

Dr. med. Jürg Eichhorn

General and internal medicine (FMH)

Private surgery for general and experience medicine

Traditional Chinese medicine TCM
Manual medicine SAMM
Qualified F.X. Mayr-doctor

Sports medicine SGSM
Nutrition medicine SSAAMP
Anti-Aging medicine

Neural therapy SANTH & SRN
Orthomolecular medicine SSAAMP
Applied kinesiology ICAK-D & ICAK-A

The type-2 diabetes

Version: 18. April 2017

Fon
Adresse
E-Mail

+41 (0)71-350 10 20
Im Lindenhof
drje49@gmail.com

Fax +41 (0)71-350 10 21
Bahnhofstr. 23
www.ever.ch

CH-9100 Herisau

The type-2 diabetes

Version: 10 January 2014

Content

Introduction	5
The Type-2 Diabetes	6
<i>There are two different types of diabetes</i>	6
<i>The diabetes illness is in progress</i>	6
<i>Causes and risks factors for type-2 diabetes</i>	6
<i>The most frequent secondary diseases</i>	7
The pathway to type-2 diabetes	8
<i>The first step: Too many carbohydrates</i>	8
<i>The second step: the insulin resistance</i>	9
Possible causes of getting insulin resistant	9
Straight consequence of insulin resistance	9
<i>The third step: The type-2 diabetes</i>	10
The metabolic syndrome: The final condition	10
The metabolic syndrome: The definition	10
The metabolic syndrome: The risk groups	10
The differences between fructose and glucose (simplified)	12
<i>Sources of Fructose (free and chemically bounded)</i>	12
<i>Fructose in food</i>	13
<i>Fruit juices are dangerous because of the fructose</i>	14
Diabetes, oxidative stress and antioxidants	15
Oxidative stress = formation of free radicals	15
Antioxidants	15
The meaning of physical activity	17
Diabetes and laboratory	18
Type-2 diabetes - the therapy	19
<i>Basic therapy</i>	19
<i>Academic medicine</i>	19
Metformin	19
Sitagliptin	19
Sulfonylurea class	19
<i>Further useful therapies</i>	20
Zinc	20
Amino acids	22
Amino acids used in the therapy of diabetes mellitus	23
Diabetes and Gymnema Sylvestre	25
Green Tea	25
The Cashew nut	25
Cinnamon lowers blood sugar and the risk of heart attack	25
Banaba	25

<i>Breakfast lowers the risk of diabetes</i>	26
<i>Diabetes and air pollution</i>	26
<i>The contents of the medicament Diabetichron</i>	27
<i>Combination of micronutrients especially for diabetics with enhancement of zinc, chromium, magnesium and others: GranuVital "Diabetes"</i>	28
Insulin blood levels of glucose and insulin after intake of 50 g glucose with and without GUAR	28
Therapeutic scheme	29
Fructose: The list	30

Introduction

The sugar illness is not at all a trivial offence, it is a severe life shortening disturbance of the metabolism, even if it is well modulated by sugar lowering pills or Insulin. The diabetes mellitus is the most frequent cause for fatal heart attacks, leg amputation, blindness or kidney failure. In the meanwhile, especially the Diabetes mellitus type 2 is regarded as a pro inflammatory illness. Diabetics are high risk patients. As younger the patient, as worse the progress! From the moment the diabetes gets symptomatically the life span declines for 30%.

The sugar illness is very often a silent health threat:

Austria: -population: 8 million people
 -estimated diabetics: 600`000
 -known diabetics under treatment: 250`000

-about 180`000 diabetics do not know, that they have a sugar illness!

The Type-2 Diabetes

There are two different types of diabetes

Type-1 Diabetes: so called *Youth Diabetes (5%)*: = absolute insulin deficiency

Type-2 Diabetes: so called *Seniority Diabetes (95%)*: = relative insulin deficiency

mostly along with: -insulin resistance

-overweight:

-metabolic syndrome:

belly fat, not the hip fat

high blood pressure

high blood sugar

high blood fat

high uric acid

The diabetes illness is in progress

- over the years, type-2 Diabetes mostly occurred between the age of 50 to 60 but newly already before 40
- nowadays even (overweight) children suffer from this sugar illness
- there surely is an estimated number of unreported cases

Causes and risks factors for type-2 diabetes

- 80% of the type 2 diabetes patients are overweight!
- too many calories, above all too many fast absorbable carbohydrates
- too much belly fat
- too little physical activity
- only few micronutrients

The most frequent secondary diseases

Makroangiopathy

- damage of the bigger blood vessels: heart attack, stroke
- 70% of the patients die of a blood vessel damage: stenosis of the arteries, caused by inflammation
- the heart attack risk is 3 to 6 times higher than for non-diabetics

Mikroangiopathy

- damage of the capillaries: -blindness (high risk)
-kidney failure
-malfunctioning microcirculation: prolonged wound healing, amputation of limbs
- in comparison with non-diabetics, the risk for blindness is 25 times higher

Neuropathy:

- 60 to 90 % of all diabetics suffer from neuropathy mainly dysfunction of sensibility and numbness of the feet

The pathway to type-2 diabetes

The first step: Too many carbohydrates

- too many calories, mainly fast absorbable carbohydrates, lead to the so called insulin resistance
- we need carbohydrates to produce energy only during the day, most of them in the morning, less in the middle of the day and none in the evening
- without physical activity we only need *slowly absorbable* carbohydrates. Strictly avoid fast absorbable carbohydrates

Slowly absorbable carbohydrates lead to a steady sugar stream from the gut to the whole body and the brain cells. They give us energy and banish fatigue. To enhance the brain concentration a steady supply of glucose is needed during the day.

The brain cells love a steady sugar stream. In the contrary, they do not like hunger at all.

