Danube University Krems

OBSERVATION

CV4–TECHNIQUE - HYPERTENSION

HYPERTENSION - OSTEOPATHIC DYSFUNCTIONS

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1 ABSTRACT

Observation

- Does the CV4-technique have a measurable effect upon blood pressure with threshold hypertensive patients
- Are there common osteopathic dysfunctions which may have an explainable reason for the development of hypertension

The objective of my study was to examine whether the CV4-technique as it is described in osteopathic text books does result in a lowering of the blood pressure (actual, measurable changes -short/medium, long-term) respectively whether there are serious changes of the blood pressure created during the implementation of the technique.
I further attempted to find out whether hypertensive patients show common dysfunctions which might represent an explainable reason for hypertension.

Methodology: There was a test group and a dummy group (each consisting of 10 male test persons aged 30 to 45 suffering from threshold hypertension).
Blood pressure was taken prior and after the performance of the technique (sitting position) respectively during implementation of the technique four times at intervals of three minutes (reclining position). An additional measurement was taken after two weeks (sitting position). With the dummy group the therapist focused his (her) thoughts on something else while merely positioning his (her) hands.
In addition an osteopathic examination using an examination sheet was carried out.

Results: A slight average short- respectively medium-term decrease of the systolic value took place; the difference to the dummy group was merely 3,54 %. In the long-term the reduced value was maintained in the test group, in the dummy group the value returned towards its original position. During the implementation of the technique there was a slight regular decrease of blood pressure.
The osteopathic examination revealed hypomobilities in the spine segments (C7/Th1, Th7-L1), increased muscle tonus (M.trapezius, short neck muscles, paravertebral muscles particularly in the thoracic spine and lumbar spine) of at least 75 % of the test persons.

Diaphragms I,II,III showed an increased tension and the secondary breathing motion was unevenly distributed.
In the visceral area the liver was at the top with 70 % alterations in mobility and motility.
The cranial area showed dysfunctions in the membrane system with 45 % of the test persons.

Discussion: Possible reasons for an insignificant effect: - insufficient relaxation of the test persons (thought flow too high) - technique was carried out too structurally and not comprehensively enough – insignificant regulating mechanism with threshold hypertensive patients – requirement of repeat the technique – it was not a treatment but merely the implementation of a technique.
The hypomobilities and tensions which were found might influence the biochemical processes of the basic system and take changed information to the relevant vegetative centers. The liquor might maintain the circulatory system of the dysfunctions through its tasks and its continuity in the entire body.
In order to make the technique more effective and to use the „body`s own pharmacy“ it might be useful to go a little further and involve higher levels as they are also described in the biological medicine and quantum physics.

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2 INTRODUCTION

„The brain is God`s drug store having within all drugs, lubricating oils, opiates, acids and every quality of drug that the wisdom of God thought necessary for human hapiness and health.“

Perhaps the rhythmic-balance interchange between all the fluids of the body secured by compressing the fourth ventricle is coming close to the art of releasing the bodily „drugs“.*Still 29*

I am fascinated by the idea of this drugstore and I thus would like to discuss it a little bit in the course of this thesis.
In the training we were alerted to the manifold effects of the CV4-technique upon the most various body functions. It was described as the technique which may be employed almost everywhere for regulating purposes. There is also various literature describing this effect.
And there is a thesis existing, similar to mine, prepared by Krasser (2000), where he looks for a decrease of high blood pressure using a lateral fluid drive technique with concentration on the ossa temporalia.

By means of this study I will merely observe the effects of this technique, I do not carry out any treatment.
I have chosen the hypertensive effect out of the great number of indications. One main criteria for this choice was the measuring parameter - blood pressure -. The taking of blood pressure is a commonly used method and feasible for me in practice.The choice of the test persons fell on threshold hypertensive patients, that are people with slight increased blood pressure results. I knew that I had access to a sufficient number of persons with this diagnosis.

<u>I will focus my observation on the following issues:</u>

1. Are real, measurable changes of the blood pressure caused by the CV4-technique applied to border line hypertensive patients (short-term, long-term changes).

2. Are there serious changes of blood pressure during the actual implementation of the technique (including the moment of the still point).

3. Does an osteopathic examination of test persons reveal common traits in the dysfunctions which might provide an explicable cause for a hypertonic condition.

In addition to the observation of these measuring results, I am interested to explore ways to cause a central action upon individual body functions, respectively the entire body.

For that, attention has to be paid to the combining link between a) the 4th ventricle and high blood pressure and b) the osteopathic dysfunction (structural, visceral, cranio-sacral) and high blood pressure.

Even pathologists of the 18th and early 19th century already were of the opinion that the fasciae are an organ which extends to all body parts, which is most important, nourishes all organs and establishes the relationships between them (Bordeu, 1767). C.B. Reichert (1845), also viewed the fascia not merely as a mechanically linking, but as an organic, vital medium and realized already that there is no part in the body where the nerves and vessels immediately touch the functioning cells but that the fascia are the transmitting medium, the carrier of the nerve and nutrition stream and that the interaction happens through them everywhere .21

An English study describes it as the organ which plays a vital and central part in all body processes and that it coordinates structural and functional relationships. (Scrivens, 1986)25

In observing the regulating functions of the fascia, I note interrelations between cell and extra-cellular fluid, the vital media of the cell. The regulating factors of the basic system, except for the cell, are the nerve and the capillaries with their varying permeability. Consequently, the regulated element in the narrower sense are the body fluids, namely the extra-cellular fluid and the blood plasma. Also the lymph, the fluid of the serous cavities and the cerebrospinal fluid belong to these. In this context it should not be disregarded that cell, nerve and capillaries exert an influence upon each other by way of the extra-cellular fluids, to which the relationships to and from the parenchymal cells are to be added in a secondary position.21

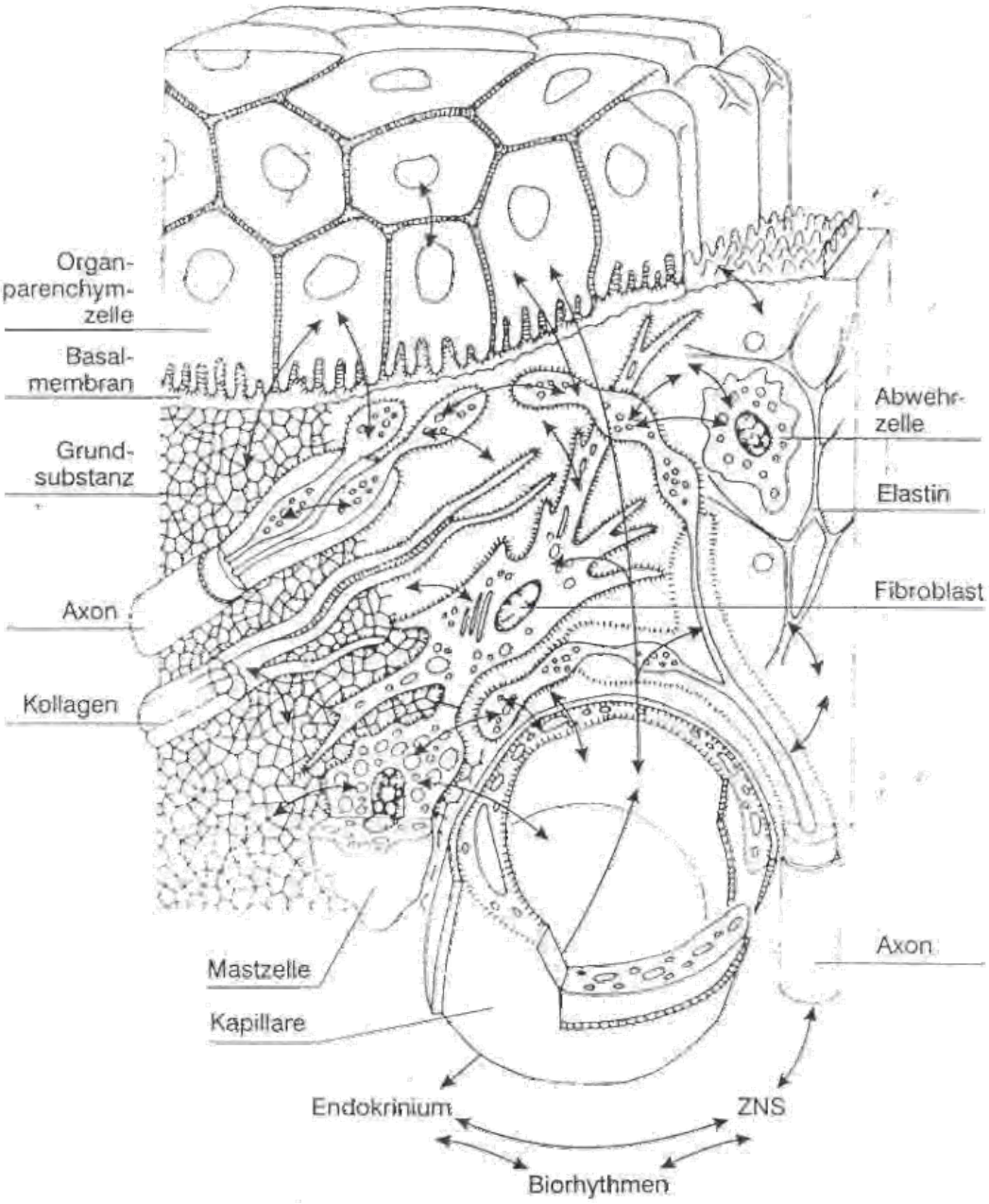


illustration 1: diagram of Basic regulation
Reciprocal relationships between terminal current flow, ground substance, terminal vegetative axons, connective tissue cells and organ parenchymal cells.

The illustration 1 makes clear, where the correlation between 4th ventricle and hypertension could be.

For me the following fields combine the anatomical and functional connection between ventricular system and blood pressure.

- the nerve centers in the area of the fourth ventricle
- the circulation and vasomotor centers of the medial zone of the reticular formation in the area of medulla oblongata (connection to the baroreceptors in the walls of the aortic arch and the internal carotides arteries)
- the limbic system (third ventricle) controlling the vegetative nerve system and the neuroendocrine system of the hypothalamus - I will also discuss this area -

The CV4-technique influences the flow of fluids (cerebrospinal fluid) and the biochemical processes, respectively in the entire body because of the continuity of the fluids.

In order to find out the connection between osteopathic dysfunction and hypertension, I would like to take a closer look at the osteopathic dysfunction.
The one has been described, among others, as a dysbalance in the coordinated rhythmic fluctuation of fluids with the cellular elements of the body.
In a well balanced body the facial structures permit free passage of nerves and vessels and good function with the tissue.
Traumatic, structural, physiological stress and other environmental influences have an effect upon the organism and trigger self defensive reactions. Changed, mostly increased tensions in the transversal, longitudinal and other fascial connections, also change the physiology of all connected organs, respectively organ systems. And consequently also the blood pressure.
(Processes in the area of extra-cellular fluids, cell, nerve, capillary, remaining tissue.)

In my opinion the key points of influence upon blood pressure are:

- in the structural area: spinal column - with an influence upon the peripheral vegetative nerve system (upper cervical segments - N. vagus, superior cervical ganglion, the rest of the cervical segments – middle cervical ganglion, stellate ganglion, thorakolumbar segments Th 7-12, L 1,2 - liver/kidney, blood vessels), in connection with the diaphragm 7^{th} – 12^{th} rib, L1-3; longitudinal and transversal fascial connections - cervical fascia (baroreceptors)
- in the visceral area: kidney, liver
- in the cranio-sacral area: membranous connection SSB –sphenobasilar synchondrosis- (hypothalamus - control of the vegetative nerve system) - thoracolumbar diaphragm (diaphragm as the turning point of all ascending and descending fascial structures).

The connection of the individual areas again is created through the comprehensive and all inclusive fascial system.

This theory of the connection of the individual fields, I have worked out by studies of anatomy, physiology and by practical experience.

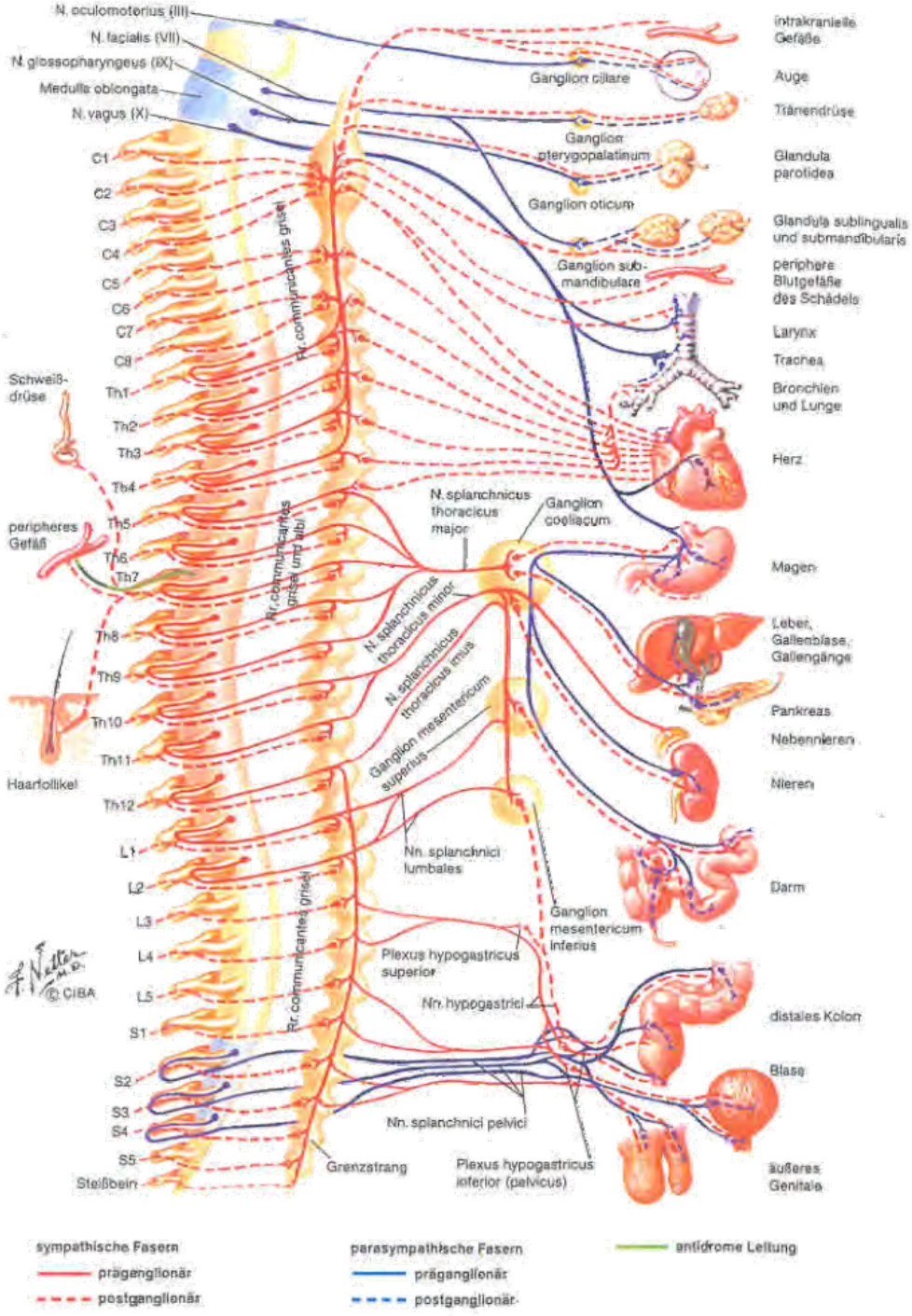


illustration 2: structure of the autonomus nerve system

3 FUNDAMENTALS

The first part of this section "fundamentals" will provide a short overview pertaining to the function and the regulating mechanism upon which the CV4-technique is intended to have an effect, and a brief summary of potential causes for essential hypertension.

3.1 Physiology Blood Pressure

Cf. 9, 10

Arterious Blood Pressure:

The cardiovascular system, the heart and the blood vessels are responsible for appropriate blood supply to the entire tissue of the organism. The factors pressure and flow are of particular importance in the cardiovascular system and are closely interconnected.

Hemodynamic principles:

- The pressures in the vascular system increase with the blood volume.
- The perfusion rate of the tissue increases with the minute volume (cardiac output).
- The arterio-venous pressure difference increases with the resistance at the exit of the arterial system.
- The pressure variations upon changes of volume, flow, or resistance increase with sinking compliance (volume elasticity).
- The arterial blood pressure depends on the cardiac output and on the extent of the total peripheral resistance.

It varies with the cardiac rhythm between a systolic (highest) and a diastolic (lowest) pressure. The heart pumps the blood in regular intervals into the aorta. During the systole approximately 70 ml blood are pushed into the aorta, during the diastole no blood gets into the aorta. Despite these variations in the area of the root of aorta there is a continuous flow in the area of the terminal arteries and capillaries. This is possible because the aorta and other major arteries have no fixed, but elastic, walls which are capable of extending and contracting.

During the systole the blood enters the arteries faster than it flows down into the capillary bed. The more fluid is pumped into the arterial system, the more the arterial pressure increases.
The elastic arterial wall then succumbs to the pressure and extends. Arteries serve as fluid reservoir. This avoids an excessively high pressure increase, as would be created with fixed walls. On the other hand, the blood continues to flow from the arteries into the capillaries during the diastole although there is no supply from the heart. During this phase the extended walls of the arteries contract and thus create an emptying of the fluid reservoir, avoiding a higher decrease of blood pressure which would be the result of an inflexible duct-system.

3.2 Regulation of Blood Pressure

Cf. 12

3.2.1 Short-term Regulation of Blood Pressure:

The regulation of blood pressure through pressoreceptors is very fast and effective. In the event of a longer lasting change of blood pressure the arterial pressoreceptors adapt to these new conditions and the regulating effect decreases. Otherwise the effect takes place within a few seconds.

The baro(presso)receptors are located in the walls of the aortic arch and the internal carotid arteries (carotid sinus). The receptors are stimulated through extension of the vessel walls. The impulses are led via sensory nerves (carotid sinus nerve, a branch of the glosso-pharyngeal nerve and aortic nerve, N. depressor) to the vasomotor centers in the medulla oblongata, the reticular formation and the arche of the fourth ventricle where deviations of the actual state from the desired state are registered. These deviations are corrected by influences upon the myocardium, arterioles and veins as well as various hormones. The baroreceptors are subject to hypothalamic control in this process.

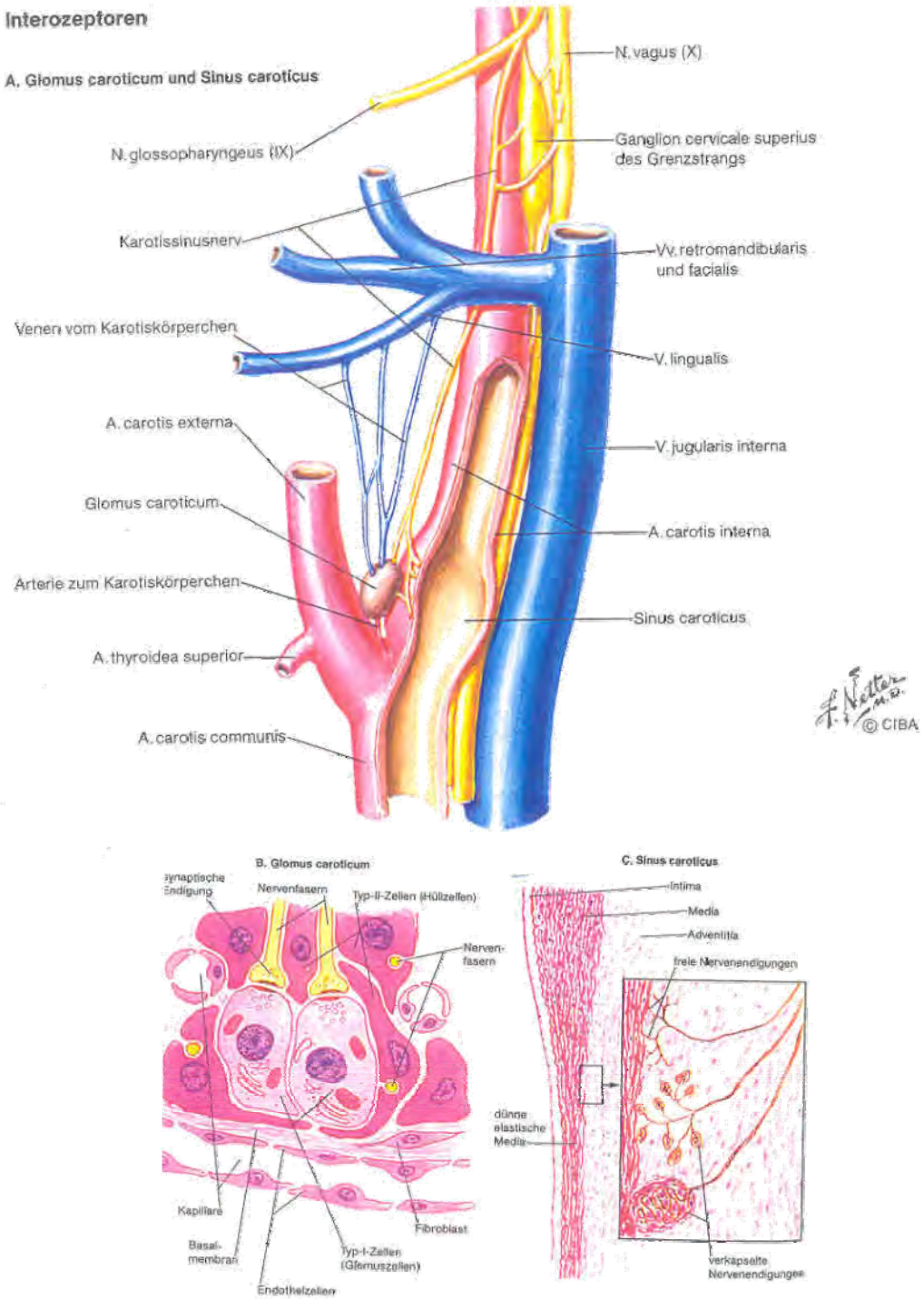


illustration 3: interoceptors (carotid glomus and carotid sinus)

Maybe this regulating mechanism could become effective at the time of the stillpoint or shortly thereafter. The fluid balance recovered by virtue of the CV4-technique should guarantee optimal function of all structures.

3.2.2 Medium-term Blood Pressure Regulation:

The effects of these mechanisms start slowly (within minutes) and take several hours to fully develop.
Middle term regulation mechanisms are:

1. transcapillary volume changes
2. stress relaxation of the vessels and
3. renin-angiotensin-mechanism

ad. 1. Transcapillary volume changes are the result of an increasing capillary pressure. At high capillary pressure fluid is pressed into the interstitium, as a result of which the intra-vascular volume, and consequently the blood pressure decreases.

ad. 2. Vascular stress relaxation pertains to the specific attribute of the blood vessels, particularly the capacitance vessels. Those vessels react to a pressure increase with a slow increase of elasticity after the initial dilation.

ad. 3. The renin-angiotensin-mechanism is activated upon any event of a renal hypoperfusion. This mechanism reaches its full effectiveness after approximately 20 minutes and may maintain it over a longer period of time.

The influence of the CV4-technique upon this mechanism might be carried out via the vegetative nerve system (sympathetic nerves influence the activity state of the smooth vascular muscular system, the resting tone of the vessels is based upon a constant tonic activity of these nerves) respectively via hormonal changes.
Changed values might already be noted at the last measurement in seating position.

3.2.3 Long-term Regulation Mechanisms:

The kidney with its volume regulation of the body fluids plays the vital role in this context. This volume represents the equilibrium between fluid intake and fluid output. The kidney responds to an arterial pressure increase with increased urine production. Thus the overall volume of body fluids is reduced. The reduced blood volume results in a decrease of the

venous return, and consequently a reduced cardiac output, and the increased blood pressure is reduced to the initial value (partially used in therapy by diuretics).

These long term mechanisms are transmitted through two hormones, aldosterone and antidiuretic hormone (ADH, vasopressin).
Aldosterone is emitted as a reaction to the stimulation with angiotensin II and III by the adrenal cortex. Aldosterone increases the tubular resorption of natrium. Water needs to follow the natrium to maintain the osmotic balance. Consequently the natrium- and extra-cellular fluid content of the body is increased. Arterial pressure decrease - renin secretion - production of angiotensin II and III aldosterone secretion - natrium retention through the kidney - water retention - increase of intravascular volume - compensatory blood pressure increase.
ADH is produced in the hypothalamus and is transmitted through neurofibers to the posterior pituitary. There it is stored and from there it is released into circulation. This hormone results in water retention by the kidney (independent from aldosterone). Upon increase of the blood volume, the atria are extended through the increased venous backflow. The stimulation of the atrium receptors impedes the creation and secretion of ADH in the hypothalamus. A reduced ADH release results in an increased renal fluid secretion. The fluid volume of the body decreases so that the initial increase of the intravascular volume may be compensated.

The newly discovered natriuretic hormone supports the Na- and water secretion and inhibits the release of renin, ADH and aldosterone. It is secreted by the atria as a reaction to the increased filling pressure. The hormone secretion, and consequently the water secretion is slowed down upon reduction of pressure and volume.

