity counteracts a hyperglycemia, intensely. To aim, at least half an hour's walk, starting 30 to 40 minutes after eating, helps greatly to keep the postprandial blood glucose concentration low (this effect is individually variable). The saying “After dinner you shall rest, or do thousand steps.“ is, according to this knowledge, incorrectly formulated. The “or” must be replaced to “and” while respecting the window of time limits by

metabolic processes. However there is a problem: The majority of professionals have no chance, within the agreed break times after eating, to first relax and then to enjoy a soothing stroll. People whose professions are associated with physical activity, are here in a clear advantage!

The likelihood of developing diabetes, also increases significantly with the number of hours a day that you spend watching television – particularly for people who are already forced professionally to physical inactivity. Of course, this has nothing to do with what you look at TV (one could come to such an idea ...), but what counts is the largely physical inactivity during this time. However, a non-negligible additional factor is also the irresistible desire of many people to consume more „goodies“ and sugary drinks in front of the TV. Then, without intermediate physical activity before going to bed, there is a risk to spend the first few hours of sleep with harmful much glucose in the blood and body tissues – without feeling anything about it.

Summary

Type 2 diabetes is largely preventable! However, this requires a high degree of self-discipline, especially when the genetic constellation is unfavourable. The food has to be chosen and prepared with a lot of knowledge in terms of quality and quantity. You have to muster the courage to find ways, which do not comply with the society standards, because the masses react defensively to deviations from the norm and assume unconsciously that it must be good, which means following the mother’s example. But this traditional opinions teach us to eat too high proportions of low fiber, high mechanical and thermal processed food with extreme carbohydrate concentrations in conjunction to the human nature’s unreasonable physical inactivity. The pharmaceutical industry and many experts proclaim this statement that modern medicine allows the conventional concept regarding normal eating habits for the diabetics. This view is short-sighted (or interest-driven) and, additionally leads deeper into the disaster, which is vehemently spreading over the world, and which is – apart from the huge financial costs – reducing the quality of life and life expectancy of many people dramatically.

Annotation: This essay does not claim to be a scientific publication and therefore does not contain any references.

Original version in German: www.volkerberger.de/Diverses/Volkskrankheit_Diabetes.pdf

Dipl.-Ing. (graduate engineer) Volker Berger 13.02.2016