Welcome to 1st international seminar

VM2G

Made possible under the auspices of the Member of the European Parliament, Doc. Pavel Svoboda

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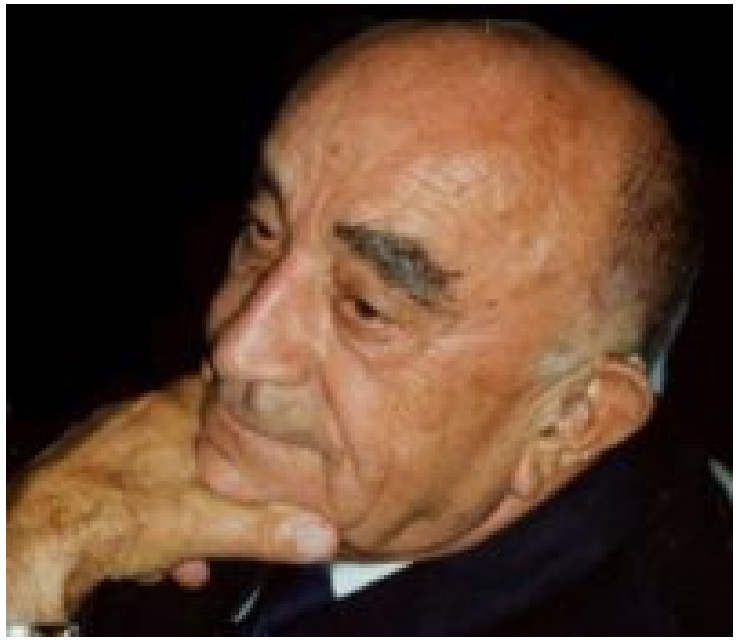
Trappist monastery

- They have here what would be hard to find elsewhere – **SILENCE**
- Do not disturb the nuns and other visitors of the monastery with your loud talk, please!
- Do not adjust the temperature control in your room, please!
- The outer gate closes at 7:30 pm.
- Do not use the dining room between breakfast and lunch, please! Other surrounding areas have been reserved for coffee breaks

Short summary of this presentation

- Introduction to the Vojta method
- Neurophysiological basics of Vojta therapy
- Possibilities of a 2nd generation Vojta method

Prof. MUDr. Václav Vojta



- He was born 12th July 1917, in Mokrosuky
- He worked as a paediatric neurologist in Prague
- From 1975, he worked in the Children's Neurological Centre in Munich
- He died September 12th, 2000

History of the Vojta method

From 1950s to 1970s

Dr. Václav Vojta – Prof. Ivan Lesný – academic Kamil Henner

- Basics of developmental kinesiology
- Reflexology of new-borns
- Dr. V. Vojta creates positional tests

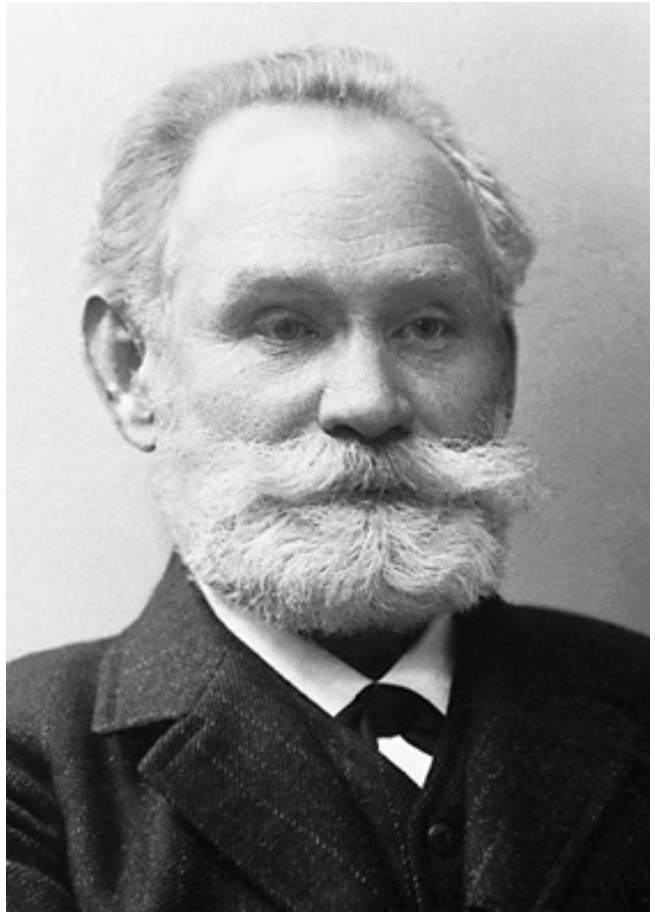
Paediatric neurology has been established as a scientific discipline

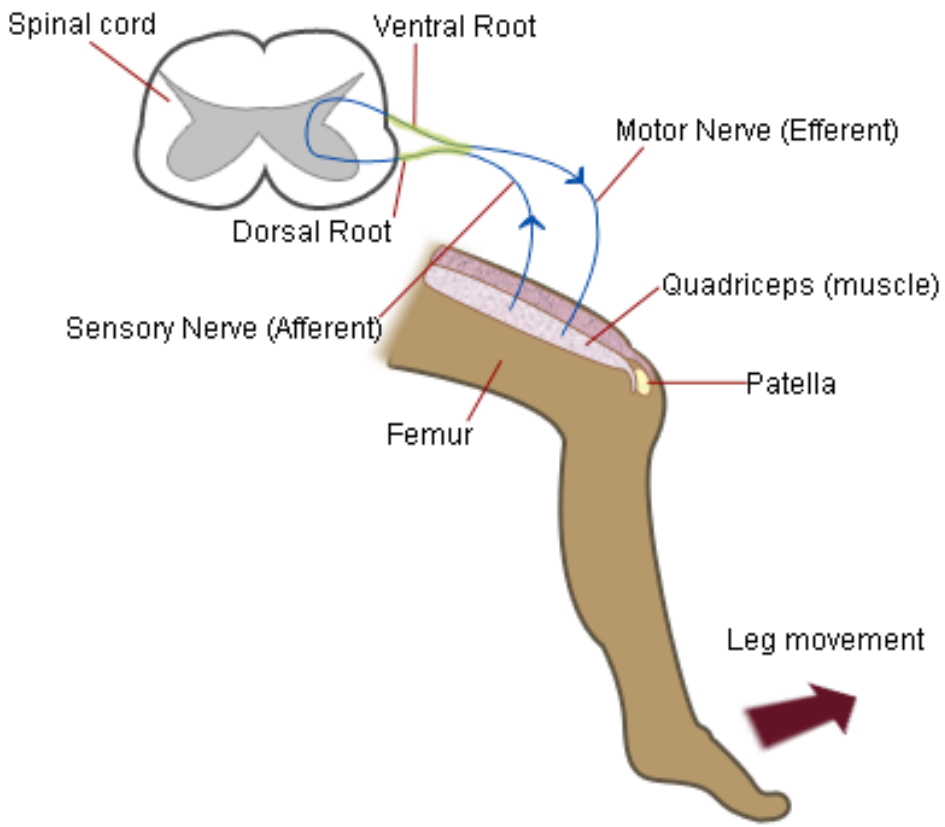
Medals and awards

1974 Heinrich-Heine Prize, the highest honour of the German Orthopaedic Society
1980 “Miteinanderwachsen” Medal from Aktion Sonnenschein
1984 BundesverdienstkreutzamBand
1985 Ernst v. Bergmann Prize from the Federal Chamber of Physicians
1986 Appointed as professor honoris causa at the University of Seoul Catholic Centre, South Korea
1992 Meinhard v. Pfaundler Medal from the German Association of Paediatricians
1992 Appointed associate professor (“docent”) at Charles University in Prague
1998 Charles University in Prague rehabilitates prof. Vojta
1996 Appointed professor and admitted to the teaching staff
1999 Awarding of Theodor Hellgrüge Award from the international Aktion Sonnenschein for his outstanding contributions, advancements and progress in Developmental Physiotherapy

Ivan Petrovitch Pavlov

(14th September 1849, Ryazan - 27th February 1936, Saint Petersburg)





In 1904, he was awarded the Nobel Prize in Physiology and Medicine

HISTORY OF THE VOJTA METHODOLOGY

- The neurophysiological basics of Vojta therapy have been built on the groundwork of I. P. Pavlov

- The reflexology works even in very complex global programs that have been applied by Vojta therapy

- Thanks to these foundations, the Vojta method is easily comprehensible and the results are established on solid scientific foundations

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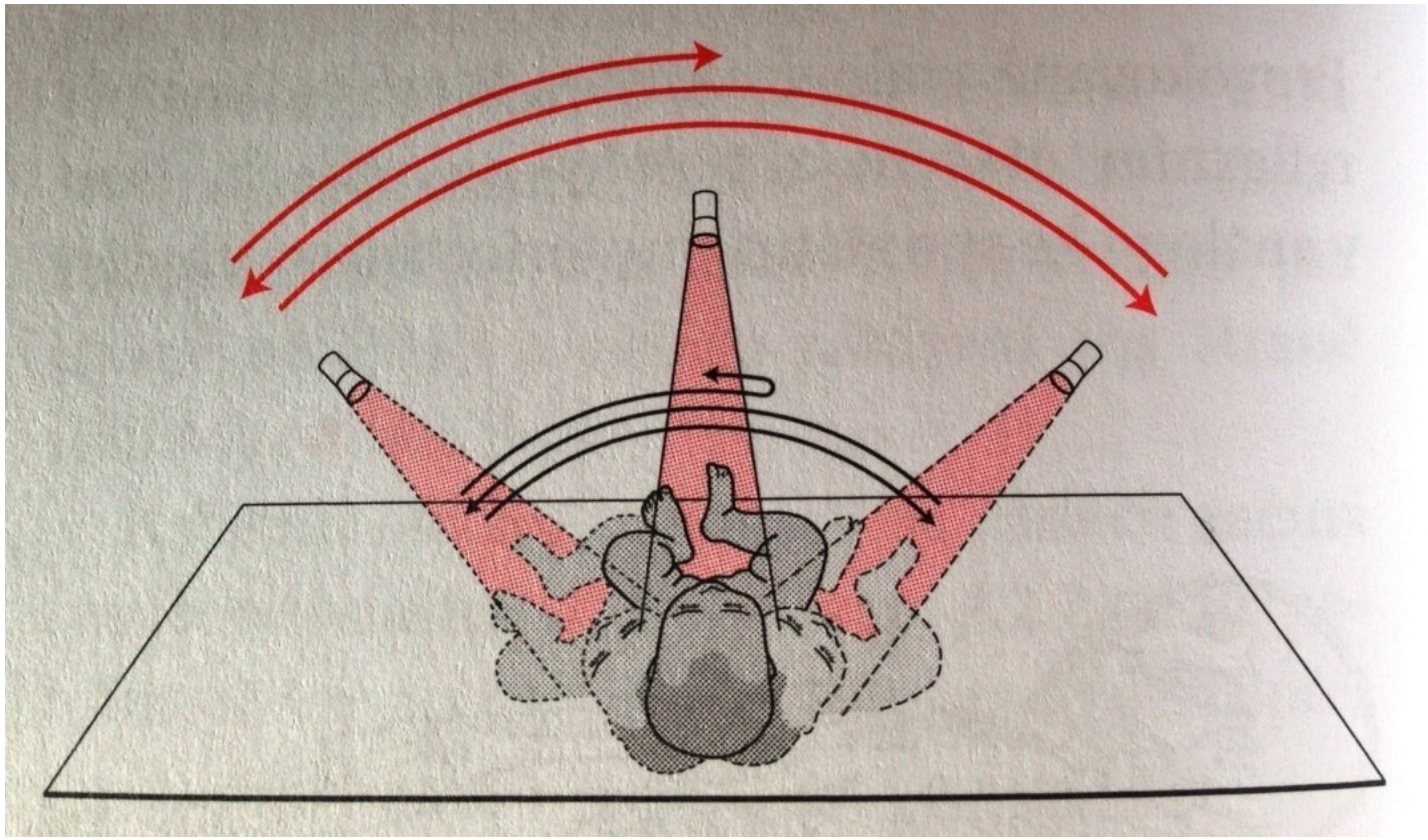
Arshavsky, Kryuchkova

Arshavsky: Fiziologia vyssej nervnoj dejatelnosti rebjonka. Medicina, Moskva, S 46-51



HISTORY OF THE VOJTA METHODOLOGY

Developmental kinesiology is a component of VM

•It's based on the findings published almost 60 years ago in 1955 by Arshavsky and Kryuchkova. Their observations proved that the automatic posture and motion of the new-borns might be global and precisely coordinated under optimal conditions.

•These findings are not well known in developmental neurology yet. The claim that the motion of the new-borns was “holokinetic” has been clearly refuted by the findings of Arshavsky

•These findings allowed V. Vojta to build the basics of developmental kinesiology on very good foundations

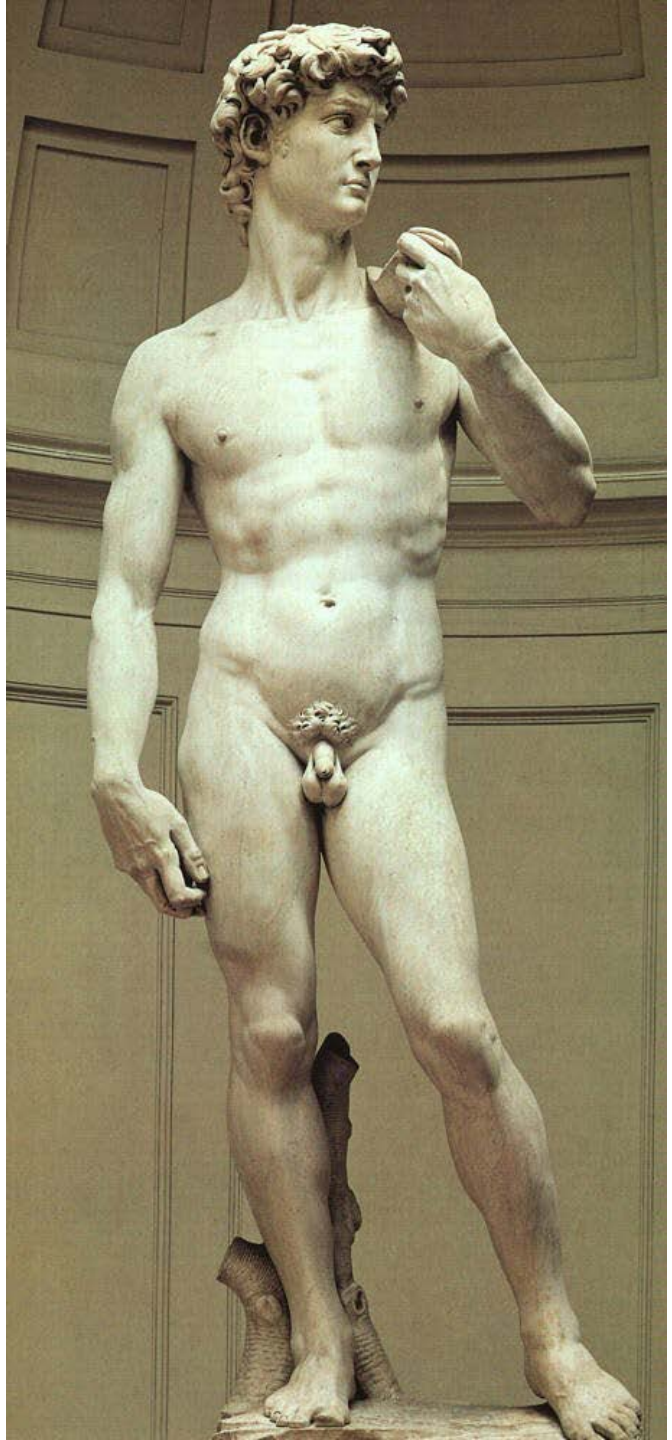
USE OF THE VOJTA METHODOLOGY

- Early diagnosis of imminent motor disorders in new-borns
- Early therapy of new-borns at risk of impaired development of motor skills
- Further use of the Vojta method
  - Older children
  - Adult patients
  - Various spectrum of diagnoses

- **Other use of Vojta principle**
  - Dynamic Neuromuscular Stabilization – Prof. Pavel Kolář
  - Basal postural programs – Jarmila Čápová

“Only the type of certainty derived from cooperation of mathematics and empiricism lets us talk about the scientific method.”