Chemical control here also adapts the perfusion rate to the metabolic activity and sympathetic vasoconstriction plays a vital role in the control of the entire vascular resistance and consequently the blood pressure. The state of concentration of the smooth vascular musculature depends on the frequency of the sympathetic impulses. An increase of the impulse frequency consequently triggers a vasoconstrictive reaction.
I measure and observe this long-term change after 14 days.

3.3 Etiology, Pathogenesy of Essential Hypertension

Cf. 15

The primary essential hypertension is a genetic, multifactorial caused blood pressure enhancement. 90 % of the hypertensive patients belong to this group.

Essential hypertension most commonly occurs at the age between 30 and 60. Below that age it is more likely that one encounters the congenital cardiovascular and endocrinal as well as renovascular forms on fibromuscular basis, whereas above that age one encounters in particular the acquired cardiovascular, respectively arteriosclerotic, the renal-parenchymatous and renovascular hypertensions on arteriosclerotic basis.
Essential hypertension, however, may already start at an early age, in which case threshold hypertension may be a preliminary stage.

Possible patho-mechanism are:

- Increased sympathic nervus activity (stress) leads to an increase of the renal vascular resistance.
- Increased vascular reactivity, heightened sodium chloride consumption and therefore an hypernatremia in the smooth muscle cells of the vessels.
- Increased renin-angiotensin activity (in more or less 15 % of the cases)
- Gene mutation for Kininase II (converting enzym) on Chromosom 17
- Decrease of the barorezeptores sensibility
- Adiposity (therefore increased cardiac output)
- Metabolic syndrome (hyperlipoproteinemia, diabetes mellitus, hyperuricemia, trunc emphasized adiposity)
- Consumption of alcohol (therefore activation of the sympathicus, suppression of the sodium-potassium-ATPase)
- Lack of vasodepressor factors (specific prostaglandines, bradykinin and kallidin)
- Displacement in the physiological amount of trace elements (e.g. cadmium, zinc)
- Renal abnormity (e.g. reduction of renal blood flow, shifting of renal excretacurve, decreased functional tubular substance, premature arteriolar nephrosclerosis)
- Racial belonging (coloured people get sick more often than white people)
- Endogenic sodium-potassium- ATPase- inhibition, disturbance of Na+H+-exchanger (antiporter) in cell membranes.

Following part of "fundamentals" will discuss the ventricle system with the nerve centers located in it, the importance of the liquor and the effects of the CV4-technique. Theories of modern physicists and biologists will point out possible mechanisms of the functioning of a CV4-technique.

3.4 *Ventricle System - 4th Ventricle*

Cf. 17

3.4.1 Embryology

The ependymally coated ventricle system is ontogenetically derived from the system of hollows of the neural tube.

Approximately in the 4th embryonical month the roof of the 4th ventricle which has remained thin curves outward at three spots and ruptures. Thus three apertures are created - the unpaired foramen Magendii in the median plain and the two foramina Luschkae on the side. Through these holes the liquor may flow out again of the 4th ventricle into the subarachnoid cavity which surrounds the brain.

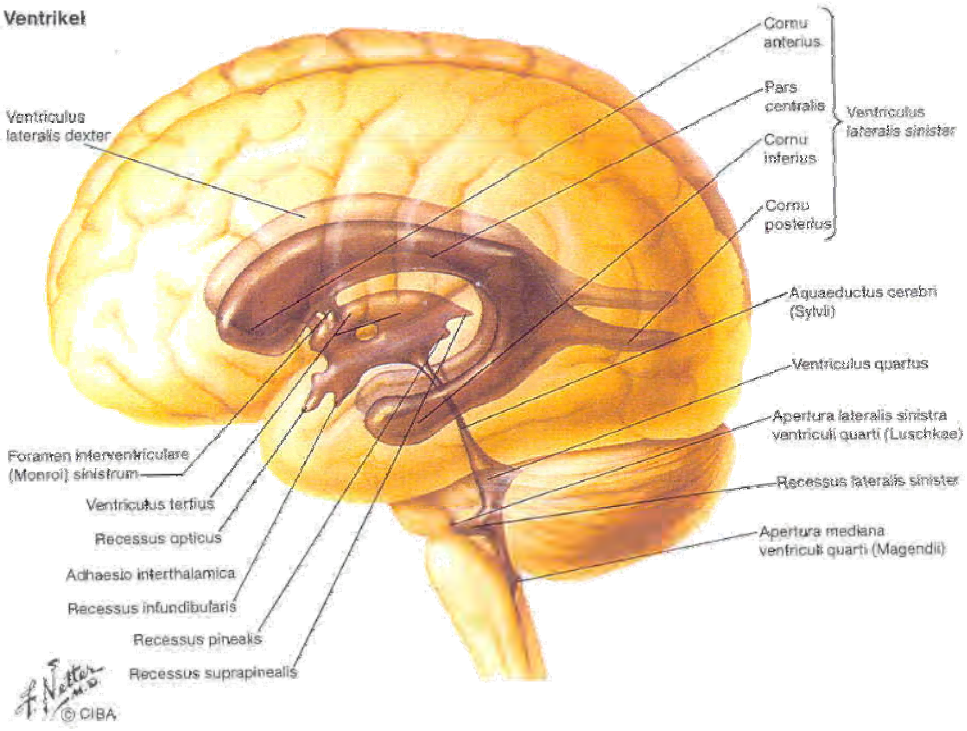


illustration 4: Ventricle

3.4.2 Anatomy

Cf. 31,14

ZNS is not only surrounded on the outside by liquor due to the subarachnoid cavity, but also contains an inner liquor area, the ventricle system.

The side ventricles are located in both hemispheres, the third ventricle is located in the diencephalon and the fourth ventricle is located in the rhombencephalon. The third and the fourth ventricle are connected by the narrow ventricular aqueduct. The fourth ventricle continues into the central channel of the spinal cord, the lumen of which, however, is often interrupted by wall adhesions. The walls of the ventricle are coated by ependyma.
The ependyma consists of a layer of ependyma cells rich in kinocilium, the ependymal cells, which may be found also on the surface of the choroid plexi (here, however, mostly with less kinocilia and tight junctions). Their kinocilia cause a constant liquor stream. The ependymal cells are connected with each other by gap junctions and maculae adhaerentes which make an exchange of fluids between the liquor space and the intercellular space of the CNS (central nervous system) possible.

In the so called neurohemal zones of the brain, substances may pass out of the blood through fenestrated capillaries into the intercellular space of the nerve tissue and vice versa. The median eminence with the neural lobe of hypophysis, the choroid plexi, the pineal gland, vascular organ of lamina terminalis, the subfornical organ and the postremal area belong to the neurohemal zones. All of these structures also belong to the circumventricular organs of which the subcommissural organ also is a part. The subcommissural organ has, however, contrary to the other circumventricular organs, a blood-brain-barrier. It is located on the epithalamic commissure immediately before the transition of the third ventricle into the aqueduct.

Over the circumventricular organs there are ependymal cells low in kinocilia, the tanycytes. Toward the ventricle they carry only one kinocilium and are connected with each other through tight junctions which do not allow any fluid exchange between liquor space and intercellular space.

3.4.3 Liquor production

The liquor is created by the choroid plexi of the lateral ventricles and the third and fourth ventricles, as well as in smaller amount also in the capillaries of the subarachnoid cavity of the skull and spinal cord and perivascularly in the ependyma and parenchyma.

Since among the functions of Liquor cerebrospinalis (LCS) are

- the transportation of hypothalamic and neurohypophysial substances
- the regulation of the chemical composition of the surroundings of the brain centers (a change of the electrolyte-composition and the ph-value of the LCS allow the influencing of the cerebral blood flow and of certain vital functions)
- the biochemical control of the entire organism through the circulation in the microtubuli of the collagenic fascia
- the bioelectric flow - LCS influences the electrical conductivity through concentration of sodium ions which varies in phases
- hydrodynamics - varying LCS pressure conditions are created in phases through the liquor fluctuation, which together with the arterial pressure changes as well as pulmonary respiration cause the drainage of nerve cells and the entire connective tissue cells

the connection between the fourth ventricle and blood pressure may be established through these functions. The nerve centers surrounded by liquor which have an influence upon blood pressure are discussed in the next point.

3.5 Nerve Centers in the Area of the 3rd and 4th Ventricle with functional Effect upon the Blood Pressure

Cf. 31

Transmitters make chemical signal transfer possible. Transmitter receptors are integral proteins of the cell membrane of neurons and neuroglia cells and protrude with one side into the extracellular space, with the other they reach into the intracellular space. In addition larger molecules, so called neuropeptides, are of importance in connection with transmission.
Classical transmitter cause a quick, short term transmission of excitement, peptides cause a reaction which starts more slowly and often lasts longer.

- Neurons with the transmitter serotonin occur in the median area of the rhombencephalon from the cranial cerebellar peduncle until down to the pyramidal decussation. The cell bodies of serotoninergic neurons only occur in the area of the rhombencephalon and there particularly in the raphael nuclei. Serotonin has an effect upon the regulation of body temperature, blood pressure, endocrinal activity.

- GABA is the most important inhibitory transmitter of CNS. In the raphael nucleus dorsalis GABAergic cells cause an inhibition of the serotoninergic neurons.

- The cell bodies of catecholaminergic neurons are mostly located in the rhombencephalon. Adrenalin influences through its release in the nuclei of solitary and dorsalis nervi vagi blood pressure and breathing. The noradrenergic system plays a role in the cardiovascular control and the steering of breathing. It is said to have a stress reducing function and influences the neurendocrine functions of the hypothalamic - pituitary system.

- In the area of the median zone of the reticular formation the definable circulation and vasomotor centers are located. They may be devided into a depressor and pressor center with according effects upon blood pressure. These areas are approximately at the height of the nuclei nervorum glossopharynei and vagi.

- The postremal area is a paired organ at the caudal end of the fourth ventricle. It contains neurons, which form noradrenalin, dopamin and enkephalin. Serotoninergic and noradrenergic axons end in this organ. In addition, it contains afferents containing substance P of the nucleus of solitary tract. The postremal area is a trigger zone for the vomiting reflex and plays a role in the regulation of the eating and drinking habit.

- Spinal cord, rhombencephalon, basal forebrain and striate body contain cholinergic neurons. The preganglionic sympathic and the pre- and postganglionic parasympathic neuron also are cholinergic.

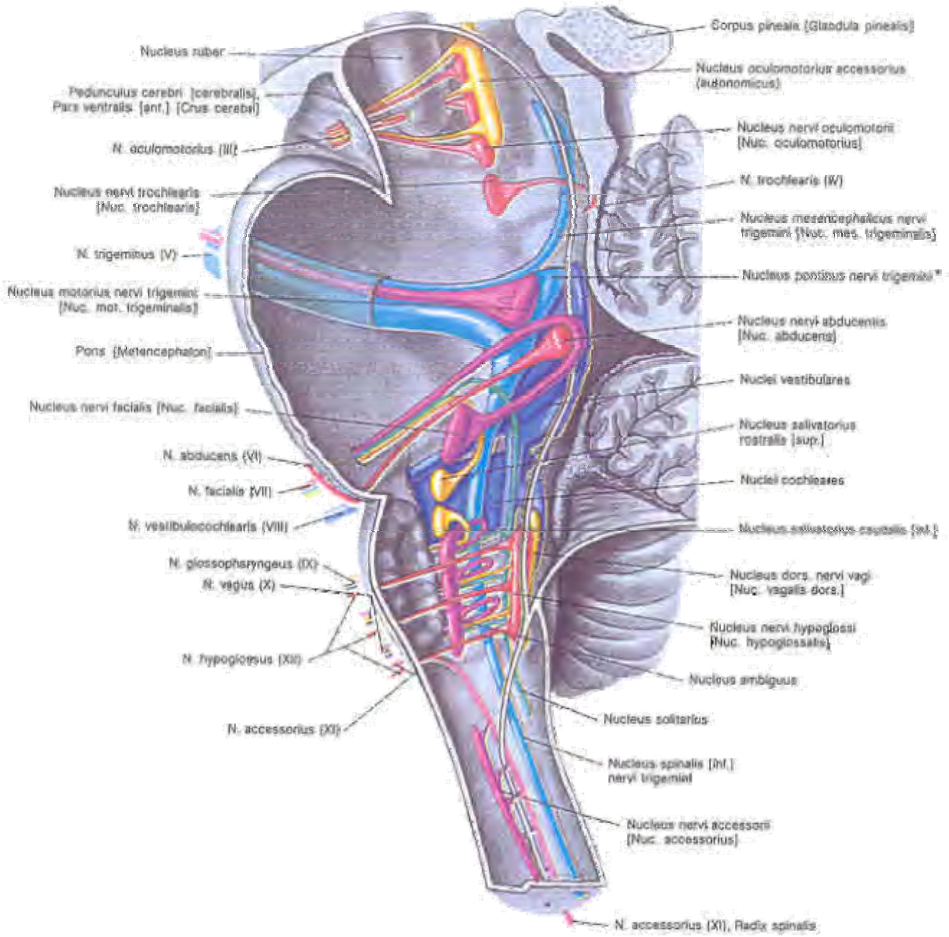


illustration 5: nuclei and intracerebral course of the brain nerves in the area mesencephalon, pons and medulla oblongata (midsagittal plain)

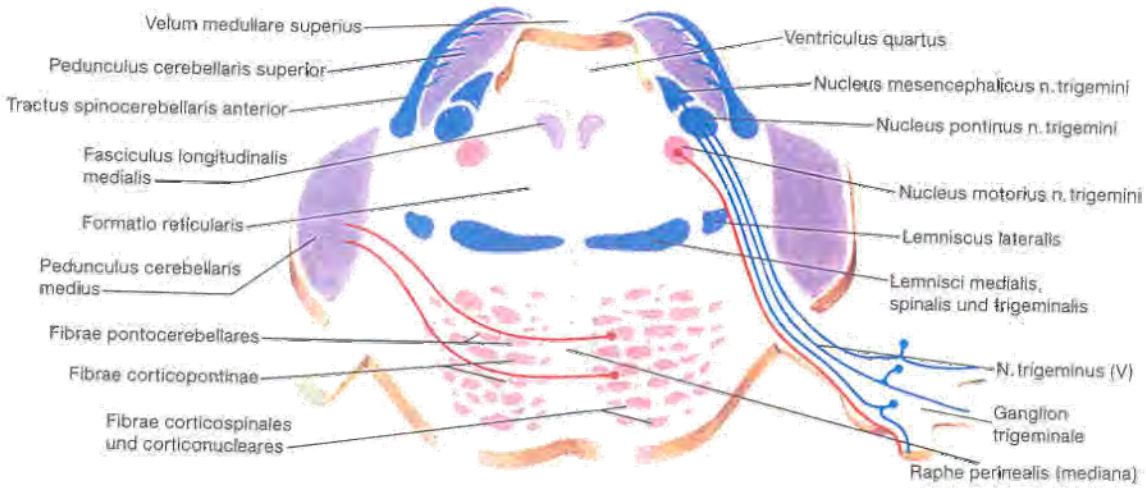


illustration 6: section through the pons at nervi trigemini

3rd Ventricle:

- The vascular organ of lamina terminalis, rudimentary in humans, is located in the thin terminal lamina of the third ventricle. Apart from plentiful blood vessels it contains the peptides somatostatin and luliberin which are released into the blood at this spot. It also possesses angiotensin II - sensitive cells. If these cells are destroyed fluid intake will not be increased upon salt stress.

- The subfornical organ is located between the interventricular foramina and both fornices which are arching above it. Apart from that, the plexii choroidei of the lateral ventricles and the third ventricle are attached at this spot. Angiotensin II comes out of the blood into the subfornical organ which contains the appropriate receptors and the enzyme converting angiotensin. Neuronal connections lead from this organ to the paraventricular nuclei and the supraopticus of the hypothalamus. The subfornical organ plays a role in the control of the fluid balance.

- In the zone of the ventricle walls and in the aqueduct of mesencephalon there are ample endorphins, endogenic molecules similar to morphine. The neurons in these zones are in direct contact with the optic chiasm, the thalamus, the epiphysis and the hypothalamus. (Roger Guillemin, nobel laureate, investigated these brain zones) It is possible that influences transmitted through the LCS may have an effect via these brain zones on hormonal, vascular and neurovegetative level.

The hypothalamus is the highest instance of the brain which is charged with the homeostasis and integration of the activities of the inner organs. Its position at the base of skull directly on top of the hypophysis puts it into the ideal position to control lower vegetative and endocrine systems in cooperation with higher cortical centers. The hypothalamus receives messages from all major sensory systems, information from interoceptors (e.g. the circulatory system), from the limbic system, information (from hormones and other substances dissolved in the body fluid), through the salt water household and the energy metabolism.
The exits of the hypothalamus project: to the limbic system, to motoric structures of the mesocephalon, to sympathetic and para-sympathetic vegetative centers of the medulla and the spinal cord (regulation of visceral functions), to the pituiltary gland (influence on salt water household, metabolism and hormone secretion).

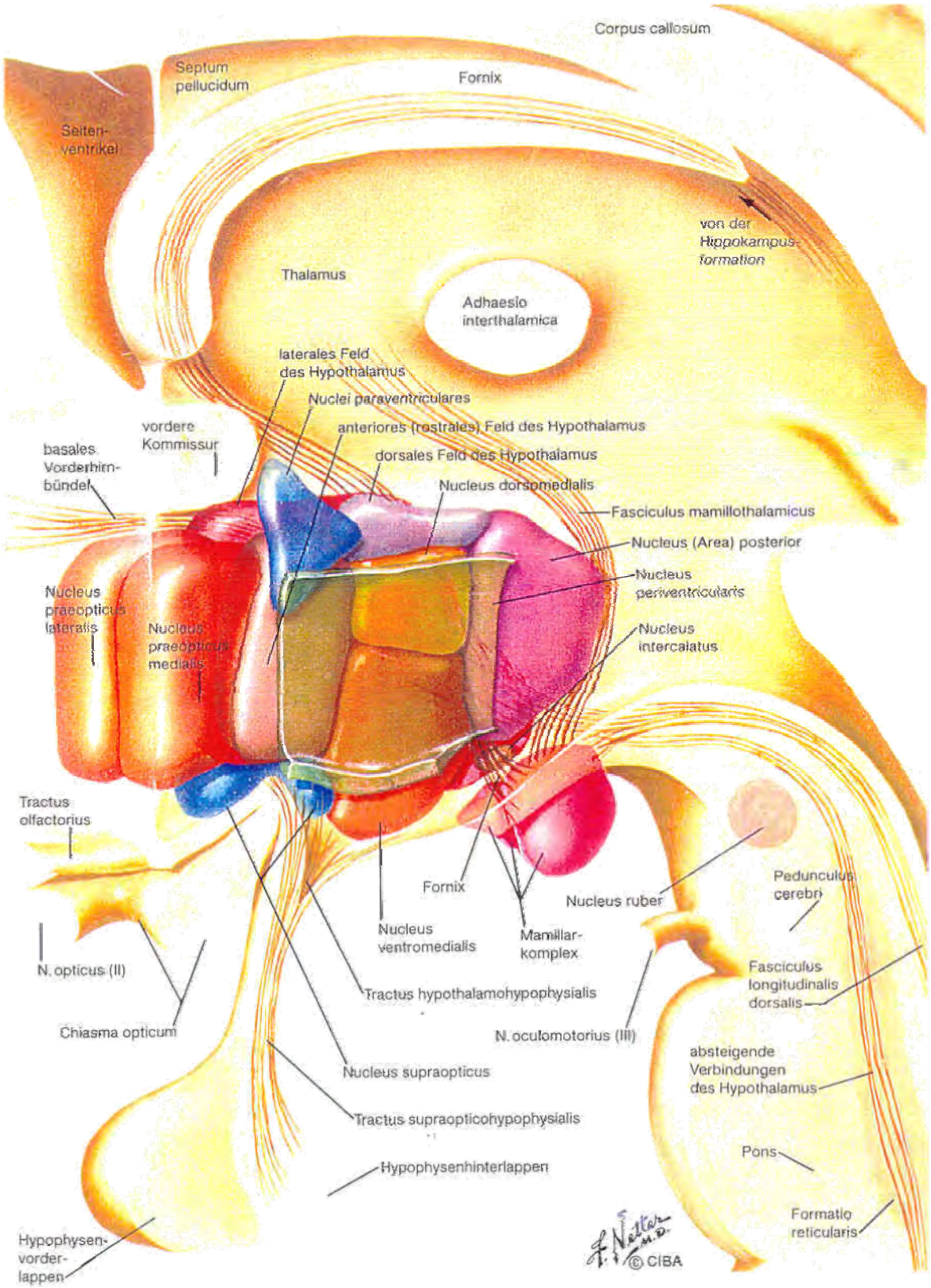


illustration 7: schematic reconstruction of the hypothalamus

3.6 Liquor circulation

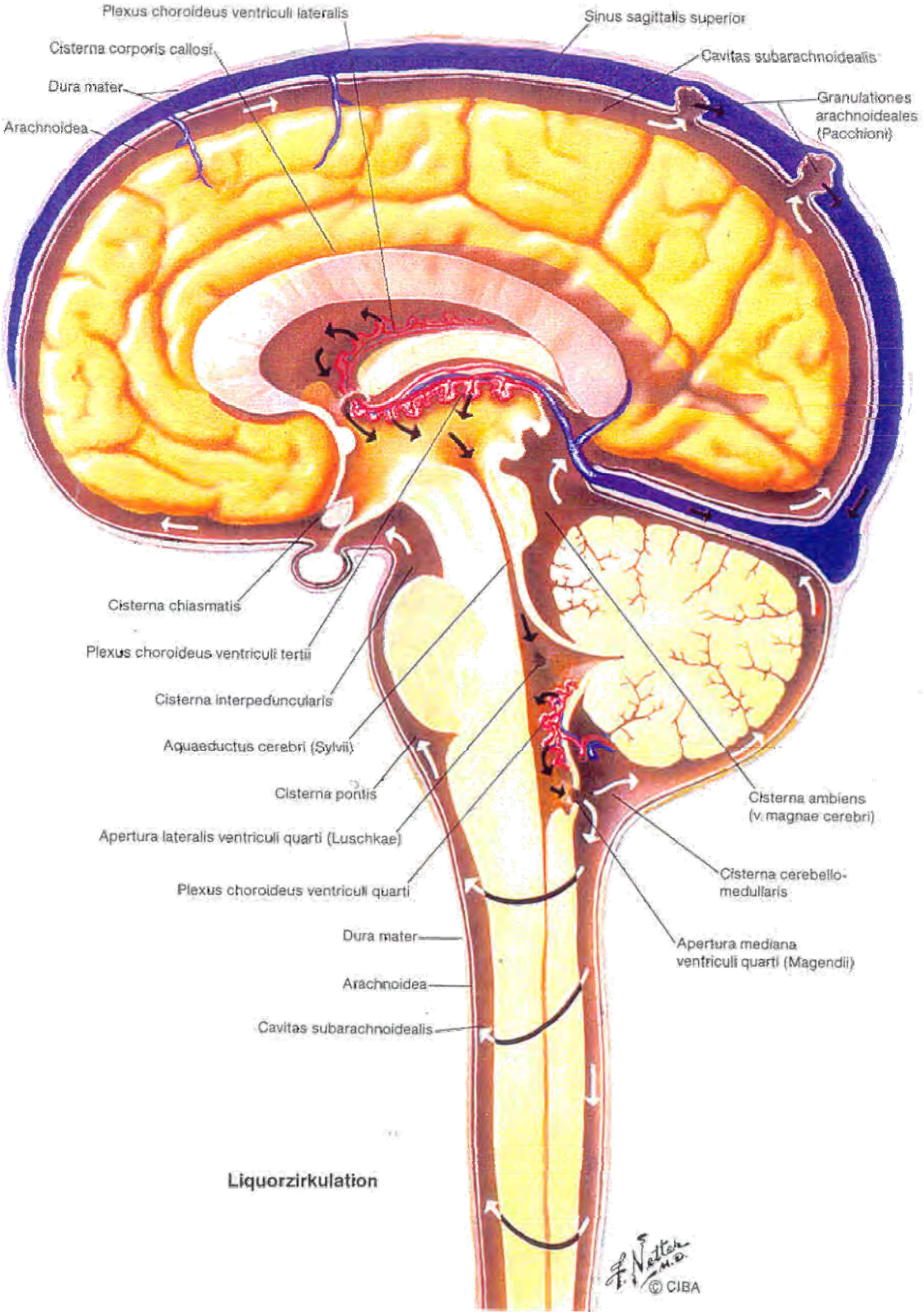


illustration 8: liquor circulation

The liquor flows from the lateral ventricles through the interventricular foramina (Monroi) into the third ventricle. There it receives affluence from the vessel system of this brain chamber and reaches the fourth ventricle through the aqueduct of mesencephalon (aqueduct of Sylvius) which also possesses a choroid plexus.
The liquor which is generated in all these areas leaves the fourth ventricle, together with a part which might be added from the central channel of spinal cord through the median aperture of fourth ventricle (Magendie's foramen) and the lateral aperture of fourth ventricle (foramen of Luschka) into the subarachnoid cavity.
The liquor then circulates at the basis of the brain in the subarachnoid cisterns which freely communicate with each other.
The major part of the liquor then rises from the cisterns to the superior sagittal sinus while flowing around the cerebral hemispheres, a smaller amount flows downward while washing around the spinal cord.

