The Pancreas

Mediator between Metabolism and Sensory Organs

by
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Anyone who comprehends the teaching of Christ feels like a bird, unaware until that point that it had wings, and now suddenly grasping the fact that it can fly and be free, with nothing more to fear.
Leo Tolstoy

INTRODUCTION

Despite intensive research, the illnesses of the pancreas are hard to grasp in diagnostic terms. As well as this, so far as the true causes and circumstances which lead to dysfunction are concerned, we still await the answers to a lot of unsolved questions.

The following is true of pancreatic illnesses: the less characteristic the complaint and the scantier the objective evidence in some presenting abdominal illness, the greater is the likelihood that chronic pancreatitis is present. Simply because the symptoms are so unspecific in nature, one might be led to suspect that the pancreas is an organ with comprehensive tasks to fulfil, and of great significance for the body as a whole.

The pains of pancreatitis are many and varied, and may lead the prescriber astray, bearing in mind that they can extend over the whole upper abdomen, boring right through to the back or travelling behind the sternum leftwards into the area of the spleen and kidneys or upwards to the heart, into the left shoulder and arm. In so doing they can mimic an attack of angina pectoris. Indeed, within this context, an ECG may well detect circulatory disturbances of the heart, and a deathly pain may occur such as is experienced in angina pectoris or cardiac infarction.

The pancreas forms part of the body's rhythmic system and includes important functions of the ego. The far-reaching disturbance of a person's rhythmic organisation which occurs in a cardiac infarct, and in an acute pancreatic crisis with oedema or necrosis, or chronic pancreatitis with symptoms of a cardiac infarct or angina pectoris, demonstrates the close connection between these two organs of the centre and of harmony.

EMBRYOLOGY

Embryologically the pancreas (*the common German name means 'abdominal salivary gland'*) develops from the same epithelial tissue as the small intestine. The so-called hepatopancreatic ring takes shape, and from one side of this the liver develops, and from the other side, out of the epithelial tissue of the small intestine, the pancreas, positioned dorsally and ventrally. The ventral bud migrates around the duodenum, resulting in a fusion of the two positions and, finally, also in the union of the excretory ducts of the pancreas, which now appears as one compact organ. From these various positions the parts of the pancreas are formed, which appear macroscopically later on. The Corpus and Cauda develop from the dorsal position, and the Head of the pancreas develops from the ventral position. Correspondingly the various parts of the excretory ducts are formed from parts of the ventral and dorsal positions. In the second and third embryonic months numerous branched epithelial buds develop which, even at this stage, hint at the later lobulate structure. The cells of these epithelial buds divide, thus forming the fine tubules for the secretion of the pancreatic juices to be formed later. At the end of this tubular system we find spherical buds; these are the divisible glandular units of the exocrine pancreas.

The Islets of Langerhans, which are classified in their entirety as insular organs, are small epithelial complexes developing out of the embryonic excretory ducts and acini. They become disconnected from their tissue of origin, become surrounded by connective tissue and well supplied by capillary blood-vessels. And thus the separation between the exocrine and endocrine portions of the pancreas is complete.

There are cases in which the pancreas, even after birth, surrounds the small intestine, or in which separated portions of pancreatic tissue occur on the wall of the small intestine, with separate excretory ducts. Such formations may even result in stenosis of the small intestine.

The fully formed pancreas, which is situated between the lamellae of the mesoduodenum is about 13-15 cm. long and weighs 70-90g. Finally the excretory ducts have a common opening with the Ductus choledocus into the duodenum at the Papilla of Vater.

THE EXCRETORY PANCREAS

In the space of one day a healthy adult pancreas produces between one and two litres of pancreatic juice, which flows into the duodenum to neutralise the acidic chyme from the stomach. Thus the secretion is especially rich in Sodium

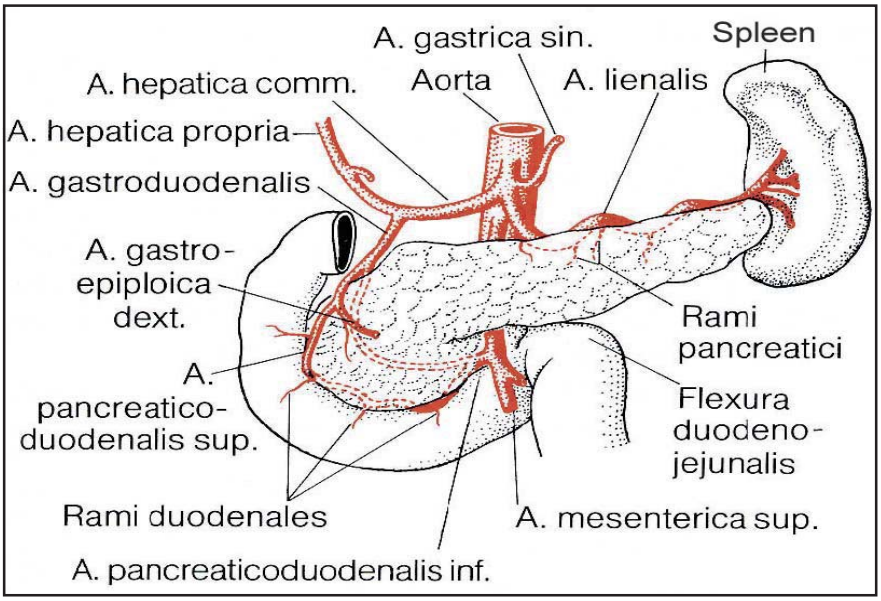

Fig.1: Position and supply of the pancreas: Aorta with Truncus coeliacus (Tripus Halleri), vascular supply of the pancreas. The stomach is not shown; A. gastroepiploica dextra has been cut off. (From: Lehrbuch der gesamten Anatomie des Menschen (=Manual of the entire human anatomy), publ. T.H. Schlieber and W. Schmidt, 3rd ed., Berlin 1983)