In this phase the pancreas hormone insulin is a real friend of the cells. Thanks to the insulin, glucose can easily pass through the walls into the cells, where the mitochondria are waiting for it. In these factories a lot of employees are busy *to burn the glucose*, so as to produce energy. In this process the employees are strongly supported by the enzyme Coenzyme Q₁₀. It can be compared to the gas pedal in the car. In our body there are about 500`000 milliards of mitochondria, supplying us with energy.

The second step: the insulin resistance

But what happens, if there are too many carbohydrates and if there is no physical activity to burn the redundant sugar?

The logical answer to the cells is very easily to understand:

The cells say to the insulin: "Sorry, my dear insulin, but at this moment we do not your help. We have enough sugar. You know, our chief, the body, is a real couch potato and hates physical activity".

"No matter", says the insulin, and redirects the sugar directly to the belly fat where it gets rapidly changed into fat.

The insulin resistance is a silent process. You cannot notice it. You still think to be in a good state of health. But that is a fatal error. The Insulin itself is a pro-inflammatory agent and the insulin resistance leads to the so called *silent inflammation*. The silent inflammation causes no pain therefore you do nothing to stop it. But after years or decades of constant inflammatory attacks, you will suffer from hypertension, high blood sugar, high cholesterol levels and high uric acid (gout). This quartet is called *metabolic syndrome*. Moreover, states of chronic inflammations like rheumatism and many others will be enhanced, too.

The belly fat is a big gland, producing a wide variety of pro-inflammatory hormones, among others the *cytokines*.

If you answer most of the following questions with yes, you might suffer from *silent inflammation*:

- are you overweight?
- are you taking hypertensive drugs like beta-blockers or diuretics?
- have you been taking cholesterol-lowering drugs?
- do you constantly crave carbohydrates?
- do you continually suffer from tiredness?
- are you groggy upon waking up?
- do you have brittle fingernails?

Insulin resistance means, that higher amounts of insulin are necessary to trigger biological reactions.

Possible causes of getting insulin resistant

- genetic disposition
- overweight, especially belly fat
- too many fast absorbable carbohydrates
- physical inactivity
- age
- gravidity
- sleep-apnea Syndrome
- insomnia: less melatonin enhances insulin resistance

Straight consequence of insulin resistance

- silent inflammation

Keep this in mind

- *every redundant gram of carbohydrates lets growing your belly, especially in the absence of physical activity!*

The third step: The type-2 diabetes

The body does not care, if you eat two plates of pasta once a month, but if it gets more or less a daily habit, it will lead to diabetes and then to an extensive variety of damages. There is so much sugar everywhere and the insulin supplies the cells only with little sugar. The abundant amount of sugar goes directly to the belly and as time goes by the mitochondria in the cells forget the mechanism of burning sugar. As a consequence fat and sugar level in the blood increase more and more. The illness becomes then Diabetes mellitus but the Diabetes is only one of the four symptoms of the metabolic syndrome.

The metabolic syndrome: The final condition

The metabolic syndrome is characterized by the following four conditions. In the beginning there might only be hypertension, for instance. As the time passes by the next condition will join the others. So finally we suffer from:

- high blood pressure: hypertension
- high blood sugar: diabetes mellitus
- high blood fat levels: hypercholesterolemia / hypertriglyceridemia
- high uric acid levels: gout

The metabolic syndrome: The definition

	limiting values
waist circumference women	<88
waist circumference men	<102
HDL-Cholesterol women	<1.29 mmol/l (50mg/dl)
HDL-Cholesterol men	<1.03 mmol/l (40mg/dl)
triglyceride	>/= 1.69 mmol/l (150mg/dl)
blood pressure	>/= 130/85 mmHg
fasting blood glucose	>/= 6.1 mmol/l (110mg/dl)

If some of these values are increased, you might suffer from a metabolic disorder

The metabolic syndrome: The risk groups

		LDL-Cholesterol
low risk	not exceeding 1 risk factor	<4.14 mmol/l (160mg/dl)
medium risk	at least 2 risk factors	<3.36 mmol/l (130mg/dl)
high risk	more than 2 risk factors or: cardiovascular diseases vascular diseases type-2 diabetes	<2.59 mmol/l (100mg/dl)

Very dangerous: the big belly



Old Town Hvar
Picture: Dr. med. Jürg Eichhorn

- the belly fat is very active
- it products hormones and estrogen
- it products pro-inflammatory mediators
- it activates the so called transkriptionsfaktor *NF-kappaB*

NF-kappaB

- *strongly boosts inflammation and cancer!*
- boosts the so called cancer-nekrosis factor *TNF-alpha*
- boosts the strongly pro-inflammatory *Interleukin-1*
- *TNF-alpha and NF-kappaB strongly enhance the insulin resistance*
- *NF-kappaB is inhibited by pomegranate polyphenoles!*

The differences between fructose and glucose (simplified)

Glucose utilization in the cells:

- insulin is involved
- insulin increases the leptine level
- leptine mediates a saturation effect in the brain cells
- hunger feelings decline quickly
- glucose will be burnt to produce energy
- glucose enhances the absorption of fructose through the gut wall

Fructose utilization in the cells:

- insulin is *not* involved
- therefore no saturation effect
- no suppression of hunger feelings
- fructose goes more or less directly to the belly fat

Sources of Fructose (free and chemically bounded)

Retail sugar: -blend of fructose and glucose

Honey: -blend of fructose and glucose

Invert sugar: -blend of fructose and glucose

Inulin: -carbohydrates, formed by fructose

Sorbitol:

- chemically deviated from glucose and then changed into fructose
- sorbitol is commonly used as nutritive sweetener in products for diabetics
- sorbitol delays the absorption of fructose in the gut, leads to diarrhea and should be avoided by diabetics