The circulation is possible into both directions, however, thus also from the subarachnoid cavity in the spine and in the skull in direction lateral ventricles.

Once reabsorbed from the arachnoid villi the LCS flows into the intracranial sinus. From the subarachnoid cavity at the peripheral nerve sheaths of the spinal nerves the LCS flows into the microtubuli (Naumenko and Moskalenko found out that the liquor is distributed through a netlike system of tubuli, so called microtubuli, into the entire body and influences all parts of the organism)[14] of the collagenic connective tissue and from there into the extra-cellular fluid which is collected in the lymph. The lymph leads through the thoracic duct into the left venous angle and to the heart.
Arterial blood flows into the skull where through the coroid plexii LCS is again produced and secreted.

3.7 Effects of the CV4-Technique

Cf. 14

The intracranial pressure increases as a cause of an increased fluid movement and fluid exchange. Consequently, LCS will not only flow through the large openings but also into the smallest distribution ways, into the enclosures of the nerves and the vessels, into the

microtubuli of the fascia to the extracellular and intracellular fluid cavities. This generally leads to an improved care of the cells, to an improved lymph circulation and to a regeneration of tissue as well to a stimulation of the brain nerve centers in this area. The biodynamic, bioelectric and biochemical attributes of LCS stimulate the entire exchange processes of the body (possible influence upon blood pressure).

Modern scientific theories show how intercellular communication, respectively the influence upon the structuring of tissue and organism might work.

- Popp (1983) has described intercellular communication through ultralight coherent electromagnetic radiation (biophotones). Obviously, apart from the biochemical, there is a constant communication between the cells, but also between them and the basic substance via oscillating electromagnetic fields. Their particularity is that they also stimulate other systems to co-oscillation. Resonance phenomena in biologic systems through electromagnetic coupling might have just as much influence upon the control of circulating systems as biochemic influences. 22
- Sheldrake (1984), a biochemist developed the theory of morphogenetic fields. Such fields are not only created through the taking shape of biologic systems and organisms, the actions of living beings, but also through chemical reactions, the growing of crystals, even the active observation which creates our biologic reality out of EPR reality (Einstein-Podolsky-Rosen). Consequently, our natural laws would be the expression of morphogenetic fields which are self increasing. They would be the expression of numerous repetition of processes, of conscious actions. 26

This could be of importance for therapeutic purposes since it might be possible to gain influence upon these fields and thus take an effect upon the structure of tissue and organism through these resonance phenomena.

Effects of the CV4-Technique according to James Jealous

Cf. 11

Through compression of the fourth ventricle a new center of the entire system is created. It is supposed to bring back "the fluid within the fluid" to its fulcrum in the fourth ventricle, to create a short idling of the fluctuation of liquor cerebrospinalis in its fluctuation. This is

supposed to take us back to the first function of life, to the movement of the fluid in the middle axis, the first orientation of light around its origin.
W.G. Sutherland calls the innate principle that centers the physiology of the cerebrospinal fluid the “liquid light”, “breath of life”, the “fluid within the fluid” and other terms to indicate its inherent intelligence.

In the model of self organization developed by Manfred Eigen (physicist) I see parallels to the definition of the effects of CV4-Technique as described in the preceding paragraph.
According to this model a development force, self organization, creates structure by taking advantage of flows through a system. This development force is said to spontaneously break the impotent and cold homogeneity of time and space and allows for dynamic structures to develop. These structures are organized on a much larger plain than the plain of the processes (e.g. the chemical reactions and the molecular exchange of matter and energy) which are the basis of these orders. 6

The third part of "fundamentals" will only briefly describe the tissue which, among others, also is a link between the fourth ventricle, osteopathic dysfunction, and blood pressure.

3.8 Supporting and connecting tissue (fascia)

Cf. 1,7,14

*"***The fascia is the place at which the cause of illnesses is to be observed and it is the place which has to be examined and at which the treatment of all illnesses should start."** Still 14

The connecting tissue consists of three components: cells, fibers (collagenic, elastic, reticular) and the basic substance. Fibers and basic substance are created by the cells. The basic substance consists of mucopolysaccarides, particularly the strongly hydropexic hyaluronic acid. The composition of the individual parts as well as the compound ratio of the three components determine the individual character of the respective connecting tissue.

The fascia is a structure of connective tissue which represents a continuously connecting layer and sheath within the body. This fascia system excels through outstanding transmitter and conductivity abilities. The fascia render fine physiological movements such as those of the cranio-sacral rhythm, the heartbeat or more obvious movements, such as the expansion of the lungs when breathing and the lifting of an arm, etc. possible. All changes of our micro- and macro-environment, the nutrition, physical activity, etc. have, via the fascia and also the other soft connecting tissue, an effect upon the cellular synthesis mechanisms.

These relationships, when disturbed, could be the basis for the major systems disease caused by civilization: e.g. hypertension

Fascial Organisation

The fascial organization of the human body is mostly laid out in longitudinal direction. Within this longitudinally organized fascia system there are traverse horizontal fascia plains (diaphragms). The traverse transverse fascia plains on the one hand serve as support for the longitudinal system, on the other hand, however, may very easily impact the fine mobility of the longitudinal fascia in cases of disturbances such as hypertonic condition or adhesions.

More traverse structures we can find in the area of joints. They also may lead to an impairment of the mobility of the longitudinal fascia due to their traverse structure.

- The following description of fascial connections between the individual organs is intended to provide an introduction about the reciprocal influence particularly in regard to the topic of this paper (blood pressure and fourth ventricle).

Kidney – Diaphragm:

Both lamina of renal fascia (prerenal fascia and retrorenal fascia) have grown together at the top with the diaphragmatic fascia and are connected on the sides.

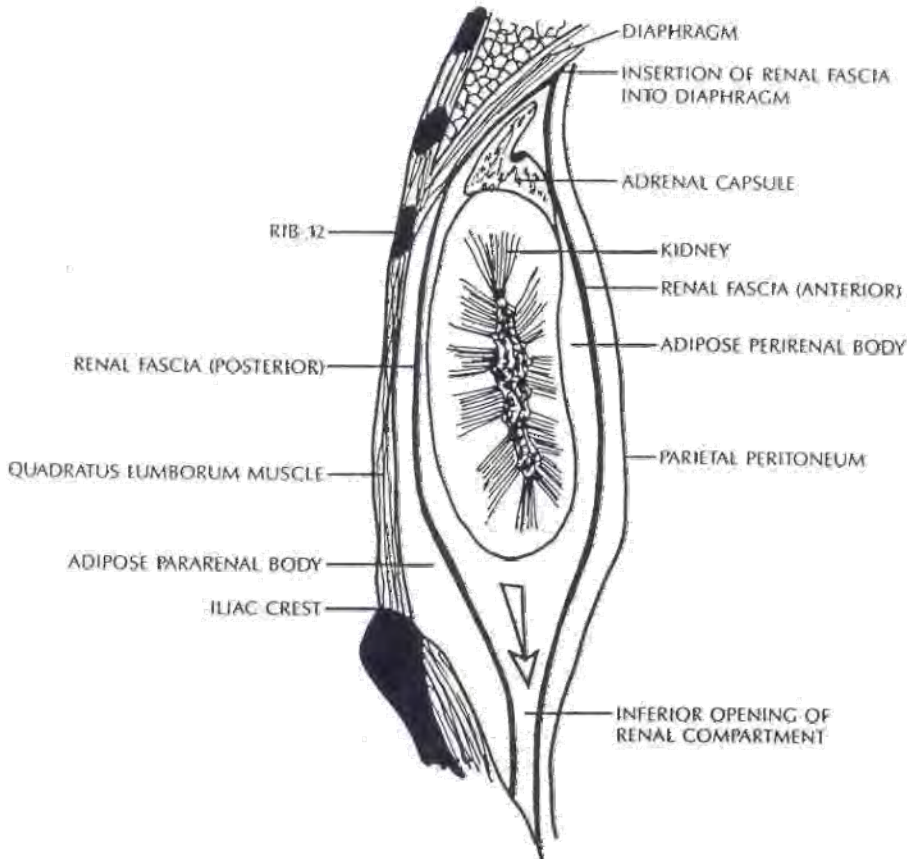


Illustration 9: Sagittalsection of the kidney

Diaphragm – Liver:

The connection diaphragm and cranial area of the liver is created via the coronary ligament of liver.

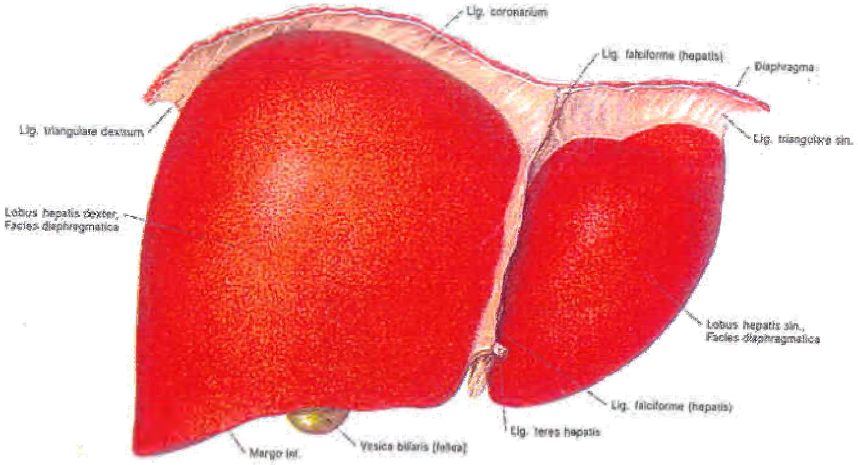


Illustration 10: Liver, fascies diaphragmatica with a part of the diaphragm

Diaphragm – Pericardium:

Ligg. phrenico-pericardia ant. and phrenico-pericardia posterior sin. and dext. connect the diaphragm with the pericardium.

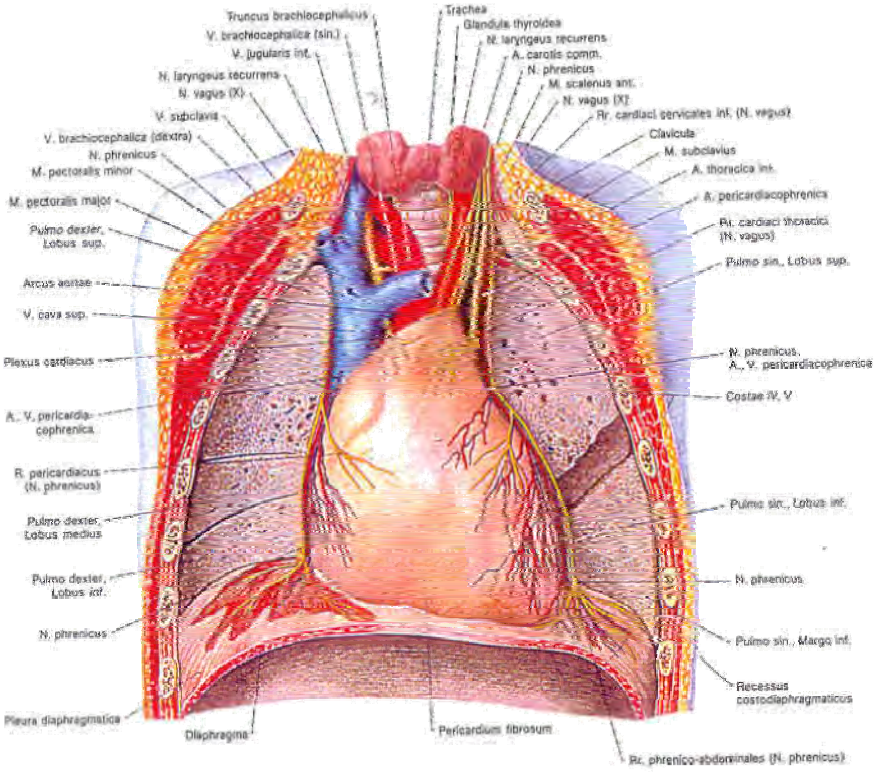


Illustration 11: Viscera of the thorax, anterior view

Pericardium – Sternum:

The connective tissue between sternum and pericardium may be devided more ore less into two parts forming a triangle.

Lig. sternopericardial sup. runs between anterosuperior part pericardiacae and posterior cord manubrium sterni (direction 2nd rib), the lig. sternopericardial inferior runs between xiphoid process and anteroinferior part pericardiacae (direction 6th rib).

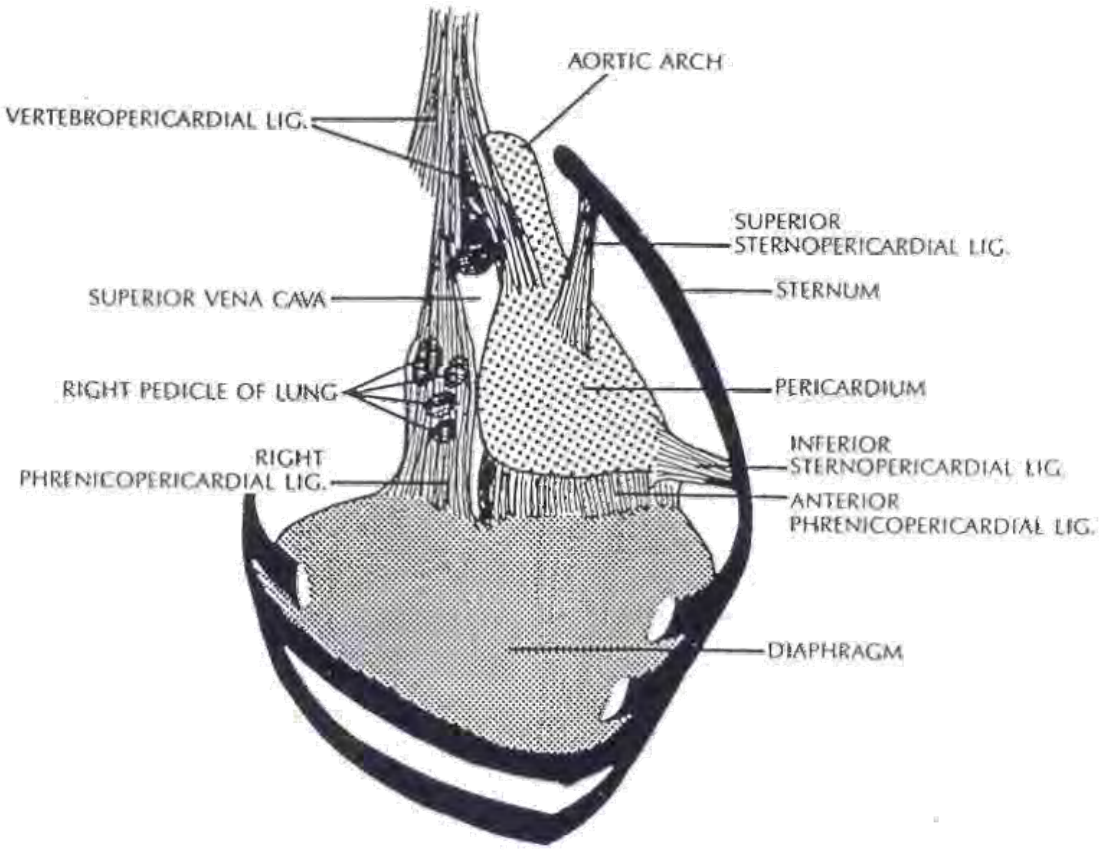


Illustration 12: Pericardial Ligaments

Pericardium – Spine:

The pericardium is connected to the spine by the vertebropericardial ligament (in general Th4 – C7 with fibres to C3).

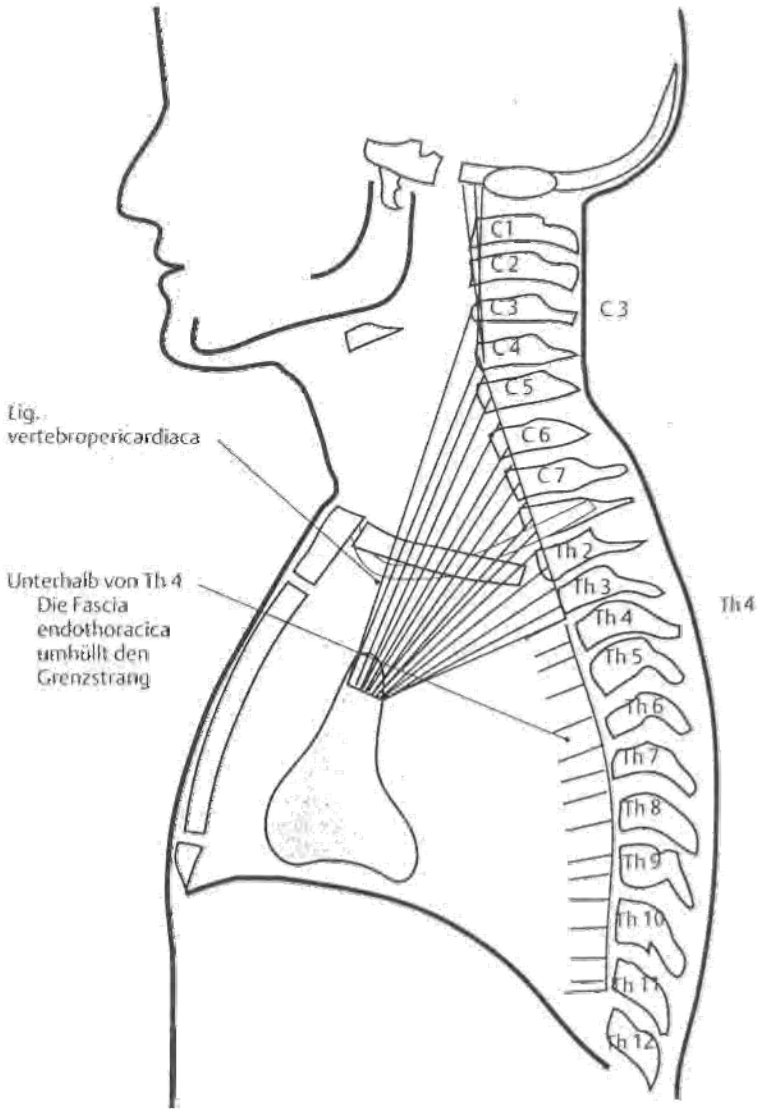
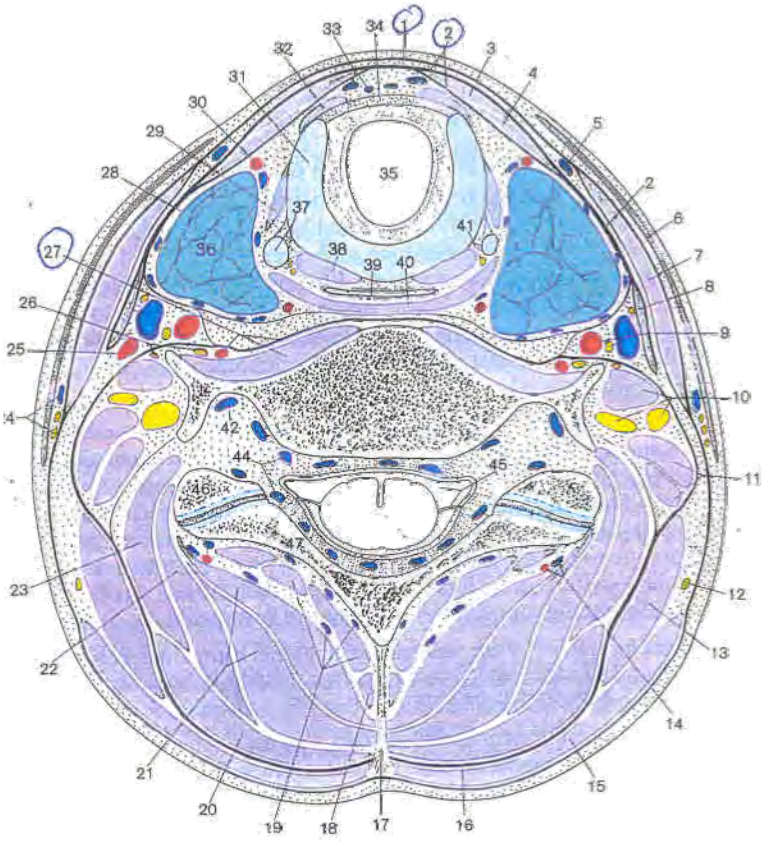


Illustration 13: Vertebropericardial Ligament

The next important spot of transversally running structures is the cervicothoracic diaphragm. The cervical region is devided into three layers by various fascial membranes (among others there are the A. carotis communis, the thyroid gland, the vagus nerve, cervicothoracic ganglion, and the diaphragmatic nerve in this area).



1 - Lamina superficialis fasciae cervicalis

2 - Lamina praetrachealis fasciae cervicalis

27 - Lamina praevertebralis fasciae cervicalis

Illustration 14: Cross section of the cervical part, through the 7th vertebral body, cranial view

1) The superficial fascial lamina, lamina superficialis fasciae cervicalis, is located under the platysma. It surrounds the ventrolateral area of the neck and is continued towards the neck in the nuchal fascia and the layer of connective tissue lying on the trapezius muscle. It is attached at the frontal area of manubrium sterni and clavicle, at the tongue bone and at the lower side of the mandible. Caudally it is connected with the pectoral fascia. At the submaxillary angle it becomes the masseteric fascia and parotid fascia. The sternocleidomastoideus muscle is sheated by it. In the cranial section of the lateral neck region (occipital triangle) superficial and deep lamina are melted. In addition they connect the cranial base with thoracic plain.

2) Praetracheal lamina of fascia is located as a triangular fascia layer in front of the viscera of the neck, caudally it is attached at the back area of both clavicles and the sternum, cranially it extends to the hyoid bone. It surrounds the lower muscles of hyoid bone. The pretracheal fascia is connected in its medial section with the superficial lamina and forms the linea alba cervicalis. The superficial lamina covers the exterior side of the thorax. There it is called endothoracic fascia. It is connected with the pericardium and thus with diaphragmatic muscle.

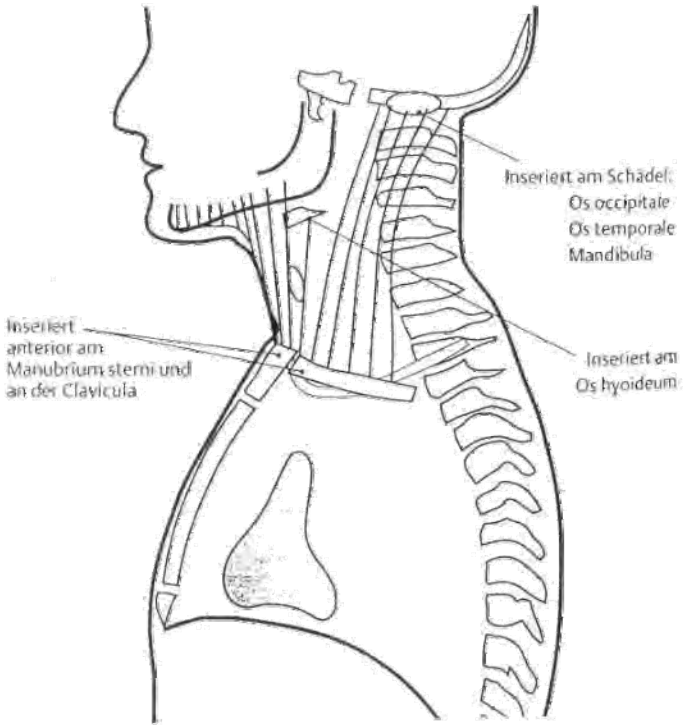


Illustration 15: Lamina superficialis fasciae cervicalis

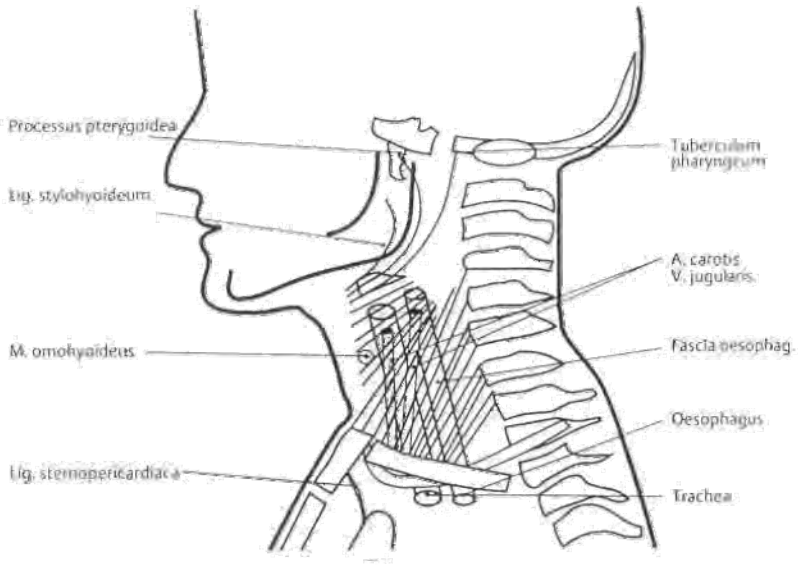


Illustration 16: Lamina praetrachealis fasciae cervicalis

27) The prevertebral layer of fascia, lamina prevertebralis fasciae cervicalis, is attached to the mesophragma of the spine with the anterior longitudinal ligament and coats the prevertebral neck muscles and the scalenus muscles. Cranially the low layer of fascia is affixed to the cranial base, caudally it continuous in the endothoracic fascia.