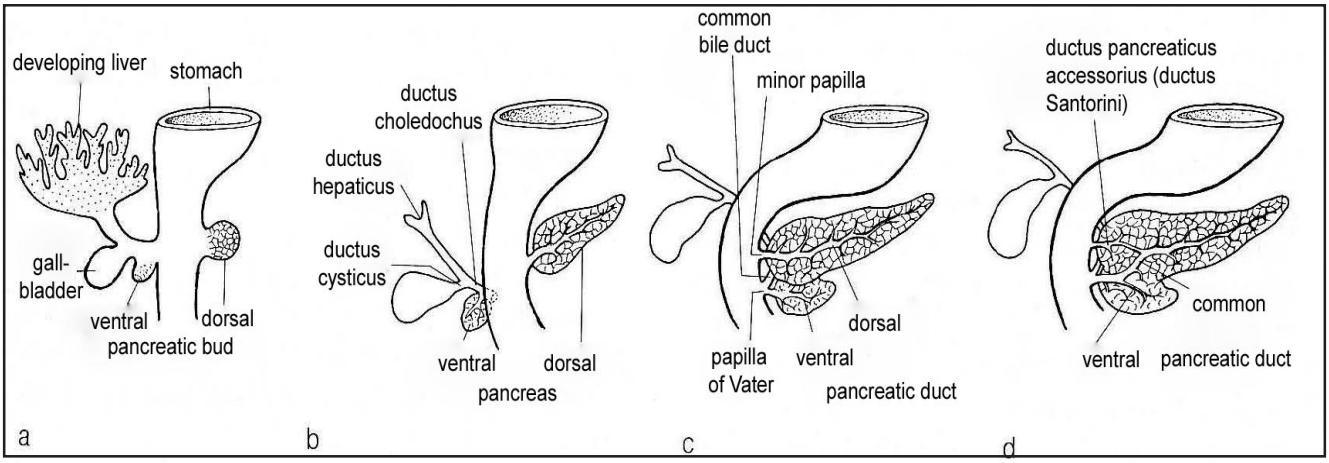

*Fig.2: Explanations of the development of liver and pancreas. **a** 30 days; **b** 35-day-old embryo. The ventral pancreatic bud adjoins the liver diverticulum and later migrates around the duodenum in a dorsal direction, towards the dorsal pancreatic position; **c** 40 days; **d** 45-day-old embryo. The ventral pancreatic position now closely adjoins the dorsal. The dorsal pancreatic duct opens into the duodenum via the papilla min., and the ventral duct via the papilla of Vater. In **d** the fusion of the pancreatic ducts is shown. (After Langmann, 1970). (From: Lehrbuch der gesamten Anatomie des Menschen (=Manual of the entire human anatomy), publ. T.H. Schlieber and W. Schmidt, 3rd ed., Berlin 1983)*

bicarbonate and also contains the mostly inactive precursors of the digestive enzymes, whose purpose is to break down the fats, carbohydrates and proteins in the duodenum. Initially the composition of the pancreatic secretion completely matches that of blood plasma, so far as its concentration of electrolytes is concerned. Only gradually does the content of Na^+ ions and HCO_3^- ions increase, at the same time as the concentration of Cl^- ions decreases. The exchange of Cl^- ions for HCO_3^- ions takes place in the cells of the luminal membrane of the small pancreatic ducts (ductules), by means of an anion exchanger. This is an active secretory process affecting HCO_3^- ions when Cl^- ions are simultaneously being taken into the cell. This process requires energy. As well as this, Cl^- ions are repeatedly released into the lumen of the pancreatic ductules via certain open Cl^- ion channels so as to enable a continuous secretion of HCO_3^- ions into the lumen, in exchange for the Cl^- ions. (In the event of mucoviscidosis these channels are defective, which results in the secretory function of the pancreas being severely disordered.) The secretion of HCO_3^- ions is made possible by the enzyme carboanhydrase. For every HCO_3^- ion which is secreted, an H^+ ion leaves the cell to pass into the blood.

The secretion of pancreatic juices is controlled by the vagus nerve and by the hormones cholecystokinin and secretin. There is a so-called feedback loop, by means of which the inflow of cholecystokinin can be halted. The vehicle for this is the quantity of trypsin which is found in the lumen of the small intestine. Secretin raises the level of secretion of HCO_3^- from the pancreatic ductules. The whole process is intensified by cholecystokinin and acetylcholine, because they raise the cytosolic concentration of Ca^{2+} ions. The hormones also influence the expression of genes by the pancreatic enzymes.

The pancreatic enzymes are indispensable for digestion. They all have an optimum pH of 7-8. If the HCO_3^- secretion is too slight, then the chyme remains acidic and the task of digestion is not carried out satisfactorily. Indigestion then occurs.

The breakdown of proteins is achieved by means of proteases, which are formed in the pancreas as precursors. Not until these enzyme precursors arrive in the gut are they activated by enteropeptidase. Initially trypsin is formed from its precursor and, for its part, this reactivates chymotrypsinogen into chymotrypsin and the other protease-precursors, into pancreas-elastase among others. Should this activation take place within the pancreas, it results in the organ digesting itself; this is known as acute pancreatic necrosis.

Carbohydrates are broken down by means of alpha-amylase. However, what initially occurs is only a separation of glycogen and starch; the remaining breakdown is carried out by the appropriate enzymes in the mucosal glands of the small intestine.

The digestion of fat is enabled by pancreatic lipase. Like alpha-amylase, this too is secreted by the pancreas as an active enzyme. In order to be effective, however, it requires further co-lipases, which are sourced from pro-co-lipases with the assistance of trypsin. For the digestion of fat, gallic acids are likewise required as co-factors.

There are further enzymes besides, such as phospholipase, elastase, DNase, RNase, etc. The variety and significance of enzymes can not be overlooked.

Illnesses of the excretory pancreas

The illnesses which may affect the excretory portion of the pancreas may be divided into:

1. congenital diseases
2. pancreatitis
3. pancreatic cysts
4. carcinoma of the pancreas.

Regarding the first of these. In the case of **congenital diseases**, the anlage of a pancreas anulare may lead to severe stenoses of the duodenum, which must be diagnostically differentiated from acute pancreatitis. Frequently surgical intervention is required. Dispersed pancreatic tissue may be found in all areas of the stomach and small intestine, and

also in Meckel's diverticula. Complications may occur in the shape of inflammations, constrictions of the intestinal lumen and ulceration of the mucosa with perforation and haemorrhaging.

Another congenital disease of the pancreas is cystic pancreatic fibrosis in mucoviscidosis. In this disease all the excretory glands of the digestive and bronchial tracts exude an extremely viscid secretion. The skin is also affected. (Like the pancreas, it is one of the organs which form part of the warmth-and-ego organisation.) Heavy losses of salt ensue, since under genetic influences the chloride balance is upset (sweat test). The problems with indigestion can be balanced in the long term by taking enzymes and orthomolecular substances. The patients' fate is decided in most cases by the chronic obstructive lung disease. There are some cases which do not manifest until middle age.

Treatment of cystic pancreatic fibrosis is very difficult. The therapist should always bear in mind the two regulators, MUCOKEHL and NIGERSAN in the form of 5X drops, with the emphasis very much on MUCOKEHL. They can be rubbed in alternately on the abdomen around the navel, or the combined preparation SANKOMBI 5X may be used. In asthmatic patients we know how important it is for them to take mucolytics. We recommend herbal teas containing ribwort, linseed, mallow and, in addition to these, teas which combat colonisation by bacteria (thyme, sage, lavender, marigold, horsetail). Using hot poultices quantities of fluids and warmth can be applied to the surface of the back, which also results in a loosening of the mucus in the body, and especially in the lungs. Because of the loss of chloride ions the body also gives off an increased amount of Na^+ ions, which are then unavailable for the synthesis of alkaline substances (e.g. $NaHCO_3$). Thus it is certainly of great importance for these patients to be given food rich in minerals - including vegetable juices. At any rate, they should keep to a diet which is rich in *complex* carbohydrates, to guarantee an optimum level of energy. Considering the high protein content of the particularly viscous secretions, we should also give some thought to the higher *complex* carbohydrate content of the diet. The SANUKEHLS Staph 6X and Pseu 6X are extremely important for immunomodulation. They can be rubbed into the hollow of the elbow in daily alternation. Beginning with 1-2 drops a day, the dose can eventually be increased to 4-8 drops, depending on the age of the patient.

Regarding 2 above. Inflammations of the pancreas occur primarily in the interstitial tissue of this organ. In the acute stage an exudate is formed here, which may be serous, serofibrinous or even purulent. However, the clinical picture depends strongly on whether or not the glandular parenchyma is involved in the disease process. What is particularly problematic is the tryptic autodigestive process which may accompany this disease. There is a suspicion that this symptomatology is sustained by digestive or lysosomal enzymes which are secreted, along with toxic components. Necroses, abscesses and even peritoneal involvement are all possible. In the liquefied tissue kallikrein is released; this is a protease which splits off vaso-active polypeptides, kinins, from their precursors. These kinins set off the severe pains of pancreatitis, and cause vasodilation throughout the body with haemorrhaging and, in the end, possibly also a state of shock from volume deficiency. Reference was made above to the damage to the heart muscle and the associated symptomatology in this context. But damage is also suffered by the other vital organs such as lungs (respiratory insufficiency), liver (elevated transaminase levels, biliary congestion) and brain (encephalopathy). At least we may look to the complete intestinal atony on the one hand and the pancreatic oedema on the other as causative agents of the shock.