Introduction to VM2G



VM2G as the next direction of development of the Vojta methodology

VM2G has emerged as a result of the following:

- New view of the neurophysiological regulation of motor skills
- Insight into 3D functional anatomy
- Insight into 3D functional biomechanics
- Use of technical accessories in therapy
- Use of advanced technologies in therapy
- Verified concept of “home therapists”

VM2G as the next direction of development of the Vojta methodology

Concept of “home therapists”

Allows to perform:

- Continuous therapy
- Systematic therapy
- Intensive therapy
- Therapy under supervision

VM2G is absolutely safe in hands of parents and home therapists

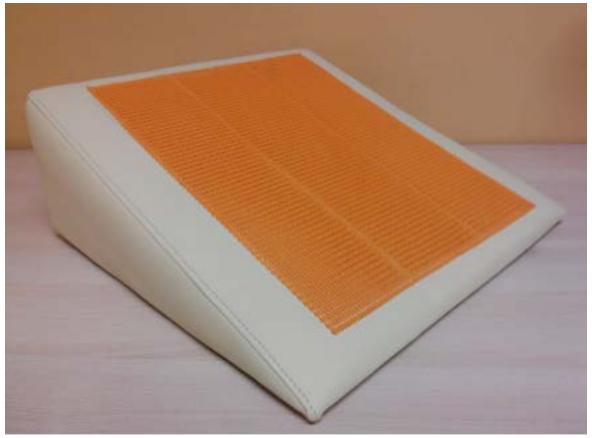
It promotes the cohesion of families of physically challenged children to and prevents family breakdown

It improves rational use of financial funds expended for care

VM2G as the next direction of the development of the Vojta methodology

The use of technical aids in therapy

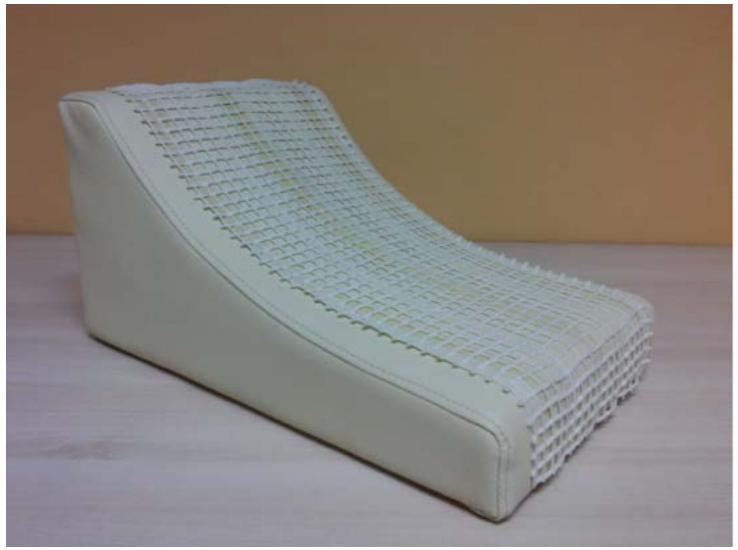
- Underlay wedges
- Foam balls
- Balance discs



VM2G as the next direction of development of the Vojta methodology

The use of technical aids in therapy

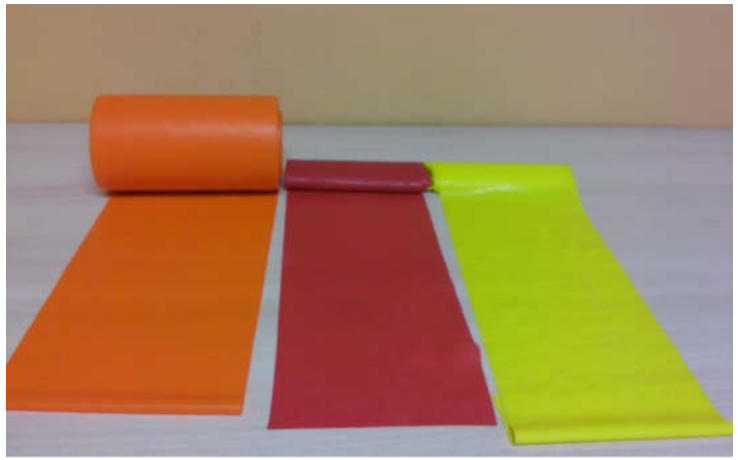
- Mats
- Bolsters



VM2G as the next direction of development of the Vojta methodology

The use of technical aids in therapy

- Non-skid mats
- Pruban®
- Thera-Band®



VM2G as the next direction of development of the Vojta methodology

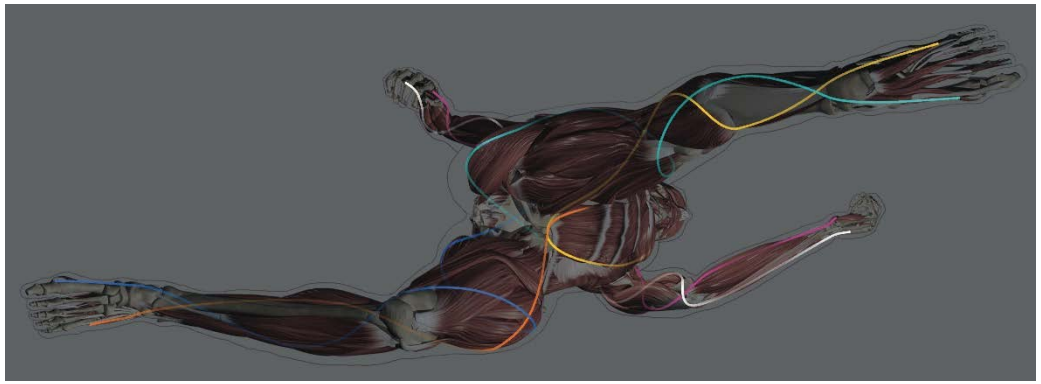
Use of advanced technologies in therapy

- Rehabilitative garment
- R – Hand
- 3D – beds

Basics of the VM2G methodology

1. Knowledge of neurophysiological programs of motor skills
2. Understanding the spiral motion dynamics
3. Awareness of determining momentum of force and speed during motion
4. Understanding the trajectories of motion that:

- Run within spiral dynamics
- Have a unique sequence
- Are unmistakeable for each individual



Basics of the VM2G methodology

VM2G therapy pursues the goal to intervene:

- Into CNS functions - **“SW”**
- Into the organization of the cerebral matrix - **“HW”**
- And use the genetically encoded kinetic program in the therapy

Neurophysiological view on the regulation of motor skills

- **BIOS – regulates vital functions; it does not regulate the motor skills**

- **Basic operational program for regulation of motor skills (Windows)**
  Automatic posture of the body, basic stereotypical movements

- **Substitute program for regulation of motor skills (DOS)**
  Automatic posture of the body, basic stereotypical movements

- **Application programs – extensive, educational program of the motor skills (Word, Excel) for fine and gross motor skills**

- **Program for “correction of movement”**

Neurophysiological view on the regulation of motor skills

- **For easier understanding of the neurological programs that are involved in the regulation of motor skills, I have used the analogy with computer programs.**

- **BIOS** – is a basic “starting” program for all types of computers. Its task is to start the basic functions of the computer. There is also permanently running “BIOS” in our brain that regulates the basic vital functions completely autonomously (heart activity, respiration, excretion, haemodynamics…). Damage to the basal program leads to inevitable death in humans and in the computer as well. The program is quite robust and maintains the basic vital functions even during severe impairment of higher programs of either the PC or, in our case, the brain.

Neurophysiological view on the regulation of motor skills

- In this computer analogy, an operational program represents “sophisticated programs” for PC control. They have great abilities to start “application programs”. Otherwise, they enable their “creation” very often and improve them gradually through “learning” (Windows, iOS, Linux…)

- The operational program develops during the first whole year as well into the first year and half of a child’s life. The ability of unaided bipedal standing and the ability of autonomic basic kinetic programs (gait, grip, respiration programs) come as a result.

Neurophysiological view on the regulation of motor skills

- In the computer analogy, the substitute program “DOS” represents the first “primitive” program for PC operation, that used to have very limited abilities of starting “application programs”

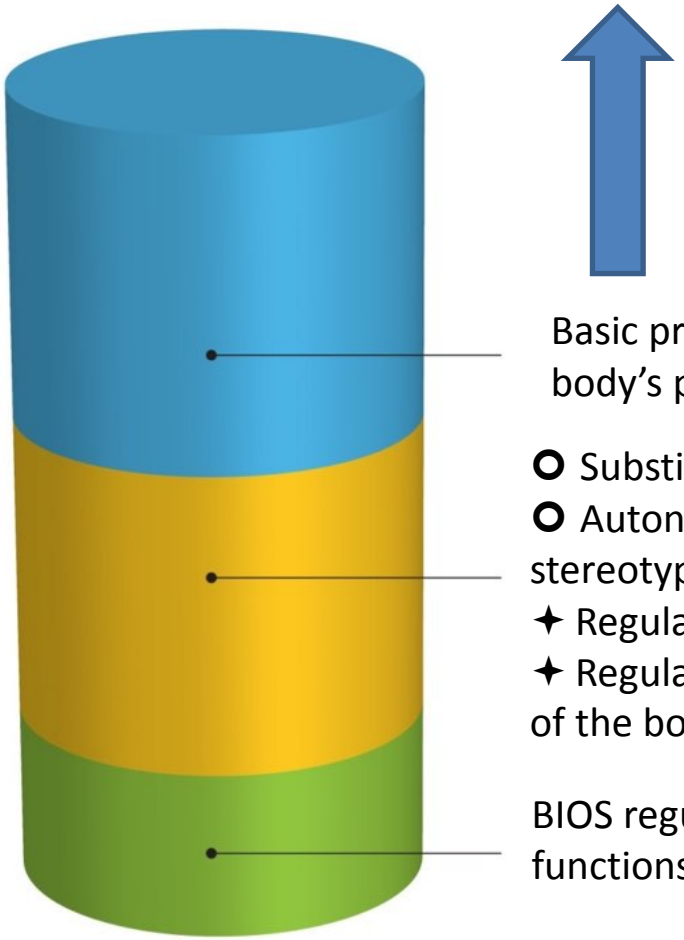
- “DOS” program is activated right after birth. It regulates the motor skills based on primitive new-born reflexes. It allows the child to survive the sudden pull of gravity. Concurrently, it enables gradual development of the complex operational program for locomotion of the musculoskeletal apparatus.

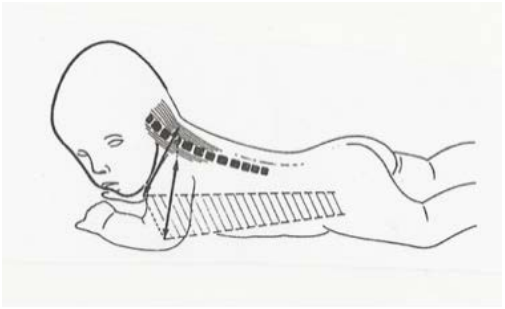
Neurophysiological view on the regulation of motor skills

- Within the world of computers, APPLICATION programs represent a myriad of opportunities for control and creation of various things. Their operation is necessary to make WINDOWS, as the basic operational program, finely-tuned, stable and robust enough. The better the tuning, stability and robustness, the better the performance of application programs is.

- In humans, all motor skills generated by learning could be considered as APPLICATION programs. They occur both in gross and fine motor skills, and they can always improve.

Status of the programs after birth

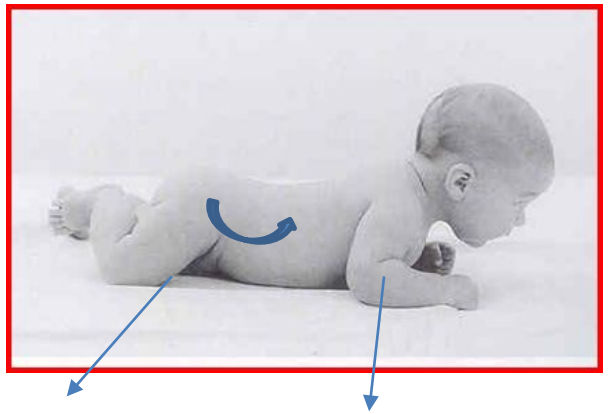




Basic program for regulation of motor skills – autonomy of the body's posture

- Substitute program for regulation of motor skills (DOS)
- Autonomic regulation of the posture of the body, basic stereotypical movements
  - ✦ Regulation by primitive reflexology
  - ✦ Regulation by primitive, ontologically old type of posture of the body

BIOS regulation of vital functions



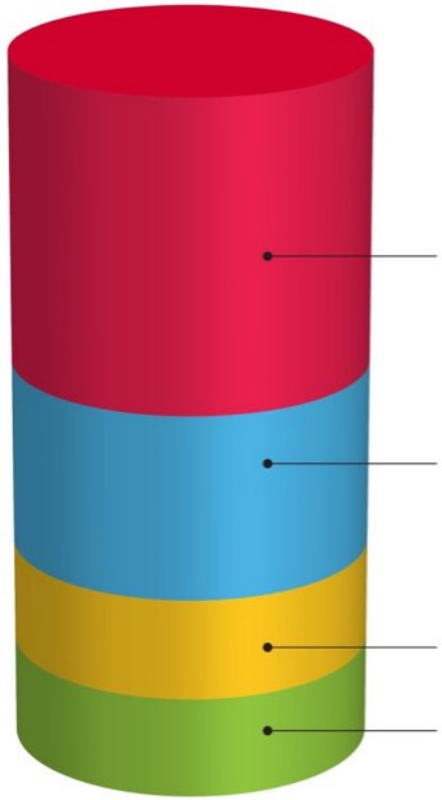
Neurophysiological view on the regulation of motor skills

- After birth, the motor skills of the child are regulated by the primitive “DOS” Substitute program and the Operational program. The DOS program gradually turns off. It “goes to sleep” together with fading reflexes of new-borns and infants. Conversely, the operational program develops. It grows in volume and finally, it takes over the regulation of motor skills completely.

- APPLICATION programs start to appear in the end of the first year of life.

Foundations of kinetic programs during human development

Ideal maturation of the programs for regulation of motor skills in adults



“Application” - extension program of motor skills (like, e.g. Word, Excel) – gross and fine motor skills

“Operational” - main regulation program of motor skills (like Windows) contains autonomic regulation of the body’s posture and basic stereotypical movements

Substitute and rescue program of locomotion (DOS)

"BIOS» - Regulation of vital functions

Neurophysiological view on the regulation of motor skills

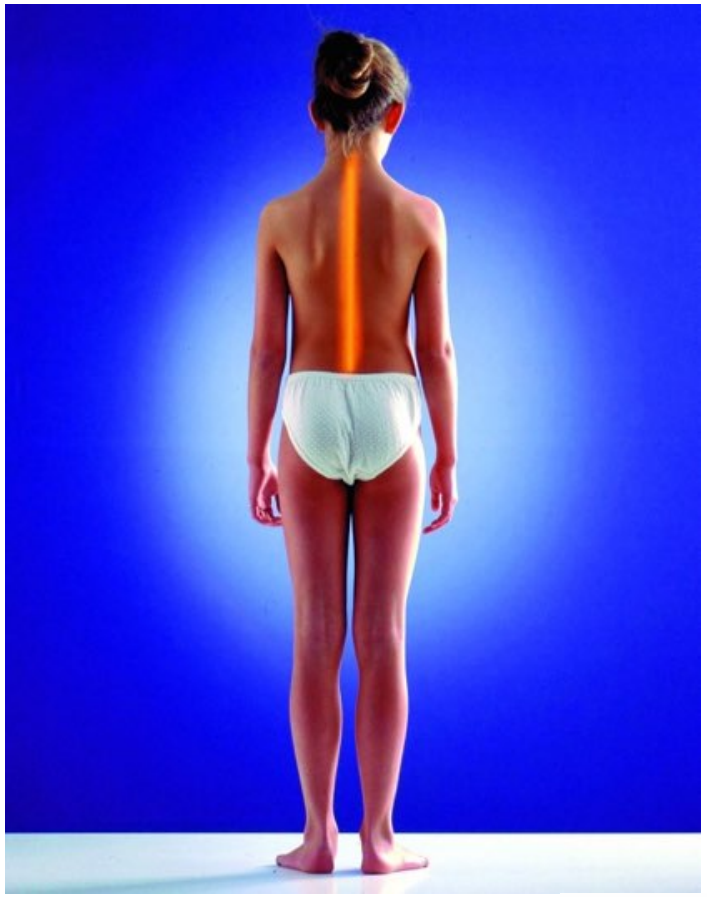
- The peak of motor “tuning” could be seen in ballerinas. The DOS substitute program is completely separated from the operational program. It cannot interfere with its functions. OP is 100 % tuned, stable and robust.

- APPLICATION programs of fine and gross motor skills are immense after long and challenging training (much greater than in untrained people). They are able to provide great performance and resist stress.

Neurophysiological view on the regulation of motor skills

Basic programs for regulation of motor skills

- Autonomic regulation of the posture of the body – in any position
- Labyrinthine and equilibrium reflexes
- Straightening reactions
- Autonomic regulation of joint centration



Basic stereotypical movements

- Gait
- Grip
- Respiratory
- Oculomotor
- Swallowing, orofacial

Neurophysiological view on the regulation of motor skills

Extension and educational application programs of motor skills (like Word, Excel) for soft and gross motor skills

They require normal and intact function of basic operational systems of motion (BOSM) with ideal autonomic regulation of the posture of the body and ideal function of basic stereotypical movements.

1.Gross motor skills

throws, jumps, hits, kicks – sports in general

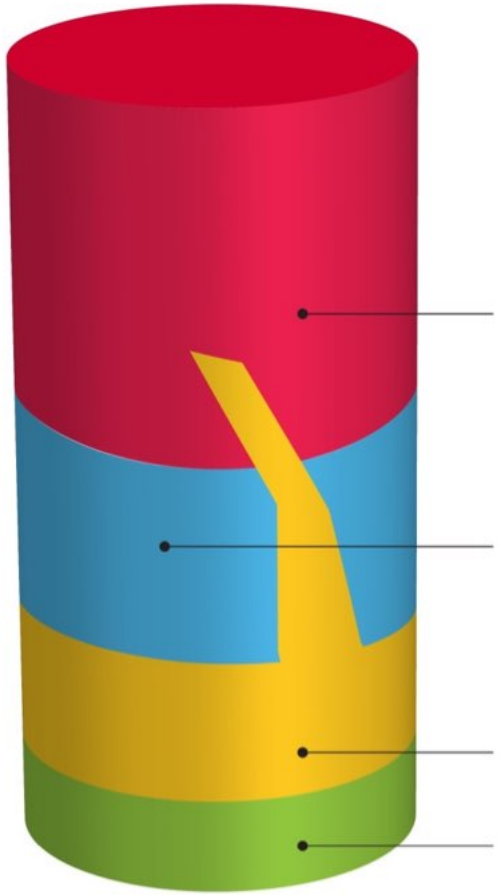
2. Fine motor skills of the hand

writing, drawing, painting, arts, playing musical instruments

3. Orofacial fine motor skills

speech, singing, playing wind instruments

Disorders of the program in pathological posture of the body

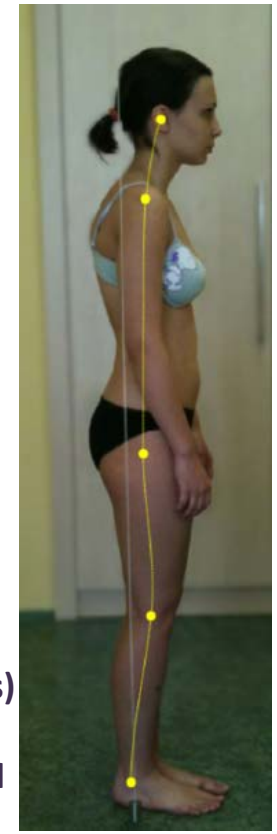


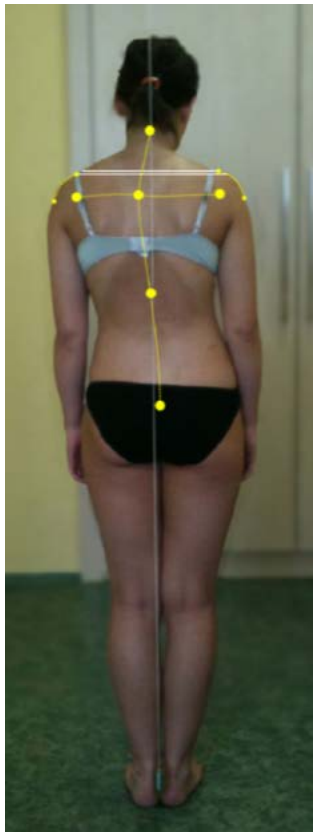
“Application” - extension program of motor skills (like, e.g. Word, Excel) – gross and fine motor skills

“Operational” - main regulation program of motor skills (like Windows) contains autonomic regulation of the body’s posture and basic stereotypical movements

Substitute and emergency program of motion (DOS)

"BIOS» - Regulation of vital functions



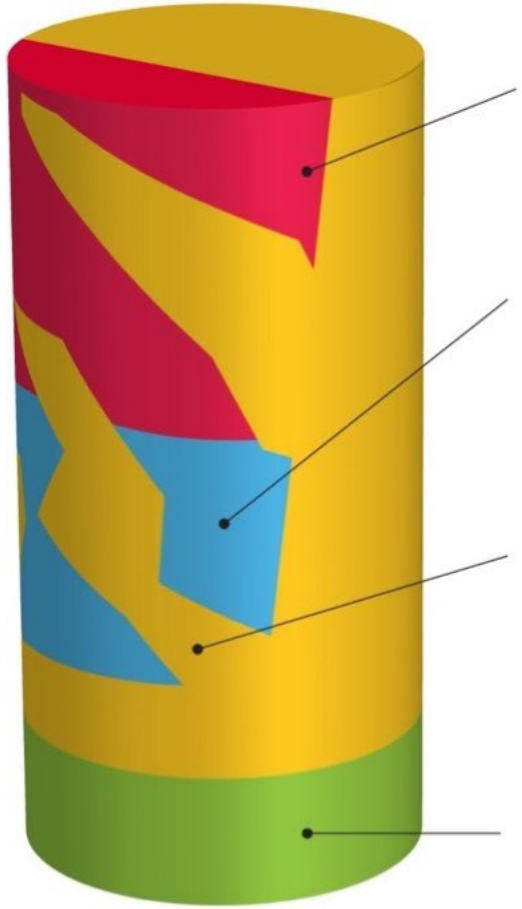


Partial impairment of the autonomic regulation of the posture of the body, partially impaired basic stereotypes, worse preconditions for “APPLICATIONS programs”

Neurophysiological view on the regulation of motor skills

The most common occurrence of motor skill disorders of the musculoskeletal apparatus happens due to impairment of the **basic program** due to interference of the primitive DOS program. The interference of the DOS program also takes place in APPLICATION programs.