The cervical region thus is in direct continuity with the cranial base, the pharyngo-basilar fascia is located at the very center, which is attached to the pharyngeal tubercle of the basilar apophysis, a terminal of the laro-pharynx.

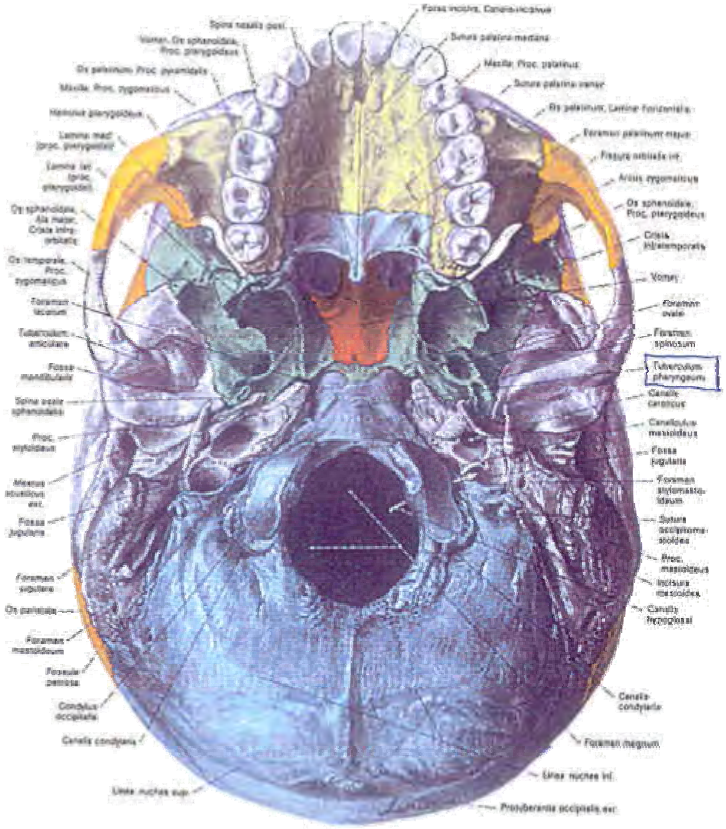


Illustration 17: Cranial base from exterior, pharyngeal tubercle

A connective tissue like connection between the rectus capitis posterior minor muscle and the back part of dura mater of spinal cord at the atlanto-occipital joint was only recently located. The fibres of the connective tissue like connections are oriented perpendicular to the dura mater.[14]

Verse it is possible that e.g. a hypertonus in the neck muscles restricts the occiput in its sutural mobility and verse may impair the sutural mobility of the other cranial bones through the inner membrane system.[14]

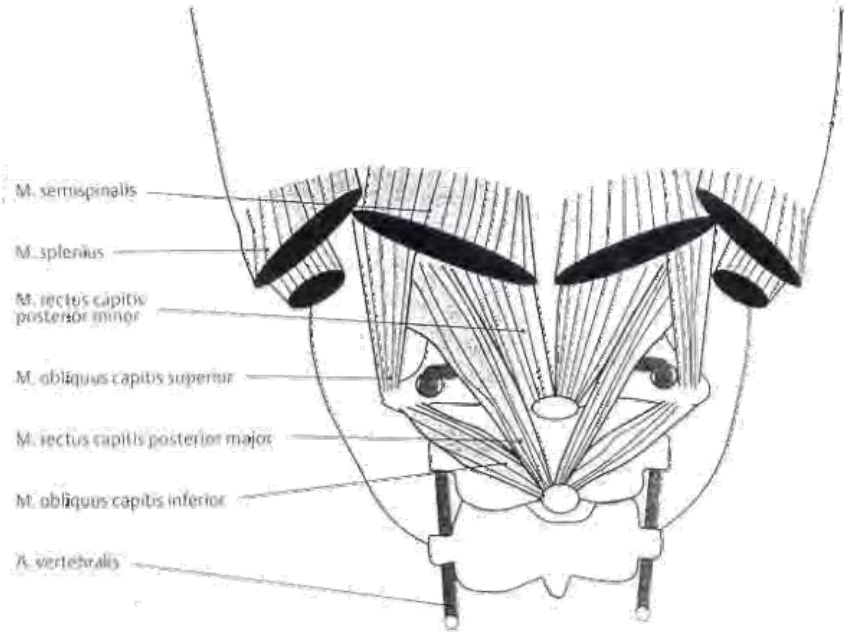


Illustration 18: M. capitis posterior minor

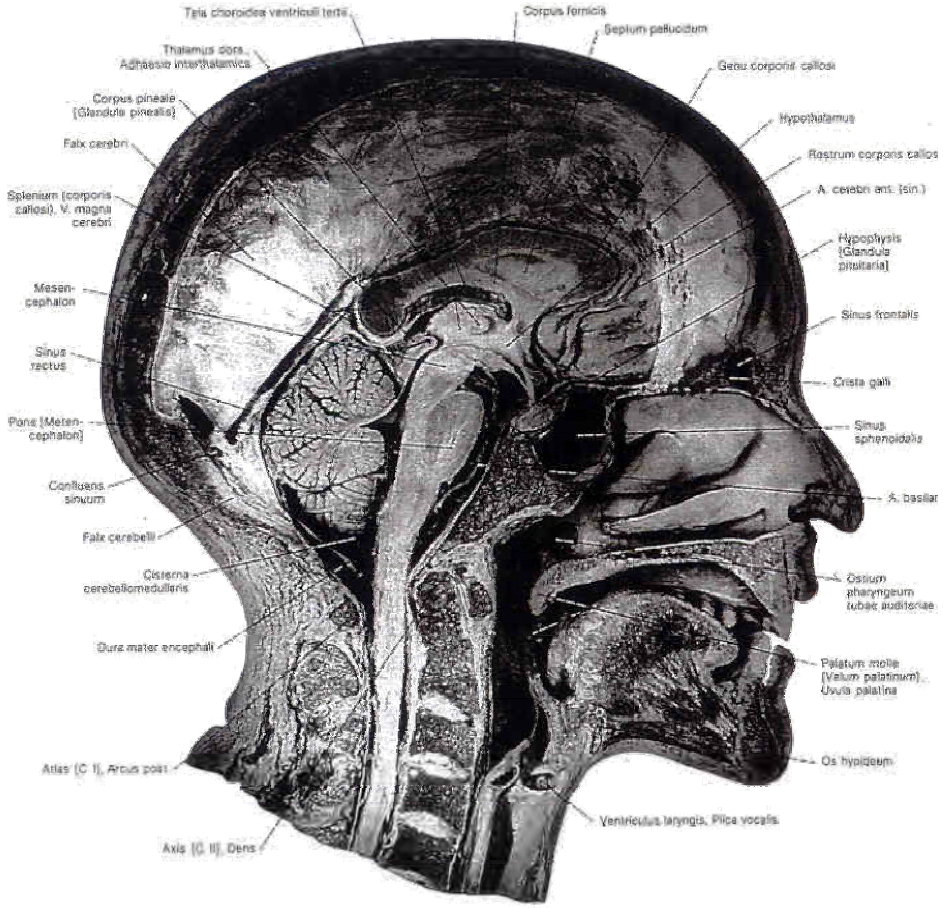


Illustration 19: Median sagittal section through the head

CNS has three connective tissue like coats which are called in the area of the brain as meningi, in the area of the spinal cord as spinal meningi. From the exterior to the interior:

- dura mater of brain and dura mater of spinal cord, dura mater
- arachnoid
- pia-arachnoid and pia mater of spinal cord, pia mater

Arachnoid and pia together form the pia mater in the broader sense, they surround the subarachnoid cavity which is filled with the liquor cerebrospinalis. The richely vascularized connective tissue of pia mater, tela choroidea, together with the ependyma in the roof of the 4th ventricle, forms the bud of the choroid plexus. By reproduction and proliferation of the pial vessels the tela choroidea pushes itself more and more into the 4th ventricle and differentiates itself to the definitive plexus choroideus. Similar in the 3rd ventricle and on both sides at the medial septum of the side ventricle. The dura mater cranialis enters the large clefts between the parts of brain with septal formations. The falx of cerebrum seperates the two cerebral hemispheres, tentorium of cerebellum covers the cerebellum, falx of cerebellum pushes itself into the vermis cerebelli.

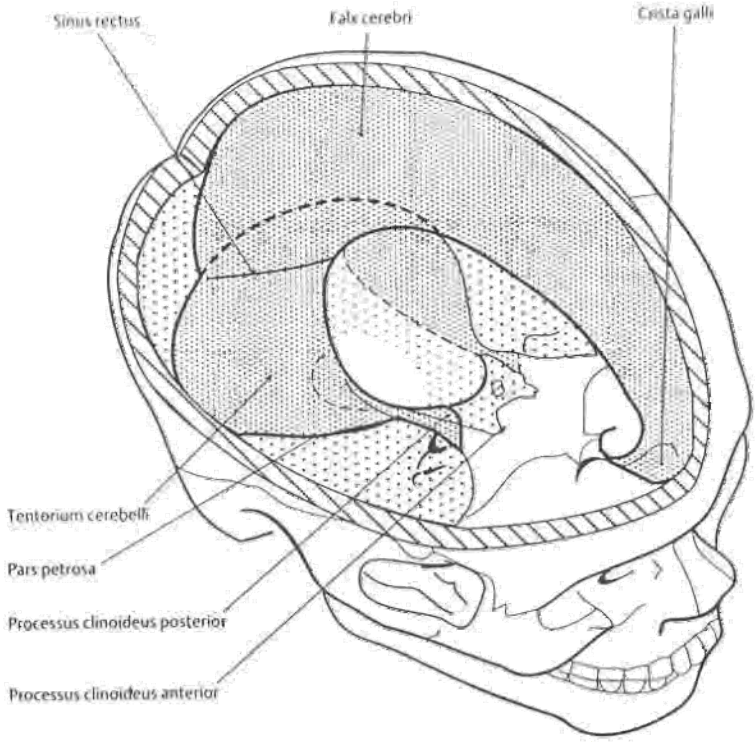


Illustration 20: Falx cerebri, Tentorium cerebelli

The dura mater represents the ligamentous system of the osseus skull, and both dura layers together may be regarded as a functional mechanical unit. According to Delaire the horizontal system (tentorium of cerebellum, diaphragm of sella turcica) functions as tensor of the cranial base, while the vertical system (falx of cerebrum and falx of cerebellum) functions as tensor of the calvaria.14 The tension of the horizontal and vertical dural system is particularly maintained and regulated by the continuous tonus of the neck muscles and the sternocleido-mastoideus muscle. Sutherland termed this dural membrane system particularly the meningeal dura a reciprocal tension membrane system.

Due to the attachement of the dura mater to the skull bones they not only move according to the tension conditions in the dura but the transmission of pulling forces to extradural, extracranial organ systems or exterior pulling forces, e.g. of the fascia upon the dura is rentered possible. The intracranial dura is directly connected with the extracranial fascia by the manyfold cranial openings at the cranial base. Extracranial tensions often are transmitted this way whire the encasements of vessels and nerves to the inner part of skull and there often cause cranial dysfunctions. Consequently, the tonus of the visceral organs is also reflected in the cranial-sacral system.

4 METHODICS

4.1 Working material

- Measuring Instrument

For measuring the blood-pressure I`ll use an electronic measuring instrument (boso medicus) with an arm-sling.

Taking the blood pressure:

The arterial blood pressure is measured with an inflatable sleeve on the upper arm. The pressure of the sleeve has to be intensified as long as it compresses the artery entirely and interrupts the blood-flow. The sleeve-pressure must be above the systolic valence. Subsequently the pressure has to be reduced slowly. The electronic measurement occurs at that moment when the artery opens itself for a short moment, the first noice is recorded (= systolic pressure). The noises are caused by the turbulent blood-flow in the narrow and partly collapsed artery under the sleeve. The diastolic pressure can be achieved, when under extensive decrease of the sleeve-pressure the noises are getting dull and quiet quickly**.**

- Questionaire- and Examinationsform: (annex)

-A two-sided form for the anamnesis and measuring results

-A seven-sided examination form for the osteopathic examination

4.2 Selection of test persons

- The practical part was carried out with 20 test persons.
- The test persons agreed to take part on a study about decreasing the blood pressure through an osteopathic technique and have been informed accordingly.
- The test persons came from offices of different general practitioners and from our physical therapy office.
- Every 2nd person who had made an appointement belonged to the „blinding“ group.
- The test persons were masculine and in the age of 30– 45 years.

- The persons had the diagnosis Hypertension at the limit from normal to high blood-pressure without medication (systol. 140 – 160, diastol. 90 – 95).
- Elimination factors: cardiac infarction, stroke, kidney-pathologies, diabetes mellitus.

4.3 Procedure of the practical part

4.3.1 Content of the practical part:

1. Anamnesis
2. Hematometry
3. Osteopathic Examination

4.3.2 Course of the practical part:

Part 1:

- The practical part is always carried out in the afternoon
- Anamnesis (anamnesis form – annex)
- The 1st blood-pressure and pulse rate measurement takes place after a recreation time of 15 minutes, in the sitting position, on both sides
- Then, lying position for the test person, the 2nd measuring follows, only left side, the measuring instrument remains in its position
- Now I start with the CV4 – technique and every 3rd minute the blood- pressure is taken by an assistant. The purpose of the 3 minutes interval is to keep the vessels reactive. Besides this, the time of the stillpoint is noted
- Subsequently, after 3 minutes the blood-pressure is taken in the sitting positon on both sides.

Part 2:

- Osteopathic examination (examination form - annex)

  Although objective measurement criteria are the basis for an osteopathic examination, the examination remains, by virtue of the subjective perception of the examining person, subjective. The osteopath has, however, through his training knowledge of the „normal“

tension state of muscles and fascia respectively of the „normal“ mobility of joints to recognize the „non- normal“ and to understand its cause.

Part 3:

- The blood-pressure checking follows after 2 weeks. It starts after a relaxing time of 15 minutes in the sitting position, on both sides.

Ad. „blinding“ group:
The difference therein is, that the CV4 – technique is not really done, but pretended. That means that the hands position of the therapist is the same, but the technique is not really done.The therapist does not concentrate on the test person and does not feel what is taking place under his (her) hands.
Of course it has to be questioned what kinds of effects the hands position on the test person has. It might be possible that a general relaxation follows, however I do not believe that the effect can be equalized with CV4-technique.

4.4 Describtion of the CV-4-technique

Cf. 14

Patient: in supine position
Therapist: is located at the patients head end

Hand position:

- The hands are put into each other forming a shell shape, the tips of thumb are touching and forming a V
- The tips of thumb point toward distal and are located approximately at the height of the second or third spine of cervical vertebra
- The balls of thumb are put in medial position at the squama occipitalis

Implementation:

- The therapist feels for the PRM (primary respiratory mechanism), the intraosseous motion of the occiput, the motion of the reciprocal membranes, the cerebellum and the fluid in the fourth ventricle
- During the expiratory phase the therapist follows with his (her) balls of thumb the narrowing of the squama occipitalis
- In the inspiratory phase the balls of thumb prevent the outward rotation, respectively the spreading of the squama occipitalis
- In the next expiratory phase the hands accompany the occiput further in its inward rotation and resist its spreading in the expiratory phase
- After several cycles the pressure against the balls of thumb decreases during the inspiratory phase. The flexion/extension motion has come to a stillpoint: the stillpoint
- It now comes to a motion of the fluids around their central axis, around their origin, micro motions might be sensed which represent a kind of disentanglement and relaxation of the fascia, muscles and bones
- Duration of stillpoint: a few seconds to several minutes
- Indicators for a successful stillpoint: deeper breathing motions, slight development of perspiration on the forehead, decrease of muscle tonus, patient falls asleep

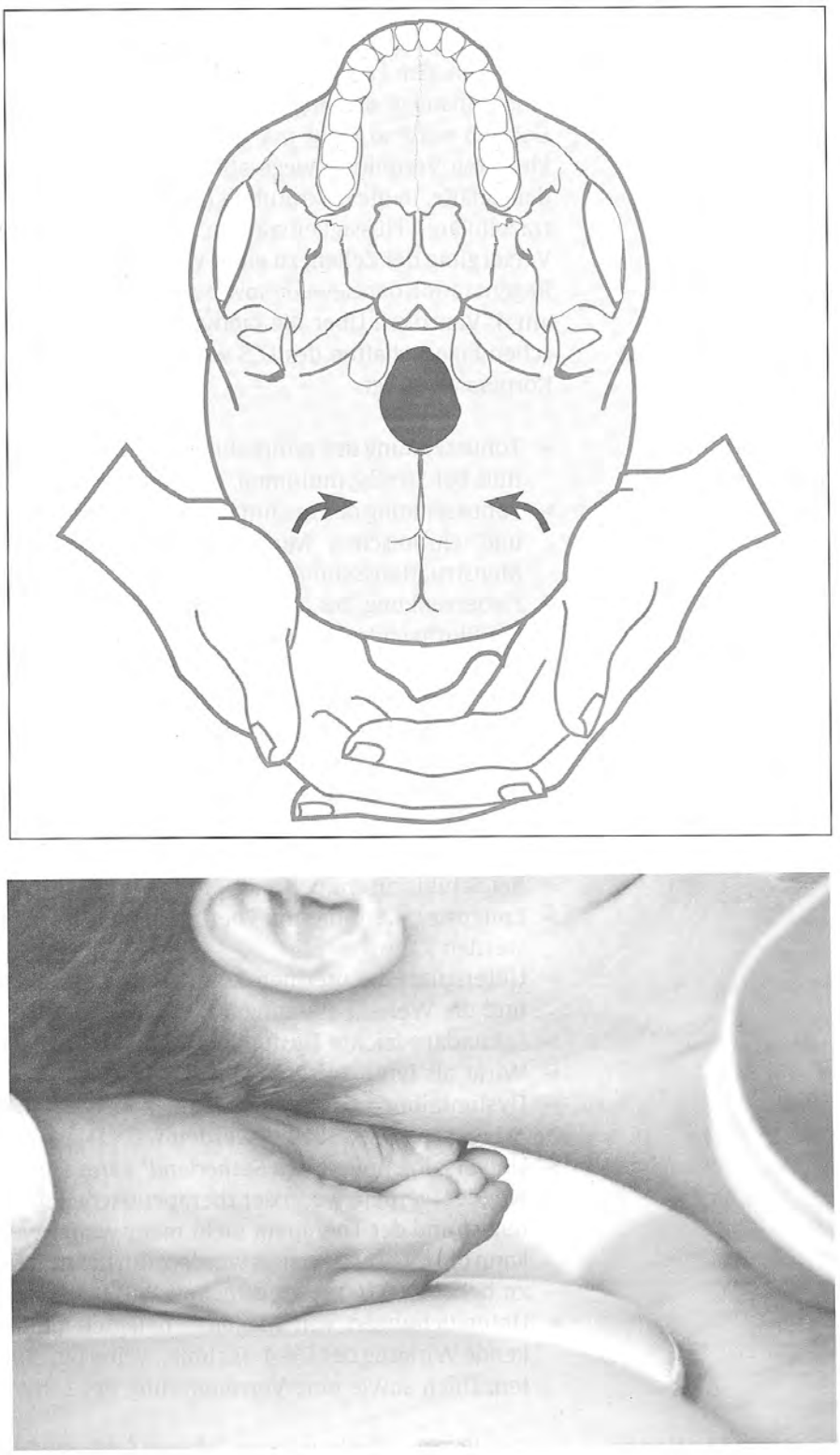


Illustration 21: CV4-Technique

5 RESULTS

5.1 Blood Pressure Results

At the begin of the section results I would like to emphasize that the number of test persons is not sufficient for a significant statement.

Table 1: Blood pressure results of the test group and the dummy group

Legend:

t1 starting position sitting

t2 reclining

t3 reclining, first measurement during application of the CV4-technique

t4 reclining, second measurement during application of the CV4-technique

t5 reclining, third measurement during application of the CV4-technique

t6 sitting, after application of the CV4-technique

t7 measurement taken after two weeks in sitting position, long-term effect

VG= test group

PG= dummy group

Re= right side

Li= left side

Blutdruck= blood pressure

Alter= Age

Mittelwert= mean value

Table 1

Osteopathie			li														re					
Blutdruck			t1		t2		t3		t4		t5		t6		t7		t1		t6		t7	
VG	Alter	kg	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia
1	30	106	166	86	140	76	142	74	***141***	***72***	142	70	148	79	152	92	156	83	158	78	144	81
2	31	95	164	108	149	92	145	92	***142***	***87***	140	88	152	106	157	94	188	109	164	102	167	106
3	37	91	178	95	148	90	152	88	***144***	***88***	148	86	156	94	138	98	172	91	184	92	136	89
4	38	87	131	80	130	80	138	82	***140***	***76***	136	77	120	74	147	83	141	88	136	80	145	81
5	42	100	165	95	164	93	***152***	***85***	146	82	142	80	150	91	155	88	155	90	145	88	150	89
6	42	80	134	88	126	90	126	88	***128***	***89***	124	87	135	94	130	87	144	95	144	88	126	89
7	43	80	159	102	135	94	141	97	***132***	***90***	138	91	141	101	148	96	153	97	142	103	156	92
8	44	75	179	96	150	90	***136***	***88***	141	91	136	89	170	104	155	95	190	90	156	85	160	90
9	45	94	147	94	128	82	126	80	127	79	***124***	***80***	128	85	141	90	135	91	129	92	142	89
10	45	92	166	100	179	95	147	89	***146***	***90***	144	87	150	96	150	95	162	98	152	99	155	95
Mittelwert VG			**159**	**94**	**145**	**88**	**141**	**86**	**139**	**84**	**137**	**84**	**145**	**92**	**147**	**92**	**160**	**93**	**151**	**91**	**148**	**90**

			li														re					
			t1		t2		t3		t4		t5		t6		t7		t1		t6		t7	
PG	Alter	kg	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia
1	31	85	159	89	155	90	144	85	130	80	140	81	164	95	150	92	165	96	152	93	162	89
2	33	83	146	80	157	80	140	71	136	72	137	68	137	78	148	86	156	82	145	74	148	86
3	37	74	167	100	142	94	140	92	138	89	137	88	145	96	164	108	144	89	144	98	166	104
4	38	85	149	99	161	96	145	88	145	83	149	90	152	97	146	92	166	100	164	97	148	87
5	39	100	144	95	144	81	130	81	131	79	132	76	133	89	158	98	155	96	137	89	166	100
6	42	90	138	92	146	89	135	88	135	88	132	84	130	92	136	85	140	90	134	89	138	88
7	42	85	155	98	145	90	144	87	140	86	142	84	148	86	150	95	150	95	145	87	144	85
8	44	71	161	97	155	84	150	83	149	82	147	82	155	83	150	91	151	99	148	90	145	90
9	45	108	157	99	138	90	135	89	138	90	139	88	140	91	144	87	162	98	152	94	158	84
10	45	90	146	96	140	79	132	84	127	84	123	77	138	88	139	87	130	84	132	84	132	92
Mittelwert PG			**152**	**95**	**148**	**87**	**140**	**85**	**137**	**83**	**138**	**82**	**144**	**90**	**149**	**92**	**152**	**93**	**145**	**90**	**151**	**91**

5.2 Representation and Describtion of the Blood Pressure Results

1. Representation of mean differences between the test group and the dummy group regarding systolic and diastolic blood pressure

Mean blood pressure/test group:

moment	systol./diastol. blood pressure left	right
t1	159/94	160/93
t2	145/88	
t3	141/86	
t4	139/84	
t5	137/84	
t6	145/92	151/91
t7	147/92	148/90

Mean blood pressure/dummy group:

moment	systol./diastol. blood pressure left	right
t1	152/95	152/93
t2	148/87	
t3	140/85	
t4	137/83	
t5	138/82	
t6	144/90	145/90
t7	149/92	151/91

2. Experimental design - effect = mean differences between starting position t1 and t6 (short-term respectively starting medium-term effect) and t7 (long-term effect)

	moment 1	moment 6	moment 7	interpretation
average blood pressure test group	159/94	145/92	147/92	variation, modest long-term effect
average blood pressure dummy group	152/95	144/90	149/92	variation, no long-term effect

Moment t1 - t6 - short term and starting medium-term effect:

In the test group the systolic value decreases on the average by 14 mmHg (8,81%), in the dummy group by 8 mmHg (5,27%). That means that there is a modest effect triggered by the CV4-technique.

No effect can be noted with regard to the diastolic value. It decreases from 94 to 92 mmHg (2,13%) in the test group and from 95 to 90 (5,27%) in the dummy group.