Diabetics should deal carefully with fruit



Picture Dr. med. Jürg Eichhorn. Legian Villa, Bali, March 2012

Fructose in food

Contain only small amounts of fructose	Contain more or less fructose	Contain plenty of fructose and sorbitol
Honeymelon	Fruit juices (even attenuated)	Apple (above all as juice and dried)
Banana	Jam	Plum, above all prune
Tangerine	Orange	Pear (above all as juice and dried)
Lemon	Cherry	Apricot (above all as juice and dried)
Sugar melon	Kiwi	Peach (above all as juice and dried)
	Khaki	Grapes (above all as juice and dried)
	Watermelone	Red and black currant (above all as juice)
	Blueberry	Date
	Blackberry	Honey
	Cowberry	Strawberry
	Pineapple	Red and white wine
	Mirabelles	Beer
	Gooseberry	
	Rhubarb	
	Mango	
	Onion	
	Black salsify	
	Artischoke	

Diabetics must avoid

- all kind of fruit juices
- ice cream
- vegetables rich in fructose like onions, white and red cabbage, field garlic
- honey and all kind of sweets and sweet food products
- all food products with nutritive sweetener (many!) like inulin, sorbitol
- liqueur and dessert wines
- *Be careful with all kind of fruit (mango...)*

Fruit juices are dangerous because of the fructose



Put some oil in the juice!

-that will lower the sugar absorption from the gut

rapeseed oil

Picture: Dr. med. Jürg Eichhorn

Diabetes, oxidative stress and antioxidants

Oxidative stress = formation of free radicals

Free radicals are the result of different degradation processes and must be detoxified with antioxidants.

If there are too many free radicals and insufficient antioxidants, the situation leads to several cell damages.

Many illnesses are due to these free radicals also seen as *metabolism waste*.

Free radicals are highly reactive molecules that are produced in the body naturally as a byproduct of metabolism (oxidation), and by exposure to toxins in the environment such as tobacco smoke and ultraviolet light. They play a role in the development of cancer and other diseases, and accelerate the aging process. By activating the arachidonic acid in the cell wall, they initiate the inflammation. Chronic strain with free radicals leads to chronic inflammation like rheumatism and others and enhances them

Antioxidants

The most important antioxidants inside and outside the cells:

-vitamin-C and Selenium

The most important antioxidants inside the cell walls:

-vitamin-E, beta-Carotene

The most important antioxidants produced in plants and fruit:

-natural preservatives

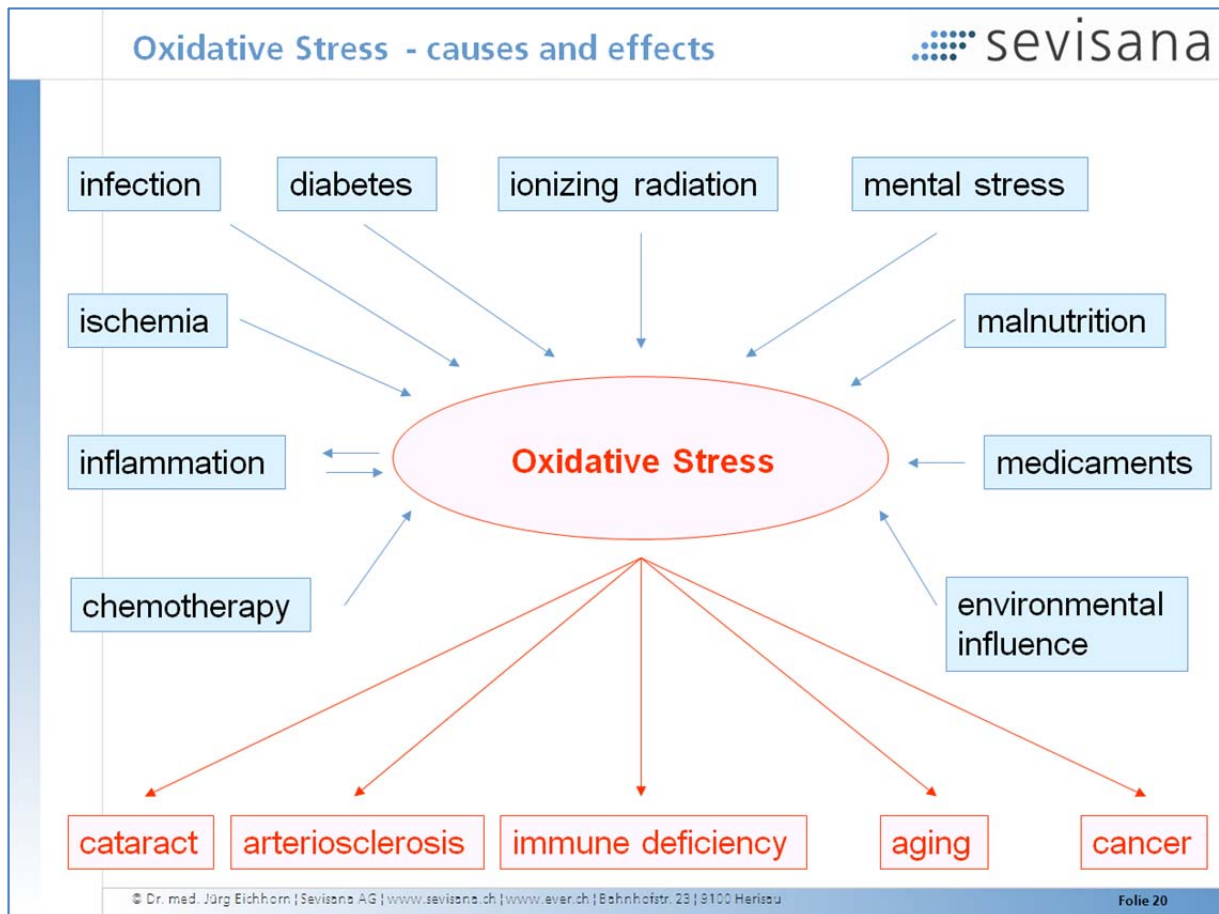
-the wide spectrum of colors due to several natural

-apple's large amount of vitamin-C is protected from oxidation by natural preservatives

Diabetes mellitus is an important source of free radicals, leading to all the known damages caused by them.