The most frequent cause of pancreatitis is mechanical obstruction of the common duct from the gallbladder and pancreas by gallstones or similar concrements. As well as this, the pancreas may become inflamed following a viral infection (such as mumps, hepatitis) or an infection by other germs (e.g. typhus), which generally attack the whole gut or portions of it. Traumas (including surgery) may also trigger inflammations. Recurring inflammations may be repeatedly triggered by the pancreatic secretion becoming congested as a consequence of cicatrisation from previous inflammations, or if calculi form from the secretion, and also from the formation of viscous secretion because it contains too high a concentration of protein. Such congestions play a significant role in the development of chronic calcifying pancreatitis following chronic alcohol abuse. Other triggers may be found in hypercalcaemia, starvation dystrophy, chronic renal insufficiency, prolonged use of steroid hormones and the like. There are also many other disorders from the metabolic area which may provoke acute or chronic pancreatitis. Depending on the region, a fifth of the inflammatory episodes of a pancreatitis case may be attributed to alcohol consumption, which must be absolutely avoided because of its cytotoxic action; it is also responsible for the strong protein content of the secretion.

Again and again the prominent symptom in pancreatic inflammation is the severe pain, described by patients as 'devastating'.

Treatment of pancreatitis

Alongside, or especially following, orthodox treatment of an *acute* attack, the therapist should take care to recommend a light diet, as this will lighten the burden on the liver, and - in the long-term - on the pancreas and the gut also. Animal proteins and fats should be strictly avoided, as should acidifying luxuries such as coffee, black tea, and alcohol. Vegetable broths and vegetable juices provide the body with the necessary minerals, vitamins and other useful plant-based substances; at the same time they support the patient's regenerative powers. A diet of steamed vegetables, low in irritants, is indicated, to which small quantities of good-quality vegetable oil may gradually be added (e.g. rape-seed or, later, linseed). The quantity of oil can be augmented from 1 tsp. to 3-4 tsp. daily, with linseed oil

gradually taking precedence as time goes by.

From the range of isopathic remedies FORTAKEHL 5X and NOTAKEHL 5X drops are the medicines of preference, given on alternating days, to regulate the inflammatory processes and the intestinal flora. For adult patients at the acute stage the recommended dosage is 5 drops three times a day, to be rubbed in or taken orally. In particularly severe cases this may be increased to 5 drops 5 times a day. A precondition of this is good capacity for elimination, and this can be improved by alkaline baths (1 tablespoonful of ALKALA N in the bath). The patient should remain in the bath for about half-an-hour. If bathing the whole body is not tolerated, foot- and arm-baths may be given. Should a viral infection be suspected, then QUENTAKEHL is the remedy of choice; this is likewise available as 5X drops and may be administered by rubbing in or orally, as indicated above for FORTAKEHL and NOTAKEHL.

In *chronic* pancreatitis likewise, a logical dietary adjustment is preferable; so far as possible a vegan diet should be introduced, along with the above-mentioned oils. The main remedy here is EXMYKEHL 3X suppositories, once or twice a day per rectum. Here too the patient must be de-acidified by means of alkaline baths, and a pinch of ALKALA N should also be taken orally in water, as hot as possible, in the morning on an empty stomach and in the evenings before going to sleep. Two SANUVIS tablets should be sucked in the morning and one CITROKEHL tablet in the evening. These remedies should not be given in the form of drops on account of the alcohol content. In the event of lactose intolerance the drops (1 tablespoonful of SANUVIS or 5-10 drops CITROKEHL) should be briskly stirred into very warm water so as to dispel the alcohol. For the same reason the patient should take 5-10 drops of ZINKOKEHL 3X in warm water in the evenings, after stirring briskly. To energise the pancreas, 5-8 drops of PINIKEHL 5X should be rubbed in or taken orally in the middle of the day, as should 1-2 capsules of MAPURIT.

Particularly in cases of chronic pancreatitis, hot potato poultices are very beneficial when applied to the whole upper abdomen. A blend of oils can also be prepared for application. For this purpose 1 dsp. of sesame oil is carefully heated in a bain-marie. To this are added 5-10 drops of essential oil of lavender. A linen napkin (10x15 cm.) is soaked in this and applied warm to the appropriate area of the upper abdomen. The oil-soaked cloth is covered with a piece of lint, a layer of cotton-wool (or possibly a sheet of plastic), and on top of this is placed a hot water bottle and appropriate dressings. Good results are likewise obtained from a poultice of boiled linseed applied to the upper abdomen.

A herbal infusion which comes to mind as very useful is e.g. a blend of equal parts of crampweed [*Potentilla anserina*] (antispasmodic), marigold flowers (vulnerary), yarrow flowers (detoxification, anti-inflammatory, general healing) and mugwort (gentle stimulation of the flow of juices in the gastro-intestinal tract and supplementary glands). 1 litre of boiling water is poured over one teaspoonful of the blended herbs, covered and left to infuse for 10 minutes. It is then strained and drunk at intervals during the late morning. The tea should always be drunk before meals, leaving an interval of at least 5 minutes before beginning the meal. If required the same quantity may be drunk in the afternoon until 17.30 hrs., otherwise it is prudent to drink a tea for the kidneys and bladder at this time, in order to improve renal function. For this purpose I would recommend a blend of equal parts of nettles, golden rod and birch leaves. In this case the dosage of the blend may be increased to 2 tsp. per litre of water. The method of preparation is the same.

The bark of the Haronga tree (Harungana madagascariensis) promotes the flow of bile and pancreatic juices; however, it is only indicated for minor insufficiency of the pancreas.

Regarding 3 above. As regards **pancreatic cysts**, we may distinguish between genuine, epithelially coated cysts and pseudocysts. In most cases genuine cysts contain a clear fluid. These cysts often arise as a sequela of pancreatitis or cystic fibrosis. They are often associated with cystic degeneration of the kidney. Pseudocysts may also contain fluid, which resembles blood, and frequently have a traumatic cause.

Treatment of pancreatic cysts

Apart from attention to diet and the body's internal milieu, the main remedy in the treatment of pancreatic cysts is NIGERSAN. An injection of NIGERSAN 5X, 6X or 7X can be given once weekly, simultaneously with an ampoule of CITROKEHL and, on days when no injection is given, the 5X drops should be taken orally or rubbed into the upper abdomen; with adults initially 5 drops are used twice daily, increasing to 10 drops twice daily. It is always prudent to support this treatment with PINIKEHL 5X, 5-8 drops once a day, and 1-2 capsules of MAPURIT. The detoxificatory role of the liver should be assisted with SILVAYSAN, and herbal infusions are indicated, as are purgatives which stimulate the lymphatic flow. When the first bottle of NIGERSAN 5X is finished, consideration should be given as to whether it would not be sensible to prescribe 10 drops of SANKOMBI 5X in the mornings and a capsule of NIGERSAN 4X in the evenings. Along with the NIGERSAN in the evenings, a CITROKEHL tablet should always be sucked.