Moment t6 - t7 - long term effect:

In the test group the average blood pressure value remains approximately the same (145/92 t6 and 147/92 t7 = 1,37% increase). That means that the effect lasts over a longer period of time, but there is no further decrease of the blood pressure.
In the dummy group the value moves back toward the starting value, there is no long-term effect. (increase of 3,47%)

3. Representation of moments 3, 4, 5 (during application of the technique - including stillpoint)

	t3	t4	t5	t2	average of t3, 4, 5
average blood pressure test group	141/86	139/84	137/84	145/88	139/85
average blood pressure dummy group	140/85	137/83	138/82	148/87	138/83

On the average there is a slight decrease of the systolic value during this phase, which is more regular in the test group than in the dummy group.

In order to evaluate the significance between test- and dummy group, a double factorial analysis of variance with repitation of measuring was carried out.
For significance a result below 0,05 would be necessary. With the help of a significance test an observed result can be lined off with little clause reserving errors from coincidence statistically. Statistical significance however is not synonym with clinical relevance.
The result was in the diastolic field at 0,674, in the systolic field at 0,836. That means that the measuring result is not significant statistically.
Referring to my formulation of question that means that by use of the CV4-technique arises no significant measurable change of the blood pressure at threshold hypertensive patients.

Significance test - systolic

General Linear Model

Notes

Output Created		10-FEB-2006 10:41:21
Comments		
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	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
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Resources	**Elapsed Time**	0:00:00,02

Within-Subjects Factors

Measure: MEASURE_1

SYSTOL	Dependent Variable
1	T1S
2	T2S
3	T3S
4	T4S
5	T5S
6	T6S
7	T7S

Between-Subjects Factors

		N
Gruppe	0	10
	1	10

Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
SYSTOL	Pillai's Trace	,841	11,418 (a)	6,000	13,000	,000
	Wilks' Lambda	,159	11,418 (a)	6,000	13,000	,000
	Hotelling's Trace	5,270	11,418 (a)	6,000	13,000	,000
	Roy's Largest Root	5,270	11,418 (a)	6,000	13,000	,000
SYSTOL * GRUPPE	Pillai's Trace	,331	1,074(a)	6,000	13,000	,426
	Wilks' Lambda	,669	1,074(a)	6,000	13,000	,426
	Hotelling's Trace	,496	1,074(a)	6,000	13,000	,426
	Roy's Largest Root	,496	1,074(a)	6,000	13,000	,426

a Exact statistic

b Design: Intercept+GRUPPE
Within Subjects Design: SYSTOL

Mauchly's Test of Sphericity(b)
Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon(a)		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
SYSTOL	,038	51,703	20	,000	,569	,758	,167

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.
b Design: Intercept+GRUPPE Within Subjects Design: SYSTOL

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
SYSTOL	Sphericity Assumed	5010,643	6	835,107	16,605	,000
	Greenhouse-Geisser	5010,643	3,416	1466,930	16,605	,000
	Huynh-Feldt	5010,643	4,547	1101,966	16,605	,000
	Lower-bound	5010,643	1,000	5010,643	16,605	,001
SYSTOL * GRUPPE	Sphericity Assumed	294,586	6	49,098	,976	,445
	Greenhouse-Geisser	294,586	3,416	86,244	,976	,418
	Huynh-Feldt	294,586	4,547	64,787	,976	,432
	Lower-bound	294,586	1,000	294,586	,976	,336
Error (SYSTOL)	Sphericity Assumed	5431,629	108	50,293		
	Greenhouse-Geisser	5431,629	61,483	88,343		
	Huynh-Feldt	5431,629	81,846	66,364		
	Lower-bound	5431,629	18,000	301,757		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	SYSTOL	Type III Sum of Squares	df	Mean Square	F	Sig.

SYSTOL	Linear	615,302	1	615,302	14,686	,001
	Quadratic	4227,515	1	4227,515	57,942	,000
	Cubic	35,208	1	35,208	,521	,480
	Order 4	72,639	1	72,639	1,040	,321
	Order 5	32,315	1	32,315	,925	,349
	Order 6	27,664	1	27,664	1,899	,185
SYSTOL * GRUPPE	Linear	49,802	1	49,802	1,189	,290
	Quadratic	20,372	1	20,372	,279	,604
	Cubic	95,408	1	95,408	1,412	,250
	Order 4	69,000	1	69,000	,988	,333
	Order 5	59,815	1	59,815	1,713	,207
	Order 6	,188	1	,188	,013	,911
Error(SYSTOL)	Linear	754,146	18	41,897		
	Quadratic	1313,292	18	72,961		
	Cubic	1215,883	18	67,549		
	Order 4	1257,523	18	69,862		
	Order 5	628,620	18	34,923		
	Order 6	262,164	18	14,565		

Tests of Between-Subjects Effects
Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	2914860,007	1	2914860,007	6403,103	,000
GRUPPE	20,064	1	20,064	,044	,836
Error	8194,071	18	455,226		

Significance test - diastolic

General Linear Model

Notes

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	N of Rows in Working Data File	20
Missing Value Handling	**Definition of Missing**	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
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Resources	**Elapsed Time**	0:00:00,00

Within-Subjects Factors

Measure: MEASURE_1

DIASTOL	Dependent Variable
1	T1D
2	T2D
3	T3D
4	T4D
5	T5D
6	T6D
7	T7D

Between-Subjects Factors

		N
Gruppe	0	10
	1	10

Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
DIASTOL	Pillai's Trace	,891	17,771 (a)	6,000	13,000	,000
	Wilks' Lambda	,109	17,771 (a)	6,000	13,000	,000
	Hotelling's Trace	8,202	17,771 (a)	6,000	13,000	,000
	Roy's Largest Root	8,202	17,771 (a)	6,000	13,000	,000
DIASTOL * GRUPPE	Pillai's Trace	,108	,263(a)	6,000	13,000	,945
	Wilks' Lambda	,892	,263(a)	6,000	13,000	,945
	Hotelling's Trace	,121	,263(a)	6,000	13,000	,945
	Roy's Largest Root	,121	,263(a)	6,000	13,000	,945

a Exact statistic

b Design: Intercept+GRUPPE
Within Subjects Design: DIASTOL

Mauchly's Test of Sphericity(b)
Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon(a)		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
DIASTOL	,105	35,499	20	,019	,619	,843	,167

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.
b Design: Intercept+GRUPPE Within Subjects Design: DIASTOL

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
DIASTOL	Sphericity Assumed	2352,571	6	392,095	27,265	,000
	Greenhouse-Geisser	2352,571	3,712	633,788	27,265	,000
	Huynh-Feldt	2352,571	5,056	465,316	27,265	,000
	Lower-bound	2352,571	1,000	2352,571	27,265	,000
DIASTOL * GRUPPE	Sphericity Assumed	36,000	6	6,000	,417	,866
	Greenhouse-Geisser	36,000	3,712	9,698	,417	,782
	Huynh-Feldt	36,000	5,056	7,120	,417	,838
	Lower-bound	36,000	1,000	36,000	,417	,526
Error (DIASTOL)	Sphericity Assumed	1553,143	108	14,381		
	Greenhouse-Geisser	1553,143	66,815	23,246		
	Huynh-Feldt	1553,143	91,005	17,066		
	Lower-bound	1553,143	18,000	86,286		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	DIASTOL	Type III Sum of Squares	df	Mean Square	F	Sig.

DIASTOL	Linear	11,429	1	11,429	,838	,372
	Quadratic	2015,238	1	2015,238	72,590	,000
	Cubic	26,133	1	26,133	1,680	,211
	Order 4	54,047	1	54,047	3,320	,085
	Order 5	211,438	1	211,438	24,844	,000
	Order 6	34,287	1	34,287	7,563	,013
DIASTOL * GRUPPE	Linear	2,314	1	2,314	,170	,685
	Quadratic	15,238	1	15,238	,549	,468
	Cubic	4,800	1	4,800	,308	,585
	Order 4	10,519	1	10,519	,646	,432
	Order 5	3,086	1	3,086	,363	,555
	Order 6	4,242E-02	1	4,242E-02	,009	,924
Error(DIASTOL)	Linear	245,543	18	13,641		
	Quadratic	499,714	18	27,762		
	Cubic	280,067	18	15,559		
	Order 4	293,031	18	16,280		
	Order 5	153,190	18	8,511		
	Order 6	81,597	18	4,533		

Tests of Between-Subjects Effects
Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	1088211,779	1	1088211,779	4698,267	,000
GRUPPE	42,350	1	42,350	,183	,674
Error	4169,157	18	231,620		

5.3 Results of anamnestic questioning about the development of high blood pressure:

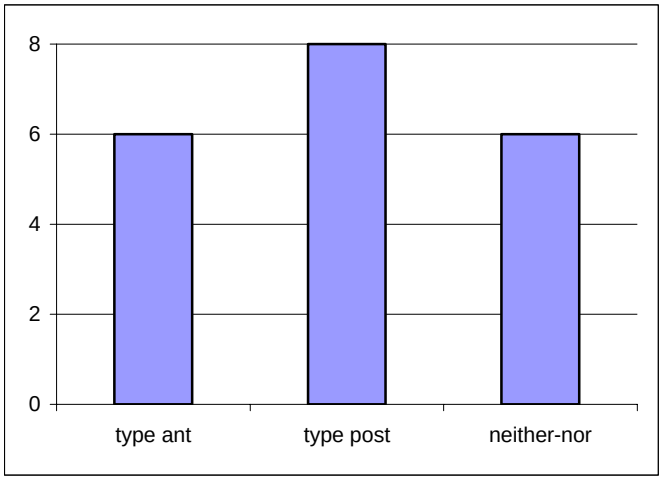
Overweight and not enough athletic activity seem to play a role in the development of hypertension. Stress at work and consumption of alcohol, nicotine and coffee, according to this study, play only an insignificant role.
(17 of 20 test persons are overweight, 15 rarely or never do any sport, 5 feel stressed with their work; 4 test persons regularly drink alcohol, 10 regularly drink coffee and 4 regularly smoke).

In 14 cases high blood pressure also affects family members (parents, grandparents). 5 test persons had an accident in their life (head trauma, fracture of the clavicle, Tossi III, whiplash injuries).
None of the test persons had a diagnosed cardiovascular disease. 11 test persons suffer from various diseases (asthma, neurodermatitis, sinusitis, pulmonary abscess, Scheuermann's disease, thyroid surgery, bile surgery, gout, migraine, stomach troubles) and accidents (see above).

5.4 Diagrams of the osteopathic examination:

5.4.1 Classification of types

type ant	6 test persons
type post	8 test persons
neither-nor	6 test persons



The classification of the types was carried out on 20 test persons, thereof 6 persons were assigned to type anterior, 8 persons type posterior and 6 persons neither type A nor type B.

The human being is constantly in a state of oscillation, the result of the various motions is the central line.

Type ant.: when the central line comes toward anterior

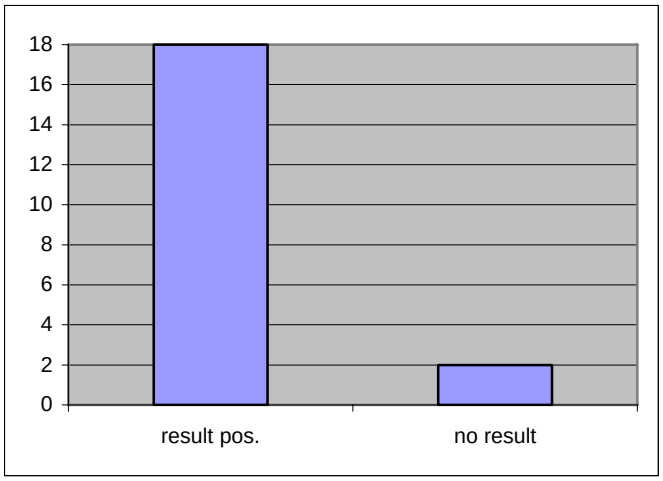
Type post.: when the central line comes toward posterior

Any deviation leads to changes of muscle tension, fascia, the curvature of the spine and conditions of pressure in the body.

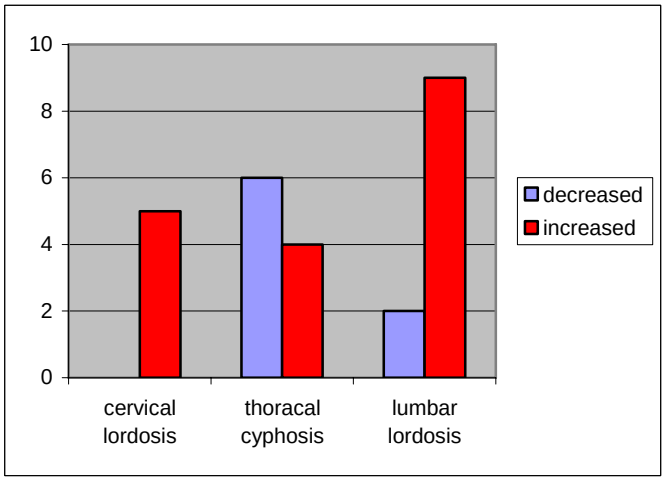
Dysfunctional chains may be created.

5.4.2 Examination - sagital plane

result positive	18
no result	2



	decreased	increased
cervical lordosis	0	5
thoracal cyphosis	6	4
lumbar lordosis	2	9

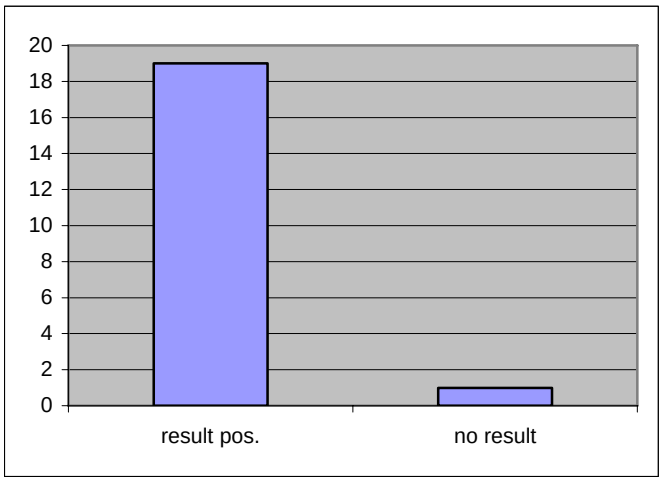


The examination in terms of changes in the sagital plane was carried out on 20 test persons. At 18 men the result was positive, at 2 men negative.

Therof changes in the area of the cervical-lordosis were increased at 5 persons, nobody decreased. 4 persons showed a intensification and 6 a decrease of the thoracic-cyphosis. The lumbar-lordosis was increased on 9 test persons and decreased on 2 persons.

5.4.3 Examination - frontal plane

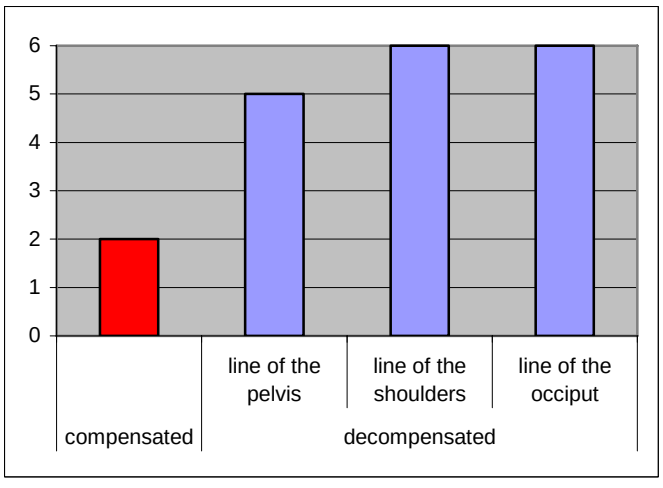
result positive	19 (2 compensated, 17 decompensated)
no result	1



The examination showed a positive result on 19 test persons, there was no result on one person.

result positive:

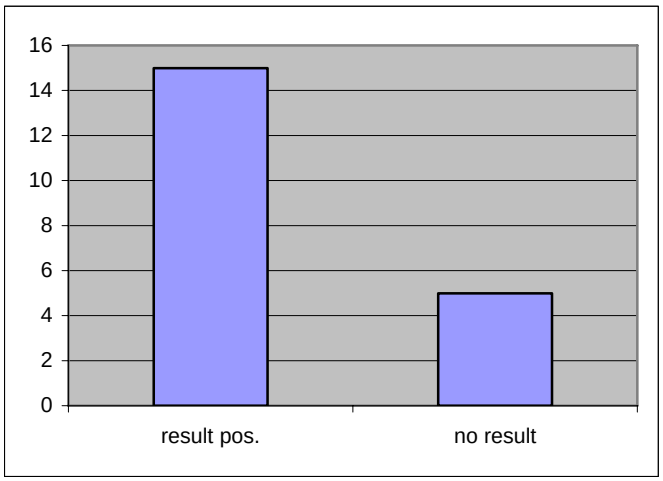
compensated	2 test persons		
decompensated	17 test persons	line of the pelvis	5
		line of the shoulders	6
		line of the occiput	6



On the 17 test persons with decompensated frontal plane 5 persons showed a divergency at pelvis area, 6 at shoulder and 6 at the occiput.

5.4.4 Examination – transversal plane

result positive	15 test persons
no result	5 test persons



At 15 of 20 test persons the examination showed a result in the transversal plane, 5 where without a result.

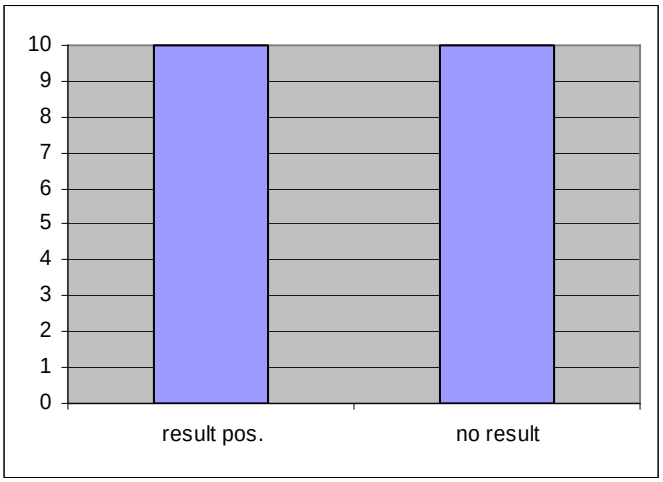
result positive	15 test persons
pelvis/shoulders rotated left	10
pelvis/shoulders rotated right	4
shoulders le./pelvis ri. rotated	1

From the 15 test persons with result, on 10 persons has been found a rotation left of pelvis and shoulders, on 4 persons a rotation right of pelvis and shoulders, on 1 person a rotation left of the shoulders and rotation right of the pelvis has been found.

5.4.5 Examination - malposition of the foot and the leg

Position of the foot:

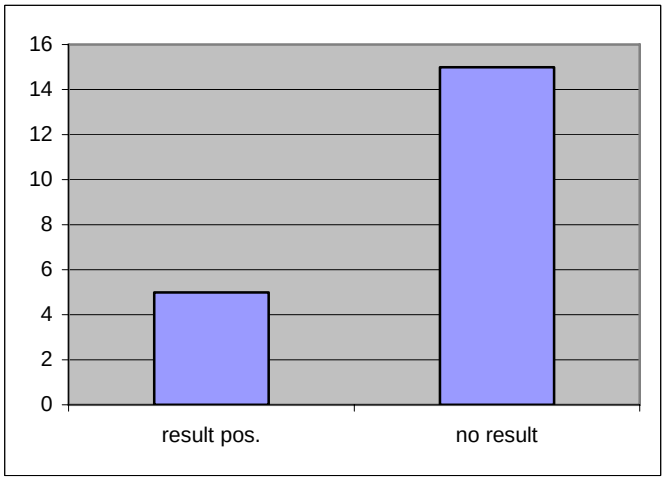
result positive	10 test persons
no result	10 test persons



The examination of the position of the foot showed a malposition on 10 persons, 10 persons were without a result.

Position of the leg:

result positive	5 test persons
no result	15 test persons

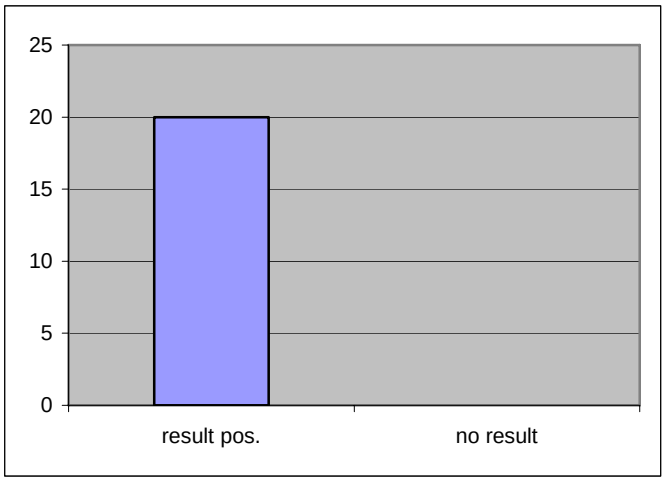


From the 20 test persons a malposition of the leg was diagnosticated on 5 persons, 15 persons were without a result.

5.4.6 Examination of the Diaphragms

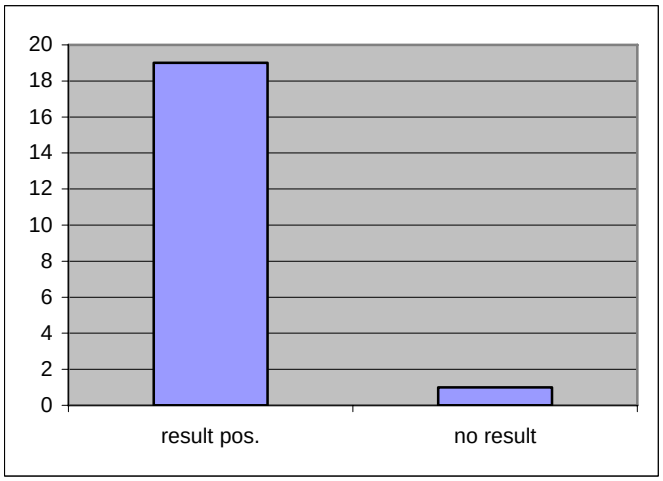
Diaphragms/standing position

result positve	20 test persons
no result	0 test person



Diaphragms/lying position

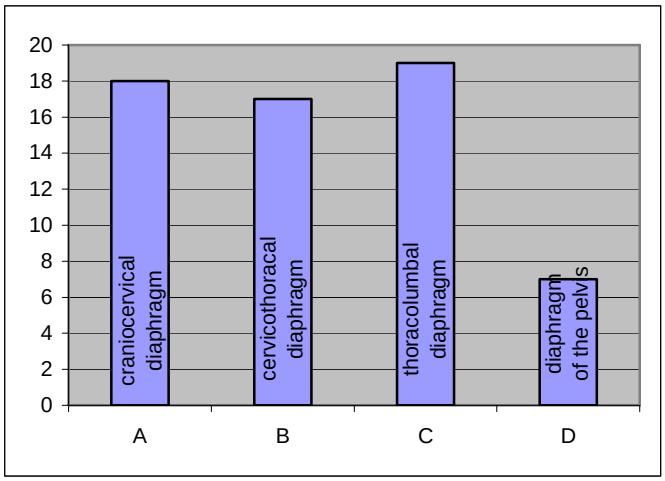
result positive	19 test persons
no result	1 test person



On all of the 20 persons the examination of the state of tension of diaphragms showed a positive result in standing position, on 19 persons a positive result in lying position, 1 person was without result.

Hypertonicity - standing position:

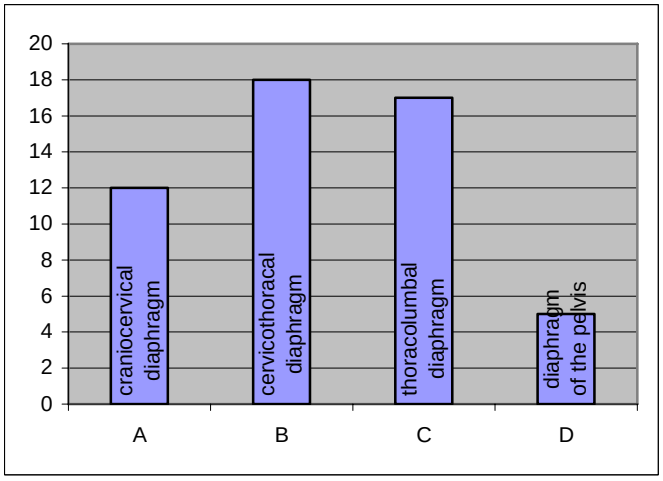
A) craniocervical diaphragm	18 test persons
B) cervicothoracal diaphragm	17 test persons
C) thoracolumbal diaphragm	19 test persons
D) diaphragm of the pelvis	7 test persons



At the examination of the diaphragms in standing position 18 test persons a hypertonus at A), 17 at B), 19 at C) and 7 test persons at D).