Status of the programs in central palsies



Application program of motor skills, gross and fine motor skills

Operational program of motor skills

"BIOS» - Regulation of vital functions without the regulation of motion

Substitute program of regulation of motor skills
Impaired autonomic regulation of the posture of the body, impaired basic stereotypical movements
Regulation by primitive reflexology
Regulation by primitive and ontologically old type of body posture
It is impossible to learn the higher extension APPLICATION programs, or it is possible with compensation aids only

Impaired autonomic regulation of the posture of the body
Impaired basic stereotypical movements
Inferior preconditions for application programs

Neurophysiological view on the regulation of motor skills

DOS substitute program for regulation of motor skills – What is it used for?

- **Impaired autonomic regulation of the posture of the body**
- **Impaired basic stereotypical movements**

- It provides survival with substitute movement patterns.
- It restricts or makes the activation of the APPLICATION programs of fine and gross motor skill impossible.
- Keeps the possibility of transition to normal patterns of motion of the operational program system

Neurophysiological view on the regulation of motor skills

- The impairment of development of the ontogenetically younger basic operational program takes place in disorders of brain development within the first year of life. This program is much more vulnerable. At the same time, the primitive DOS program is not switched off. Conversely, it is fixed, including the primitive reflexology.

- Thus, the ability to learn the APPLICATION programs is significantly restricted or impossible.

Neurophysiological view on the program for “repair of movement”

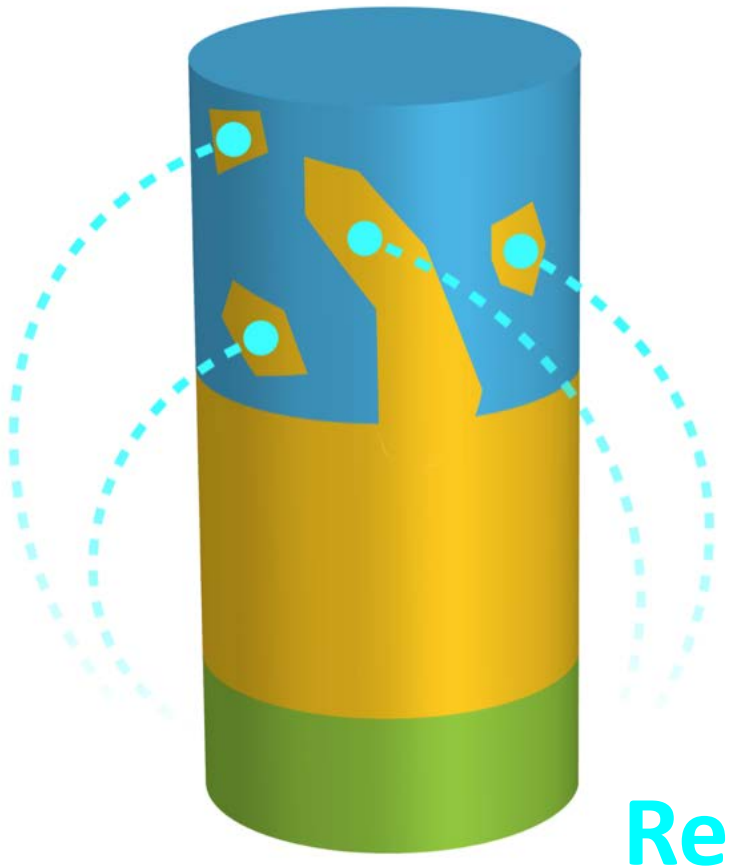
- Status of the programs during the first year of life
- Impairment of the “basic operational program”
- Expansion of the “substitute operational program”

Operational program for motor skills

Substitute program for motor skills

“BIOS” - regulation of vital functions without the regulation of motion

Neurophysiological view on the program for “repair of movement” during the first year of life



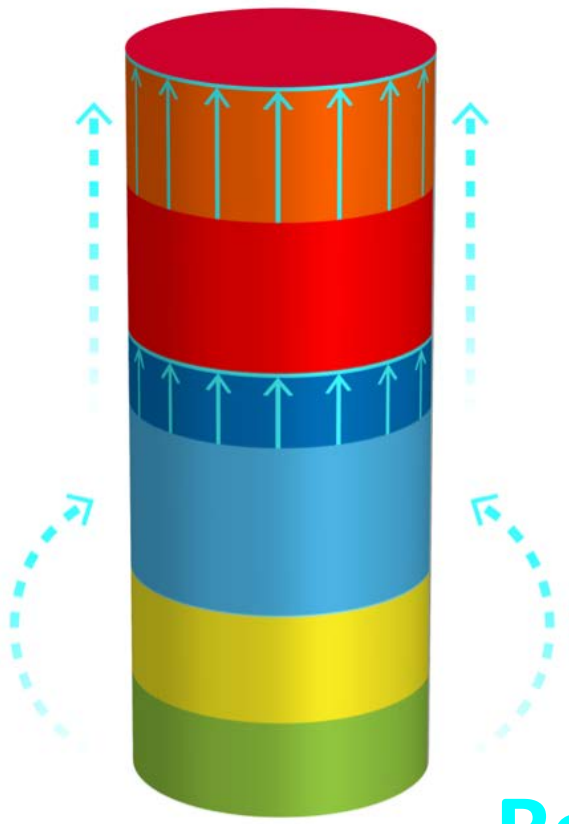
- The process of therapeutic intervention by reflexive stimulation with the Vojta methodology – VM2G
- Gradual “healing” of the basic operational program
- Regression and switching off of the substitute operational program

Reflexive stimulation

Technique of the stimulation of the new-borns with VM2G

Repair of the basic “operational” programs

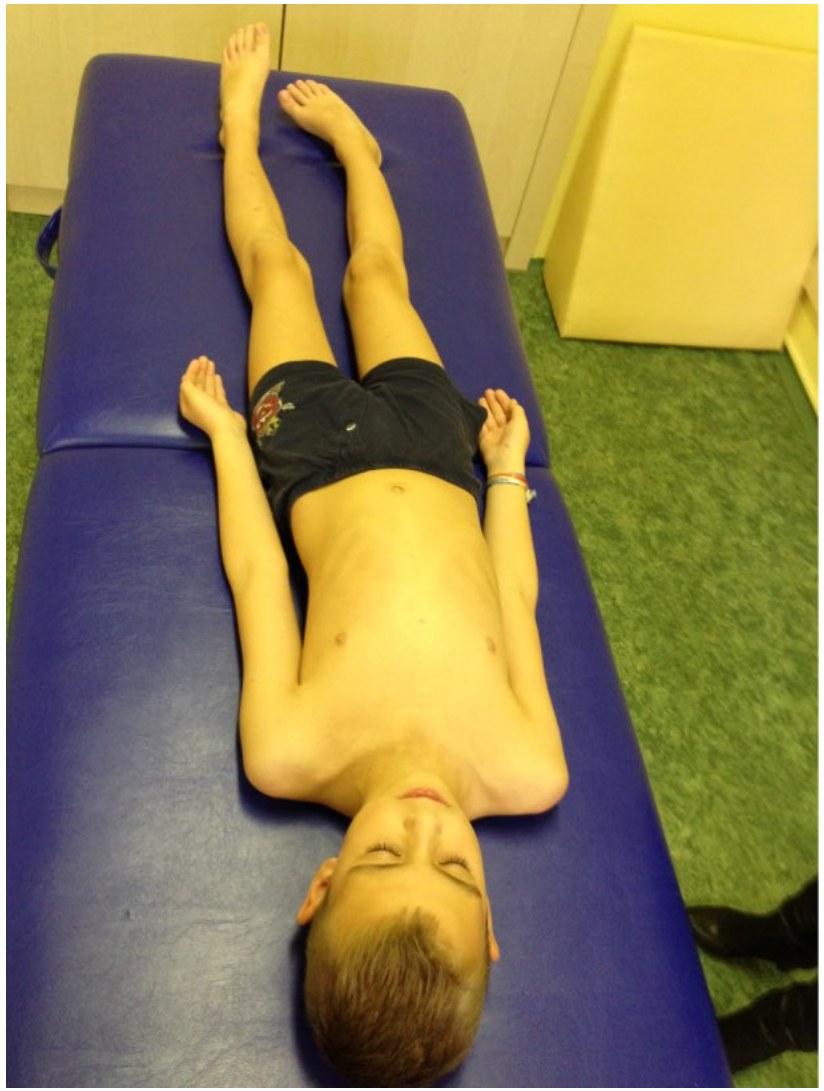
Neurophysiological view on the program for “repair of movement”

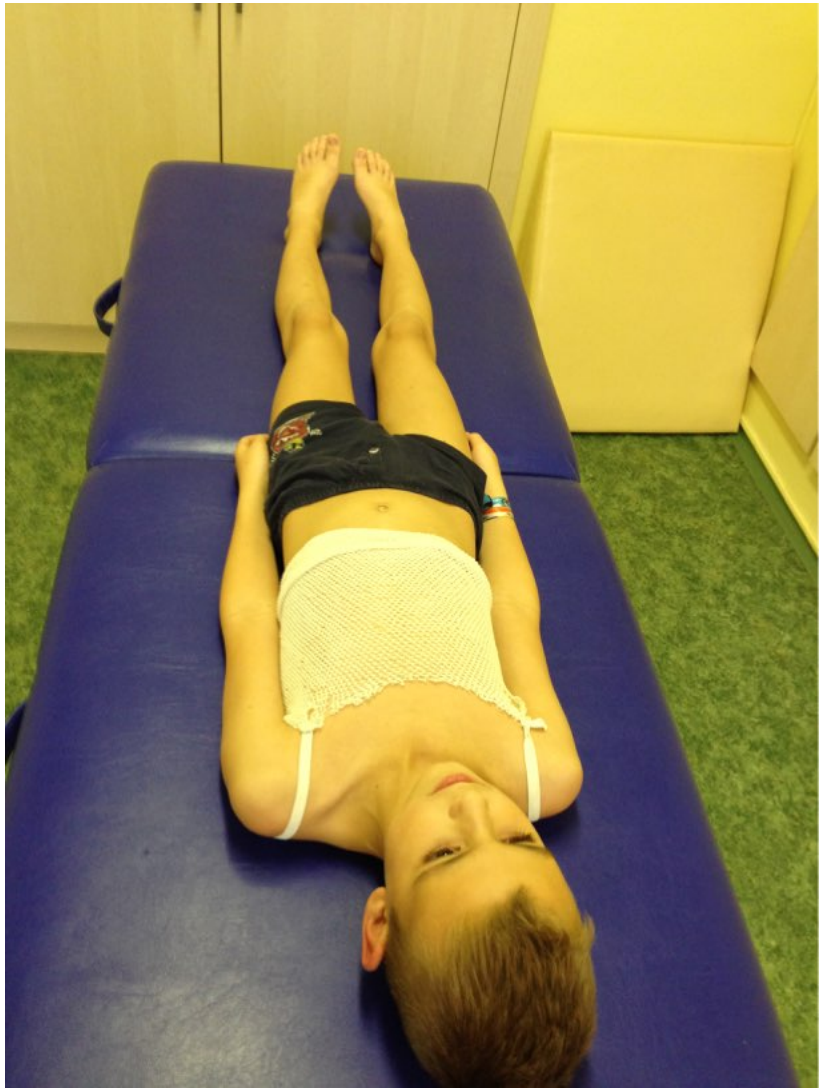


- Influence of the performance of the stimulation with Vojta methodology in terms of VM2G methodology in healthy individuals
- Basic operational program of motor skills becomes robust
- Application programs have conditions for growth and development

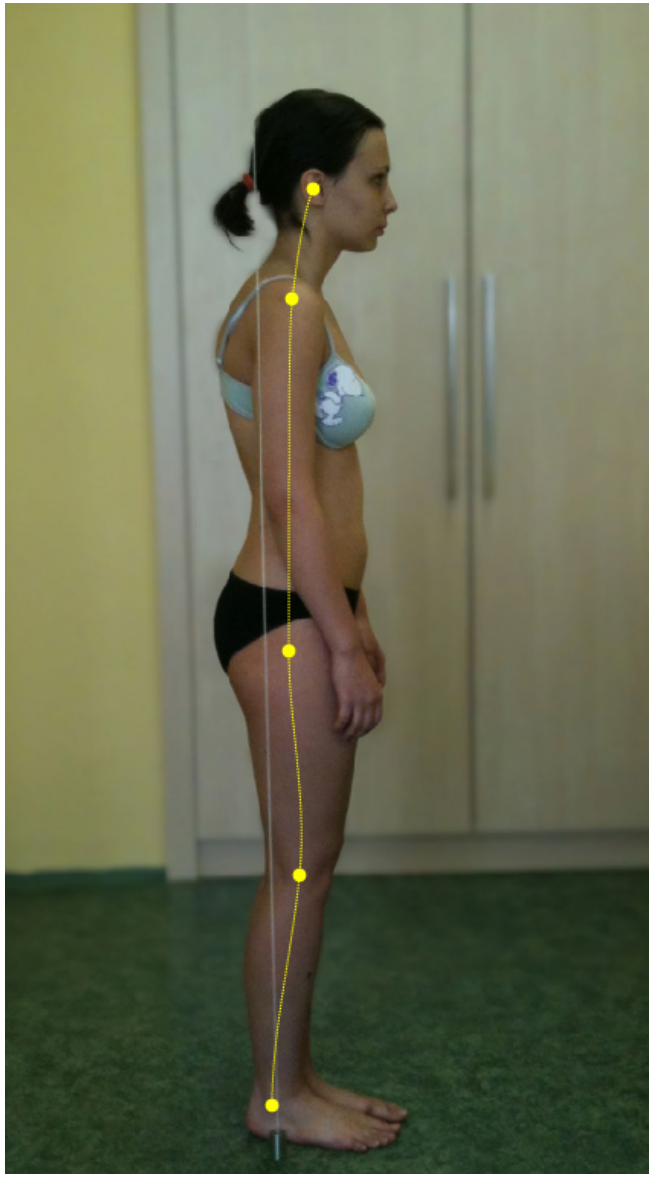
Reflexive stimulation

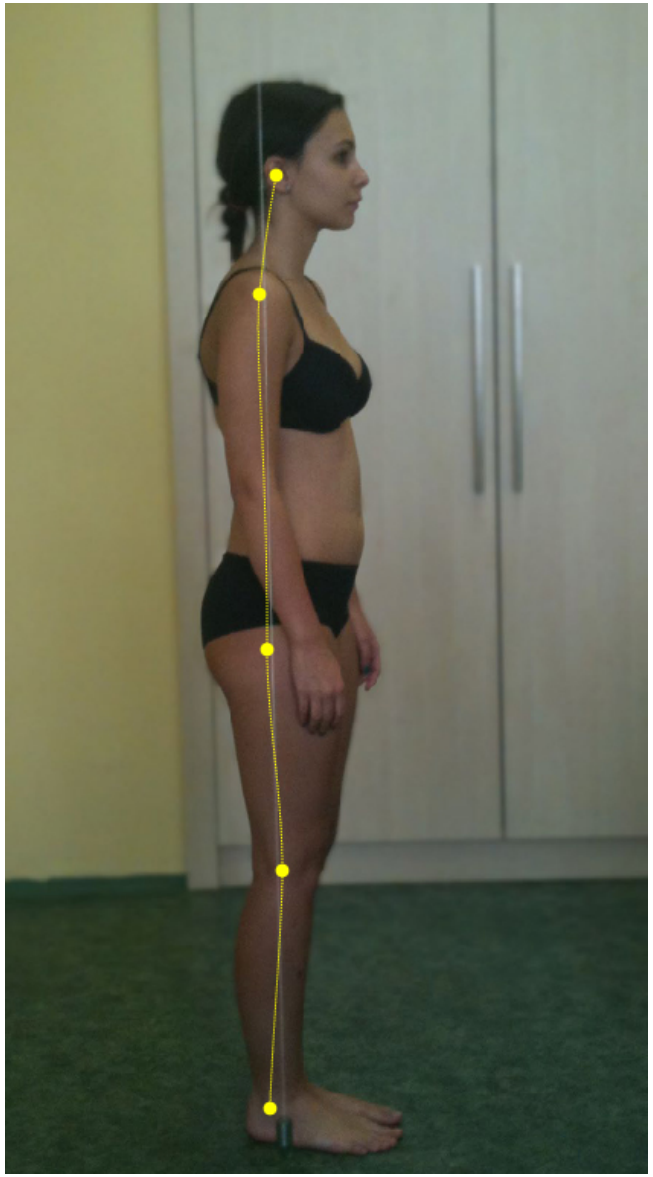
Immediate effects of the stimulation with VM2G