In the case of pseudocysts, MUCOKEHL and NIGERSAN are often of equal value; in that case we prescribe MUCOKEHL 5X drops to be rubbed into the upper abdomen and taken orally in the mornings (10 drops altogether) and, in the evenings, the same dosage and application of NIGERSAN 5X drops. As well as these, the patient takes 2 SANUVIS tablets in the morning and 1 CITROKEHL tablet in the evening.

Regarding 4 above. **Carcinoma of the pancreas**

This is a diagnosis which is often only made very late on, and often too late. The prime approaches from the natural therapist's point of view involve treatments to detoxify, to de-acidify and

to remove metabolic waste. Foci of infection and disruptive fields must be sought out and disposed of. The patient requires comprehensive supplementation with minerals, trace elements and secondary botanical agents from freshly pressed vegetable sources, along the lines propounded by Dr. Max Gerson. According to Dr. Johanna Budwig's discoveries, vegetable oils, particularly linseed oil, contribute electrons which reactivate the cell metabolism. Of the SANUM remedies it is conceivable that EXMYKEHL, NOTAKEHL, NIGERSAN and MUCOKEHL could be given, depending on the patient's eliminative capacity, in daily alternation, in the form of 3X suppositories. The immunomodulators LATENSIN, RECARCIN, UTILIN, UTILIN "H" and UTILIN "S" also have a role to play.

THE INCRETORY PANCREAS

As well as its excretory functions, which contribute to the breakdown of components of our food, the pancreas also fulfils important endocrine functions.

Central to our energy metabolism is glucose. The concentration of glucose in the blood plasma (blood-sugar level) depends on how much is being used at any given time and on the complementary production of glucose. The breakdown of sugar in the body may take place aerobically or anaerobically, the process is generally referred to as glycolysis.

By the term glycogenesis the formation of glycogen from glucose is understood. This occurs mainly in the liver and the musculature and serves to provide sugar storage and a rapid availability of glucose. The opposite is glycogenolysis, by means of which glycogen is broken down into glucose. Gluconeogenesis is a process by which glucose is created from non-sugary substances. This may be from amino-acids, e.g. glutamine, from lactate, which is produced by anaerobic glycolysis, and from glycerine.

The critical organ for the whole carbohydrate metabolism is the islets of Langerhans in the pancreas. There are three distinct types of cell in the pancreas, A-cells, B-cells and D-cells. 25% of the islet cells are A-cells (or α-cells), which produce glucagon; 60% are B-cells (or β-cells) and produce insulin, and a further 10% are D-cells, which produce somatostatin. These hormones influence each other in formative and secretory functions, although the precise mechanism is not clearly understood. The islet cells of the head of the pancreas additionally produce pancreatic polypeptide, whose physiological function, however, is not clear.

The functions of the pancreatic hormones may be defined as follows:

1. Storage of the energy taken in in the form of glycogen and fat, with the aid of insulin,
2. Mobilisation of energy reserves at times of hunger, during work or in stressful situations, through glucagon (and adrenalin),
3. Stabilisation of the blood-sugar level,
4. Promotion of growth.

By referring to this list it may be easily understood how profoundly the pancreatic hormones impinge on our metabolism and particularly on our energy levels. According to this list it is insulin which has the greatest significance for the metabolism.

Insulin

Insulin is a peptide. This means that, when it is lacking, a direct oral replacement is not possible, since it is denatured and broken down by the digestive process. In general it may be stated that insulin is composed of two peptide chains which are linked together by two disulphide bridges. The half-life of insulin is c. 5-8 minutes. It is broken down primarily in the liver and kidneys. The release of insulin from the B-cells is controlled by a rise in the blood-sugar concentration. At the same time the glucose level in the B-cells rises via the capillary blood-supply.

This finally effects a depolarisation of the B-cells, by means of a closing of the potassium channels and an opening of the calcium channels, through which an inflow of calcium takes place. As a result of the increased inflow of Ca^{2+} into the B-cells, an exocytosis of insulin occurs, with simultaneous opening of the K^+ channels, through which the incretion of insulin is switched off again as a feedback reaction. During digestion the B-cells experience a particular stimulus to release insulin, which comes via cholinergic vagus threads, via gastrin and secretin. Certain amino-acids, such as arginine and leucine also promote the release of insulin, as do also free fatty acids, pituitary hormones and a few steroid hormones. Thus there are many factors, plus hormonal or quasi-hormonal substances, which intervene in this regulatory mechanism.

The release of insulin is inhibited by adrenalin and noradrenalin, whose task it is to ensure that the blood-sugar level rises. Somatostatin also maintains a balance between the A-cells and B-cells. In situations of ongoing severe stress or, e.g., during fasting or hunger, the depressed blood-sugar level is registered by sensors in the CNS, and via this route the sympathetic nervous system is stimulated and thereby insulin production is inhibited. On the other hand we know that a basic release of insulin always occurs at times of hunger, at a level of about 10-20 BE.

Insulin depresses the blood-sugar level by stimulating those enzymes which are responsible for glycolysis and glycogenogenesis, especially in the liver. In this way two-thirds of the glucose arriving during digestion following a meal is stored as glycogen. In the phases between meals these reserves can then be mobilised by means of the insulin antagonist, glucagon, whose concentration in the blood is always considerably lower than that of insulin. This is particularly true with regard to the CNS, which is heavily dependent on a good energy supply for its proper functioning. However, insulin does not only regulate the sugar-level in the blood, it also promotes the storage of a wide range of amino-acids as protein, especially in the skeletal musculature. It works anabolically, constructively. As well as this, it also has a role to play in fat metabolism by inhibiting lipolysis, so