Study:

A diabetic has a reduced vitamin-C supply for 30 %! In type 2 diabetics, a daily supply of 2x500 mg vitamin-C significantly improved the insulin resistance, lowered the HbA1c, the total cholesterol, the LDL-cholesterol and the triglycerides. HbA1c is a measure of the average blood sugar level for the last three months.



The meaning of physical activity

Endurance sport improves not only the insulin resistance, but it although enhances *NO* in the endothelial wall of the arteries. *NO* is a nitrogen derived substance, which defends the inner blood vessels wall from harmful influences like the cytokines (silent inflammation!) and tobacco products (strongly destroy *NO*).

Keep this always in mind

- *the combination diabetes + smoking is a highly explosive partnership, especially if accompanied by hypertension and high cholesterol levels!*
- endurance sport lowers the blood pressure, improves the blood vessel walls, lowers Insulin resistance and cholesterol levels
- endurance sport helps burning fat and losing weight and helps muscles grow
- remember that it's never too late to start exercising and that all your activity counts - today and all the days thereafter



Legian Beach, Bali. March 2012. Picture Dr. med. Jürg Eichhorn

Diabetes and laboratory

HbA1c	EDTA blood. Shows the average glucose level of the past three months
microalbuminuria in the urine	protein lost in the kidney, good sign for blood vessel damage
oxidated LDL und 8-iso PGF2	oxidative stress
CRP high sensitive	good sign for pro-inflammatory activity
blood fats	HDL and LDL-Cholesterol, triglyceride
homocysteine	serum, not full blood

Type-2 diabetes - the therapy

Basic therapy

- loose weight, if you are overweight. BMI target: 23-24, not over 25
- strictly avoid fast absorbable carbohydrates
- eat slowly absorbable carbohydrates with main focus in breakfast
- follow the guidelines of the *Main Street Diet* and the *TopMix-Life-Elixir*
- collect physical activity the whole day long
- start your individual physical training
- choose a sport, where you must use all muscles
- become keen on sports
- nutrition change without sport does not work
- sport without nutrition change does not work
- but both together will soon keep your doctor away.....

Academic medicine

Metformin

- is effective against hunger
- indication: Overweight diabetics

Sitagliptin

(Januvia, Janumet = combination Januvia + Metformin)

- sitagliptin inhibits the enzyme *dipeptidylpeptidase 4*, responsible for the breakdown of the hormone *glucagon-like peptide 1 (GLP-1)*, GLP-1 is produced in the gut mucosa, enhances the liberation of insulin and lowers the hormone glucagone, which is antagonist to insulin
- this GLP-1 effect is called *incretine effect*
- metformin and sitagliptin and others from this group of medicaments do not cause hypoglycemia

Sulfonylurea class

- liberation of insulin in the pancreas (β -Cells) by blocking potassium channels
- all these medicaments can cause hypoglycemia
- one of the best medicine in this group is *Diamicron*, causing less side effects and less hypoglycemia

Further useful therapies

Zinc

- in diabetics the zinc loss by the kidneys, due to the higher protein loss, is twice to three times higher
- zinc acts like Insulin. It is needed for a sufficient insulin production
- moreover, zinc is able to improve the insulin receptors in the tissues

Chromium

- chromium is part of the *Glucose-Tolerance-Factor*, a regulator of the sugar metabolism
- a lack of chromium leads to higher sugar and fat levels
- chromium improves the binding of insulin to the tissues
- chromium improves the glucose utilization inside the cells

Magnesium

- due to the protein loss in the kidneys there is a lack of magnesium inside the cells, which enhances the insulin resistance
- a lack of magnesium leads to difficulties in successful stabilization of glucose levels with medicaments

Vitamin-B

- diabetics suffer from vitamin-B deficiency more frequent than non-diabetics
- the worse the stabilization of the sugar level, the lower are the vitamin-B levels
- the vitamins B1, B6 und B12 improve (and protect) neuropathy as diabetes side effect
- the B-vitamins play an important role as co-enzymes in the metabolism of the carbohydrates, proteins and fats
- a lack of B6 and B12, together with a lack of folic acid and biotine, leads to high homocysteine level
- homocysteine is a metabolism product of the amino acid methionine
- homocysteine should be regenerated back to methionin by the help of the upper listed vitamins
- high homocysteine levels lead to damages of the arteries, like thrombosis, embolism and finally to infarcts
- they also leads to brain atrophy

Keep this in mind

- every diabetic should know his homocysteine level
- every diabetic should supply himself with zinc, chromium and B-vitamins in sufficient amounts
- type-2 diabetes needs high amounts of these nutrients

Alpha-Lipon acid

- in studies alpha-lipon acid improves neuropathy symptoms significantly

Omega-3 fatty acids - fish oil

- high triglyceride levels could be a sign of insulin resistance
- fish oil lowers triglyceride levels
- they protect the artery walls from inflammation, that is from arteriosclerosis, too
- they improve the immune systems and are effective against all kinds of inflammations
- they block the clumping of the thrombocytes and therefore protect from thrombosis
- they improve the fluidity inside the cell walls
- they dilate the blood vessels and lower the blood pressure to normal values
- moreover they improve brain functions (better concentration, less depression)

Keep in mind

- all diabetics should intake at least 3 gr of a purified fish oil daily

Amino acids

Amino acids are the building components of the proteins. 8 amino acids are essential, that is we have to intake these acids with the nutrition:

- *lysin, methionin, tryptophan, threonin, leucin, isoleucin, valin and phenylalanin*

6 Amino acids are half essential. Under certain circumstances we are able to produce them by ourselves:

- *cystein, glutamin, arginin, ornithin, glycin and taurin*

Amino acids used in the therapy of diabetes mellitus

Glutathion

- -glutathione is the most important antioxidant inside the cells
- -the gut mucosa is rich in glutathione too

sources:

- vegetables: -broccoli is the top source for glutathione within the vegetables
-all kinds of cabbage
- pomegranate: -pomegranate is within the fruit the top source for glutathione

Carnitine

- it plays a central role in the fat metabolism
- transportation of fat into the mitochondria
- energy supply in the muscles and in the heart

Sources:

- whole grain products
- meat: attention: could enhance inflammation
- milk: attention: cow milk and cow products enhance inflammation

Carnosine

- carnosine is the classical anti-aging amino acid
- it shows antioxidative and metal binding properties
- rich in carnosine are the brain, the eye lenses, the heart and skeleton muscles

sources:

- fish: attention: salt water fish is polluted with mercury and other toxins
- meat: attention: could enhance inflammation

Arginin

- improves the fat metabolism
- improves the production of the growth-hormone dependent IGF-1, which promotes the growth of the muscles and bones

sources:

- fish: attention: salt water fish is polluted with mercury and other toxins
- meat: attention: could enhance inflammation
- soya
- hazelnut
- whole grain products

Glutamin

- rich incorporated in the muscles, where it is produced, too
- serve in the gut mucosa as energy provider
- increased consumption when immune system activity is up regulated
- increased consumption: High endurance activity

sources: -wheat
 -oat
 -milk (caseine): attention: cow milk and cow products enhance inflammation

Valine, Isoleucine, Leucine

The muscle tissues consist of 35% valine, isoleucine und leucine: building the muscle protein

sources: -egg: attention: only 3-minute egg or fried eggs sunny side up
 -hazelnut
 -meat: attention: could enhance inflammation
 -milk (caseine): attention: cow milk and cow products enhance inflammation

Diabetes and Gymnema Sylvestre

Gymnema Sylvestre is a tropical plant. Other names are: Meshasringi, Madhinasini, Madhoolika, Gurmar, Sirukurinchaan, Amudhapushpam, Chakkarakkolli. The leaves contain *saponine*, which, while chewed, reduce sweet craving and general hunger feeling. New studies show that Gymnema Sylvestre lowers the need for insulin.

Study in West-Bengalen:

Men and women with sugar illness, average age 50 years and average weight 59 kg.

After 60 days of using this plant, 91% show improvement of the glucose values in the blood: Morning sugar before eating: Average decline from 162 to 119.

Green Tea

Green tea extract protects the LDL-Cholesterol from oxidation and at the same time it dilutes the glycemc load of the blood (findings of a study).

The Cashew nut

Like insulin, molecules in the cashew nuts improve the flow of glucose into the cells are involved in the fat metabolism, too. Both processes contribute to a natural regulation of the insulin levels.

Cinnamon lowers blood sugar and the risk of heart attack

Cinnamon lowers blood sugar, cholesterol, triglyceride in type-2 diabetes. A natural preservative, the water soluble Polyphenole, is responsible for these effects. Positive effects on the glucose and cholesterol levels are expected with 1 to 6 gr cinnamon per day. 3 gr is the recommended amount.

Banaba

<http://www.tropilab.com/banabatincture.html>

Banaba (*Lagerstroemia speciosa*) is a medicinal plant with a long history, used as a natural remedy in the treatment of the type-2 diabetes. The blood sugar lowering effect of Banaba leaf extract is similar to that of insulin, but the mechanism is different. Banaba is also used in weight control. The leaves are known to be diuretic and purgative (cleanse the liver) as well. The leaves also contain valoneic acid dilactone (VAD) that can be employed in the treatment of gout. It is used as an inhibitor of xanthine oxidase to lower uric acid levels. Banaba extract shows a significant decrease in total hepatic lipid contents. This decrease is due to a reduction in the accumulation of triglyceride.

Breakfast lowers the risk of diabetes

To start the day with an empty stomach raises the risk of a bad mood, impaired cognitive ability and fatigue. Study: 29'000 men. 2'000 men got diabetes after 16 years. Nearly all of the 2'000 men did not eat breakfast. It seems, that calorie intake at breakfast (low carbohydrates!) stabilizes the sugar metabolism. High intakes of carbohydrates during the course of the day, especially late in the evening, demonstrated a bigger influence in the sugar metabolism than the carbohydrates eaten in the morning.

Diabetes and air pollution

- there is a worldwide correlation between air pollution and diabetes
- the number of new diabetics is 20 % higher in regions with high air pollution
 - Big towns: 9.6 % suffer from diabetes
 - Rural areas: 7.4 % suffer from diabetes
- Harvard-University: already 10 mcg pollutants let increase the diabetes rate for 1 %!

The contents of the medicament Diabetichron

<http://www.vitabasix.com/stoffwechsel-gewicht/diabetichron/diabetichron-produktinformation.html>

Content of the morning capsule		
	pro capsule	daily dosage
Banaba-extract	12 mg	24 mg
Chromium	200 mcg	400 mcg
Gymnema sylvestre-extract	150 mg	300 mg
Bittermelon-extract	75 mg	150 mg
Vitamin-C	125 mg	250 mg
Vanadium	150 mcg	300 mcg
N-Acetylcystein	75 mg	150 mg
Vitamin-E	20 mg	40 mg
Fenugreer-extract	37,5 mg	75 mg
Blueberry-extract	12,5 mg	25 mg
Coral Calcium	12,5 mg	25 mg
Alpha-Lipon acid	50 mg	100 mg

Other ingredients: Rice flour, Magnesiumstearat, SiO₂, Tricalciumphosphat, Gelatine

Content of the evening capsule		
	pro capsule	daily dosage
L-Carnitin	35 mg	70 mg
Enzyme-complex	12,5 mg	25 mg
Biotin	150 mcg	300 mcg
Magnesium	200 mg	400 mg
Coral Calcium	12,5 mg	25 mg
Alpha-Lipon acid	100 mg	200 mg

Other ingredients: Rice flour, Magnesiumstearat, SiO₂, Tricalciumphosphat, Gelatine

Dosage: 2 capsules (yellow) in the morning and 2 capsules (blue) in the evening with about 200 ml water

Combination of micronutrients especially for diabetics with enhancement of zinc, chromium, magnesium and others: *GranuVital "Diabetes"*

Welche Mikronährstoffe für Sie empfohlen werden, sehen Sie an der untenstehenden Aufstellung. Es ist jeweils die Wirkstoffmenge pro Tag angegeben. Die Zusammensetzung ist auf die HCK® Produktpalette abgestimmt, die wir zur Erstellung einer individuellen Mischung empfehlen.