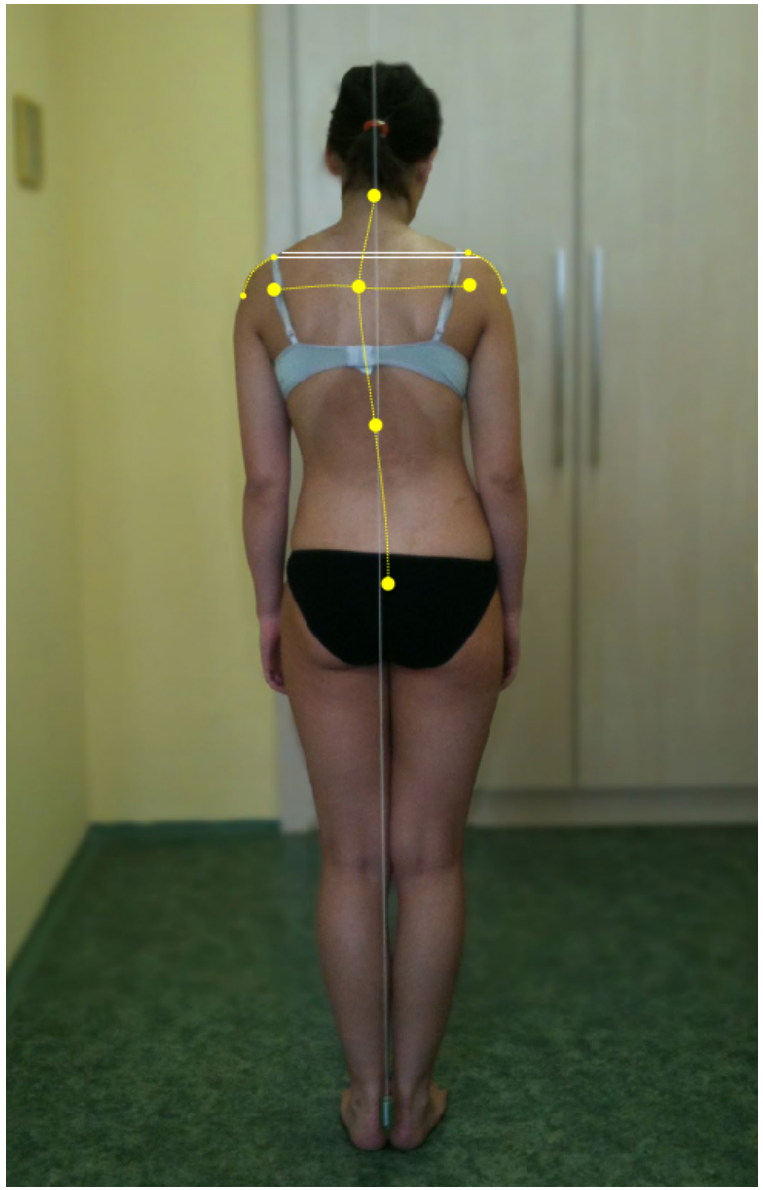


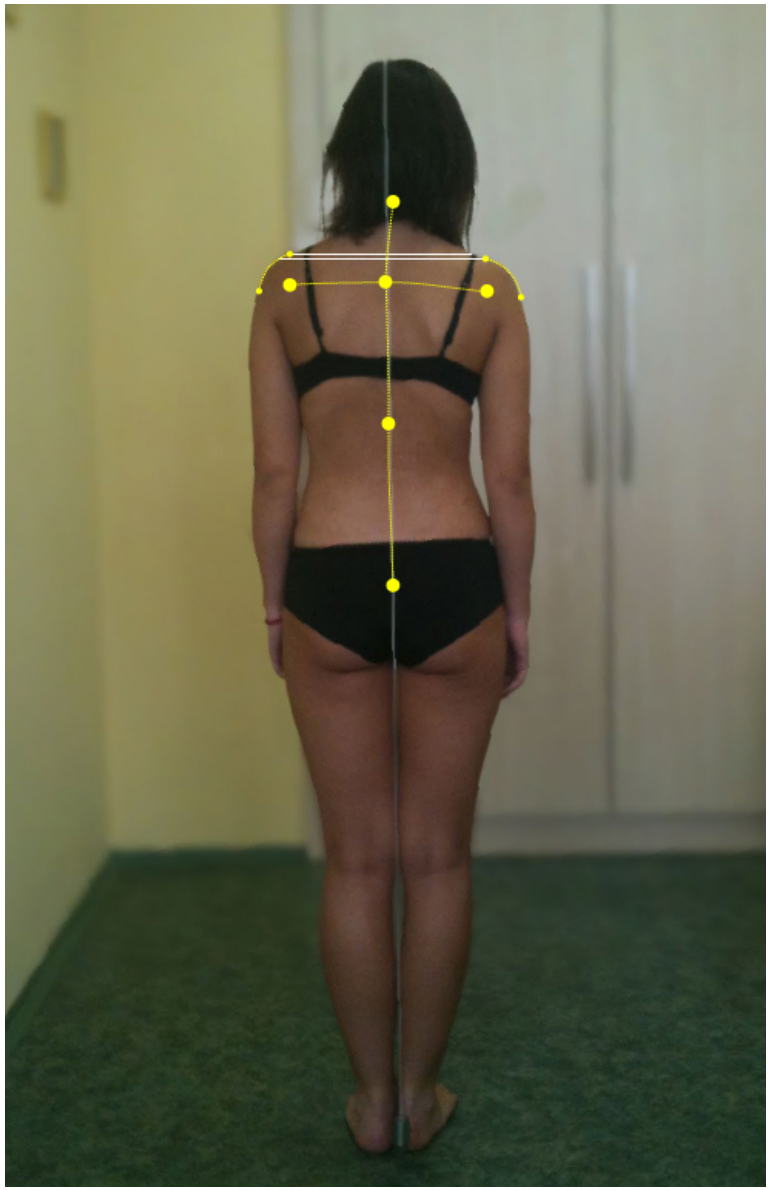
Repair of the impaired posture of the body



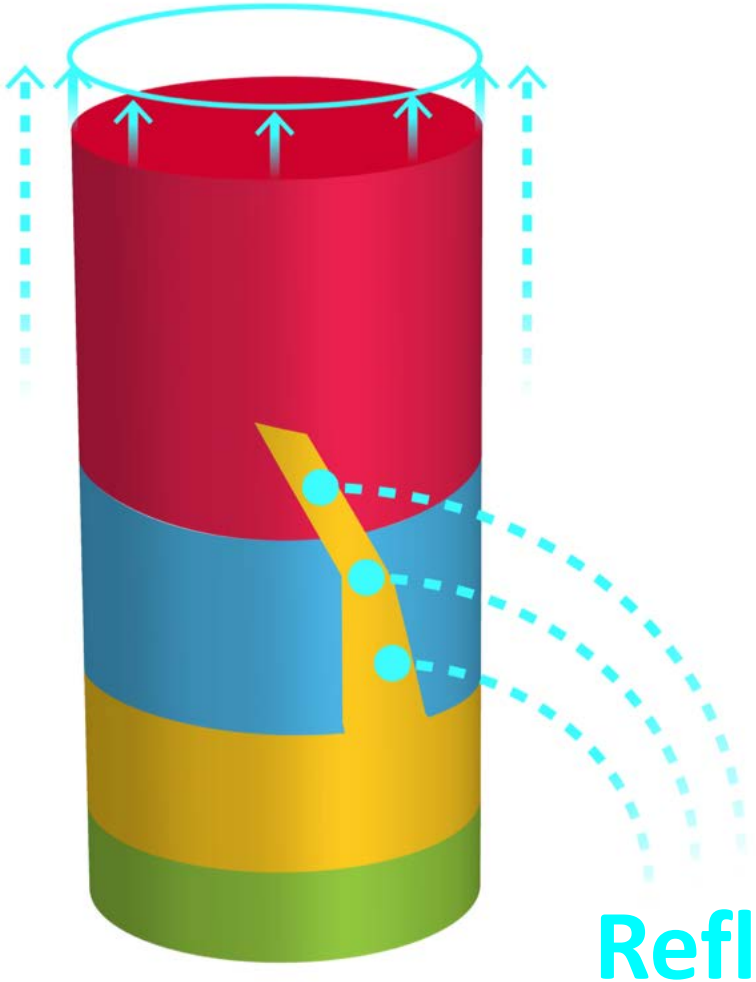


Repair of the impaired posture of the body





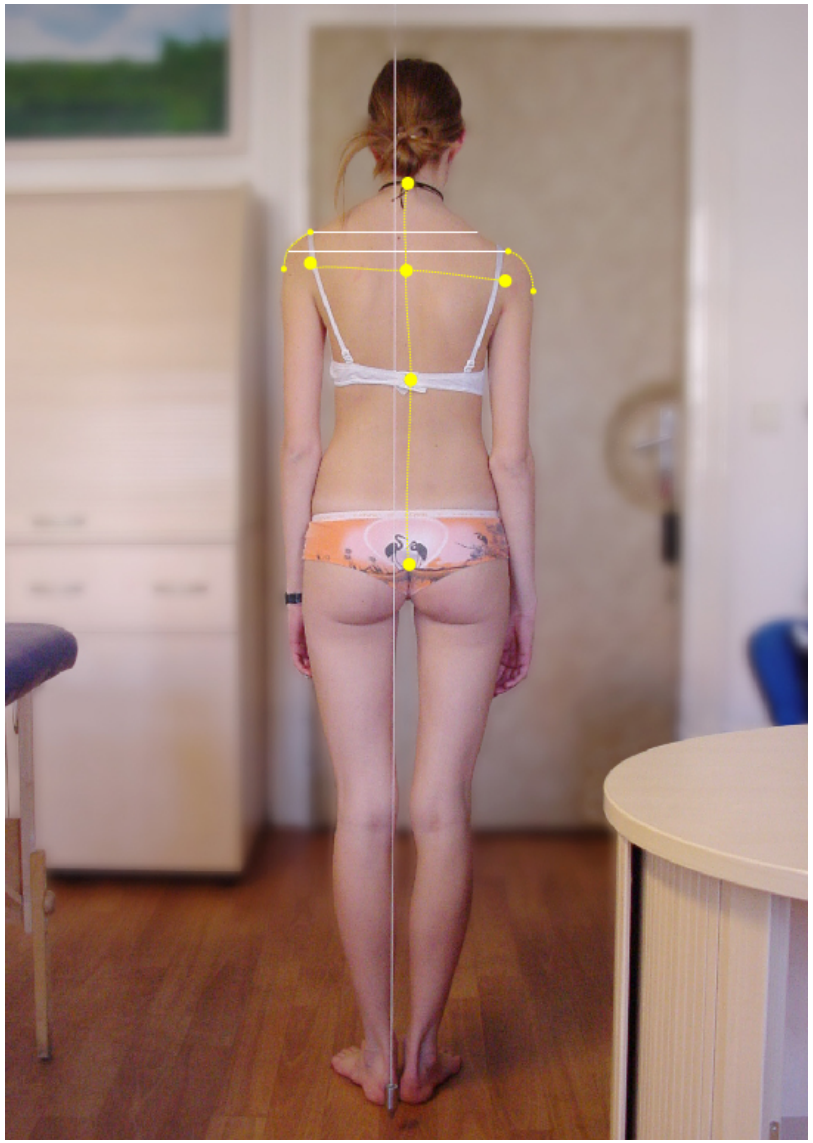
Neurophysiological view on the program for “repair of movement”

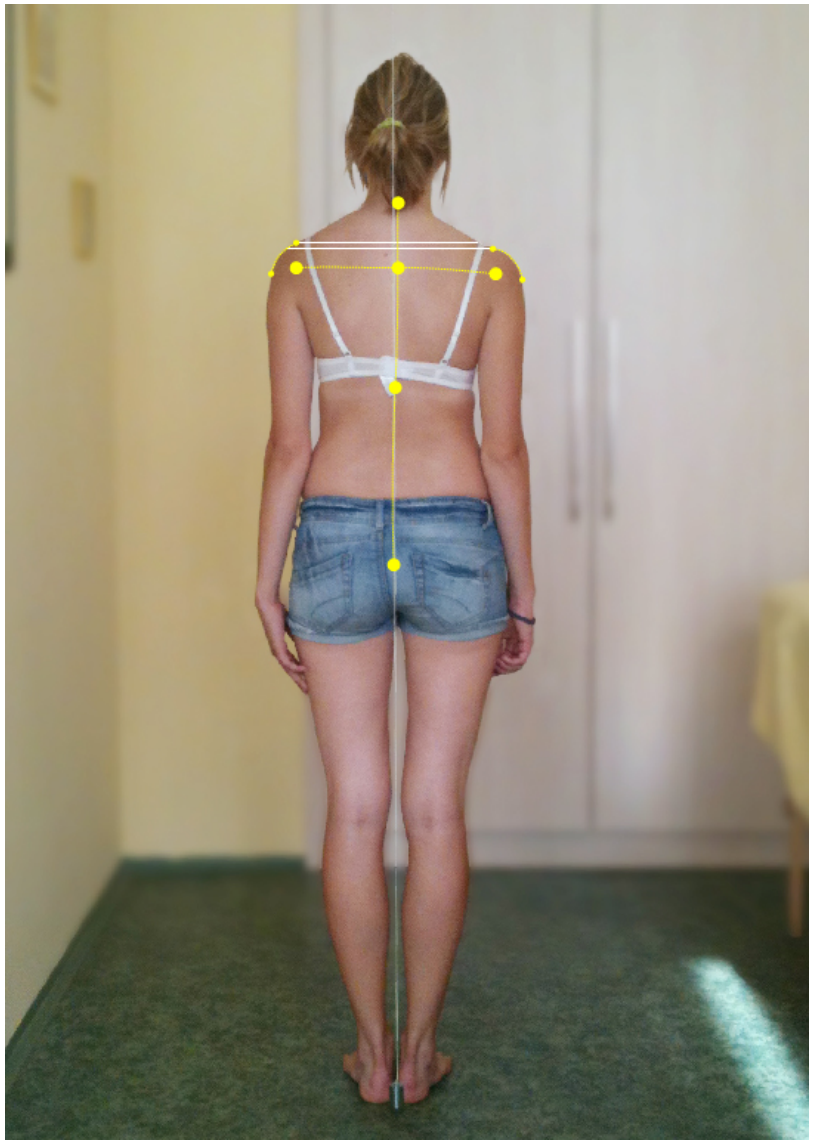


- **Primary** therapeutic influence of the performance of VM and VM2G in patients with milder impairment of the basic operational program
  - Normalizing the operational program
- **Secondary** influence on the development of the application programs
  - And their development and growth

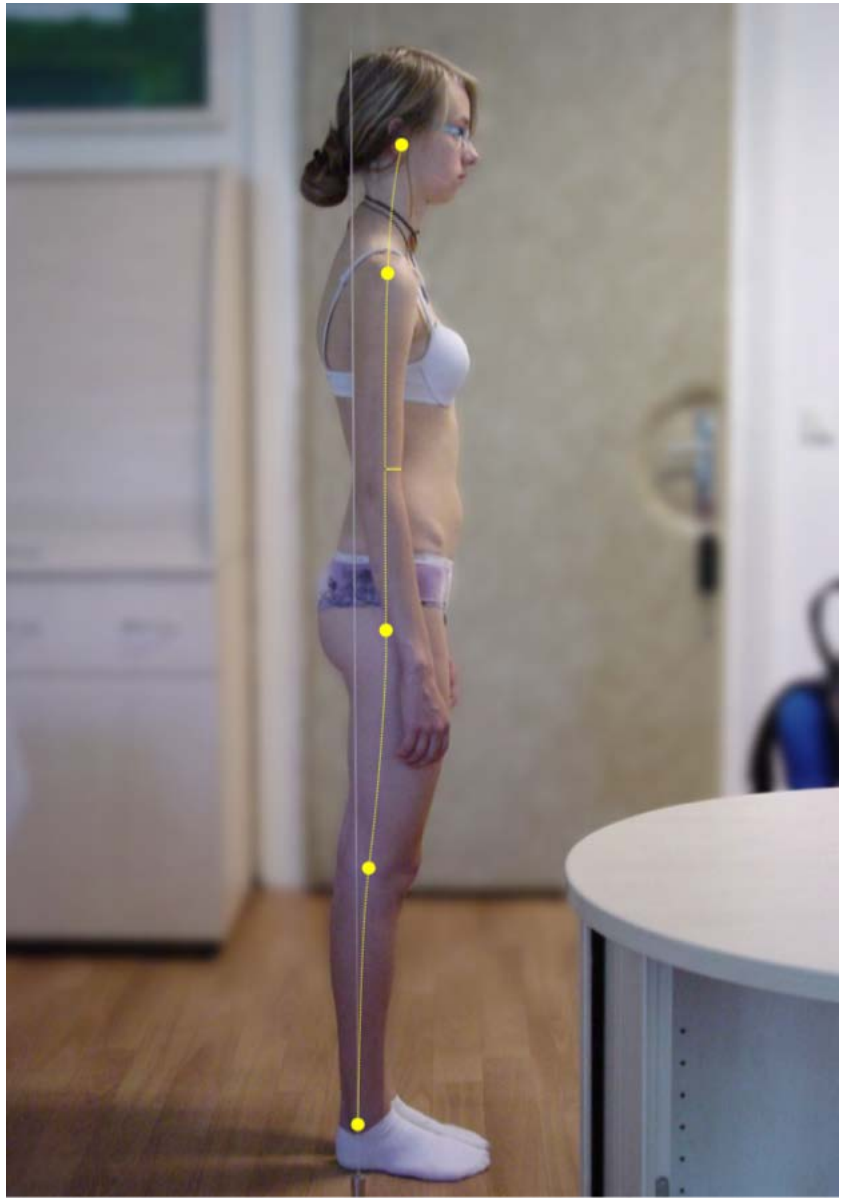
Reflexive stimulation

Repair of the impaired posture of the body

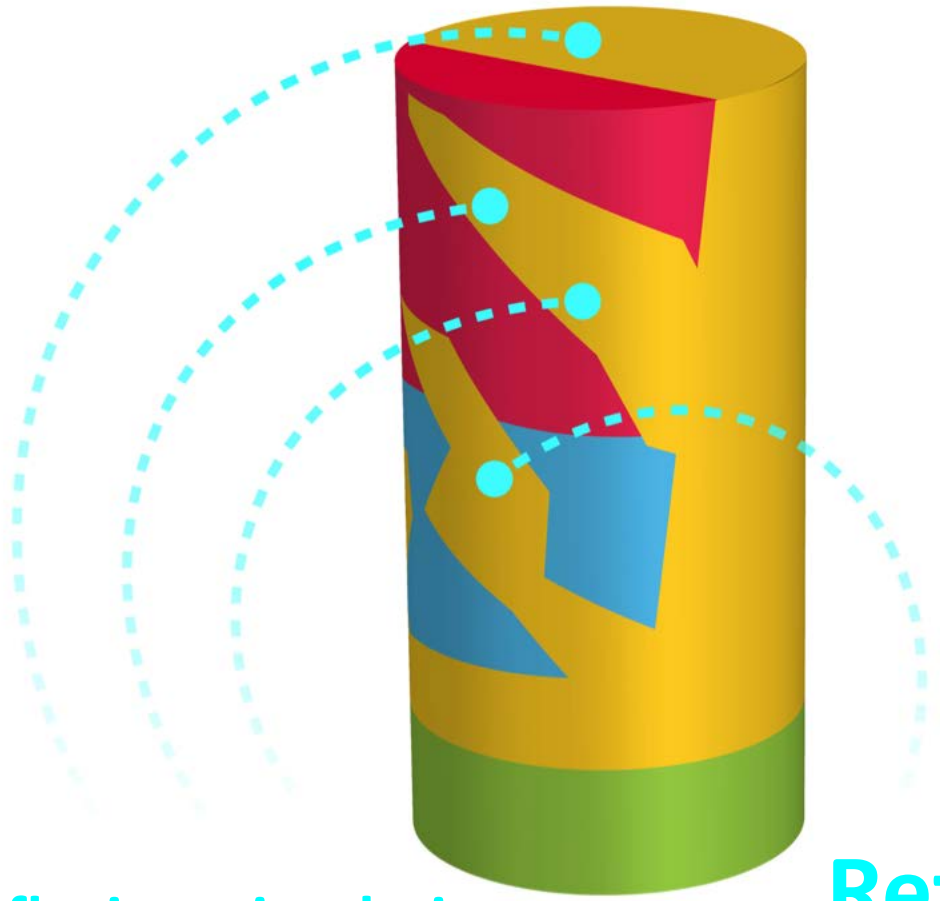




Repair of the impaired posture of the body



Neurophysiological view on the program for “repair of movement”