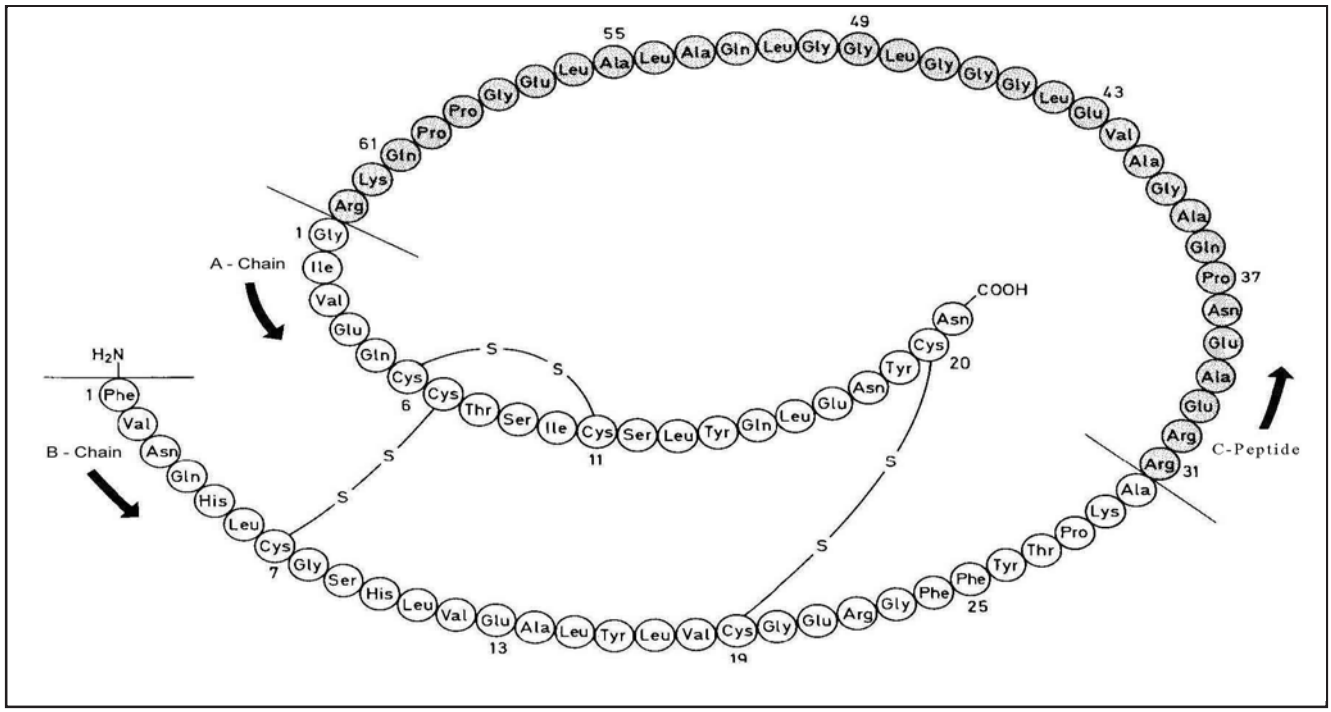

Fig.3: Primary structure of porcine insulin (in several other books the S-S bridges appear simply as linking axes Cys-Cys). (From: Klinische Pathophysiologie (= Clinical Pathophysiology), edited by Walter Siegenthaler, 6th ed. 1987, publ. G. Thieme Verlag.)

here too it acts constructively, or at least as a preservative.

Fluctuations in the incretion of insulin make their presence felt particularly in the sugar metabolism. If there is too much insulin there is a lack of sugar, hypoglycaemia, which may culminate in hypoglycaemic shock because the CNS is under-supplied. If, on the other hand, the carbohydrate intake is too great, the body's glycogen storage capacity is overstretched. The reserves are converted to fats and stored as triglycerides. As well as this we have recently become aware from Prof. Wendt's research last century that such sugars form compounds with proteins, by means of which both these basic building blocks may be stored, e.g. as collagen.

Diseases of the incretory pancreas.
The best-known dysfunction of the sugar metabolism is diabetes mellitus, or sugar diabetes. In this case the concentration of glucose in the blood is elevated, hyperglycaemia, and excess glucose is eliminated via the kidneys. With regard to this, it was Prof. Wendt, again, who pointed out that there are three forms of hyperglycaemia.

a) *Activity hyperglycaemia* in healthy people: when human activity increases there is also an increased glucose requirement, which needs to be satisfied by an elevated blood-sugar level.

b)*Compensated activity hyperglycaemia* in Type 1 diabetes (juvenile onset): because of insulin deficiency it is not possible for the muscle cells to create glycogen from glucose in order to store energy. Thus, in an emergency, there is no glycogen reserve to fall back on. The person is therefore lacking in energy and feeble. The body therefore releases glucose from storage into the bloodstream to make good the deficiency in the circulation; the blood-sugar level rises. On the other hand, because of the insulin deficiency, the glucose which is consumed in the food is not converted to glycogen for storage, and this likewise results in hyperglycaemia. In the cell itself glucose can be converted to glycogen without any insulin being present; however, this is a very slow process, and the reserves which are thus created do not go very far when physical work is being performed.

c) *Congestive hyperglycaemia*: it is Prof. Wendt's understanding that a lack of glucose in the cell is the result of thickening of the basement membrane of the vascular wall, particularly in the capillary area. When the basement membrane of the capillary epithelium is healthy we also have healthy diffusion pressures in the blood-vessels. However, if the basement membrane is thickened, e.g. by fatty protein and a corresponding storage of sugar-protein materials, then the diffusion time increases by the square of the distance. In a diabetic, for instance, the basement membrane is three times as thick as in a healthy person. The diffusion time is then 3x3=9 times longer than in a healthy person. In the person with congestive hyperglycaemia therefore the cell only receives a ninth of what it would in someone with a healthy basement membrane. The starving body-cell signals its deficiency by expressing peptides, and glycosidic centres transmit their signals to the glucose stores; these then release glucose until the same centres feed back a command to stop. These are the explanations arising from Prof. Wendt's understanding.

Classification of diabetes mellitus
Orthodox medicine makes a crude distinction between Diabetes mellitus (DM) Type I, with an absolute lack of insulin, and Type II, with reduced

effectiveness of insulin - "insulin resistance" - where in most cases there is an elevated insulin level in the blood. There is an assumption that the tendency to become diabetic is inherited.

1. Juvenile-onset diabetes mellitus (Type I)

The view of orthodox medicine is that, where there is a pre-existing genetic predisposition, damage (or even destruction) of the β-cells of the pancreas follows some viral infection which has caused a childhood disease (e.g. measles, mumps, rubella, coxsackie virus). That can trigger an auto-immune disease, which eventually leads to an ongoing destruction of the insulin-producing cells. Mumps viruses are particularly dangerous in this respect, because they have a special affinity for the tissue of salivary glands. Allegedly they penetrate the islet cells and destroy them, or damage them to the extent that they are no longer recognised as belonging to the body, so that an allergic reaction is triggered. In favour of such a process is the fact that in freshly diagnosed diabetics a powerful release of insulin is encountered - to the extent that the islet is exhausted - plus an unhealthy deposit of lymph. In these patients islet-cell antibodies may be detected at an early stage; after years their level gradually subsides again after the auto-immune processes have run their course.

Paramyxoviruses

The mumps virus is one of the paramyxoviruses. The paramyxoviruses constitute a large group of pathogens, which can trigger serious diseases in both humans and animals. Other members of this group include, inter alia, the causative agents of human parainfluenza (1 & 3) and of bovine broncho-pneumonia; the human mumps virus and the parainfluenza viruses 2 & 4, which can cause fowl-pest (Newcastle disease) in poultry and kennel cough in dogs; the measles virus; the pathogens of distemper, cattle plague, plague in small ruminants and seal distemper; plus, finally, the respiratory syncytial virus, both human and bovine.

In the meantime it has come to light that such kinds of virus, in particular the measles virus, remain lurking in the organism for years as a persistent infection. In such cases they are known as "slow viruses", and they have a particular affinity for the brain, especially the meninges and those cells and organs which produce hormones. Clearly this also explains why viral illnesses triggered by the mumps or measles viruses are frequently complicated by meningitis, orchitis or oophoritis. Nonetheless, 20-30% of affected adult males suffer from orchitis.

As a result of intensive scientific investigations we now know that many viruses in this group are not host-specific. Particularly in relation to SARS (severe acute respiratory syndrome) it was discovered that viruses which were originally specific to animals had adapted to humans (Prof. Hans Wilhelm Doerr of the Frankfurt University clinic). Paramyxoviruses were also found on examining reptiles which were suffering or dying from viral illnesses with pulmonary symptoms and central nervous disorders, and these viruses were not strictly host-specific.

It is clear from the latest evaluations of clinical studies and reports from Asia that avian influenza viruses in particular may cause fatal illnesses in both big cats and domestic cats, without the existence of any host-specificity (Dr. Thomas Vahlenkamp - Veterinary Surgeon - in the "Deutsches Tierärzteblatt" [= *German Veterinary Journal*] Jan. 2005). In the above-mentioned article the major importance of the pig in the transmission of avian viruses to humans is also exposed. Pigs may become infected with either human or avian influenza viruses. Reference should also be made to the significance of the fact that avian viruses may be transmitted to big and domestic cats, resulting in illnesses that in some cases have had fatal consequences, since cats themselves are not considered susceptible to infection by the influenza A virus. We should therefore not dismiss the possibility of such avian flu viruses developing forms which would be extremely pathogenic to humans.