Hypertonicity supine position:

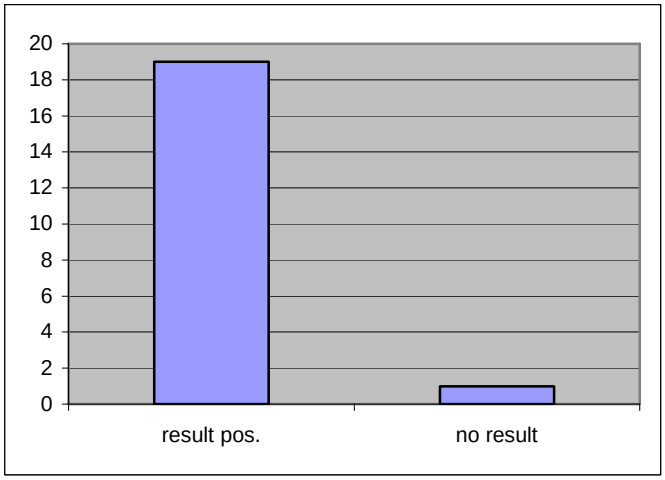
A) craniocervical diaphragm	12 test persons
B) cervicothoracal diaphragm	18 test persons
C) thoracolumbal diaphragm	17 test persons
D) diaphragm of the pelvis	5 test persons



The examination of the diaphragms in lying position showed a hypertonus on 12 persons at A), on 18 persons at B), on 17 persons at C) and on 5 persons at D).

5.4.7 Examination - thoracolumbal transition

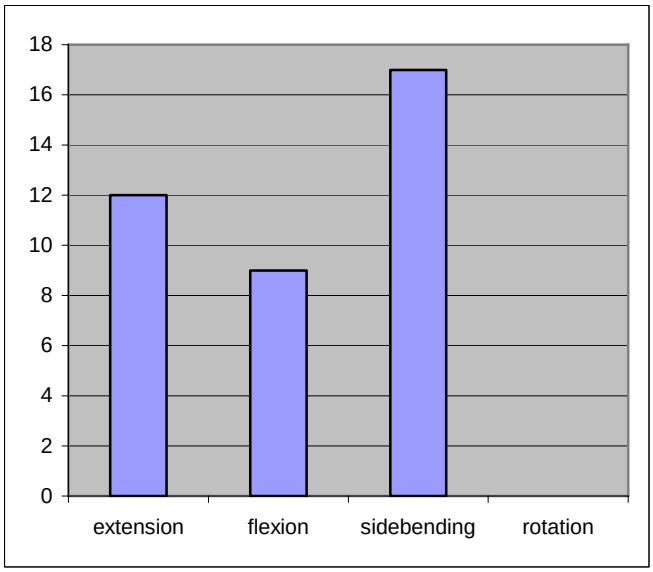
result positive	19 test persons
no result	1 test person



The examination of the thoracolumbal transition showed on 19 persons a positive result, 1 person was without a result.

Loss of motion:

extension	12 test persons
flexion	9 test persons
sidebending	17 test persons
rotation	0 person

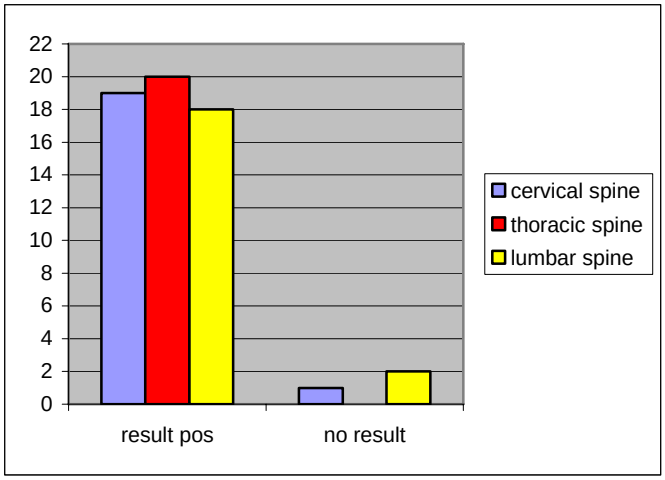


From the 19 test persons with a result 12 persons showed a restriction of extension, 9 a restriction of flexion and 17 a restriction of sidebending.

5.4.8 Examination – active motion of the spine/sitting position

result positive
cervical spine 19 test persons
thoracic spine 20 test persons
lumbar spine 18 test persons

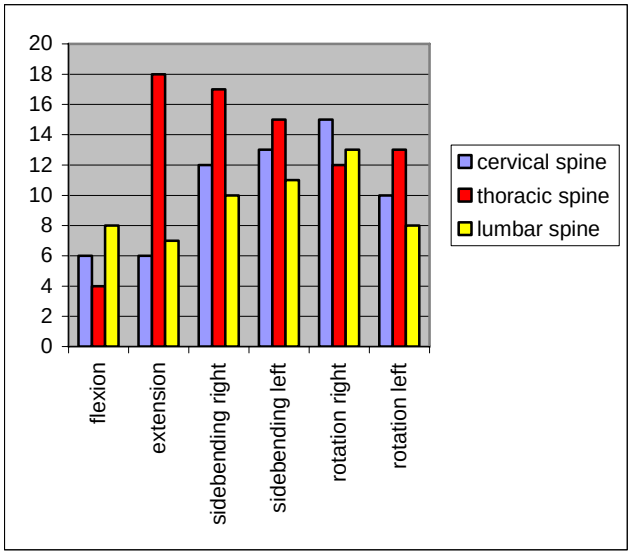
no result
cervical spine 1 test persons
thoracic spine 0 test persons
lumbar spine 2 test persons



The examination of the active motion of the spine in sitting position showed a positive result in the area of the cervical spine on 19 persons, 1 test person was without a result. All 20 test persons showed a positive result on the thoracic spine. In the area of the lumbar spine 18 persons had a result, 2 persons were without a result.

Motion testing:

	cervical spine	thoracic spine	lumbar spine
flexion	6	4	8
extension	6	18	7
sidebending right	12	17	10
sidebending left	13	15	11
rotation right	15	12	13
rotation left	10	13	8



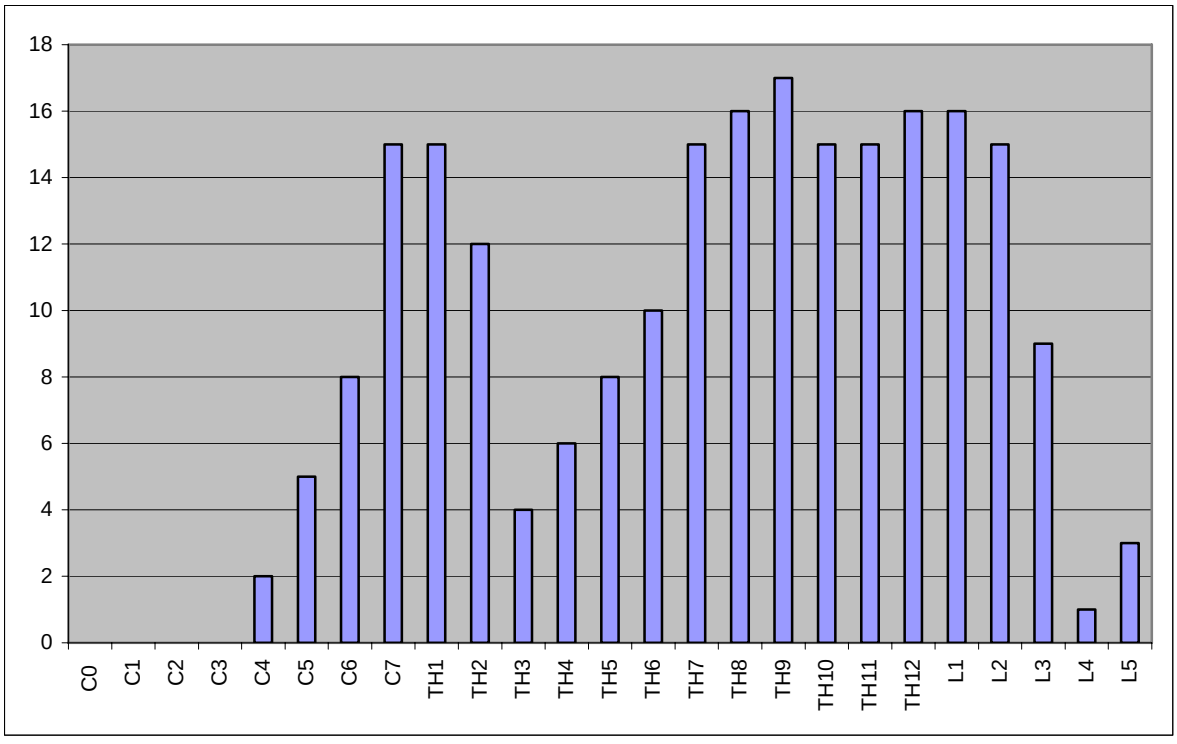
The examination of the individual directions of motion at the area of the spine- section cervical spine, 6 persons showed a reduction of flexion, 6 a reduction of extension, 12 a reduction of sidebending right, 13 a reduction of sidebending left, 15 a reduction of rotation to the right and 10 a reduction of rotation to the left.

At the area of the thoracic spine 4 test persons showed a reduction of flexion, 18 a reduction of extension, 17 a reduction of sidebending to the right, 15 a reduction of sidebending to the left, 12 a reduction of rotation to the right, 13 a reduction of rotation to the left.

And at the area of the lumbar spine, 8 test persons showed a reduction of flexion, 7 a reduction of extension, 10 a reduction of sidebending to the right, 11 a reduction of sidebending to the left, 13 a reduction of rotation to the right and 8 a reduction to the left.

5.4.9 Examination – passive motion of the spine:

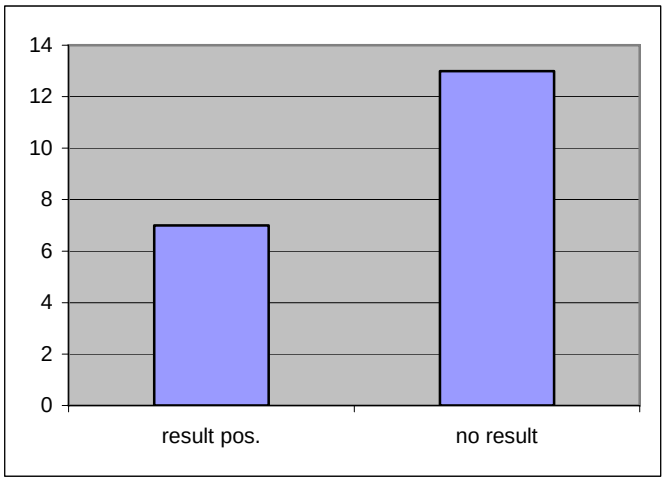
segment of the spine	test persons
C0	0
C1	0
C2	0
C3	0
C4	2
C5	5
C6	8
C7	15
TH1	15
TH2	12
TH3	4
TH4	6
TH5	8
TH6	10
TH7	15
TH8	16
TH9	17
TH10	15
TH11	15
TH12	16
L1	16
L2	15
L3	9
L4	1
L5	3



The passive motion of the spine was measured on 20 test persons, therof was no result at the area C0,C1,C2 and C3, 2 persons had a reduction of motion at the area C4, C5- 5 persons, C6- 8 persons and C7- 15 persons.
The thoracic spine showed a reduction of motion at the area Th1 on 15 men, Th2 on 12, Th3 on 4, Th4 on 6, Th5 on 8, Th6 on 10, Th7 on 15, Th8 on 16, Th9 on 17, Th10 on 15, Th11 on 15 and Th12 on 16 test persons.
At the area of the lumbar spine 16 persons had a reduction of motion on L1, 15 on L2, 9 on L3, 1 on L4 and 3 persons on L5.

5.4.10 Examination - malposition of the sacrum

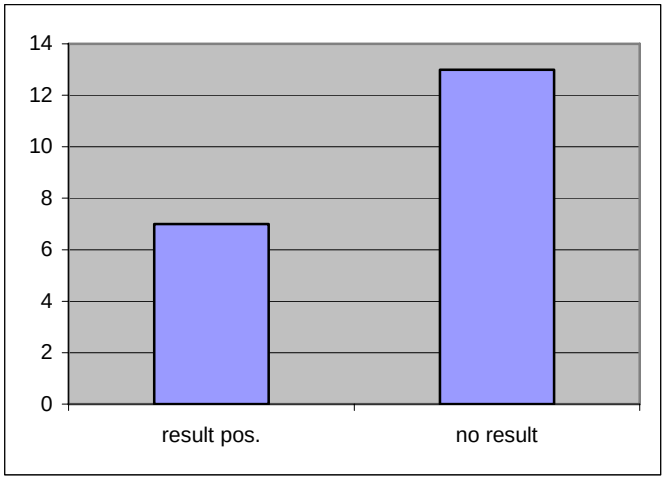
result positive	7 test persons
no result	13 test persons



On 20 men the position of the sacrum in supine position was diagnosticated. 7 test persons showed a positive result, 13 test persons had no result.

5.4.11 Examination - Ilium anterior

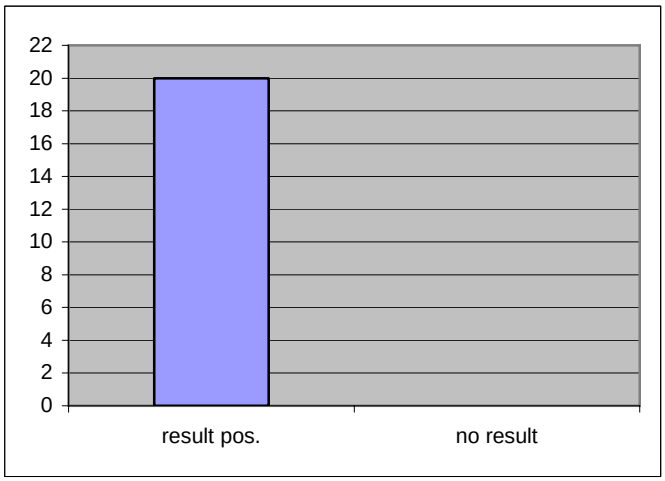
result positive	7 test persons	(right 3, left 4)
no result	13 test persons	



At this examination it was searched for an ilium anterior in supine position. Through it a positive result was found on 7 test persons (ilium anterior on the right on 3 persons, ilium anterior left on 4 persons) 13 test persons were without a result.

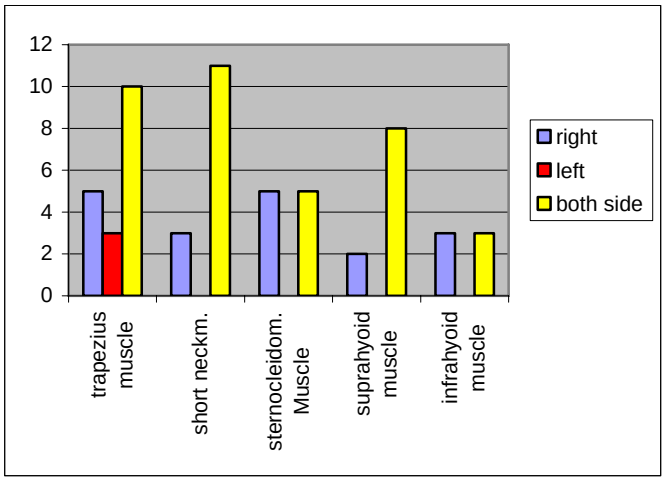
5.4.12 Examination – palpation of the muscles (hypertonic)

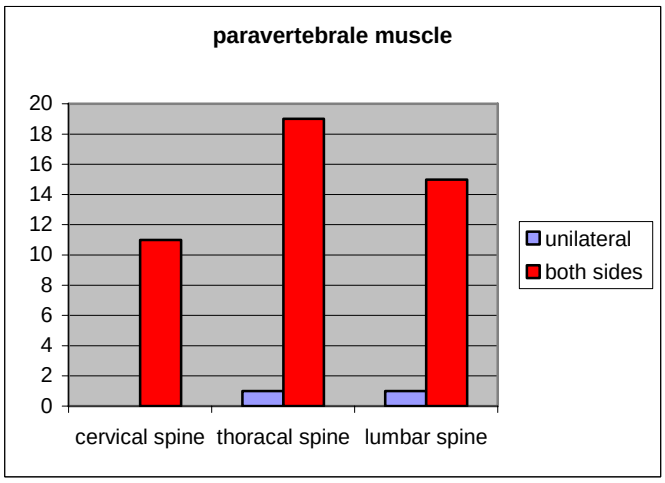
result positive	20 test persons
no result	0 test person



The examination of the muscular tension on 6 muscles respectively muscles groups showed a positive result on all of the 20 test persons.

	right	left	both sides
trapezius muscle	5	3	10
short neckm.	3	0	11
sternocleidom. muscle	5	0	5
suprahyoid muscle	2	0	8
infrahyoid muscle	3	0	3
paravertebral muscle	cervical spine	thoracal spine	lumbar spine
- unilateral	0	1	1
- both sides	11	19	15





The muscular tension was tested in lying position.

5 test persons showed a right hypertonic trapezius muscle, 3 left and 10 persons both sides.

On 3 test persons the short neck muscles were hypertonic on the right, none on the left and on 11 test person both sides.

At the area of the sternocleidomastoideus muscle 5 test persons showed a hypertonicity on the right, none on the left and 5 both sides.

The suprahyoid muscle was hypertonic on 2 persons on the right, none person left and on 8 men both side.

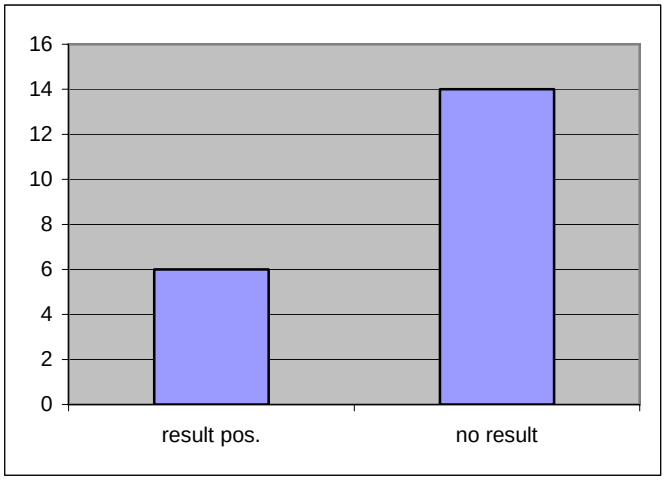
The infrahyoid muscle was hypertonic on 3 persons on the right, none person left and on 3 persons both side.

Furthermore the paravertebral muscle was diagnosticated. There was no result on none of the test persons at the area of the cervical spine unilateral, both side on 11 test persons. At the area of the thoracic spine there was 1 test person unilateral, 19 test persons both side.

At the lumbar area 1 person showed a hypertonicity unilateral, 15 men both side.

5.4.13 Examination – peripheral joints

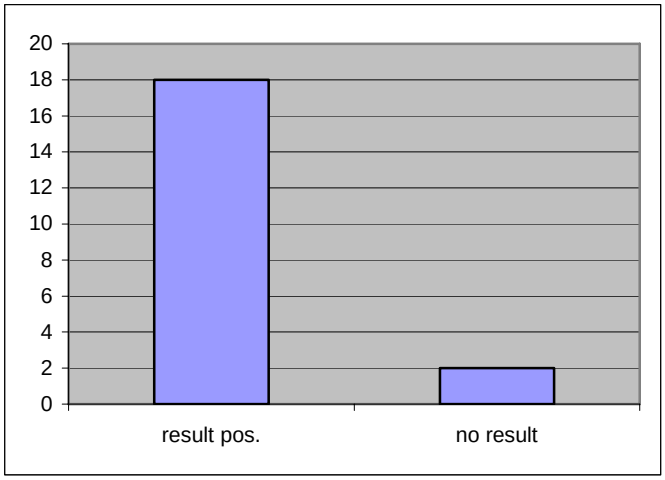
result positive		6 test persons
loss of motion	right hipjoint	2 test persons
	left hipjoint	1 test person
	left shoulderjoint	3 test persons
no result		14 test persons



The motion of the peripheral joints was tested. Therefrom 6 test persons had a positive result. 14 test persons had full mobility in their joints.

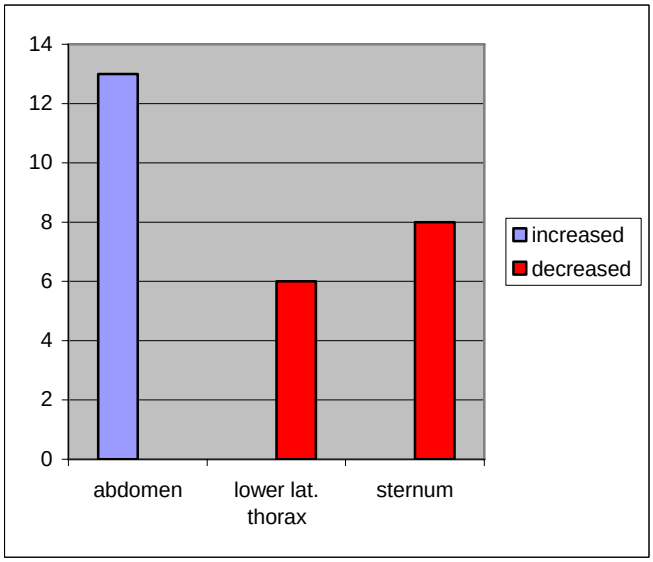
5.4.14 Examination – breathing motion

result positive	18 test persons
no result	2 test persons



The breathing motion was examined at the area of the abdomen, the lower lateral thorax and the sternum. Thereby the result was positive on 18 men, 2 men were without a result.

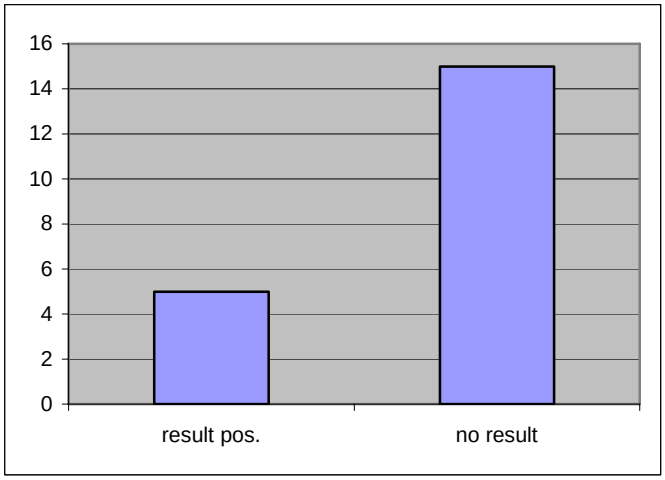
Breathing motion:	abdomen	lower lat. thorax	sternum
increased	13	0	0
decreased	0	6	8



An increasing of the breathing motion was found at the abdomen on 13 test persons. A decreased motion at the area of the lower lateral thorax on 6 men, at the area of the sternum on 8 men.

5.4.15 Examination – mediastinum

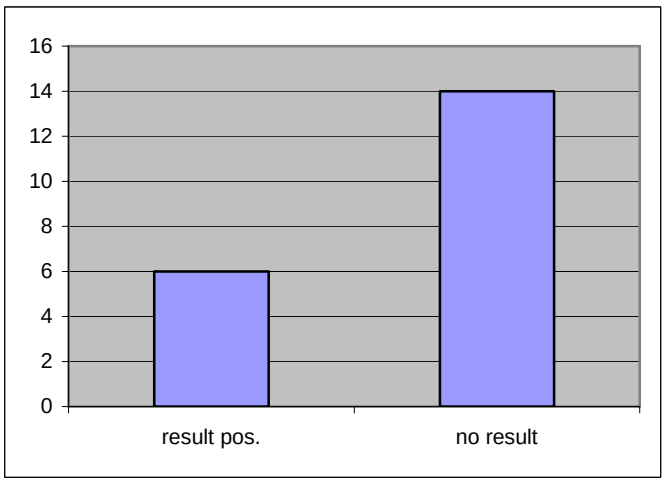
result positive	5 test persons
no result	15 test persons



The state of the tension at the area of the mediastinum was diagnosticated on 20 test persons. Therefrom 5 persons had a positive result, 15 persons no result.