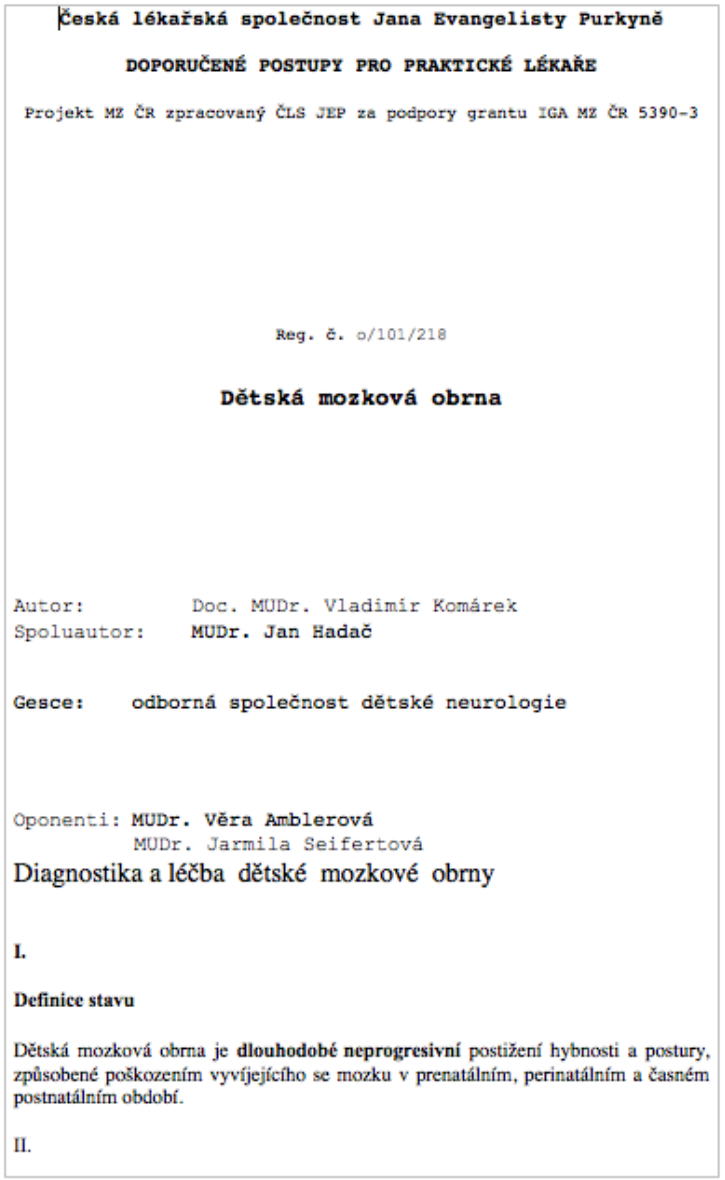


Reflexive stimulation

- Influence of the reflexive stimulation in the patients with severe impairment of the basic operational program (e.g. cerebral palsy, stroke...)
- Restitution of the basic operational program
- Switching off the substitute operational program
- Improvement of functions of the application programs

Reflexive stimulation

Regulation RECOMMENDED PROCEDURES FOR GENERAL PRACTITIONERS – Reg. No. o/101/218, refer to:



Česká lékařská společnost Jana Evangelisty Purkyně

DOPORUČENÉ POSTUPY PRO PRAKTICKÉ LÉKAŘE

Projekt MZ ČR zpracovaný ČLS JEP za podpory grantu IGA MZ ČR 5390-3

Reg. č. o/101/218

Dětská mozková obrna

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Diagnostika a léčba dětské mozkové obrny

I.

Definice stavu

Dětská mozková obrna je **dlouhodobé neprogresivní** postižení hybnosti a postury, způsobené poškozením vyvíjejícího se mozku v prenatálním, perinatálním a časném postnatálním období.

II.

Early identification of incipient disorders of movement and posture

Screening of the psychomotor development of a child by Vlach should be examined in all children by a general practitioner for children and youth (paediatrician).

Screening of postural development by Vojta should be examined in all children at risk and in all children suspected of impairment to their psychomotor development. This examination should be recommended by paediatrician and repeatedly performed by a paediatric neurologist, paediatricians specialized in early diagnostics of movement disorders, or eventually, by rehabilitative physicians or physiatrists.

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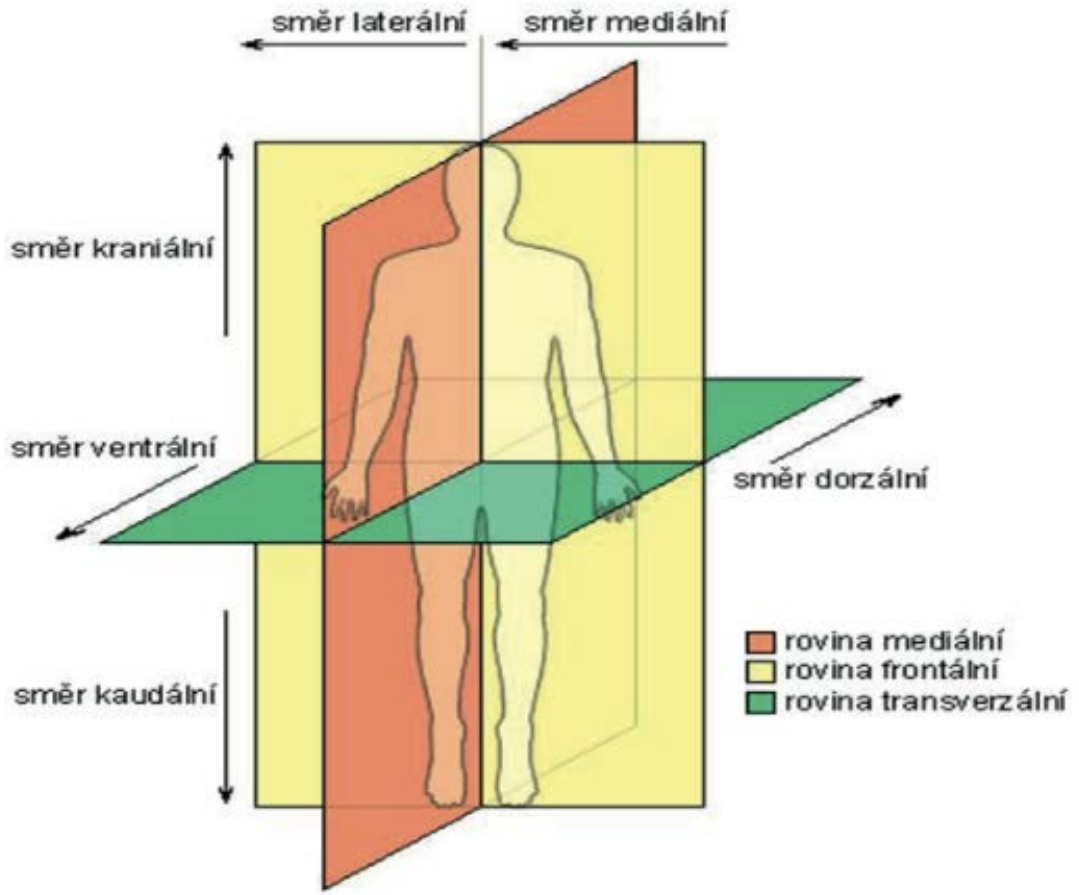
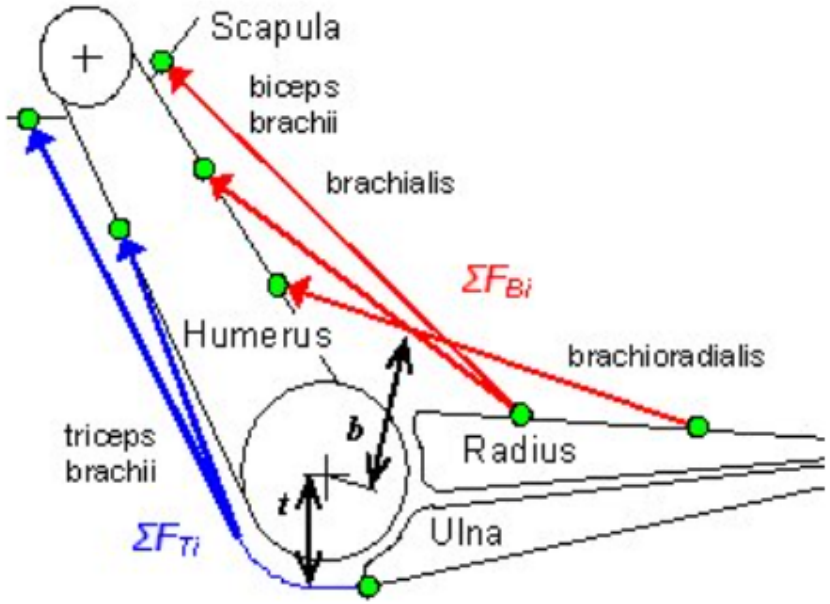
“Classical” Anatomy

“Classical” Anatomy

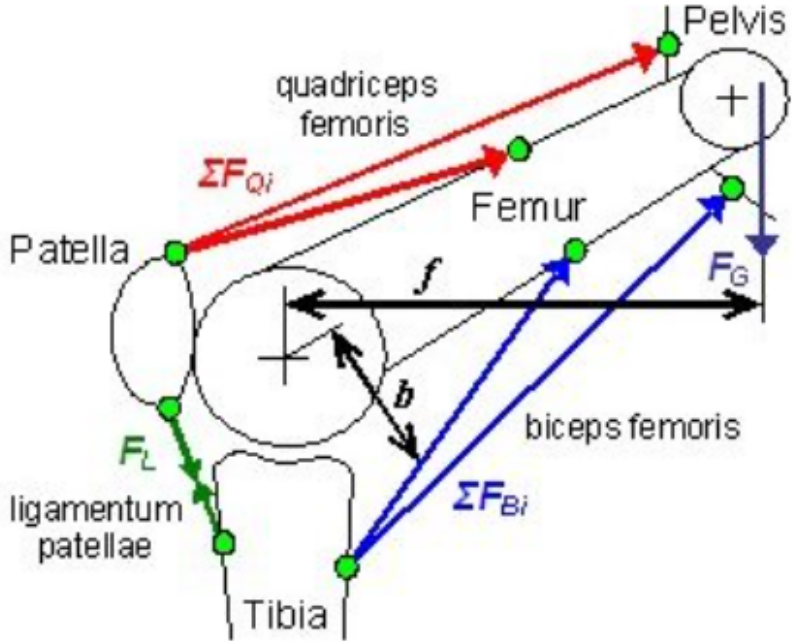
- **Planar**
- **Analytical**
- **Base = autopsies of cadavers**
- **Functions of muscles = origin and insertion**
- **Origin of the muscle = the proximal end**



“Classical” Anatomy – Practical applications in biomechanics



Obr.1: Silové poměry v horní končetině.

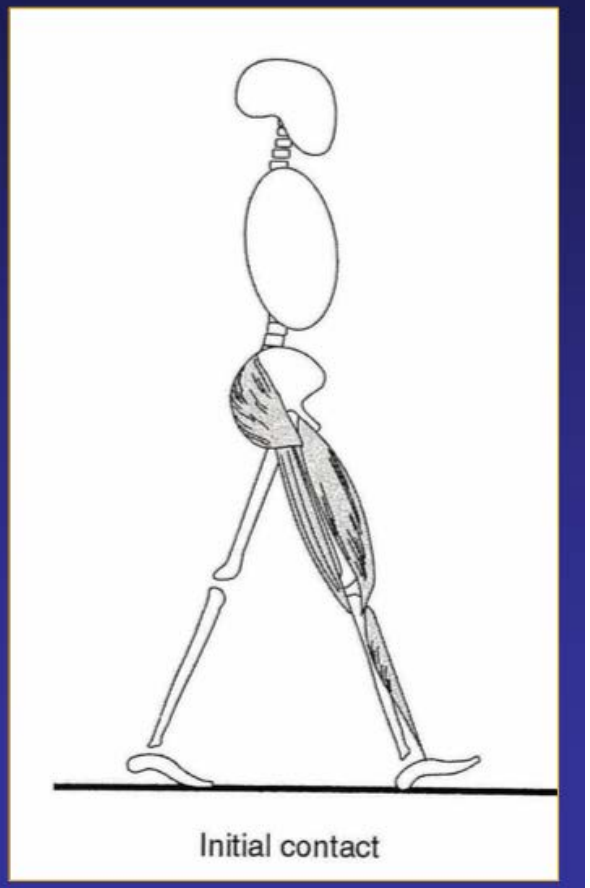


Obr.2: Model základních silových poměrů v tibiofemurální části

“Classical” Anatomy – Practical Implications

Počáteční kontakt

- nastává v okamžiku, kdy se končetina (pata) dotkne podložky
- pata se stává středem otáčení
- abnormální modely počátečního kontaktu

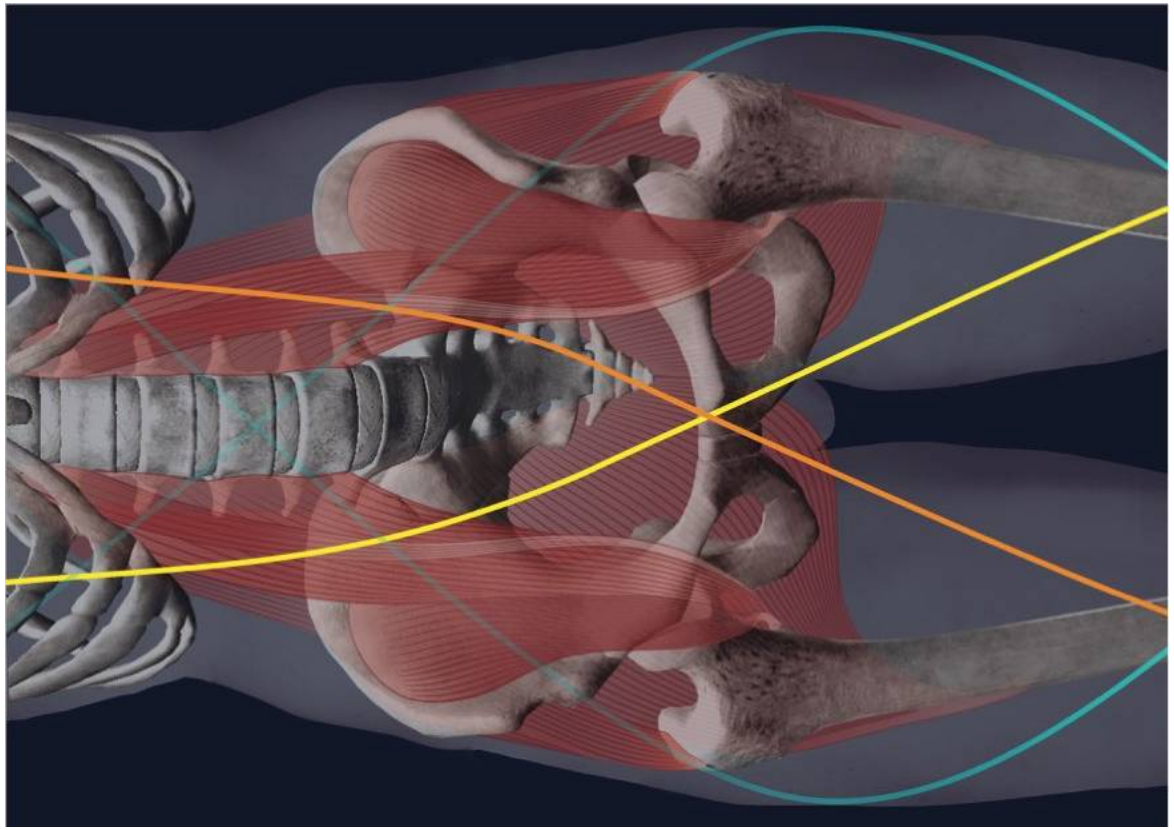


Initial contact

3D – functional anatomy

- **Spatial**
- **Synthetic**
- **Base = Body in motion**
- Functions of muscles are not based on “origin + insertion” principle
- Function is formed by muscular chains
- Origins of muscular chains are not situated proximally
- Muscular Chains function based on:
- Punctum fixum – punctum mobile principle

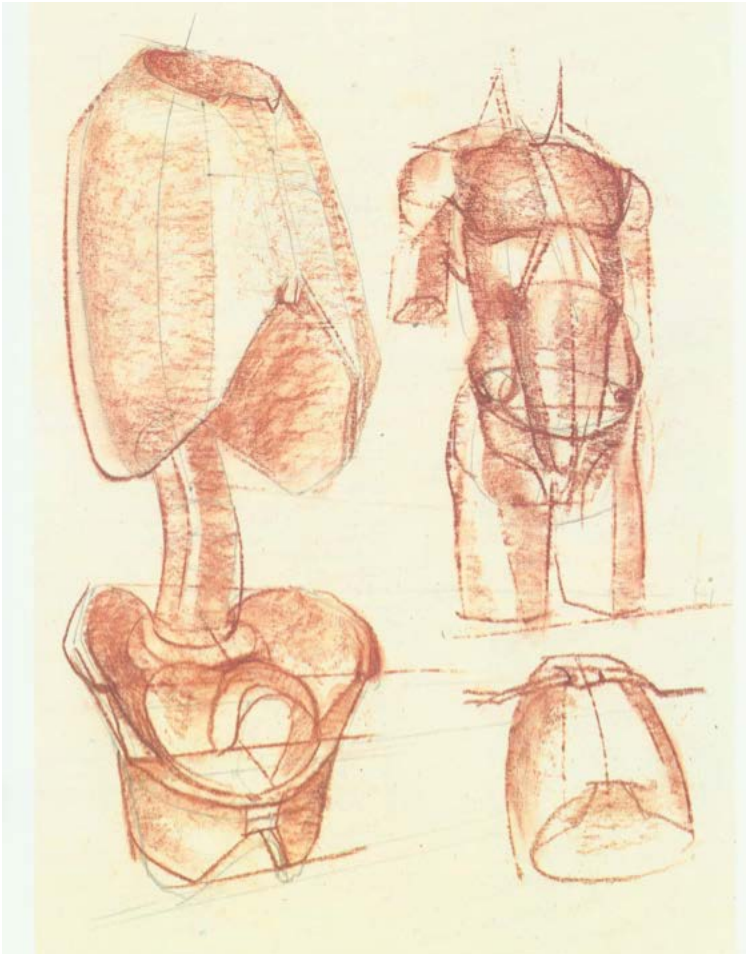
3D - functional anatomy



Requires the following:

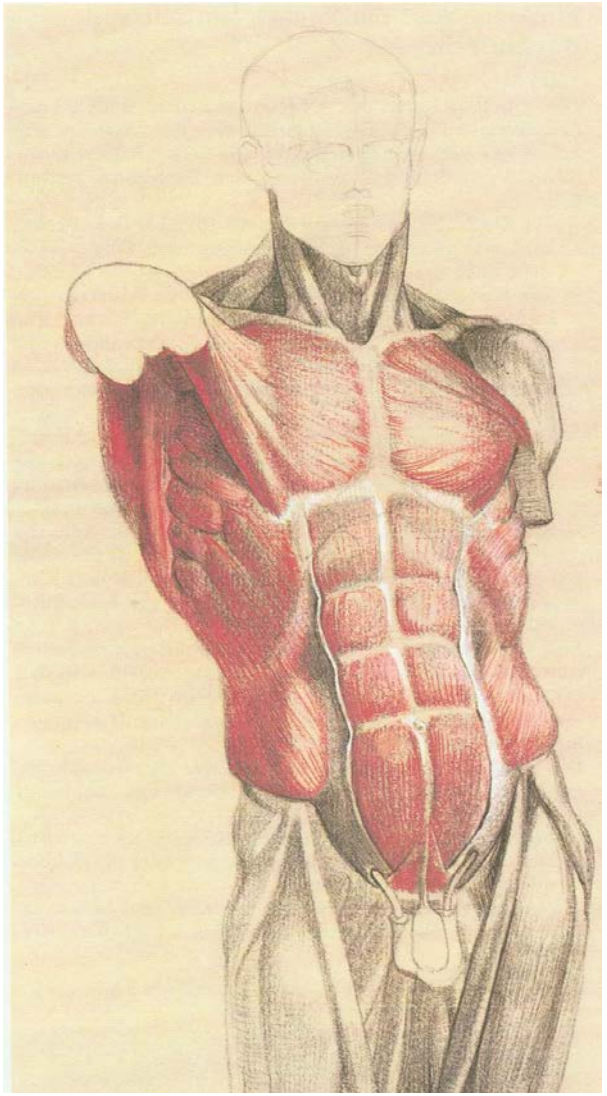
- To watch the body in different positions
- Not to be restricted by “classical” anatomy
- To try to see the body spatially
- To see the body within 3D-space

3D - functional anatomy

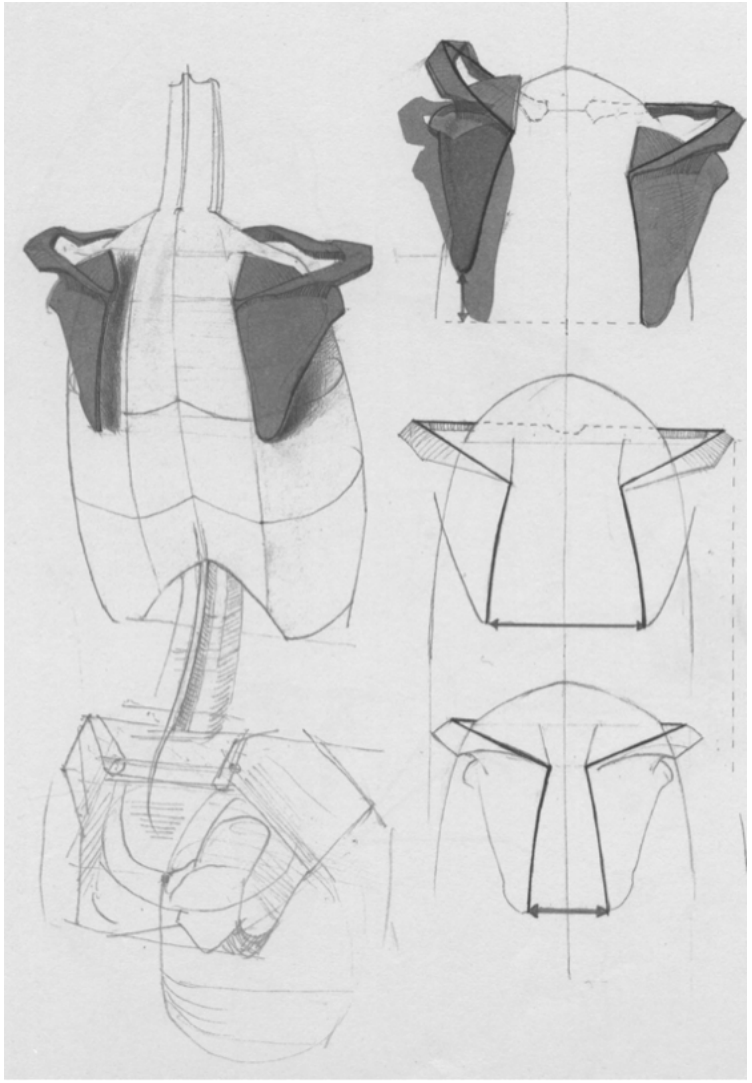


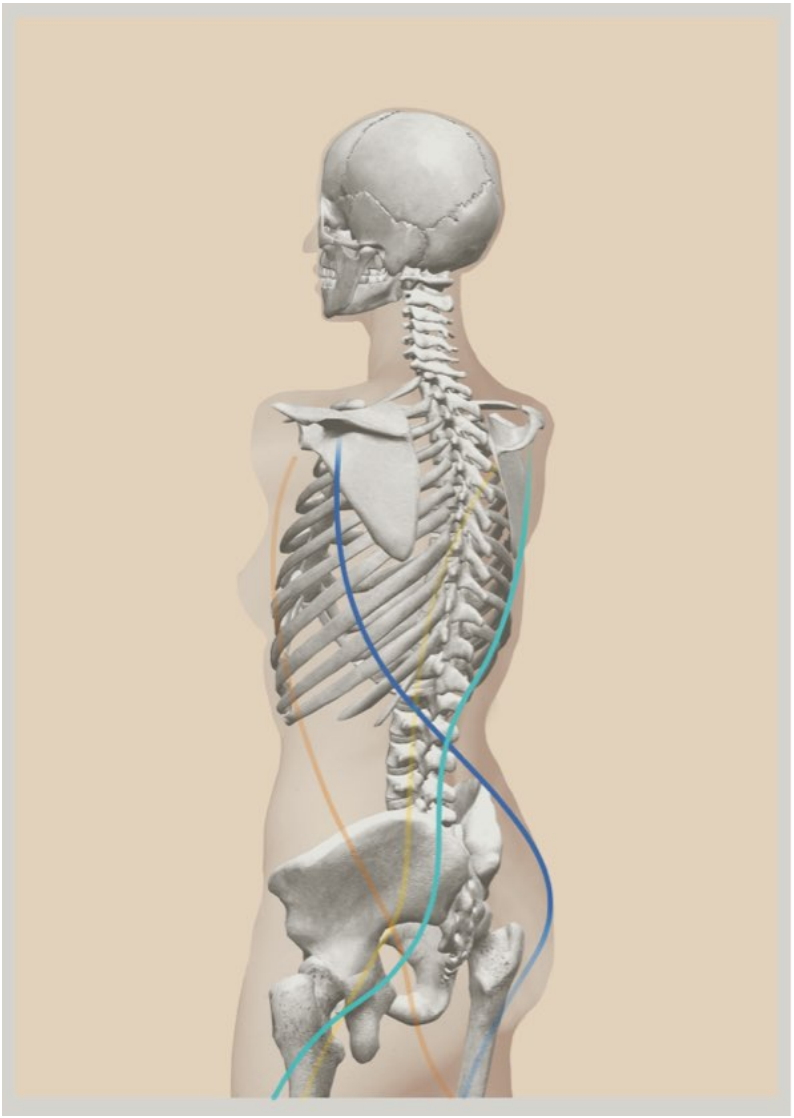
3D - functional anatomy

- Video - Nick Vujicic



3D - functional anatomy





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3D – Biomechanics

Foundation of movement:

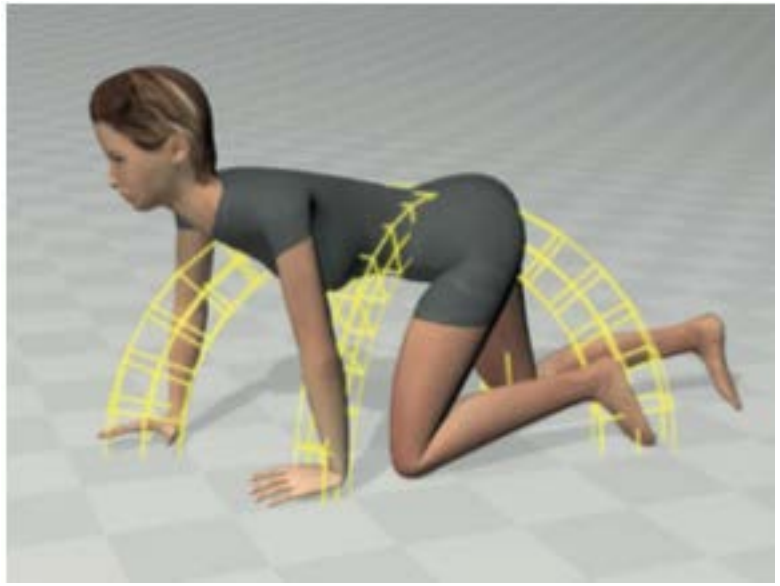
COORDINATED

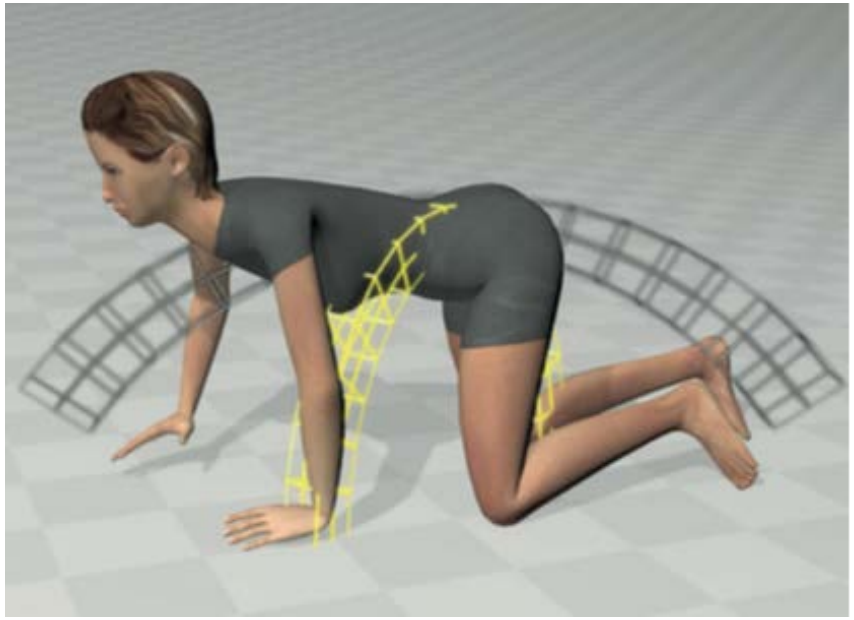
CONTRACTION

WAVES

3D Biomechanics

- “Bridge” model of the musculoskeletal apparatus of the human body
- V. Vojta used “jib-crane” model





3D Biomechanics

Dynamics of spiral muscular loops

- Slow tonic muscular loops
- Fast phasic muscular loops

Basics and theories of Vojta methodology

Short summary of this presentation

Basics of developmental kinesiology from birth to the accomplishment of the development in the 1st year of life (up to 1.5 year respectively)

Developmental kinesiology – pathological manifestations

Early diagnosis of children within the 1st year of life

General kinesiology of adults

General kinesiology of adults – pathological manifestations

Basics of developmental kinesiology from birth to the accomplishment of the development in the 1st year of life (up to 1.5 year respectively).

- Spontaneous kinetic expression of the child from the birth to the accomplishment of the development by verticalization and unaided gait goes through inevitable milestones
- These milestones could be particularly characterized by changes in the geometry of the body and biomechanics.

Basics of developmental kinesiology from birth to the accomplishment of the development in the 1st year of life (up to 1.5 year respectively).

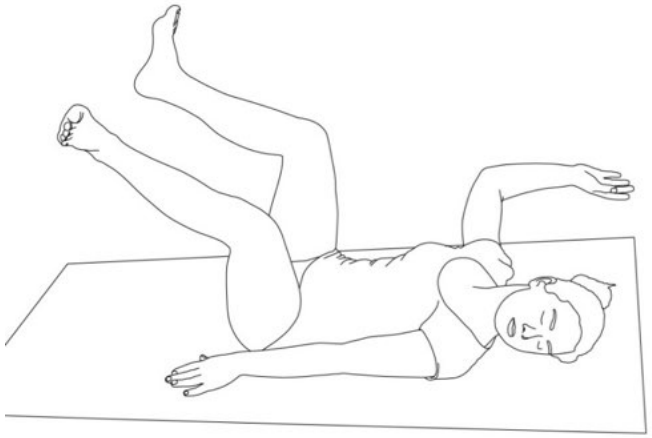
For the needs of developmental kinesiology, classification introduced by Vojta has been routinely used. It classifies the sides of the body to **mandibular and occipital.** It also classifies the weight-bearing points and movement points as **punctum fixum and punctum mobile**.

Basics of developmental kinesiology

Supine position

Punctum fixum (PF) – the points of support are the following sites (see the picture of the skeleton depicted from below)

- Nape
- Both scapulae
- Both pelvic alae
- Both soles and elbows

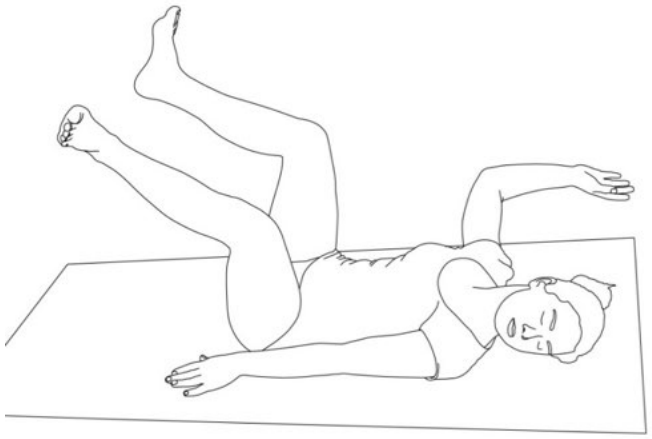


Basics of developmental kinesiology

- **Supine position**

Punctum mobile (PM) – points of motion occur only with the elevation of the hands (e.g. towards an offered toy) and feet subsequently (also while trying to grip something)

The position is highly stable – support in 5 PFs or 9 PFs respectively



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Basics of developmental kinesiology

Supine position in 3rd month

Turning from the back to the side in the 2nd half of the 2nd quarter

Basics of developmental kinesiology

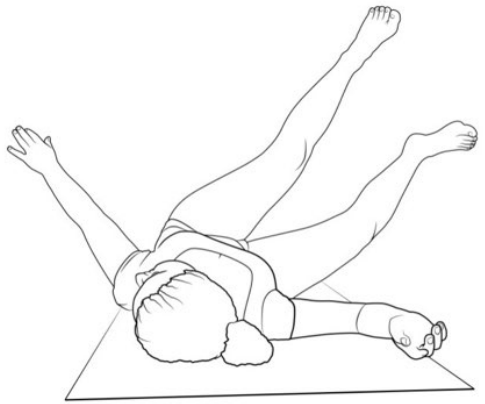
•Turning

• Initiation of the turning from the supine position to the side is followed by change of points of support and the points of motion; the movement is initiated by the turning of the head and the movement of the eyes, respectively

–PF – On the head; it releases from the support to let the head turn

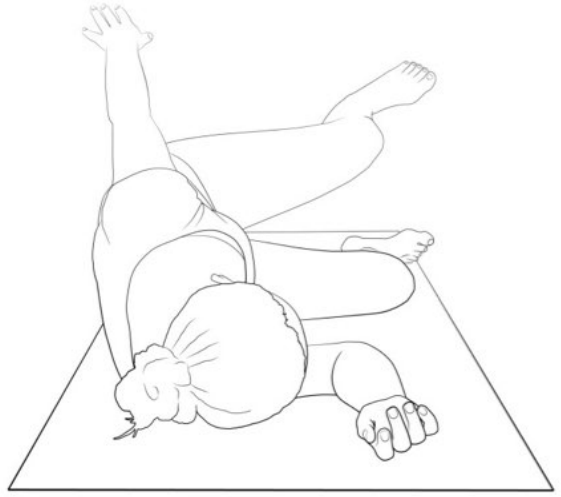
–PF – The pelvic and scapular PFs release from the support at the mandibular side of the body so that the mandibular half of the thorax and pelvis elevates

–PF – At the nape shift from the scapular region to the shoulder joint and from the pelvic region to the hip joint



Basics of developmental kinesiology

- New PF origins at the elbow of the upper extremity at the occipital side of the body
- That's how the support of three points forms, which is less stable, but it enables the transition to the new stable position of four points
- PM – The hand on the mandibular site becomes the "leading" PM
- PM – Both lower extremities become "auxiliary and balancing" PMs



Basics of developmental kinesiology

- **Position on the side**

- Stable position that enables the hand on the mandibular side to become the “exploring” hand in the space in front of the face. First functional differentiation of the upper extremities to supportive and physical function is being formed. The support has 4 points, or 5 points respectively. Head leaning on the side makes up the fifth point.

  – PF – The occipital upper extremity has its PF at the shoulder and at the elbow

Basics of developmental kinesiology

- **Position on the side**

  –PM – The head gets out of the support (for a while), and the visual perimeter gets higher.

  –PM – The hand on the mandibular site has the range of motion above and to the front

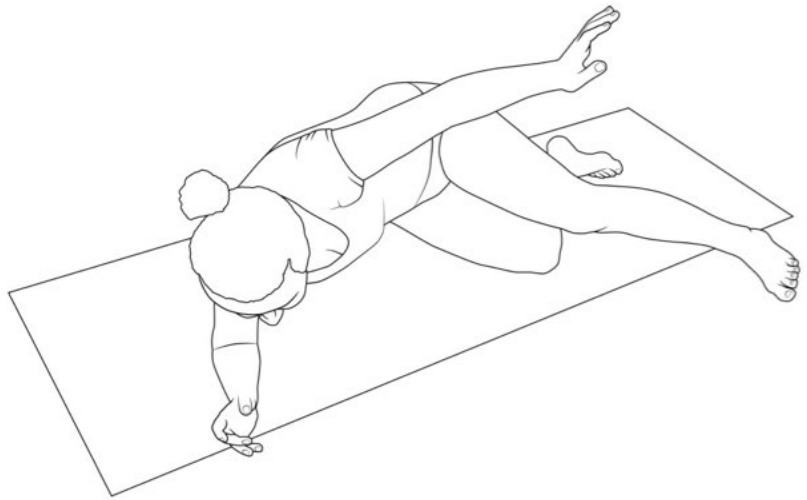
  –PM x PF – foot on the mandibular site varies between the possibility of leaning on the knee and the possibility of the movement that would enable returning to the safe position on the back

Basics of developmental kinesiology

•Turning

•Turning from the position on the side to the belly and back
•Leaning on the PF at the elbow on the occipital site would release the load at the shoulder and the whole chest becomes a PM.