In connection with human autoimmune diseases this could mean that such non-host-specific viruses, acting as "slow viruses" could trigger immunological reactions with especially damaging consequences for hormone-producing organs and cells, such as the pancreas, gonads, thyroid and brain (incl. meninges). Precisely in the region of the brain and meninges many neurotransmitters are released which have a similar action to that of hormones throughout the body. We may therefore deduce that viruses have a particular affinity for such hormone-producing tissues, which then respond with auto-immune reactions. For this reason the connection with inoculation comes under discussion, since in this case foreign proteins and modified viruses are also introduced into the body, and some of these are not recognised by the recipient's immune system, or else they form compounds with body-cells or -proteins, eliciting auto-immune reactions. This suspicion is firmed up by the results of research carried out at McGill University in Montreal.

Symptomatology of juvenile-onset diabetes

The first signs of juvenile-onset diabetes developing are lassitude, thirst, profuse urination, nocturnal enuresis, craving for sweet foods and cerebral circulatory disorders. The child's weight is normal or below normal, the blood-sugar count fluctuates, and there is a tendency to hyperacidity. To counteract the

Paramyxoviruses

- Parainfluenza (1 & 3) pathogens, human and cattle (bronchopneumonia)
- Human mumps viruses, parainfluenza viruses 2 & 4
  -> Fowl pest (Newcastle disease)
  -> Kennel cough (in dogs);
- Measles viruses;
- Pathogens of distemper, cattle plague, plague of small ruminants and seal distemper;
- Respiratory syncytial virus, human and bovine.

hyperglycaemia and fluctuations in blood-sugar of juvenile-onset diabetes, insulin is administered. The body responds superbly to these doses; they are necessary to prevent the child going into an acidotic coma. Admittedly these doses of insulin, however pure it is, are not without their problems. As a result of irritation and auto-immune reactions in the vascular epithelium, deposits and thickening of the capillary walls occur throughout the body. The resulting illnesses in the renal area and the eyes are common knowledge. Not only this, but the insulin supplementation results in inhibition of the body's own production in the remaining healthy islet cells, so that it is not long before these islet cells die off.

2. Adult-onset diabetes (Type 2)

This kind of diabetes corresponds to Prof. Wendt's congestive hyperglycaemia. It mainly affects patients over 40. However, in a frightening number of cases we are now finding that more and more younger people are suffering from this disease. If we consider the eating habits of our population, however, this trend is not surprising. Consequently in treatment we need to set our sights on dietary reform: proteins and fats of animal origin should be given up, and also temporarily those of vegetable origin, if the vegetable fats are saturated. Orthodox medicine seeks an explanation for elevated sugar and insulin levels in the patient's blood, inter alia, in "insulin resistance" of the affected receptors on the surface of the body's cells. This may be partly accurate, but it can be demonstrated that patients who rigorously change their diet to food of entirely vegetable origin with lots of *long-chain* carbohydrates and bulk, with very tiny quantities of animal protein - after a period of complete fasting - are able to achieve excellent control of their blood-sugar level using their body's own insulin.

In order effectively to influence this so-called *"insulin resistance"* in other ways, it is important to be familiar with the mechanisms by which insulin can bond with the cells, and by which glucose gets into the cell. This consideration brings us to glucose tolerance factor (GTF). This factor is a substance very similar to hormones, which regulates the sugar metabolism by enabling insulin to bind on to the cell receptor so that sugar may be discharged into the interior of the cell. Apart from B-vitamins and amino-acids, this hormone-like substance also contains the trace element chromium. It is an organic chromium compound, which may also be used as a dietary supplement (e.g. as polynicotinic acid-chromium). (Research into GTF goes back to Dr. Walter Mertz of the National Institute of Health at Bethesda, Maryland. He found that GTF is a compound of niacin and chromium.)

Chromium is one of the so-called adaptogens; these are materials which only slightly influence the healthy functioning of the body, but which have a substantial favourable influence on those reactions which have become unbalanced. For this reason an adaptogen can contribute to the prevention of degenerative diseases and can slow down the ageing process.

In organic compounds chromium is non-toxic, in contrast to inorganic chromium, which can be severely toxic, e.g. in tanners, who work with such chromium-containing inorganic substances.

Chromium occurs naturally and in quantity in the following sources which are accessible to humans: brewer's yeast, liver (a storehouse for all vitamins and minerals) and kidneys of mammals, cereals, esp. bran and germ (except of maize and rye), root vegetables. Small quantities may also be found in fish, esp. in the skin, bones and gristle (i.e. all the bits we throw away), apple peel, beer, mushrooms, wine and pepper. An organically grown apple with its peel contains 36(!) micrograms of chromium, a single plum contains 5 micrograms of chromium.

Generally nucleic acids contain very high concentrations of chromium, this is important for the metabolism, the structure and the cohesion of the DNA threads. Chromium is the only trace element which reduces in quantity in the body as we get older. Nowadays we know that chromium is used to detoxify the body of cadmium and lead, for which reason smokers in particular are at special risk of developing diabetes.

It is also suspected that diabetics are particularly prone to kidney problems which result from cadmium poisoning. Relevant experiments were carried out on mice, and these confirmed that diabetic, overweight mice were particularly susceptible to cadmium stress, compared with normal mice. Depending on the dosage, they reacted much earlier with insulin resistance and glucose reaction, and furthermore they also manifested proteinuria and calciuria.

In experimental animals a low-chromium diet produced severe impairment of the ability to metabolise glucose. At the same time, the pancreas enlarged considerably with a diet deficient in chomium. Investigations have been carried out on desert rats which developed diabetes on a laboratory diet. If they were returned to their desert habitat they ate greedily from a salty shrub and also dragged large supplies of the plant into their larders. The animals quickly returned to health and no longer had diabetes. When the plant was analysed it turned out to be particularly high in chromium.

Dutch fisherman have shown that fish oils radically reduce insulin resistance (E. Blaurock-Busch, „Orthomolekular-therapie in der Praxis", 1st ed. 1995, Natura-Med Verlag).

Of course, type II diabetes may be triggered by an acute or chronic inflammation of the pancreas. Causes to be considered include surgery, as well as disorders in the hormonal balance and in the fat metabolism. However, there is no doubt that stress plays a particular role. Long-term stress continually stimulates the sympathetic nervous system, and a knock-on effect of this is a slowing-down of insulin production. It is therefore imperative that severe physical, emotional and mental stress is processed rapidly and swiftly, so that the body's normal equilibrium can be restored. The patient should learn relaxation techniques and practise them regularly. In stress situations a human

being consumes the same amounts of oxygen, energy, minerals and vitamins as does a top athlete, the difference being that the athlete has undergone training and is receiving heavy supplementation. Under stress large amounts of free radicals are produced, but under long-term stress these cannot adequately be broken down, owing to a lack of recovery breaks. This leads to a breakdown of the immune system. At that point people are particularly susceptible to "slow viruses" and bacteria which exist permanently in the body as cell-wall-deficient forms.

Regarding the sugar balance and growth processes in the body, there are other endocrine glands which also deserve greater attention, such as the thyroid, the adrenals as well as their superior regulation by the pituitary. Hyperthyroidism results in a marked release of glucose and assimilation of glucose from food, involving a correspondingly high level of insulin production for regulatory purposes. This rapidly predisposes the patient to diabetes, because the islet cells tend to become exhausted. The glucocorticoids of the adrenal cortex become actively involved in the sugar metabolism. They enable gluconeogenesis from proteins if the liver's reserves of glycogen are insufficient to provide enough glucose for the energy metabolism. The corticoids elevate the blood-sugar level appropriately, whilst at the same time acting to inhibit inflammatory processes in the body.