Wirkstoff	Menge	Wirkstoff	Menge
Vitamine			
Vitamin B1 (Thiamin)	30,0 mg		
Vit. B2 (Riboflavin)	30,0 mg		
Vit. B3 (Nicotinamid)	30,0 mg		
Vit. B6 (Pyridoxin)	60,0 mg		
Vit. B12 (Cyanocobalamin)	90,0 µg		
Vit. C (Ascorbinsäure)	1.000,0 mg		
Vit. D3	15,0 µg		
Natürliches Vit. E	160,8 mg		
davon			
α-Tocopherol	140,4 mg		
γ-Tocopherol	18,1 mg		
ζ-Tocopherol	18,1 mg		
Biotin (Vit. H)	150,0 µg		
Folsäure (Vit. B9)	1,2 mg		
Pantothensäure (Vit. B5)	60,0 mg		
Spurenelemente			
Chrom	300,0 µg		
Mangan	10,0 mg		
Molybdän	100,0 µg		
Selen	50,0 µg		
Zink	84,0 mg		
Mineralstoffe			
Magnesium	550,0 mg		
Quasivitamine			
Cholin	240,0 mg		
Inositol	180,0 mg		
PABA	60,0 mg		
Ballaststoffe			
Guarkernmehl	3,9 g		
HPM Cellulose	33,3 mg		

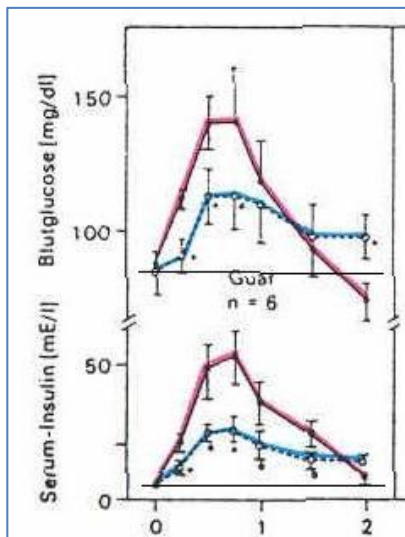
Eine solche Mikronährstoffmischung kostet Sie pro Tag ca. Fr. 3,30.

Folgende Produkte decken obige Nährstoffempfehlungen für 30* Tage ab:

Artikel	HCK® Mikronährstoffmischung	Tageseinnahme	Anzahl Tage	Gesamtmenge	Kosten je Tag	Komplettpreis	MwSt.
00000	HCK® Mikronährstoffmischung bestehend aus folgenden Artikeln	9,7 g/17,9 ml	30	291 g/538 ml	Fr. 3,27	Fr. 97,95	2,50 %
Artikel	Menge	Preis	Anzahl	PosMenge	PosPreis		
H110011	Vitamine Komplex	15,0 g	6,20 Fr.	3,00	45,0 g	18,60 Fr.	
H108011	Spurenelemente JK Komplex	25,0 g	6,20 Fr.	2,00	50,0 g	12,40 Fr.	
H110411	Vitamin C	30,0 g	9,15 Fr.	2,00	60,0 g	18,30 Fr.	
H110711	Vitamin E NAT	36,0 g	14,15 Fr.	1,00	36,0 g	14,15 Fr.	
H106011	Magnesium	30,0 g	6,10 Fr.	2,00	60,0 g	12,20 Fr.	
H111011	Zink	10,0 g	5,05 Fr.	3,00	30,0 g	15,15 Fr.	
H101211	Chrom	10,0 g	7,10 Fr.	1,00	10,0 g	7,10 Fr.	

All micronutrients are embedded in guar. Guar gum effectively lowers the absorption of carbohydrates in the gut and therefore the insulin, too. Thanks to the prolonged sugar stream from the gut to the cells for hours, you will feel less hungry and less sweet craving, too. Guar (guar bean) is a legume which produces a natural gum used in food and paper industry.

Insulin blood levels of glucose and insulin after intake of 50 g glucose with and without GUAR



Red line: without GUAR

-high levels of glucose and insulin
-hypoglycemia after two hours!

Blue line: with GUAR

-only slightly increased levels of glucose and insulin
-no hypoglycemia after two hours!
-no hunger thanks continuing sugar stream

Therapeutic scheme

	daily dosage
GranuVital „Diabetes“	2x 1 ½ measuring spoon (10 ml)
Fishoil Epa Pro SevisanaLine	at least 3 gr (6 capsules)
Diabetichron	2 yellow capsules in the morning 2 blue capsules in the evening
Cinnamon	3 gr (grinded)