- PF at the hip joint at the occipital side becomes the support for this unstable situation.
- PF at the knee on the occipital side starts to shift caudally, as the lower extremity extends
- PM on the hand on the mandibular side accomplishes the turn onto the belly
- PM on the foot on the mandibular side helps to turn the pelvis onto the belly, while the lower extremity extends fully.



Basics of developmental kinesiology

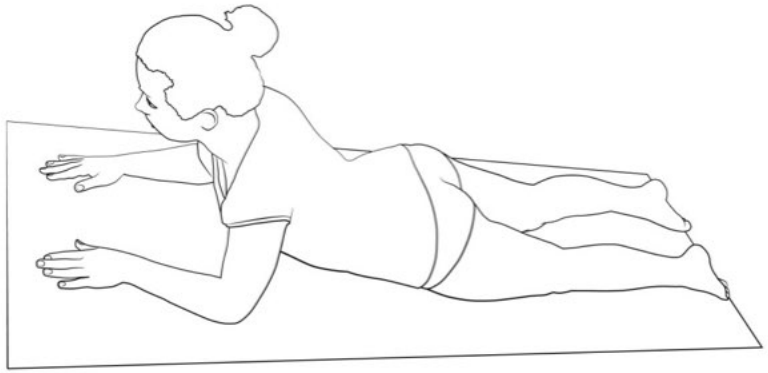
- **Position on the stomach – 3rd month of development**

- Stable position on the stomach is provided by the support of the upper extremities at the forearms

  – PF – Elbows including the whole surface of the forearms

  – PF – Pelvic symphysis forms another important support

  – PM – It's the head and its free posture on the extended nape that enables significant widening of the visual perimeter



Basics of developmental kinesiology

- **Position on the stomach – 4th month of development**

- **A change in the support takes place**

  –PF – They shift to the open palms of both hands

  –PF at the symphysis shifts caudally

  –PM – The head enables to look around from “the upper floor”; the extension of the cervical and thoracic spine increases the range of rotatory movement and that further increase the visual perimeter

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Basics of developmental kinesiology

Position on the stomach – 5th to 6th month of development

• There is another change in the support that enables releasing one hand from the support to enable the grip

–PF stays at the occipital upper extremity and the whole surface of the forearm

–PF – shifts from symphysis to the hip joint on the occipital side

Basics of developmental kinesiology

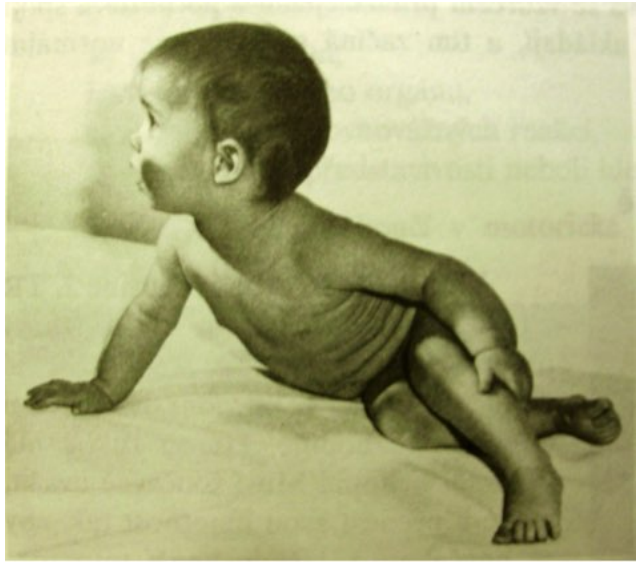
Position on the stomach – 5th to 6th month of development

–PM – The head

–PM – The hand on the mandibular side is freed from support and becomes the “grip organ” that is used to satisfy the explorative needs of the child. The hand starts to have the ability of stereognosis. Until then, mouth was the only option to investigate the surrounding world.

Basics of developmental kinesiology

- **Transition from the position on the stomach to the oblique sitting – 8th month of development**



- The oblique sitting position enables the transition to the crawling on all fours

  –PF is at the open hand on the occipital side

  –PF is at the hip joint on the occipital side

  –PF – The whole surface of the thigh and the knee on the occipital side

  –MP – It's the head that gets to higher position again. Whole cervical ant thoracic spine is extended and enables increasing of the rotation and wider view

  –PM – The hand on the mandibular side gets into the vertical axis above the head

Basics of developmental kinesiology

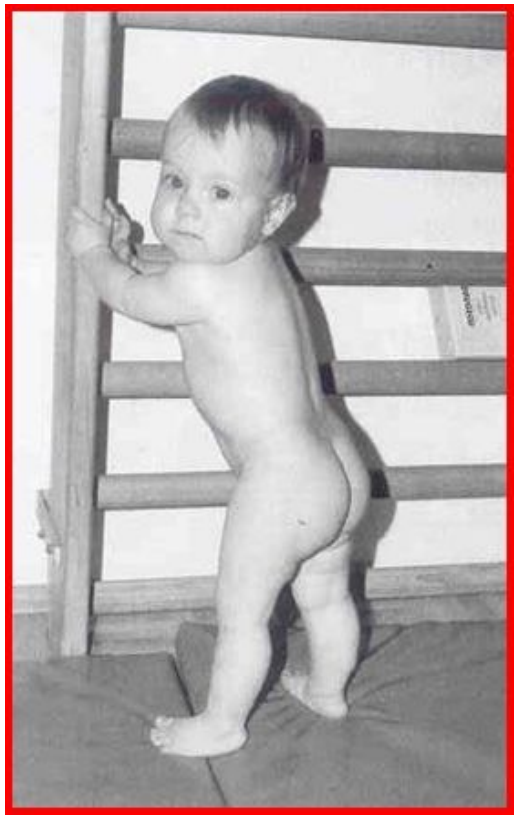
- **Crawling on all fours – 9th to 10th month of development**

•It is enabled by full differentiation of the function of the support and movement both on upper and lower extremities.
•It is a basic precondition for the upcoming bipedal gait.

–PF – support in the extended occipital hand
–PF – support in the knee of the mandibular leg
–PM – mandibular hand
–PM – occipital leg

Basics of developmental kinesiology

- Standing position with support and the transition to the quadrupedal gait
- Unaided standing with no support
- Unaided bipedal gait



Basics of developmental kinesiology

- Standing position with support and the transition to the quadrupedal gait
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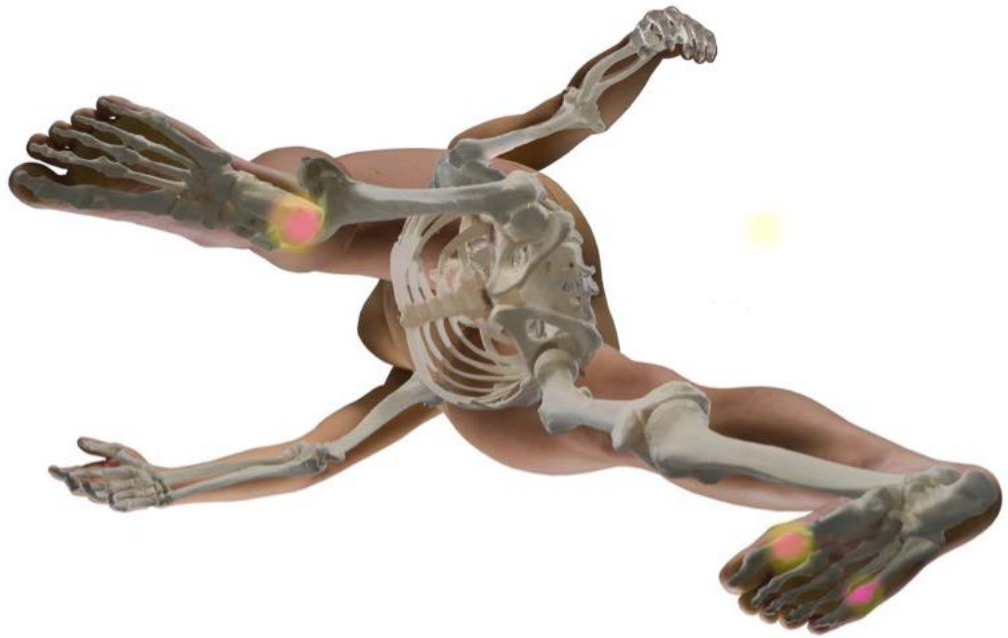


Basics of developmental kinesiology

- **Running with phases of flight**

Developmental kinesiology – pathological manifestations

- Basic disorders of righting could be safely recognized in spontaneous motor skills in 3rd month of life (photo comparing physiological and pathological righting)

- Recognizing initial stages of central coordination disorder (CCD) is a necessary precondition for early commencement of therapy

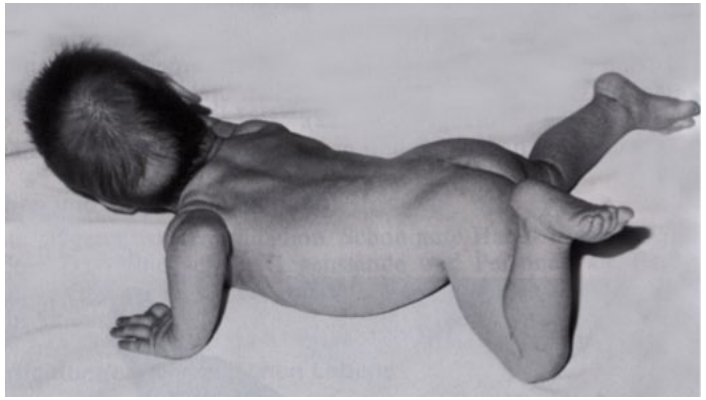
Developmental kinesiology – pathological manifestations

- Disorder of the rotatory abilities of the spine or its individual segments is obvious when the infant rolls over during the 6th month of life (photo compares the physiological and pathological rotation).
- For example, in cerebral palsy, the rotation of spinal segments is completely obstructed. It is only partially preserved in the...

- ...craniocervical,
- cervicothoracic and
- thoracolumbar transitions

Developmental kinesiology – pathological manifestations

- Disorder of normal spinal rotation subsequently distorts standard rotations in radicular joints. Furthermore, the disorder spreads to the joints of the extremities. This causes significant pathological changes in global motor skills of the body.
- Joint disorders are manifested as follows:
  - Disorder of autonomic joint centration in terms of both static and dynamic centration
  - Predominance of inner rotation (particularly in radicular joints)
  - Predominance of adduction
  - Predominance of flection
  - Predominance of ulnar deviation
  - Restriction of supination
  - Restriction of physiological range of motion in the joint

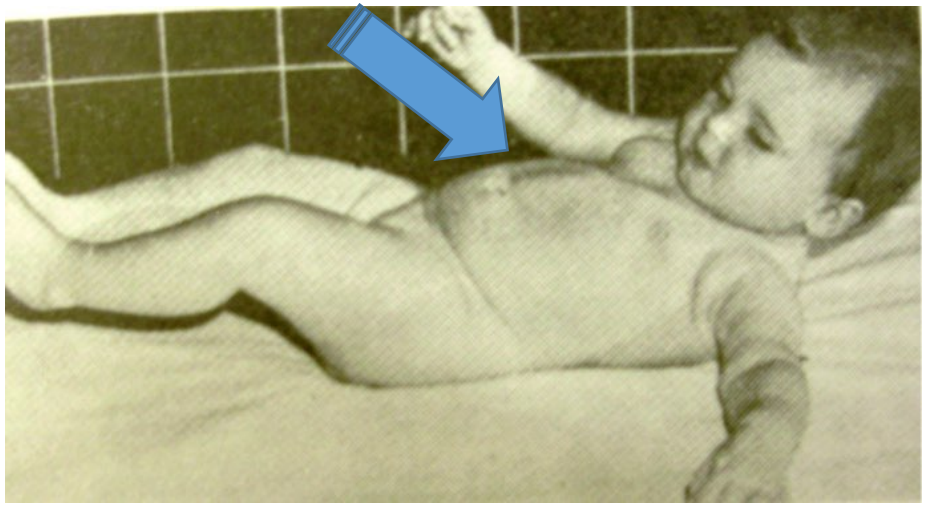


Developmental kinesiology – pathological manifestations

- Disorder of muscle tone in terms of global hypertonia or global hypotonia, or the hypertonic-hypotonic “mosaic” syndrome

8th month

Developmental kinesiology – pathological manifestations



Girl, 7 months – spastic diparesis

Same girl in 9th month

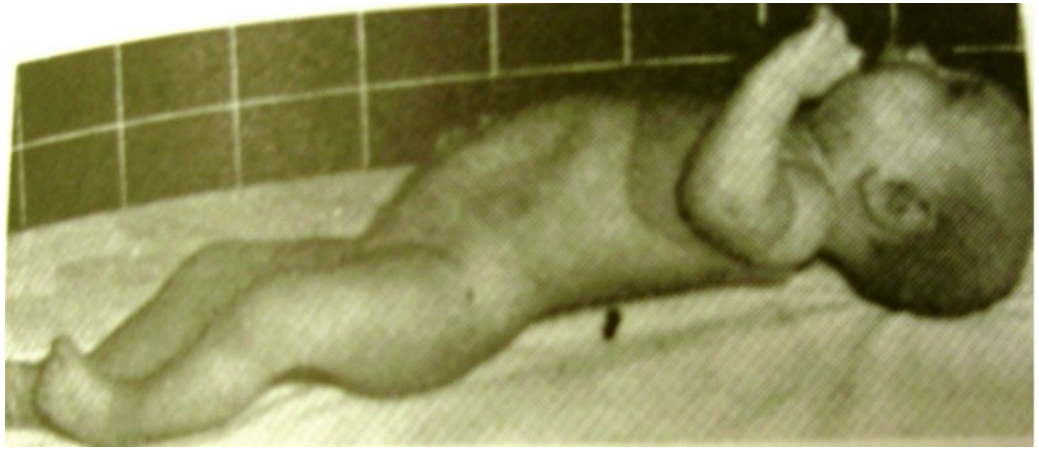
Developmental kinesiology – pathological manifestations

Boy, 5 months – moderate hypertonic type central coordination disorder, risk of development of athetosis

Developmental kinesiology – pathological manifestations

Girl, 5.5 months – severe hypertonic type central coordination disorder, development of athetosis

Same girl with opisthotonic posture of the head



Developmental kinesiology – pathological manifestations

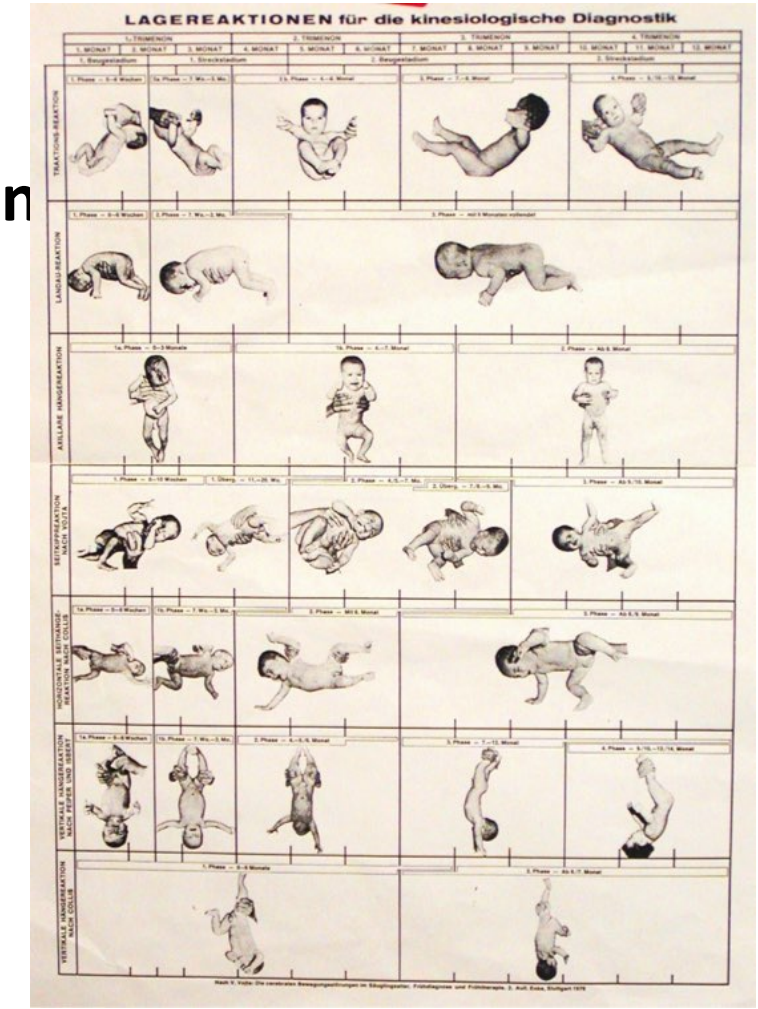
Same girl with opisthotonic posture of the head

Girl, 9 weeks - severe central coordination disorder accompanied by rigidity – “deceptive support”

Early diagnosis

1974 - Early diagnosis

allows early detection of imminent disorder of the motor development within the first year of life; recognizing FUTURE cerebral palsy is difficult.



Early diagnosis contains:

spontaneous motor skills, new-born reflexology, postural responses in POSITIONAL TESTS

Disorders of autonomic regulation of body posture

General kinesiology in adults

- The ideal development during the first year of life is the essential precondition for maintaining the body's correct posture in adulthood. It means, according to the "original idea", the original genetic plan.
- If the development was disturbed in some way during this sensitive period, it is very probable that some disorder of the statics or dynamics of the musculoskeletal apparatus would appear in adolescence or adulthood.
- As the development is completed between 17 and 19 years of age, it will be obvious, whether the musculoskeletal apparatus is able to tolerate the stress, and eventually, which disorders could be expected to appear.

General kinesiology in adults

- If the motor development was defective during the first year of life, the subsequent growth during adolescence would lead to further development of these disorders.

- If the defect was severe, the progression of the disorders would be quite visible and subsequent care is predominantly orthopaedic (e.g. elongation surgeries of shortened tendons) and rehabilitative.

- Fortunately, these cases are rather sparse in the population (up to 5%). These disorders are often not really obvious or they are considered irrelevant due to their supposed minuteness. Thus, they are not properly treated.

- Unfortunately, the imperfect final development of the musculoskeletal apparatus and its subsequent petrification comes as a result.

- The disorder of the locomotive system appears in terms of “HW”, i.e. the musculoskeletal apparatus, as well as the regulation of the locomotion of the body, i.e. the “SW” disorder of the CNS.

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General kinesiology in adults

Myoskeletal disorders are visible in the incorrect posture of the body at all levels:

(photographs of individual disorders follow...)