Incidentally, there are indications that diabetes is accompanied in all cases by slight inflammation. The origin of this may lie in the auto-immune processes which take place in the pancreas (in type I) and in the vascular epithelium (in type II), giving rise to a release of corticoids in the body. Stress, to which we are all exposed, does whatever else is required in this context to militate against the regulation of insulin.

Treatment of diabetes

It follows that any treatment which is to bring relief - or, better still, recovery - must satisfy all these points.

1. At the outset of any treatment programme must come dietary reform. In the context of SANUM therapy, the emphasis should particularly be on advising and treating those suffering from type II diabetes. When a person's connective tissues and vascular epithelium are already severely affected by protein deposits, it makes little sense to feed them on yet more protein and animal fats. They should rather be advised to consume *complex* carbohydrates. These include good-quality, cold-pressed vegetable oils such as linseed oil, rape-seed oil and walnut oil as a dressing on healthy vegetable dishes, because particularly in diabetics the fat metabolism is frequently disordered. So long as it is not too sweet, the diabetic should consume plenty of fruit, since the sugar here is predominantly fructose, which can be metabolised slowly, but without insulin. Seeds and nuts also represent a healthy basis for the diet, particularly in view of their high trace element content (including chromium). Root vegetables such as Jerusalem artichokes and dandelion are high in inulin, which is a form of carbohydrate that is easily available to diabetics.

2. Following the dietary reform, the second stage is an attempt to regulate the physical milieu, particularly the acid-alkaline balance. The treatment should commence with deacidification by means of alkaline baths to which ALKALA N has been added; the dosage is 1 teaspoonful for a footbath, or 1 dsp. for a full bath. The patient should remain in the bath for at least 20 minutes. Because of the risk of nephrotic changes in diabetics it is always sensible to involve primarily the skin in the process of deacidification, so as to avoid overloading the kidneys unnecessarily with the elimination of salts or protons. The harmonic potencies of the organic acids, lactic acid and citric acid, in SANUVIS and CITROKEHL assist in the regulation of the acid-alkaline balance and stimulate the Citric Acid Cycle. SANUVIS is prescribed in the mornings: the adult dose is 2 tablets or 1 tsp.- 1 tbsp. of drops in warm water. For children the dosage should be reduced accordingly. In the evening the patient should take 1 tablet or 10 drops of CITROKEHL.

3. Because we always have to reckon with the implication of viral structures in the onset of diabetes, the diabetic should in any case be treated with QUENTAKEHL. Sometimes NOTAKEHL also needs to be used. It is best to begin with 5X drops. In the case of adults 5-10 drops should be given twice daily, partly rubbed in in the umbilical area and partly taken orally. Because of the dietary disorder of the intestinal milieu it may be necessary to treat initially with FORTAKEHL 5X and PEFRAKEHL 5X drops; in that case the prescription is: in the morning, FORTAKEHL 2-10 drops, rubbed in and taken orally and, in the evening, the same dosage of PEFRAKEHL. This treatment may be continued for an extended period of time, then changing over to SANKOMBI 5X drops. Here the adult dose is 5-10 drops twice a day, rubbed in and/or orally.

In all cases the "centre" must be supported with PINIKEHL in the form of 5X drops with a dose of up to 8 drops at lunchtime. As well as this, MAPURIT, 1-2 capsules at lunchtime, and LIPISCOR, up to 12 capsules daily are recommended. MAPURIT contains magnesium and Vitamin E, thus favouring metabolic processes, whilst LIPISCOR provides the body with the necessary omega-3 fatty acids, so as to combat the hypercholesterinaemia and triglycerinaemia so typical in diabetics. LIPISCOR also prevents inflammatory processes in the epithelium and tissues by displacing arachidonic acid.

4. Up to 10 drops of ZINKOKEHL 3X should be taken in the evenings.

In addition, thought should be given to Chromium supplementation, e.g. from Brewer's yeast and other foods mentioned above, also Manganese supplementation and particularly the B-group Vitamins.

5. There are many botanical remedies, or active substances derived from botanical sources, which have a favourable action on the pancreas. In all cases the patient should drink, in the morning and on an empty stomach, weak herbal infusions containing slightly bitter substances.

The following is an example of a "pancreatic blend":

Crampweed (Anserinae herba)	50.00
Agrimony (Agrimoniae herba)	50.00
Marigold (Calendulae flos)	50.00
Yarrow (Millefolii flos)	50.00

Preparation: Pour 1 litre of boiling water over 1 tsp. of the blend, cover and leave it to infuse for 10 minutes, then strain. Drink a cup at a time through the late morning. The amount of the blend per litre of water may be increased up to double the above if this is tolerated. The blend may be expanded to include the addition of Centaury, Sanicle, and Fumitory; these botanicals could be added up to an additional 20.00 parts each.

For the afternoon a further litre of herbal tea would be advisable, prepared from equal parts of lady's mantle, birch leaves and nettles. On principle, good old *dandelion* should not be overlooked; in the form of a herbal tea, dandelion syrup, dandelion juice, mother tincture or TARAXAN 3X injectable. It is eminently suitable for supporting both the functions of liver, bile and pancreas, and the work of the kidneys. Of course the parts of the fresh plant are excellent in salads, or just eaten in their natural state, freshly picked, since they contain sugars, vitamins, minerals and other active substances.

The roots of dandelions and chicory contain plenty of *inulin*, as do Jerusalem artichokes, scabwort (inula), artichokes, salsify, burdock and sunflower. This sugar can be metabolised without the aid of insulin, and the roots and other parts of all the above-named plants have a sweetish taste on account of its presence. Inulin can also be heated, without the polysaccharides coagulating or becoming lumpy.

Anyone who eats a lot of fruit needs little insulin in their body. This is particularly so in the case of *bilberries (blueberries)*: both leaves and berries act well in diabetes mellitus. For patients the fresh berries have the best results; while eating these the patient can take an insulin holiday. The action is due to strong tannins (proanthocyanidines) inter alia. It may be stated that, generally speaking, all red pigments act particularly well, especially on the vascular system.

Tea made from bean-skins lowers the blood-sugar level markedly, owing to the amino-acids in it, particularly lysine. When the skins are dried, the toxic phasin is broken down.

The *balsam apple* (Momordica), a member of the pumpkin family, is edible and is eaten as a vegetable in Asia. Unwary diabetics who are not accustomed to eating balsam apples may suddenly pass out whilst eating this vegetable, from hypoglycaemia. The balsam apple modulates the T- and B-cells and suppresses macrophages. At the same time it brings about a regeneration of β-cells, which produce insulin. (Thus bitter cucumbers should be thought of for diabetes!)

Guar flour is obtained from the seeds of the bushel bean (Cyanopsis tetragonaloba) or guar bean. The rubbery substances that it contains have a strong dilating action which delays the passage of food through the stomach. In this way better use is made of the residual insulin. (Not to be confused with guar-seed flour!)

Wild sweet pea (Galega officinalis) or *goat's rue* is a member of the Papilionaceae family. Its seeds contain the alkaloid Galegin, which has a similar action to that of synthetic biguanide. Glucose is utilised better, whilst at the same time it inhibits the gluconeogenesis by the liver. It is particularly well suited to type II diabetes; in type I it is only effective if the base amount of insulin is still produced in the body.