Fructose: The list

Source: Big Souci, Fachmann Kraut

Food / Food Product (pro 100g)	Energy kcal	Energy kj	Fructose mg	Sorbitol mg
Honig. Blütenhonig	302	1284	38'800.0	
Invertzuckercreme. Kunsthonig	331	1406	36'100.0	
Quittenkonfitüre	236	1001	33'900.0	
Pflaumenkonfitüre, Zwetschgenkonfitüre	241	1024	33'500.0	
Weinbeere. getrocknet. Rosine	292	1242	33'200.0	890.0
Apfel. getrocknet	248	1053	27'300.0	2'490.0
Apfelgelee	259	1101	27'100.0	
Dattel. getrocknet	276	1174	24'900.0	1'350.0
Feige. getrocknet	250	1059	23'500.0	
Kirschkonfitüre	250	1061	21'700.0	
Preiselbeere, in Dose, gezuckert	183	778	21'300.0	
Brombeerkonfitüre	259	1101	20'100.0	
Heidelbeerkonfitüre	258	1098	19'900.0	
Erdbeerkonfitüre	256	1088	18'700.0	
Himbeergelee	246	1044	18'200.0	
Quittengelee	250	1064	17'700.0	
Pflaumenmus	202	858	16'200.0	
Johannisbeerkonfitüre, rot	257	1092	16'000.0	
Orangenkonfitüre, Apfelsinenkonfitüre	258	1098	15'400.0	
Johannisbeergelee, rot	247	1050	14'100.0	
Himbeerkonfitüre	251	1068	13'800.0	
Aprikosenkonfitüre	248	1053	13'500.0	
Pflaume. getrocknet	222	943	9'370.0	6'570.0
Hagebuttenmarmelade	252	1073	8'900.0	
Traubensaft, Handelsware	70	297	8'300.0	
Kakifrukt	70	297	8'000.0	
Birnen in Dose	67	285	7'850.0	
Apfelmus	79	334	7'500.0	
Heidelbeeren, in Dose	76	320	7'400.0	
Pflaume, in Dose	72	305	7'400.0	
Pfirsich. getrocknet	240	1021	7'390.0	5'330.0
Hagebutte	94	399	7'300.0	
Granatapfel	74	316	7'200.0	
Weinbeere. Weintraube	68	287	7'083.0	200.0
Birne	55	234	6'730.0	2'170.0
Himbeeren. in Dose	71	303	6'700.0	
Erdbeeren, in Dose	70	297	6'500.0	
Apfelsaft	48	204	6'400.0	560.0
Kirsche. süß	63	266	6'140.0	
Sapodille	86	365	6'000.0	
Aprikosen in Dose	65	278	5'800.0	
Apfel	54	228	5'740.0	515.0

Sauerkirschsaft. Muttersaft	55	233	5'300.0	
Ananas, in Dose	68	288	5'200.0	
Cashew-Apfel	53	225	5'170.0	
Kirschen, süss, in Dose	56	238	5'100.0	
Aprikose. getrocknet	240	1021	4'880.0	4'600.0
Kiwi	50	213	4'600.0	
Johannisbeernektar schwarz, Handelsware	56	237	4'540.0	22.0
Mirabelle	63	269	4'300.0	
Kirsche. sauer	53	226	4'280.0	
Grapefruitsaft, Handelsware	47	201	4'200.0	
Wassermelone	37	159	3'920.0	
Pfirsich, in Dose	63	269	3'800.0	
Boysenbeere	33	138	3'700.0	
Reineclaude	56	240	3'670.0	
Papaya	32	134	3'500.0	
Guave	34	144	3'430.0	
Banane	88	376	3'400.0	
Heidelbeere. Blaubeere	36	154	3'350.0	4.3
Stachelbeere	38	160	3'330.0	
Loquate, Japanische Mispel	40	170	3'200.0	
Litchi	74	316	3'200.0	
Johannisbeere. schwarz	39	167	3'192.0	
Passionsfrucht, Muttersaft	57	244	3'140.0	
Brombeere	44	185	3'110.0	
Himbeersaft. Muttersaft	28	120	3'080.0	
Mandarinensaft. Muttersaft	46	196	3'020.0	
Johannisbeere, weiss	30	129	3'000.0	
Preiselbeere. Kronsbeere	35	147	2'930.0	
Johannisbeernektar rot, Handelsware	54	231	2'874.0	28.0
Passionsfrucht	63	268	2'810.0	
Mango	58	245	2'600.0	
Ananassaft, in Dose	43	185	2'590.0	
Orange, Apfelsine	42	180	2'580.0	
Johannisbeere. rot	33	139	2'490.0	
Orangensaft, Apfelsinensaft, ungesüsst	42	180	2'470.0	
Ananas	56	236	2'440.0	
Orangensaft, Muttersaft, Apfelsinensaft	43	184	2'320.0	
Erdbeere	32	136	2'300.0	32.0
Grapefruitsaft. Muttersaft	36	154	2'300.0	
Heidelbeeren, in Dose, ungezuckert	24	100	2'170.0	
Grapefruit. Pampelmuse	38	163	2'100.0	
Cola Getränke	43	184	2'080.0	
Himbeere	33	142	2'050.0	8.5
Pflaume	49	208	2'010.0	1'410.0
Schwarzwurzel, gekocht, abgetropft	17	71	1'930.0	
Weisskohl. Weisskraut	25	105	1'760.0	
Artischocke	22	93	1'730.0	
Jackfrucht	70	297	1'700.0	
Tomatensaft, Handelsware	17	73	1'647.0	
Weisse Rübe. Wasserrübe	25	104	1'510.0	
Acerola	16	68	1'460.0	
Sekt. weiss	84	348	1'440.0	
Winter-Squash, Kürbisgewächs	26	109	1'400.0	