5.4.16 examination – motility of the organs

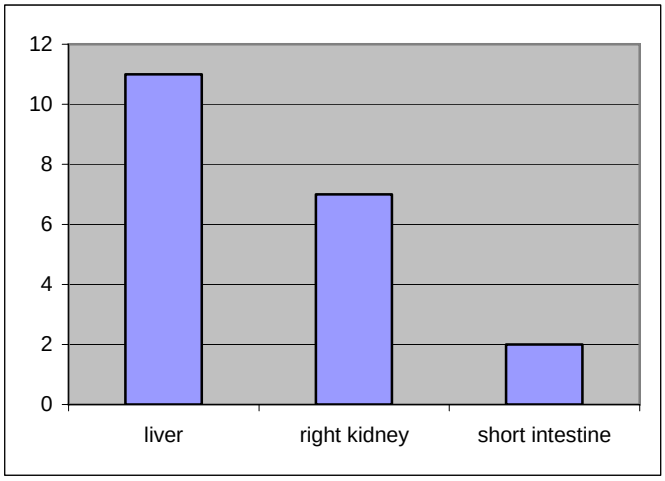
result positive	14 test persons
no result	6 test persons



The motility of the organs was diagnosticated on 20 men. Therefrom 6 test-persons had a positive result, no result 14 test persons.

result positive

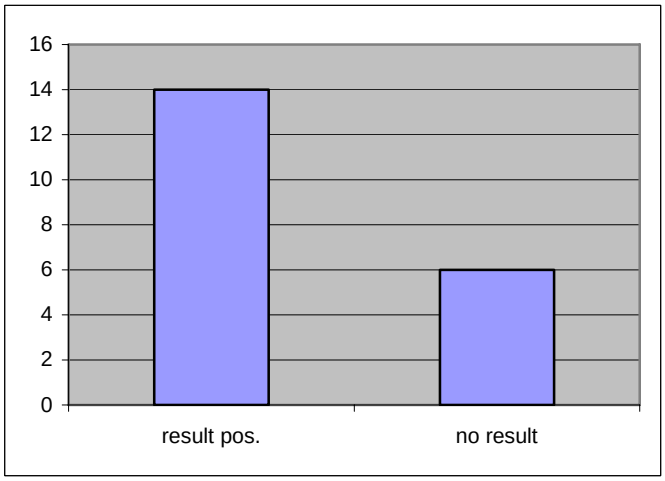
liver	11 test persons
right kidney	7 test persons
short intestine	2 test persons



Out of the 14 men with a positive result, 11 men had a reduction of the motility at the area of the liver, 7 men at the area of the kidney on the right side and 2 men at the area of the short intestine.

5.4.17 examination – mobility of the organs

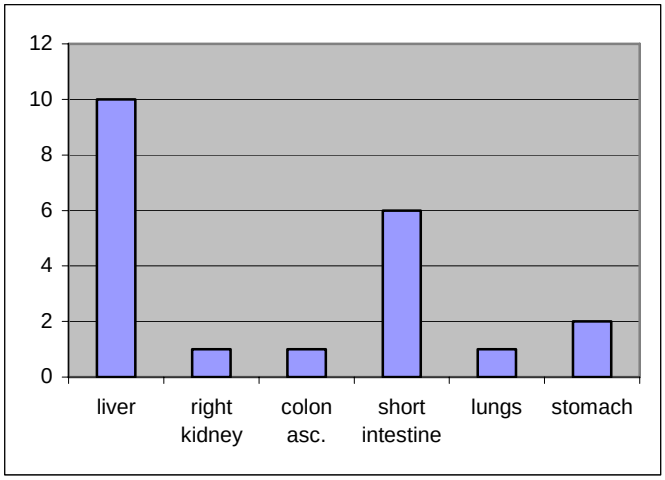
result positive	14 test persons
no result	6 test persons



The mobilitytest of the organs was carried out on 20 test persons. Therefrom 14 men had a result, 6 had no result.

result positive:

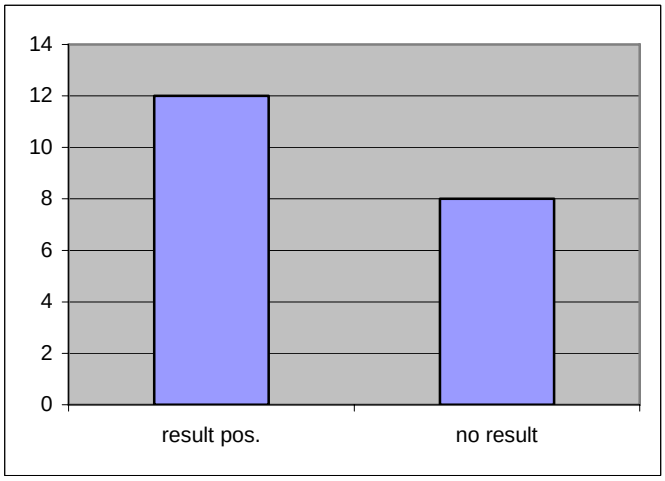
liver	10 test persons
right kidney	1 test person
colon asc.	1 test person
short intestine	6 test persons
lungs	1 test person
stomach	2 test persons



Out of the 14 test persons with a result, 10 men had a reduction of the mobility at the area of the liver, 1 man at the area of the kidney on the right side, 1 man had a reduction of the colon ascendens, 6 men at the area of the short intestine, 1 man at the area of the lungs and 2 men at the area of the stomach.

5.4.18 examination – sleep disturbances

result positive	12 test persons
no result	8 test persons

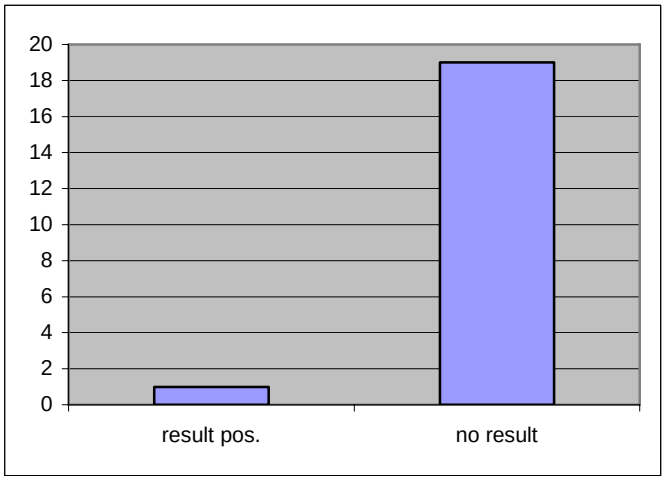


The 20 test persons had been questioned concerning sleep disturbances. 12 men indicated sleep disturbances (dyscoimesis, dysphalaxia), 8 had no sleep disturbances.

time of awaking: 1-2 am (5 test persons), 2-3 am (1 test person), after 0 am (1 test person)

5.4.19 Examination of the cranial system (related to amplitude, frequency)

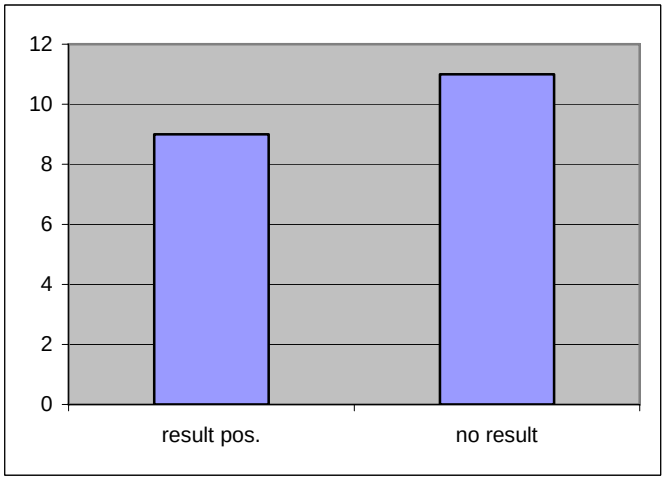
result positive	1 test person
no result	19 test persons



At the 20 test persons the amplitude and the frequency of the PRM was diagnosticated. Therefrom 1 test person was positive, 19 test persons had no result.

5.4.20 Examination of the cranial system (dysfunction of membranes)

result positive	9 test persons
no result	11 test persons



The 20 test persons had been examined on dysfunction of membranes of the cranial system. Therefrom 9 men had a positive result, 11 men had no result.

5.5 Results of the osteopathic examination

The osteopathic examination shows that the tested threshold hypertensive patients in large numbers (75 % and more) have a restriction of mobility in the spine segments (C7, Th1, 7, 8, 9, 10, 11, 12, L1, 2). In the area of the tested musculature the trapezius muscles, the short neck muscles, and the paravertebral musculature (thoracic spine, lumbar spine) were the muscles which were most frequently hypertonic. Hypertonicity in large numbers was also found in the diaphragms I, II, III in standing position and II, III in reclining position. In 95 % of the test persons the breathing motion was not evenly distributed in the areas abdomen-flanks-sternum.

The visceral area showed a positive result with 14 test persons, the liver being at the top with regard to motility and mobility.

The cranial area showed a changed tension in the membrane system with 45 % of the test persons.

At section discussion 6.2 I refer to my question: Does an osteopathic examination reveal common traits in the dysfunctions which might provide an explicable cause for a hypertonic condition.

5.6 Listing of the highest values of the osteopathic examination

I structural area

II visceral area

III cranial area

ad. I.

a) restriction of the passive mobility of spine:		result positive	%
C7		15	75%
Th1		15	75%
Th7		15	75%
Th8		16	80%
Th9		17	85%
Th10		15	75%
Th11		15	75%
Th12		16	80%
L1		16	80%
L2		15	75%
b) increased muscle tension:			
trapezius muscle		18	90%
short neck muscles		15	75%
paravertebral muscles	(thoracic spine)	19	95%
	(lumbar spine)	15	75%
c) increased tension of diaphragms:			
standing:	I	18	90%
	II	17	85%
	III	19	95%
reclining:	II	18	90%
	III	17	85%
d) respiratory motion changed:		19	95%

ad. II.

1. motility			
		14	70%
	liver	11	55%
2. mobility		14	70%
	liver	10	50%

ad. III.

1. changed tensions in the membrane system		
	9	45%

6 DISCUSSION

6.1 Blood Pressure reducing Effect

My study shows that contrary to descriptions contained in text books the implementation of the CV4-technique does not necessarily lead to a significant decrease of blood pressure (neither short-term nor long-term).

I now ask myself what the possible causes for the insignificant impact might be.

1. The chosen group of test persons (threshold hypertensive patients) suffered from an only slightly increased blood pressure; consequently the body saw no reason to severely decrease the blood pressure.

2. The measuring situation could have been a stress situation for the test persons despite their having been explained the procedure. We know that thought processes influence the body functions just as there are influences from the surrounding. Thus a test person might unconsciously have held his thought flow so high that the body could not come to rest in the necessary degree. This, in turn, is necessary for the setting in motion of the exchange processes.

3. The technique was carried out to structurally and not precisely enough. Dr. Sutherland taught the CV4-technique for an entire week, the implementation was much more differentiated, far-reaching and consequently may be also more effective. Manfred Eigen (physicist)[6] also states that the development of structures happens on a much higher level than on the plain of chemical reactions and molecular exchange processes of matter and energy. I believe that this higher level has been short cut in the implementation of the technique.

4. A further point might be that osteopathy is a holistic treatment method and a technique which is performed structurally is not enough to cause a change in a disease model, e.g. hypertension, which is influenced by many factors. Consequently a complete treatment in

which the CV4-technique would be used at the beginning or at the end and the remaining treatment individualy would be very different might possibly the more successful.

5. Mc.Catty stated in his book "Essential of Craniosacral Osteopathy"16 that sometimes it is necessary to repeat the technique for several times to effect a change. Page 111

These considerations might be taken into account in a further study and lead to a changed implementation of the work.

The study prepared by Krasser (2000) shows that the application of the technique involving rocking of the temporals, i.e. an increase of the lateral fluctuation leads to a decrease of blood pressure with hypertensive patients immediately after application of the technique.13 This result was also confirmed by the observations of Doversmith (1953). She says in an article about “Fluid-Fluctuation and the autonomic System”,30 that people with the extension pattern tend to be sympathicotonic and people with the flexion pattern tend to be rather vagotonic. That would mean that ventricle compression, the support of fluid fluctuation in the anterior-posterior direction reinforces the pattern of the sympathicotonic and normalizes that of the vagotonic, and vice versa the rocking of the temporals, i.e. the lateral fluctuation would reinforce the pattern of the vagotonic and normalize that of the sympathicotonic.

It would be interesting to observe in a further study the pattern (Flex./Ext.) of the test persons and then apply the appropriate technique.

Rodrigruez (2000) did a study about neurovegetative effects by CV4-technique. He noticed a change of body temperatur, heart- and respiratory frequency by carrying out the technique.4

Perez Martinez (2000) wanted to prove in her study as well, that the CV4-technique has an effect on the arterial blood pressure, the heart rate and the body temperatur. The result showed a drop of the blood pressure, especially the systolic result and the heart rate.20

In my investigation I met with studies which use the CV4-technique but searched for or wanted to prove the effects in other areas.

6.2 Common Traits in the Dysfunctions of Border-line Hypertensive People

The osteopathic examination shows that there are common traits in the dysfunctions affecting hypertensive patients, that fascial structures which run transversally (diaphragms) are of importance just as described in theory and that a balanced secondary breathing mechanism exercises an important draining effect, again upon the connective tissue cells.

By treating the diaphragms, the sternum, the existing hypomobile peripheral joints and sections of the spine one could consequently influence cell and metabolic processes, and as a consequence blood pressure.

The fact that in the visceral area the liver is the organ most often found in dysfunction confirms that metabolic problems are a cause for hypertension. This is also confirmed by the great portion of test persons who are overweight and who belong to the pyknomorphic constitutional type. Biologic medicine says that with pyknomorphic types the energy household tends to a sympathicotonic -anabolic metabolic situation and that pyknomorphic condition predisposes from an organ medical standpoint to hypertension, arteriosclerosis and cholelithiasis.

The examined cranial system plays, contrary to my assumption, with this group of test persons in connection with threshold hypertension only an insignificant role. It should be considered, however, that only the PRM (primary respiratory mechanism) and the tension of falx and tentorium were examined and there were no specifique artikular or intraosseous tests taken. Consequently this area is limited regarding its evidence.

6.3 Thoughts

Looking back at my introduction and the sentence

"Perhaps the rhythmic interchange between all the fluids of the body secured by compressing the fourth ventricle is coming close to the art of releasing the bodily "drugs"

I now reach the conclusion, after having studied the anatomy and physiology of the ventricle system that the more important place in the sense of chemical and energetic processes (pharmacy) is the third ventricle. Unfortunately one only knows a fraction of the neurophysiology in this area.

The CV4-technique allows me to reach all ventricles via the liquor fluctuation, but maybe one could reach more with a CV3-technique?

Consciousness

Jim Jealous said in a lecture (march 1999) that the CV3-technique allows not a control of the third ventricle but merely a support of it and that it is a way to communicate with consciousness.[11] A synchronization with consciousness, with the well-being in the body would be the highest approach to support a healing process. This approach is also the origin, the core of osteopathy.

In modern biology there is also discussion of this consciousness. It is said that all things in our biologic reality have a consciousness and that this consciousness has an inherent urge for increasing complexity. The consciousness guides these things to ever increasing organization. It is an attribute of this consciousness to enter into contact with other objects of our biologic reality, to develop interactions and to organize itself.[18]

Even in connection with quantum physics (the quantum theory is based on the so called superposition principle according to which everything is connected with everything) one reads about this consciousness. It is said that only the active process of an observation allows our biological reality to be created out of the EPR-reality (Einstein, Podolsky, Rosen;= an a-temporal and un-localized reality, a reality of possibilities, a holistic reality, in which connections remain existing regardless of time and space).

Observation, however, requires consciousness. Consciousness is the fundamental building block of our reality.[18]

So for myself I reach the conclusion: The pharmacy exists, however, it is not sufficient to wash around certain structures with the liquor cerebrospinalis but it is necessary to get into contact with a consciousness which in the individual case makes the required choice of the "drugs" and their dosage.

7 SUMMARY

The following general statements may be made based upon the results of this study pertaining to the effect of the CV4-technique upon high blood pressure, respectively to common dysfunctions found with hypertensive patients:

- In the short- respectively medium-term there is a slight decrease of blood pressure with the average decrease of the systolic value (-8,81%) measured in the test group differing by only 3,54% from the dummy group`s value (-5,27%). No decrease can be noted with regard to the diastolic value.
- In the long-term the reduced value (plus 1,37%) remains, but there is no further decrease. In the dummy group the value moves back toward the original position (plus 3,47%).
- During the implementation of the technique (including stillpoint) there is a slight decrease of the systolic value which is more regular in the test group than in the dummy group.

Reasons for the insignificant effect of the technique might be, that threshold hypertensive patients do not have a massively increased blood pressure and the regulated mechanism consequently cannot be very significant or that the test persons were not able to relax sufficiently, that the technique was carried out too structurally and not precisely enough. Further reasons might be that a technique, separated on the holistic approach of osteopathy, is not enough to create a significant change or that it is simply sometimes necessary to repeat a technique several times.

<u>The osteopathic examination has shown that:</u>

- At least 75% of the test persons suffer from restrictions of their mobility in the spine segments C7/Th1, Th7,8,9,10,11,12,L1,2, increased muscle tone (Mm. trapezii, short neck muscles and paravertebral muscles – in the area of the thoracic spine and lumbar spine). Further the diaphragms showed increased tension and the secondary breathing motion was unevenly distributed.

Hypomobility and increased tensions in the diaphragms might lead to a reduced circulation of the liquor in the microtubuli of the collagenic fibers which might change biochemical processes and as a result cause dysfunction of organs and organ systems.

The importance of fascial structures running transversally with their influence upon the longitudinal fascial system and its connections, respectively the influence of the secondary breathing upon the basic system (drainage effect) is supported with the results.

- The visceral area confirms with its result (the liver is at the top with its mobility and motility restriction) the fact that metabolic problems might be a cause for hypertension.

- The cranial area, with 45% of dysfunctions in the membrane system, shows a rather insignificant value. It should be considered, however, that only the PRM (primary respiratory mechanism) and the tension of falx and tentorium were examined and there were no specifique artikular or intraosseous tests taken.

Structural tensions need not necessarily be located in a central point in order to alter biochemical or bioelectrical exchange processes, the information from the periphery might suffice.

In order to make the technique more effective and to better use the body`s own „pharmacy“ it might be necessary to go a little further and to involve higher levels which are also described in the biological medicine and quantum physics.

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9 LIST OF ILLUSTRATIONS

10 GLOSSARY

Adrenergic: concerning the effect of the neurotransmitter adrenaline

Consciousness: every form of being composed of energy in various states of information; = energy and information

Biological Reality: the reality known to humans, with the dimensions time and space as well as causality

Cholinergic: concerning the effect of the neurotransmitter acetylcholin

Ependyma: ektodermal, one-layered cell lining, neuroglia cells, of the cerebral cavities and of the central canal of spinal cord.

EPR-Reality: according to Einstein, Podolsky, Rosen: an atemporal, not local reality, holistic reality, in which connections remain existing independent of time and space

Fluid drive: guidance of fluids

Fulcrum: point of equilibrium

Idling: remaining in idle state

Kinocilium: movable cell appendices located closely together (kinocilia)

Light: light which constantly illuminates the inner world, since our consciousness is not working instinctively but congnitively, we do not see it

Liquid light: W.G. Sutherland used this expression often for the term „Breath of Life“ (breath/life engine)

Liquor: fluid

Liquor cerebrospinalis: cerebrospinal fluid

Morphogenetic field: according to Rupert Sheldrake: memory in which individual processes and individual experiences are stored which then can be called up by each individual, not locally tied. DNS functions as antennae for the receipt of morphogenetic fields.

Mobility: organ movability under the influence of the diaphragm

Motility: the organ`s own movability under exclusion of all externally originating influences, in particular of the diaphragmatic motion, not clearly proven

Noradrenergic: concerning the effect of the neurotransmitter noradrenalin

Pyknomorphic: morphology (structure and form of body) associated with the constitutional type of pyknic according to Kretschmer

Resonance phenomenon: the oscillating of a system capable of oscillation under influence of periodically changed energy forms

Self organization: scientific theory which explains the origination of life as a quality existing within matter (M. Eigen, I. Prigogine). Assumption that evolution is an inherent feature of matter

Serotoninergic: concerning the effect of the neurotransmitter serotonin

Stillpoint: the cranio-sacral motion comes to a stillpoint, relaxed state of fascia, fluids, breathing-break

Transmitter: a substance transmitting excitation

Typ anterior/Typ posterior: when the described gravity line moves toward the front/toward the back

11 ANNEX

11.1 Questionaire

Anamnesis

Name:		Date:	
Address:			
Age:			
Marital Status:	unmarried	married	devorced
Profession:		employed	self-employed
Work:	I like it	It stresses me	neither/nor

Diagnosis:		
Date of incidence:		
Be on medication:	yes	no
Family members with Hypertension	yes	no
Cardiac/Circulation diseases	yes	no
Other diseases, surgery, trauma:		
Last measured height of the blood pressure:		

Consumption of alcohol	never	seldom	regularly	heavy
Consumption of nikotin				
Consumption of coffee				
Sports:	yes		no	
	Staying-power sport	Heavy athletics	Combatant sport	
Frequency:	moderate	at least once a week	at least 2-3 times a week.	
Body height:		Body weight:		

Measurement

Blood pressure:			**Pulse:**	
after a recreation time of 15 minutes, seated position	right	left	right	left
at the beginning of the CV4-technique, lying position				
after 3 minutes				
after 6 minutes				
after 9 minutes				
after the CV4-technique, seated postion, after 12 minutes				
2 weeks later, after a recreation time of 15 minutes, seated position				

11.2 Examinationsform

Name of the test person: **Date:**

S t r u c t u r a l - S y s t e m

Standing position:

Posture:	Type ant.:		Type post.:	
Sagital plane				
	normal	decreased		increased
Cervical Lordosis				
Thoracal Cyphosis				
Lumbar Lordosis				

Frontal plane:		
	compensated	decompensated
Occiput Shoulders Pelvis		

Transversal plane :		
	ant.	post.
Shoulders		
Pelvis		

Genu varum		Genu valgum		Genu recurvatum	
Malposition of the foot		yes		no	

Palpation of the diaphragms	normotonic	hypotonic	hypertonic
Craniocervical diaphragm			
Cervicothoracic diaphragm			
Thoracolumbar diaphragm			
Diaphragm of the pelvis			
General listening	Standing position		Seated position

S t r u c t u r a l - S y s t e m

Aktive motion tests of the spine :

Standing position:

Foreward bending	Standing position:	
	Sitting position :	

	free motion	reduced motion
Flexion		
Extension		
Sidebending		

Seated Position:

Cervical spine	free motion	reduced motion
Flex.		
Ext.		
Rot.ri.		
Rot.le.		
Sideb.ri.		
Sideb. le.		

Thoracic spine	free motion	reduced motion
Flex.		
Ext.		
Rot.ri.		
Rot.le.		
Sideb. ri.		
Sideb. le.		

Lumbar spine	free motion	reduced motion
Flex.		
Ext.		
Rot. ri.		
Rot. le.		
Sideb. ri.		
Sideb. le.		

S t r u c t u r a l - S y s t e m

Segmental test of the spine in sitting position:

Cervical spine	free motion	moderate reduced motion	strongly reduced motion
Co			
C1			
C2			
C3			
C4			
C5			
C6			
C7			
Thoracic spine			
Th1			
Th2			
Th3			
Th4			
Th5			
Th6			
Th7			
Th8			
Th9			
Th1O			
Th11			
Th12			
Lumbar spine			
L1			
L2			
L3			
L4			
L5			

Supine :

Cervical spine	free motion	moderate reduced motion	strongly reduced motion
Co			
C1			
C2			
C3			
C4			
C5			
C6			
C7			

S t r u c t u r a l - S y s t e m

Prone position :

Lumbar spine	free motion	moderate reduced motion	strongly reduced motion
L1			
L2			
L3			
L4			
L5			
Thoracic spine/ribs			
Th1			
Th2			
Th3			
Th4			
Th5			
Th6			
Th7			
Th8			
Th9			
Th1O			
Th11			
Th12			

Position of the sacrum:	no result	result pos.

Difference of the length of the legs		Ilium ant.	
ri.	le.	ri.	le.

Examination of muscle tension:

	normotonic		hypotonic		hypertonic	
	re.	li.	re.	li.	re.	li.
Sternocleidomast. muscle						
Trapezius muscle						
Suprahyoidal musc.						
Infrahyoidal musc.						
Short neck musc.						
Paravertebral musc.						
Cervical spine						
Thoracic spine						
Lumbar spine						

S t r u c t u r a l - S y s t e m

Peripheral Joints:

Lower extremity	free motion		moderate reduced motion		strongly reduced motion	
	ri.	le.	ri.	le.	ri.	le.
Hip joint						
Knee joint						
Ankle joint						

Upper extremity	free motion		moderate reduced motion		strongly reduced motion	
	ri.	le.	ri.	le.	ri.	le.
Shoulder joint, Acjoint, St.Cjoint						
Ellbowjoint						
Wristjoint						

V i s c e r a l S y s t e m

Sitting Position:

Sotto- Hall Test	ri.		le.	

Supine Position:

Pulse of A. radialis	ri.		le.	
Pulse of A. dorsalis pedis	ri.		le.	
General listening (local listening)				

Diaphragms	normotonic	hypotonic	hypertonic
Craniocervical d.			
Cervikothoracal d.			
Thoracolumbar d.			
Diaphragm of the pelvis			

Breathing motion	normal	decreased	increased
Abdomen			
Lower/lateral thorax			
Sternum			

Mediastinum: (tension)	

Motility/Mobility

	Lungs	Liver	Stomach	Spleen	Kidney	Short Intestine	Colon
Motility							
Mobility							

Dyscoimesis:		Dysphalaxia:	
Time of awaking:			

C r a n i o – s a c r a l S y s t e m

Cranial Rhythm	normal	decreased	increased
Frequency			
Amplitude			
Occiput/ Sacrum	synchron	asynchron	

Tension of membranes	normal	alteration
Falx cerebri		
Tentorium cerebelli		
Dysfunction	result positive	no result

11.3 Description of Examination Sheet

1. Standing Position: Determination Type ant. - Type post.:

a) Description of Technique:

The therapist stands to the side of the test person, one hand placed in front on the sternum, the second hand placed on the back (thoracic spine) of the test person who is moved slowly toward his tiptoes and heels, in each direction to the point of the appearance of a compensation reaction. The distance from the central line to anterior and posterior is being determined. Physiologically the way to the front is longer than the way to the back.

b) Theoretical Background:

The human being is constantly in a state of oscillation, the result of the various motions is the central line. It runs through the dens of the axis, through the promontory of the sacrum, through the trochanter major, through the centre of the knees and slightly ant. of malleolus lat.
Type ant.: When the central line comes toward ant.
Type post.: When the central line comes to post.
Any deviation leads to changes of muscle tension, fascia, the curvature of the spine and conditions of pressure in the body:
Dysfunctional chains may be created.