Ginseng (Panax ginseng) likewise contains active substances which depress the sugar level.
Purée from the *prickly pear* or the *onion* have a diabetogenic action, as do many other plants. Attention has recently focussed on the bark of the cinnamon tree (Cinnamonum aromaticum).

There are about 800 plants to which a diabetogenic action is attributed. Amongst those employed in Homoeopathy we should think particularly of Syzygium jambolanum.

ANTHROPOSOPHICAL CONSIDERATIONS

If we just pause to consider the pancreas from quite a different angle, i.e. purely with regard to its anatomical position in relation to the other organs of the body, we see that the head, with the predominantly excretory part - that concerned with the metabolism - lies directly in the flexure of the duodenum, near the liver, which is above all a metabolic and detoxifying organ. The tail, on the other hand, with its more incretory part, the "sensory pole", lies more to the left, nearer to the spleen, adrenals and kidneys. From a humanistic point of view, both the kidneys and the spleen are associated more with the sensory organs, which makes the pancreas a "medium" mediating organ, because - with its "sensory pole" - it makes contact with these two other "sensory organs", whilst remaining in contact with the metabolic organ, the liver, via its more excretory head area. The superior function of the human ego-organisation expresses itself strongly in the pancreatic organ as a centre of both the circadian and metabolic systems. If this organ becomes diseased, then both these systems are severely impaired.

If we examine the islets of Langerhans carefully, we find that the B-cells are mostly situated in a central position, with the A-cells grouped around them, in some cases even forming a ring. It is possible to perceive a signature in this. There are the central energies (compression, incarnation, glycogenesis) acting through the B-cells, and the universal energies (dissolution, release, excarnation, transportation of glycogen into sugar and, finally, warmth); which are expressed by the A-cells. The proportion of the two different kinds of cell, A to B, in the human being is roughly 1:3.

From investigations carried out on animals we know that the A- and B-cells are continually undergoing a process of conversion, formation and dismantling. In fish, incidentally, the exocrine and endocrine pancreas are still separate organs. In humans and animals the sugar balance maintains an equilibrium typical of the species. Sea creatures (fish, sharks), snakes and animals that hibernate have a balance of sugar management which contrasts sharply with that of warm-blooded creatures which do not hibernate, and of birds. In a hibernating hedgehog, for instance, there is a measurable relationship of A- to B-cells of 1:6.2. At this time the blood-sugar level has dropped to 50mg. per 100ml. During the summer, when it is active, the hedgehog's relationship of A- to B-cells is 1:3.3, with a corresponding blood-sugar level of 125mg. per 100ml. In birds the proportion of A-cells as compared with B-cells is much higher. This means that, even by giving very high doses of insulin, one can only have a very transitory influence on the blood-sugar level. In these creatures' bodies, therefore, insulin hardly has any part to play in the storage of energy, which might explain the rapidity with which they become exhausted and the speed at which they die, especially in winter when food is scarce.

Of course, energy supply correlates very closely with body temperature. Here too we may find help in understanding the situation by making a comparison with animals that hibernate. In their case, we know that during their hibernation they are in a state where consciousness and organisation of body-heat have left the body. As in the case of cold-blooded creatures their body temperature - and therefore sleeping and waking also - are regulated from a centre situated outside their body (the cosmos). When the ambient external temperature reaches a certain point, the animals start to wake up, influenced by the warmth. And here something remarkable happens: the awakening begins at the sensory pole, in the sensory organs, then comes mobility of the head, after that the front legs start to move, and finally the hind legs. It is also quite possible that these creatures drag themselves along by the front legs, whilst the rear half of the body, still asleep, is pulled along as if paralysed. In the hedgehog, for instance, the warming-up process takes quite a short time - about two hours - and effects a rise of 20° in body temperature. So from this we can see that basically it is quite possible that the body temperature control mechanism can leave the body and return to it again. However, it is by the rhythmic system of the pancreas that this body temperature control mechanism is formatted. This is because it is the pancreas which regulates the material basis of warmth, the carbohydrate metabolism.

The body temperature control mechanism develops only gradually, both phylogenetically and ontogenetically. The cold-blooded creature is totally dependent on external regulation, and the development advances via the variable-temperature creatures to the warm-blooded ones. Among those warm-blooded creatures born with no hair, e.g. mice and rats, during infancy there is a period of 10-14 days when they behave like cold-blooded creatures, and it is only when that period is over that they become capable of regulating their own body temperature. Likewise the human infant is dependent on being warmly wrapped during the initial stage of its life in order to maintain an even temperature; not until the second month of life does temperature regulation commence, showing a difference of 1° between the waking and sleeping states. In the human being, the body temperature control mechanism proceeds hand-in-hand with the maturing of the ego-organisation.

In many people a disorder of the body temperature control mechanism may be found. On questioning these patients, one finds out that they are filled with tremendous coldness, both emotionally and physically. Frequently this "chilling" initially resulted from insufficient clothing of the lower extremities, which later frequently resulted in chronic abdominal illnesses, of the genitourinary tract, the appendix and even the liver. This chilling of one organ resulted in ongoing disorders of the whole organism.

We know from Chinese medicine that the spleen-pancreas meridian exerts a strong influence on the kidney-bladder meridian. Conversely an energy-shortage in the organs on the latter meridian also weakens the spleen, the pancreas and the liver.

In all cases we may infer from the above that a disordered rhythm of both metabolism and body temperature control mechanism results in a long-term weakening of the central regulating organs, the spleen and the pancreas. With the emancipation of human beings, a marked disconnection from cosmic and natural rhythms has occurred, because of the break away from the rhythms of the days and the seasons. Because of technological achievements a modern person can turn night into day and, in their living quarters, they can adjust the winter temperature to a level close to that of summer. If we compare these possibilities with the natural processes as seen in hibernating creatures, then it is possible that the lack of "sleeping and wintering" phases in our lives might result in the premature exhaustion of the regenerative powers of our rhythmic organs.

Most people lack the rhythmic activation of their bodies which comes from work, regular movement or sports. It is well-known that it is precisely a "monotonous", uniform job that accentuates the body's rhythms, and people who are jointly involved in rhythmic work get into a "communal rhythm", so that the individual becomes a part of the whole (many farm-hands threshing on the threshing floor, making music in a group). This growing together results in a great easing of tension for those involved, because its rhythmic nature makes the workload seem compensatory. This is not only perceptible, but measurable too, e.g. in the pulse and blood pressure. The significance of this for the treatment of the pancreas as a rhythmic organ is, that the patient should be physically active and achieve harmony through movement, and this will have a positive effect on the whole sugar balance. Motion, going for walks, games, sports: all these minimise the chromium losses

in the body, provide for anabolic muscle-building, and counteract hyperglycaemia. We know that a particularly large amount of sugar is stored in the musculature as glycogen if we eat immediately after doing sports because, straight after exertion, the muscle cells' acceptance-level of glycogen is particularly high. Breathing and relaxation exercises are suited to optimising the oxygenation of the body and transferring people from a sympathicotonic state to a recovery stage. The best precondition for achieving harmony at the centre is a structured daily routine, with generally detoxifying measures such as slurping of oil, alkaline baths, Kneipp hydrotherapy and skin brushing each having their appointed place, together with a well thought-out diet and adequate sleep at night. These efforts require a certain amount of self-discipline and energy of the patient, but this will be repaid in all kinds of ways. Generally speaking a process of enhanced consciousness sets in, through which the patient can rediscover more and more about taking care of the body and about the "sweetness" and fulfilment to be had from life: something which we are all searching for.

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