Sapote	94	397	1'380.0	
Zwiebel	28	117	1'360.0	
Tomate	17	74	1'360.0	
Zitrone	36	152	1'350.0	
Kürbis	24	103	1'320.0	
Möhre. Karotte	26	109	1'310.0	
Bohnen, Gartenbohnen. Schnittbohnen	32	138	1'310.0	
Mandarine	46	195	1'300.0	
Zuckermelone. Honigmelone	54	231	1'300.0	
Rotkohl. Rotkraut. Blaukraut	22	92	1'280.0	
Paprikaschote. grün	19	79	1'250.0	
Tomaten, in Dose	18	77	1'250.0	
Porree. Lauch	25	105	1'240.0	
Pfirsich	42	176	1'230.0	890.0
Kohlrabi	24	104	1'230.0	
Karambole	24	100	1'200.0	
Zucchini. Sommer-Squash	20	83	1'140.0	
Wirsing	26	108	1'110.0	
Broccoli	29	121	1'100.0	
Roggenvollkornbrot	193	818	1'060.0	
Fenchel. Blatt	24	100	1'060.0	
Aubergine	17	73	1'030.0	
Zitronensaft, Muttersaft	26	114	1'030.0	
Spargel	18	75	995.0	
Karotten, Möhre, gekocht, abgetropft	18	78	940.0	
Grünkohl	37	154	920.0	
Blumenkohl	23	95	895.0	
Aprikose	43	182	870.0	820.0
Gurke	12	52	865.0	
Bärlauch	12	50	845.0	
Okra. Eibisch	19	81	800.0	
Broccoli, gekocht, ungesalzen, abgetropft	22	93	800.0	
Limone	31	130	800.0	
Rosenkohl	36	152	790.0	
Blumenkohl, gekocht, ungesalzen, abgetropft	19	79	760.0	
Schnittlauch	27	114	760.0	
Grahambrot	199	845	740.0	
Radieschen	14	61	715.0	
Chicoree	17	70	715.0	
Tee: Schwarztee (Blätter)	141	592	700.0	
Petersilienwurzel	40	169	660.0	
Batate. Süsskartoffel	108	459	655.0	
Rettich	16	64	620.0	
Malzgetränk	50	213	620.0	
Endivie	14	58	610.0	
Kaktusfeige, Opuntie	36	154	600.0	
Brotfrucht	110	467	600.0	
Spargel, in Dose	16	67	565.0	
Spargel, gekocht, ungesalzen, abgetropft	12	53	560.0	
Löwenzahnblätter	27	112	555.0	
Rosenkohl, gekocht, ungesalzen, abgetropft	31	129	540.0	
Chinakohl	12	50	525.0	
Kopfsalat	11	48	525.0	

Weizenkeime	312	1313	500.0	
Limabohne. Samen. trocken	275	1167	500.0	
Scharbockskraut			500.0	
Bohnen, Schnittbohnen. grün, in Dose	12	53	495.0	
Fasan. mit Haut. ohne Knochen. Mittelwerte	155	649	460.0	
Kümmel, echter, Blatt	26	110	457.0	
Roggenmischbrot mit Weizen. Roggen über 50%	210	892	450.0	
Kichererbse, Samen, grün	139	588	440.0	
Breitwegerich	24	103	440.0	
Weizenmischbrot mit Roggen. über 50% Weizen	226	959	420.0	
Karotten, Möhre, in Dosen	14	57	410.0	5.0
Wein. Weisswein, mittlere Qualität	71	297	410.0	
Bambussprossen	17	73	410.0	
Rhabarber	13	56	390.0	
Roggenbrot	217	921	380.0	
Zuckermais. Speisemais. Maiskörner roh	87	369	375.0	
Augenbohne, Kuhbohne, Samen, trocken	239	1014	360.0	
Petersilienblatt	50	214	320.0	
Brennessel	40	170	285.0	
Mangold	14	59	270.0	
Sauerampfer	21	90	265.0	
Steinpilz. frisch	21	81	260.0	
Pastinake	59	249	255.0	
Malve, wild, Blatt	37	157	250.0	6.0
Rote Rübe, Rote Beete	41	175	250.0	
Guter Heinrich	38	161	250.0	
Wein, Rotwein, leicht	67	279	250.0	
Bier. Nährbier. Malzbier	54	229	250.0	
Wiesenknöterich	28	119	235.0	
Feldsalat. Rapunzel	14	59	230.0	
Champignon. frisch	16	67	213.0	
Brötchen. Semmel	272	1155	210.0	
Sauerkraut. abgetropft	17	71	210.0	
Spitzwegerich	19	79	210.0	
Taubnessel. weiss	30	128	205.0	
Avocado	221	909	200.0	
Giersch. Geissfuss	39	166	180.0	
Gartenmelde	20	86	175.0	
Kartoffel	70	298	170.0	
Gundermann	27	114	155.0	
Taro. Wasserbrotwurzel	100	426	153.0	
Klette, Grosse Klette	28	118	149.0	
Bier. Pils. Lagerbier	42	177	140.0	
Meerrettich	63	267	130.0	
Spinat	17	70	125.0	
Wiesenbocksbart	17	71	110.0	
Gerste. ganzes Korn. entspelzt	314	1331	100.0	
Sellerieknolle	18	77	100.0	
Bleichsellerie	15	65	100.0	
Dinkelmehl, Vollkornmehl	333	1410	91.0	
Portulak	11	47	91.0	
Kichererbse. Samen. trocken	306	1294	90.0	
Mais. ganzes Korn	325	1377	90.0	

Spinat, gekocht, ungesalzen, abgetropft	14	60	90.0	
Franzosenkraut	19	82	85.0	
Schwarzwurzel	18	76	80.0	
Pfifferling, frisch, Rehling	11	48	70.0	
Linsen, Samen, trocken	270	1144	65.0	
Erbsen, Schote und Samen, grün	81	344	65.0	
Weizenkleie. Speisekleie	171	721	50.0	
Roggen. ganzes Korn	293	1244	50.0	
Dinkelmehl, Typ 630	333	1415	43.0	
Weizen. ganzes Korn	298	1263	40.0	
Erbsen. grün, in Dose	38	159	35.0	
Weizenmehl. Typ 550	332	1408	32.0	
Weizenmehl, Typ 812	326	1383	30.0	
Weizenmehl, Typ 630	332	1410	30.0	
Hafermehl	391	1654	30.0	
Weizenmehl. Typ 405	332	1409	20.0	
Champignon, in Dose	14	59	20.0	
Kümmel, echter, Wurzel	106	449	19.0	
Rind, reines Muskelfleisch	108	455	17.0	
Bier. Weissbier. Weizenvollbier	38	158	11.0	2.3
Kohlrübe. Steckrübe	29	123	0.6	