2. Determination of Spinal Curvatures in the Sagital Plane:

a) Description of Test:

Visual judgment of the curvatures from the side (lateral).

b) Theoretical Background:

The curves are created through the functional development of the body. At birth there is a cyphoses in the cervical, the thoracic and the lumbar spine; as soon as the head may be lifted, a normal cervical spine - lordosis, and when the child begins to stand and walk the lumbar spine - lordosis are being developed. The thoracic spine maintains its cyphosis.

3. Determination of the Spine in the Frontal Plane, according to the Delaunoit Method:

a) Description of Test:

The therapist stands behind the test person and places the fingers on the crista iliaca, the acromion and the palpable lower rim of os occipitale on both sides. The height of the lines is being determined.

b) Theoretical Background:

This method was developed in the praxis of a Belgium osteopath who observed that right handed persons compensate in a very specific way: Lumbar spine and Th12 follow the motions of the pelvis, occiput and ilium line are the same, shoulder line moves the other way. This method offers an opportunity to diagnose that section which cannot compensate.

4. Determination of the Spine in the Transversal Plane:

a) Description of Test:

The therapist stands behind the test person. He puts the fingertips on both SIAS and on both sides on the ant. region of the acromion.

A determination of the anterior/posterior position of the respective parts and thus of the rotating motion of the spine (scoliosis) takes place.

5. Determination of the Knee and Foot Position:

a) Description of Test:

Visual determination of a deviation from normal position.

b) Theoretical Background:

Genu varum (bowleg): Reduction of med. angulus between the long axis of femur and tibia.

Genu valgum (knock-knee): Enlargement of med. angulus between the long axis of femur and tibia.

Genu recurvatum: abnormal hyperextendibility of tibia in knee joint.

Malalignment of foot: Changes of longitudinal and transverse arch of foot, congenital malalignments.

6. Determination of Diaphragms in Standing Position, under Gravity Effect:

a) Description of Test:

The therapist stands behind the test person.

Craniocervical diaphragm: The therapist feels with the fingertips the tension of the muscles in the area upper cervical spine-occiput (short neck musculature, M. trapezius, M. sternocleidomastoideus, M. splenius, M. semispinalis) and the floor of the mouth (M. mylohyoideus, M. geniohyoideus, M. digastricus, M. stylohyoideus).

Cervicothoracic diaphragm: (thoracic inlet), the therapist feels the area between clavicula, acromio-clavicula joint, anterior rim of trapezoid, C7 on both sides. During inhalation the cupola of pleura pushes against the fingers.

Thoracolumbar diaphragm: The therapist again feels from behind along the costal arch the attachments of the diaphragm.

Pelvic diaphragm: The therapist feels the tension of the pelvic floor in the area of fossa ischiorectale with both thumbs from caudal to cranial.

b) Theoretical Background:

Craniocervical Diaphragm: All muscles and fascia which are attached at the occiput may, if there is hypertonic tension, disturb or block the craniosacral system in various degrees. Most of the cranial nerve nuclei as well as medulla oblangata which contains the respiratory, the circulatory and other vital centers, are located in the area, at the height of the 4th ventricle.

Cervicothoracic Diaphragm: A. carotis communis (in a fascia sheath of V. jugularis and N. vagus) runs under M. sternocleidomastoideus. At the height of the hyoid bone hypertension of the muscles located there may cause a compression of the artery. The carotid sheath in that area is surrounded by a muscular triangle which is formed by M. omohyoideus, M. sternocleidomastoideus and the posterior part of M. digastricus. The floor of this triangle is formed by Mm. scalenii anteriores and mediales. The carotid sheath is covered by the lamina superficiales. The carotid gland (glomerus caroticum), a parasympathetic ganglion, which is involved in the control of blood pressure and respiration through chemoreceptors is located at the height of the forking off of A. carotis interna and externa.

At the beginning of A. carotis interna there is also Sinus caroticus at the walls of which pressoreceptors for the regulation of blood pressure are localized. Both are enervated by R. sinus carotici (9th cranial nerv) which is also connected with N. vagus and the sympathetic cervical ganglia.

Thoracolumbar diaphragm: Almost all body structures have direct or indirect contact with the diaphragmatic muscle. It takes a central role in the static of the body since it functions as a lever between the posterior and anterior gravity lines of the body. It is responsible for the balance between the posterior and anterior muscle group as well as between the crossed muscle groups at rest as well as in motion. It also connects the upper with the lower diaphragms.

Fascial connection of diaphragm to cranial:

Lig. phrenicopericardica

Lig. pulmonale

Lig. phrenicopleurale

Fascial coverage of the diaphragm with endothoracic fascia

From the carotid sheath to temporal bone, os mandibulare

phrenicopleural fascia - cupola of pleura - lamina praevertebralis fascia cervicalis - tub. pharyngeum of occiput.

Oesophagus - buccopharyngeal fascia - attachment occiput, sphenoid bone, temporal bone

Pelvic diaphragm: Is responsible for the transfer of power to the legs and the upright position of the gait. Due to the influence of the pelvic diaphragm on the mobility of the sacrum and coccyx and on the longitudinal fascia as well as due to its impact on the fluid stream in this area a normal tension is absolutely essential for a physiological craniosacral motion.

Ptosis of digestive organs and impairment of the static function of the diaphragm increased forces may have an impact on the pelvic floor.

7. General Listening:

a) Description of Test:

The test person stands, respectively sits, and the therapist stands behind and puts one hand flat on the posterior parietal area of the cranium, either along the axis of the spine or transverse to it. The second hand stays free or is put in the area of the coccygeal bone (in line of the spine). The test person is asked to close the eyes and the body spontaneously moves in the direction of impairment/tension in the body. A slight pressure by the therapist's hand makes the test person aware of the motion and causes a slow down.

b) Theoretical Background:

The therapist uses his hands to "listen" to the body of the test person. If specific tissue is in dysfunction, it looses elasticity, interrupts the membraneous equilibrium and obtains a new axis, respectively a new pivotal point for mobility and mobility motions. During palpation, when one concentrates on the movement of the tissue one feels that the hand is pulled into a area which is in dysfunction, it moves much less than healthy tissue.

It is very important that the therapist is as passive and absorbent as possible. One must not project one's own tension on the test person.

8. Standing or Sitting Flexion Test:

a) Description of Test:

The therapist is behind the test person. The thumb of the therapist simultaneously palpate both spinae iliacae posteriores superiores. The test person is asked to leave both feet on the floor, to stretch the knees and then slowly bend forward. The position, respectively the motion of both spinae, is observed during the bending forward of the upper body.

Under normal conditions, thus free mobility of the iliosacral joints, spinae iliacae posterior superior are located at the same height at the end of the bending motion of the trunk as at the beginning of the motion.

b) Theoretical Background:

The sacrum rotates around a horizontal axis toward the ilia in the iliosacral joints. The term nutation is used for this rotating motion of the sacrum. In the event the iliosacral joint does not nutate on one side, the spinae iliacae posterior superior is pulled with the sacrum in comparison to the opposing side to cranial.

9. Active Tests of the Spine (particularly Thoracolumbal Transition)

a) Description of Test:

Flexion: The therapist stands behind the test person, the hands are located on the crest of ilion on both sides. The test person is asked to slowly bend down and forward until the motion can be felt at the ilia.

Extension: The therapist stands behind the test person, the hands are located on the crest of ilion on both sides. The test person is asked to slowly stretch to the back until the motion can be felt at the ilia.

Lateralflexion: The therapist stands behind the test person, the hands are located on the crest of ilion on both sides. The test person is asked to slowly slide one hand down along the thigh on the same side (the spine remains in middle position, the knees remain stretched). The motion is stopped as soon as on the opposite crest of ilion the motion can be felt.

b) Theoretical Background:

This test allows to observe the opening and closing of the facet joints, particularly in the thoracolumbar area, as well as the extent of motion and asymmetries.

10. Active Test of the Spine in Sitting Position, in the Area of the Cervical, the Thoracic and the Lumbar Spine:

a) Descripton of Test:

Cervical Spine:

Flexion/Extension: The therapist stands on the side of the test person and observes the motion of the head to the front direction sternum and to the back with the eyes directed to the ceiling.

Free mobility: chin - sternum contact

view to the ceiling over the head

Rotation: The therapist stands behind the test person, with the hands on the left and right shoulder. The test person is asked to look to the back on the right, respectively left, side.

Free mobility: 90° from the middle line.

Lateralflexion: The therapist stands behind the test person, one hand is located on the parietal bone (left), the second hand controls the elevation of the shoulder (left). The test person is asked to move the right ear toward the right shoulder. Thereafter the sides are switched.

Free mobility: 40 - 45 degrees in each direction.

Thoracic Spine:

Flexion: The therapist stands behind the test person (sitting), the hands are located on the crest of ilion on both sides. The test person is asked to slowly bend down and forward until the motion can be felt at the ilia.

Extension: The therapist stands behind the test person (sitting), the hands are located on the crest of ilion on both sides. The test person is asked to slowly stretch to the back until the motion can be felt at the ilia.

Rotation: The therapist stands behind the test person, the hands are located on both shoulders (acromion). The test person is asked to move toward the back with the right/left upper body.

Free mobility: 40 degrees in each direction.

Lateralflexion: The therapist stands behind the test person, the hands are located on each shoulder (thumbs to the back, fingers to the front), the test person moves the right/left shoulder direction right/left ilium.

Free mobility: 20 degrees in each direction, the course of the motion profile is also observed.

Lumbar Spine:

Flexion: The therapist stands behind the test person (sitting), the hands are located on the crest of ilion on both sides. The test person is asked to slowly bend down and forward until the motion can be felt at the ilia.

Extension: The therapist stands behind the test person (sitting), the hands are located on the crest of ilion on both sides. The test person is asked to slowly stretch to the back until the motion can be felt at the ilia.

Rotation: The therapist stands behind the test person, the hands are located on both shoulders (acromion). The test person is asked to move toward the back with the right/left upper body, 40/45 degrees in each direction.

Lateralflexion: The therapist stands behind the test person (sitting), the hands are located on the crest of ilion on both sides. The test person is asked to slowly slide one hand down along the thigh on the same side (the spine remains in middle position, the knees remain stretched). The motion is stopped as soon as on the opposite crest of ilion the motion can be felt.

11. Segmental Examination of the Spine in sitting Position:

a) Description of Test:

Flexion/Extension: The therapist stands to the side of the test person, the fingers of the palpating hand (middle finger, index) are located between two spinosii in the height of the tested segments.

If the cervical spine and the upper thoracic spine (until T4) are tested, the second hand is located in the area of the frontal bone, the parietal bone.

If the thoracic spine (T5-T12) and the lumbar spine is tested, the second hand grasps the contralateral shoulder from the front.

A small flexion/extension movement happens.

Rotation: The therapist stands to the side of the test person, one finger (middle finger, index finger) is placed to the right and left next to the proc. spinosus on the proc. transversus of the tested vertebra, the second hand is positioned the same way as in the flexion/extension test.

A small rotating motion happens.

Lateral flexion: The therapist stands to the side of the test person, one finger is placed on each side of proc. spinosus between the proc. transversus that is being tested and the proc. transversus located below it. The second hand is placed on the frontal and parietal bone for the test of the cervical spine and the thoracic spine until T4, for the remainder of the spine the lower arm rests posterior on the thoracic girdle. A lateral flexion happens.

Note is taken as to whether the respective vertebral segment is confined (no matter in which direction) or freely movable.

12. Segmental Test of the Cervical Spine in Supine Position:

a) Description of Test:

The test person is in supine position, the therapist sits behind the test person, at the head-end, the lower arms are rested on the treatment table. The palpitating fingers are located in the groove between occiput and atlas. Now the head is slightly flexed and extended, the motion only takes place in the atlanto-occipital joint.

For the test of the atlanto-axial joint the fingers are positioned behind the proc. transversii of the atlas, the head is slightly flexed (occiput on atlas), then the head is rotated into both directions until the motion may be felt on each side of the proc. transversus.
For the segments C2 to C7 a translatory test of movement takes place. This test examines the lateralflexion. The translatory motion, for instance from C4 to the right is combined with a lateralflexion from C4 to the left.
The testing fingers are located on both sides, laterally to the vertebral segments and move these to the right and the left. The same test is taken in the flex- and ext-position of the respective segment.
The freedom, respectively reduction, of mobility is noted.

13. Segmental Test of the Spine in Prone Position:

a) Description of Test:

The therapist is to the side of the test person, the cranial hand is positioned with its index and middle finger on both sides of proc. transversus next to the proc. spinosus of a vertebra, the caudal lower arm is located in the area of crista iliaca-sacrum and a small rotating movement of the pelvis is carried out until it reaches the palpated segment. This test is taken in the lumbar spine up to the middle thoracic spine. For the upper and one part of the middle thoracic spine a rotating movement is carried out via the shoulder. The caudal hand feels a vertebral segment and the cranial hand (grasps the shoulder - fingers are positioned anterior, thumb posterior) moves the upper part until the motion arrives at the tested segment.
For the rib test the controlling finger is located 2 fingers' wide aside to the proc. spinosus, over the art. capitis costae.
The relationship between the controlled segment and the moved segment is diagnosed.

14. Test of the Sacrum:

a) Description of Test:

The test person is in prone position. The therapist palpates with both sulci (flat or deep), the both inferior anguli of the sacrum (caudal/cranial, posterior/anterior) and takes a rebound test (nutation, contra-nutation).

15. Examination of the length of the legs and the anterior ilium:

a) Description of Test:

The test person is in supine position. The therapist feels with the thumbs on both sides for the lower demarcation of the medial malleoli. Note is taken which malleolus is lower.

Then the therapist feels the spina ilica anterior superior on both sides and takes note of the caudal positioned spina.

b) Theoretical Background:

Differential diagnoses - dysfunction sacrum/ilium:

Long leg and spina iliaca anterior superior caudal on same side: ilium-problem.

If the side of the long leg and the caudal spina iliaca anterior superior do not match it is more likely to be a problem concerning sacrum/lumbar spine.

16. Examination of muscle tension:

a) Description of Test:

The test person is in prone, respectively supine, position. The therapist feels the musculatures tension with the fingertips.

The muscular tension may be increased, the musculature shortened, ribbed, feeling like a rope. It is possible that fibrous tissue changes may be felt.

b) Theoretical Background:

Choice of muscle:

Sternocleidomastoideus muscle, supra- and infrahyoidale musculature: Position of the carotid sheath (glomerulum caroticum), carotid sinus (pressure receptors in the sides of the sinus). A hypertonus of this area could influence the function of the receptors.

Short neck musculature, trapezius muscle, sternocleidomastoideus muscle, suprahyoidale musculature: A hypertonus could influence the region in the height of 4th ventricle with all its cranial nerves nuclei and vital centers and the entire craniosacral system.

Paravertebral musculature:

A hypertonus of this musculature could influence the vegetative nervous system (sympathetic trunk system).

17. Examination of the Peripheral Joints:

a) Description of Test:

The test person is in supine position. The therapist tests the various joints of the upper and lower limbs by means of the common osteopathic examination respectively treatment technique (GOT, TGO).

18. Sotto-Hall Test:

a) Description of Test:

The test person is sitting, the therapist palpates the pulse of the radial artery at the distal lower arm, while he brings the arm into abduction and external rotation. At the end of the motion the test person should turn the head to one side and then the other side. During all of these passive and active motions the pulse should remain constant in intensity and frequency. The test is positive if the pulse weakens or disappears.

b) Theoretical Background:

The disappearance or weakening of the radial pulse in the Sotto-Hall Test is caused by the compression of the subclavian artery. If the pulse is weakened at 30 degrees or less external rotation, the test person mostly is due to the changed mechanics in the area of the thoracic inlet. If the weakening happens between 30 and 90 degrees external rotation this most often is caused by a visceral restriction. If the pulse only disappears upon turning of the head this usually is due to a problem in the cervical or upper thoracic area.

19. Test of A. Radialis and A. Dorsalis Pedis:

a) Description of Test:

The test person is in supine position. The therapist stands on the side of the test person and feels with one hand the pulse of the radial artery at the lower arm and with the second hand the pulse of the dorsal artery of foot in the area of cuneiform bones I and II. The pulse should have the same string in the both locations and should be felt contemporaneously respectively with a minimal delay at the foot.

b) Theoretical Background:

If the test is positive, sclerotic, stenosing changes at the aorta and the renal arteries may be present.

20. General listening - local listening:

a) Description of Test:

The test person is in supine position, the therapist positions his more sensitive hand on the abdomen in the area of the middle line. The fingertips are located in the area of proc. xiphoideus and the thenar is above the bellybutton. The testing hand is moved into the direction of the restriction.

b) Theoretical Background:

The therapist uses his hands to "listen" to the body of the test person. If specific tissue is in dysfunction, it looses elasticity, interrupts the membraneous equilibrium and obtains a new axis, respectively a new pivotal point for mobility and mobility motions. During palpation, when one concentrates on the movement of the tissue one feels that the hand is pulled into a area which is in dysfunction, it moves much less than healthy tissue.

It is very important that the therapist is as passive and absorbent as possible. One must not project one's own tension on the test person.

21. Palpation of the Diaphragm in Supine respectively Prone Position:

a) Description of Test:

The test person is in supine position for the palpation of the craniocervical, cervicothoracal and thoracolumbar diaphragm, in prone position for the pelvic diaphragm.

b) Theoretical Background:

The test excludes the influence of gravity and any tensions associated therewith in these areas. See item 6.

22. Examination of the Breathing Motion:

a) Description of Test:

The test person is in supine position. The therapist observes the breathing motion in the areas: abdomen, lower/lateral thorax and sternum. There should be a harmonic extension of these areas (from the bottom to the top) during inhalation.

b) Theoretical Background:

During inhalation the space in the thoracic cage is increased, it is extend in longitudinal as well as transversal direction, the diaphragm is pushed down. This is an active process (work of the inhalation musculature), the exhalation is virtually passive (the parenchym of the longs and the ribs return to their initial position due to their elasticity).

The diaphragm is the central point which keeps the equilibrium between thorax and abdomen. The thorax functions pneumatically, the abdomen hydraulically. Whenever one space is greater, there is an effect to the diaphragm and its connections. The redistribution of pressure happens through the structures that are transversally-oriented such as diaphragm, thoracic inlet, pelvic floor as well as through the ligament structures which are longitudinally oriented and which create the connection between the transversal structures. This system only functions, however, if the elasticity and expandability of these structures is adequate. The system of posture and conditions of pressure also influence each other (Type post., Type ant.).

Different pressures in the body:

Thorax: - 5 cm H2O

Upper Abdomen: + 5 cm H2O

Middle Abdomen: + 15 cm H2O

Lower Abdomen: + 20 cm H2O

Pelvis: + 30 cm H2O

An abnormality in these pressure values disturbs the function (excretion, secretion) of the organs, the function of the paths of conduction (vessels, nerves).

23. Examination of the Tensions in the Mediastinum:

a) Description of Test:

The test person is in supine position. The therapist puts one hand posterior in the area of the middle thoracic spine and one hand anterior in the area of the sternum and conducts a "listening" in this area.

b) Theoretical Background:

The mediastinum is the continuation of the visceral space of the neck which is located between fascia cervicalis media and -profunda, which is continued through the upper thoracic aperture as a connective tissue storage area of the thoracic cavity located between the left and the right lung. It houses the various paths of conduction and connects the thoracolumbar with the cervicothoracical diaphragm through ligamental and fascial structures (horizontal and vertical system, compare tentorium and falx in skull).

24. Examination of Motility:

a) Description of Test:

The test person is in supine position. The therapist puts his hand on the respective organ and feels its inner active motion.

b) Theoretical Background:

The organs have an inner active independent motion. There is no scientific explanation for this phenomenon, it is based on experience. Possible explanations could be that it is an extension of the craniosacral rhythm or that it is connected with the motion during the embryonal stage. This theory says, that the axes and the directions of the embryonal developmental motions remain in the memory of the visceral tissue.

A motility cycle has 2 phases, one in which the organs move towards the medianline and one in which they move away from it. These phases are called "expir" and "inspir". There is no specific relationship between the direction of the motions of the organs during their visceral motility and mobility.

Changes in motility motion may hint at functional disturbances of the organs.

25. Examination of the Mobility of Organs:

a) Description of Test:

The test person is in supine respectively side position. The therapist stands on the side of the test person and tests with common osteopathic examination technique (GOT; TGO) in the area of the organs to determine the mobility of the organs.

b) Theoretical Background:

The organs are moved directly and one obtains information about elasticity, tension and damage of muscular and ligamental structures. This may indicate malfunction in the organ or further dysfunction with structures that are connected with it.

26. Questioning with regard to sleeping Habits:

a) Description:

Questioning.

b) Theoretical Background:

Any dyscoimesis may indicate that the test person cannot put aside the events of the day, cannot workout problems of any kind, or is stressed.

A dysphylaxia may be connected with the energy cycle. Energy circulates through the body and reaches peaks in various organ systems or energy paths at various times. Each organ reaches the highest activity during a specific time period. If the test person always awakes at the same time this could indicate a malfunction of an organ again (organ clock).

27. Examination of the Craniosacral Rhythm (CRI):

a) Description of Test:

The test person is in supine position. The therapist sits at the head end of the person, the elbows resting on the treatment table.

Position of hands: Hands on each side of the skull, index in the height of the great wing of sphenoid bone, behind the lateral angle of eye, middle finger at the temporal bones, behind the ears, small fingers to the side at the height of the occiput, thumbs to the extent possible

touch each other on top of the skull. They serve as external fixed point (skullcap position according to Sutherland).

The expansion and retraction phase is tested. The frequency is 6 - 14 cycles per minute in physiological state. The amplitude indicates the motion change of the flex and extension motion. In order to see if it differs from the norm the neutral zone between the two phases must be determined.

b) Theoretical Background:

The primarily respiratory mechanism consists of the following factors:

1. Motility of the brain and the spinal cord.
2. Fluctuation of the cerebral and spinal liquid (LCS).
3. Mobility of the intracranial and intraspinal membranes.
4. Mobility of the skull bones.
5. Automatic mobility of the sacrum between the pelvic bones.

The involuntary mobility of the cerebral tissue as well as the production and the resorption of cerebrospinal fluid by the Villi arachnoidei and the choroidei plexi are the cause of the creation of this rhythm. During the inspiration phase the ventricles fill up and empty out again during the expiration phase.

28. Examination of the Synchronicity between Occiput and Sacrum:

a) Description of Test:

The test person is in side position. The therapist sits at the dorsal side of the person between occiput and sacrum.

Handposition: The cranial hand is located on the squama occipitalis, the fingers point to cranial, the caudal hand is positioned on the sacrum, the fingers point to caudal.

The therapist feels for the synchronous movement of those both bones.

b) Theoretical Background:

The movement of the base of the skull is transmitted to the sacrum through the dura mater of spinal cord, the dural continuation of the intracranial membranes.

29. Examination of the Membrane Tension in Skull:

a) Description of Test:

The test person is in supine position. The therapist sits at the head end of the person, the elbows resting on the treatment table.

Position of hands: Hands on each side of the skull, index in the height of the great wing of sphenoid bone, behind the lateral angle of eye, middle finger at the temporal bones, behind the ears, small fingers to the side at the height of the occiput, thumbs to the extent possible touch each other on top of the skull. They serve as external fixed point (skullcap position according to Sutherland).

The septi (falx of cerebrum and tentorium of cerebellum) of the intracranial membrane system are felt for their tension and their equilibrium (longitudinal and horizontal system).

b) Theoretical Background:

Due to the structural connection of all membranes tensions in any part of this membrane system may influence any other parts of the system (intracranial and extracranial membrane system).

30. Examination of Dysfunctions of SSB:

a) Description of Test:

The test person is in supine position. The therapist sits at the head end of the person, the elbows resting on the treatment table.

Position of hands: Hands on each side of the skull, index in the height of the great wing of sphenoid bone, behind the lateral angle of eye, middle finger at the temporal bones, behind the ears, small fingers to the side at the height of the occiput, thumbs to the extent possible touch each other on top of the skull. They serve as external fixed point (skullcap position according to Sutherland).

The therapist gives a fine impulse into the direction to be tested and follows the motion induced thereby with passive attention to its final point. The therapist notes whether the motion is admitted or restricted.

b) Theoretical Background:

Disturbances in the SSB have an impact on the remainder of mobility of the skull bones and the entire skull mobility through the fascial connections. They impact the craniosacral system and the functions that are connected with it.