•Collapse of the arches of the feet, deviation of the axes of calcanei, tarsal bones and toes

•Axes of the lower extremities, predominantly of the foot

•Posture of pelvis

•Posture of the spinal axes

•Configuration of the ribcage

•Posture of the shoulder girdles

•Posture of the upper extremities, predomina

•Posture of the head

•Posture of the mandible

•Position of eyes

General kinesiology in adults

- Apparent disorder of the motion of the body in terms of SW defect:
- Disturbed regulation of basic stereotypical movements
  - Gait
  - Grip
  - Respiratory movements
  - Orofacial stereotypical movements
- Impaired regulation of gross motor skills – throwing, jumping, hitting, kicking – sports in general
- Impairment of fine motor skills – writing, drawing, painting, arts, playing the musical instruments
- Orofacial fine motor skills – speech, singing,

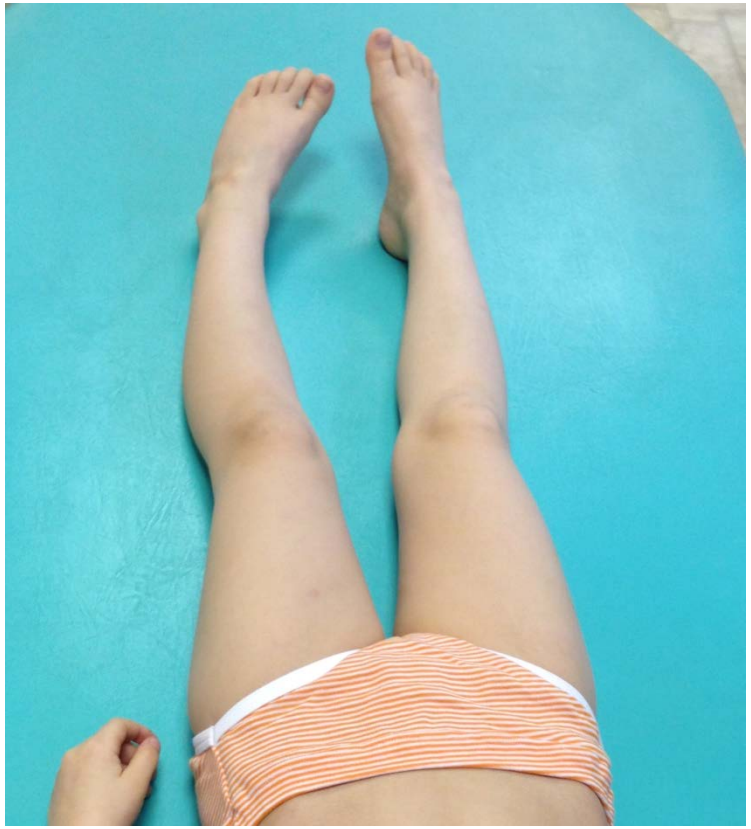
  playing wind instruments

General kinesiology in children – pathological manifestations

- Myoskeletal disorders are visible in the incorrect posture of the body at all levels:
  - Collapse of the arches of the feet, deviation of the axes of calcanei, tarsal bones and toes
  - Axes of the lower extremities, predominantly of the foot

General kinesiology in children – pathological manifestations

- Deviation of axes of calcanei
- Inward collapse of the soles (most often)
- Deviation of axes of knee joints
- Inward rotation of hip joints (relative shortening of the lower extremities)

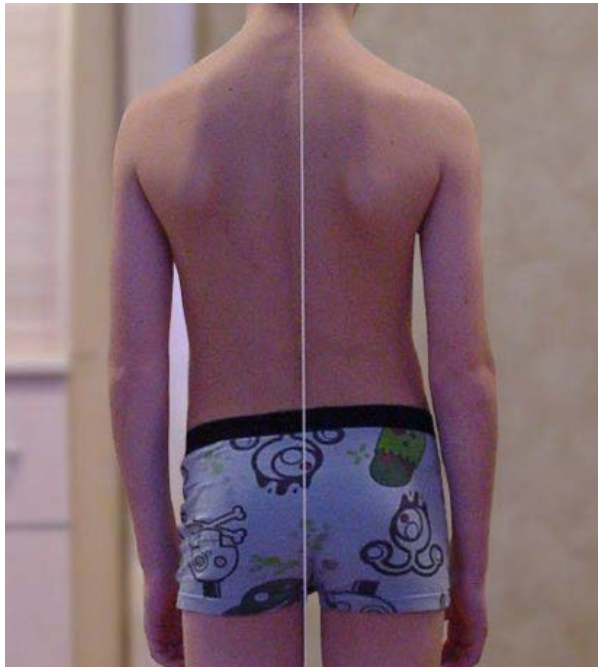


General kinesiology in children – pathological manifestations

- Lateral tilting of the pelvis
- Axial rotation of the pelvis
- Flexion posture of pelvis – functional shortening of the lower extremity and its rotation are the reason.

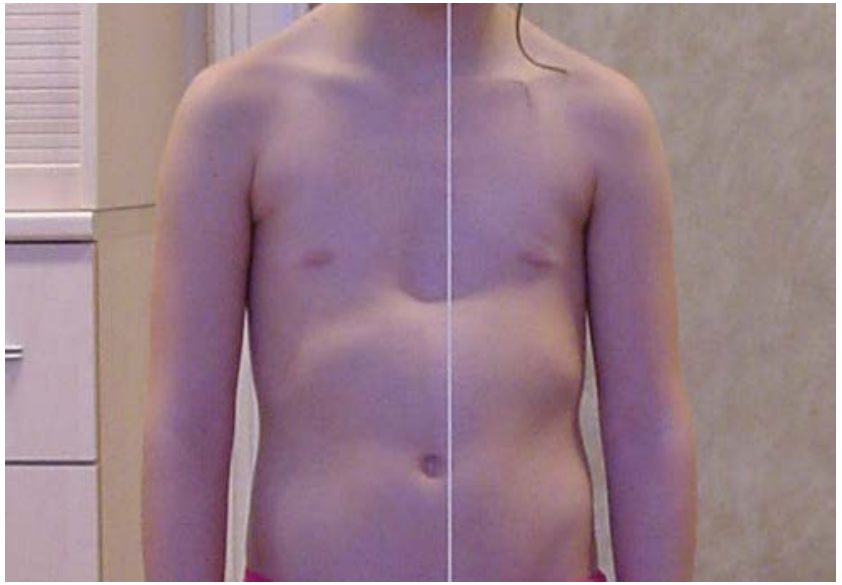
General kinesiology in children – pathological manifestations

- Hyperlordosis of the lumbar spine
- Lateral deviation of the axis of the lumbar spine
- Axial rotation of the axis of the lumbar spine



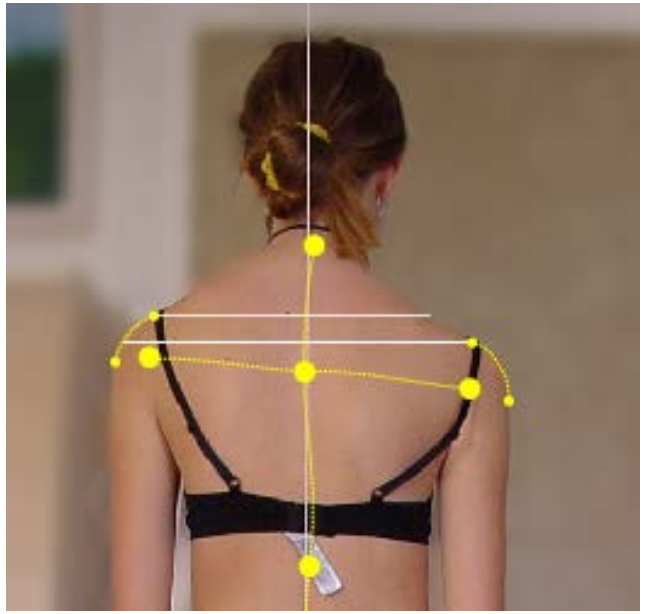
General kinesiology in children – pathological manifestations

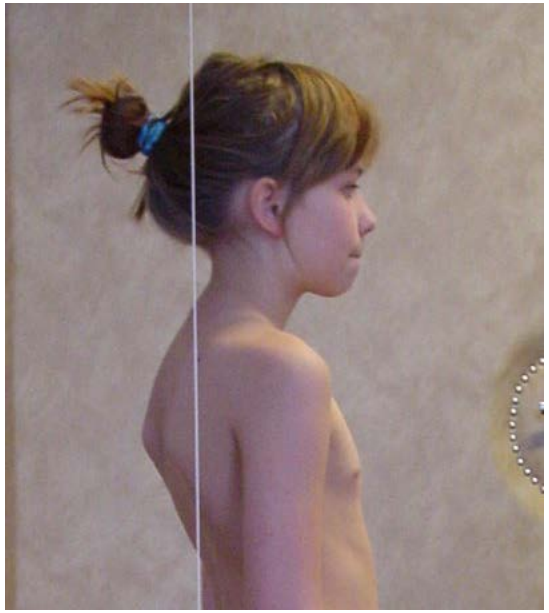
- Hyperkyphosis of the thoracic spine
- Impaired configuration of the chest
- Impaired spinal axis



General kinesiology in children – pathological manifestations

- Impaired posture of the shoulder girdles at unequal height, protraction, winged scapula
- Limitation of full supination of the forearm
- Posture of the hand in ulnar deviation





General kinesiology in children – pathological manifestations

- Impairment of the stereotypical respiration
- Impaired configuration of the chest

General kinesiology in children – pathological manifestations

Relaxed and divided linea albapathologically relaxed muscle tension of the abdominal wall

General kinesiology in children – pathological manifestations

The patient with the disorder of the autonomic regulation of the posture of the body, immediate the exposure to reflex stimulation VM2G on automatic regulation

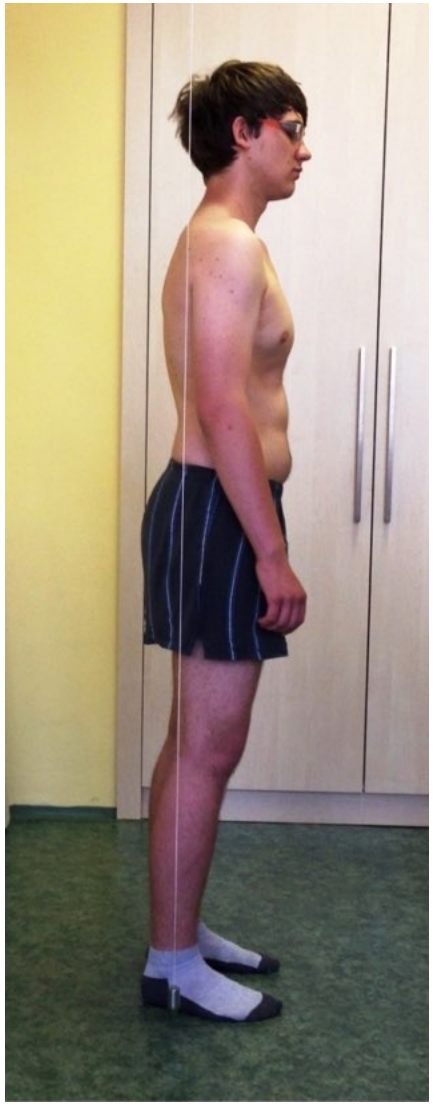
General kinesiology in children – pathological manifestations

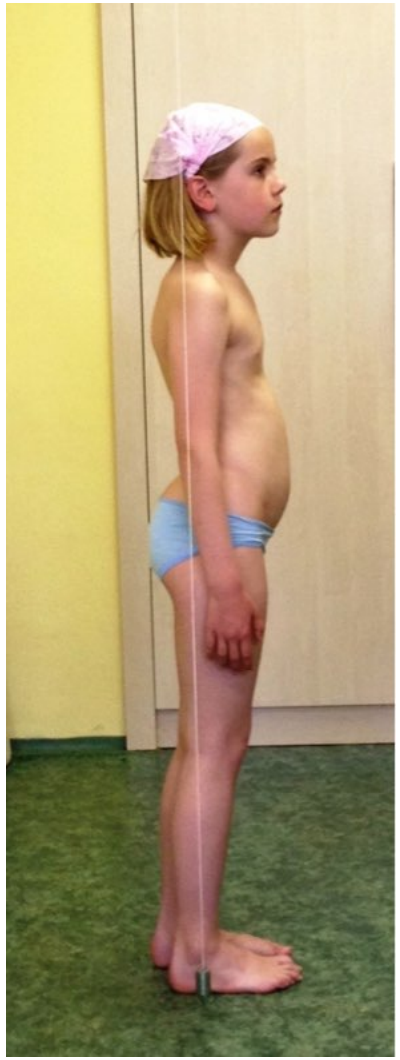
Disorder of the autonomic regulation of the posture of the mandible impairment of the stereotypes in the orofacial region

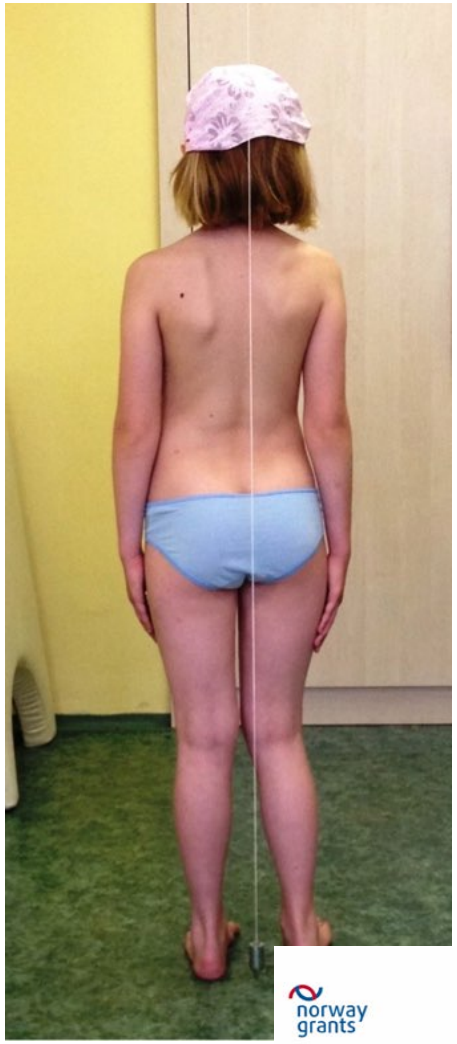
General kinesiology in children – pathological manifestations

Disorder of the autonomic regulation of the posture of the lower extremities and the left hand

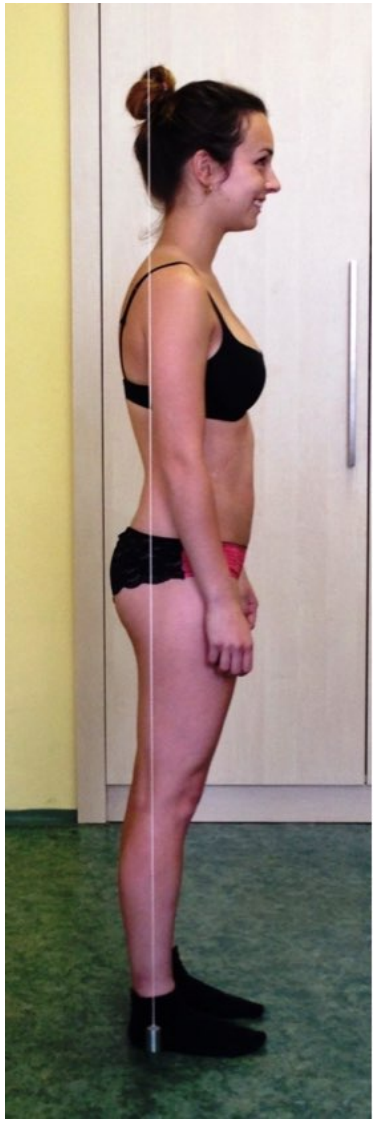
Disorder of the autonomic regulation of the posture of the body

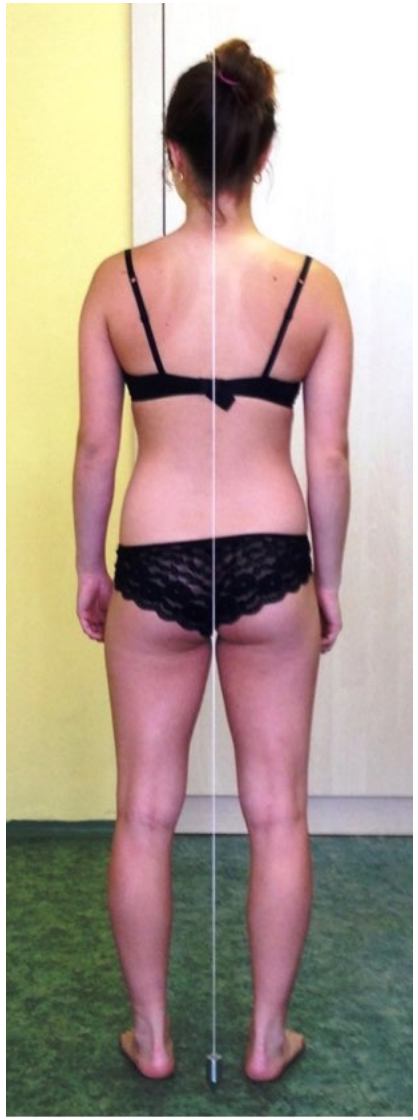




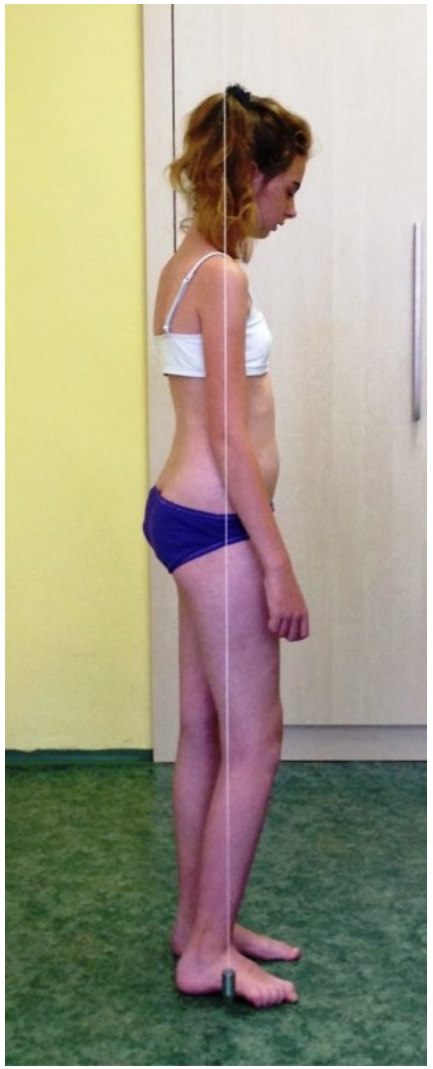


Disorder of the autonomic regulation of the posture of the body





Disorder of the autonomic regulation of the posture of the body



Change of the autonomic regulation of the posture immediately after the therapy

Disorders of the autonomic regulation of basic stereotypical movements

- Gait
- Grip
- Respiratory movements
- Orofacial stereotypical movements – swallowing, chewing; speech disorders develop; singing, playing wind instruments

Disorders of the autonomic regulation of basic stereotypical movements

Stereotypical gait

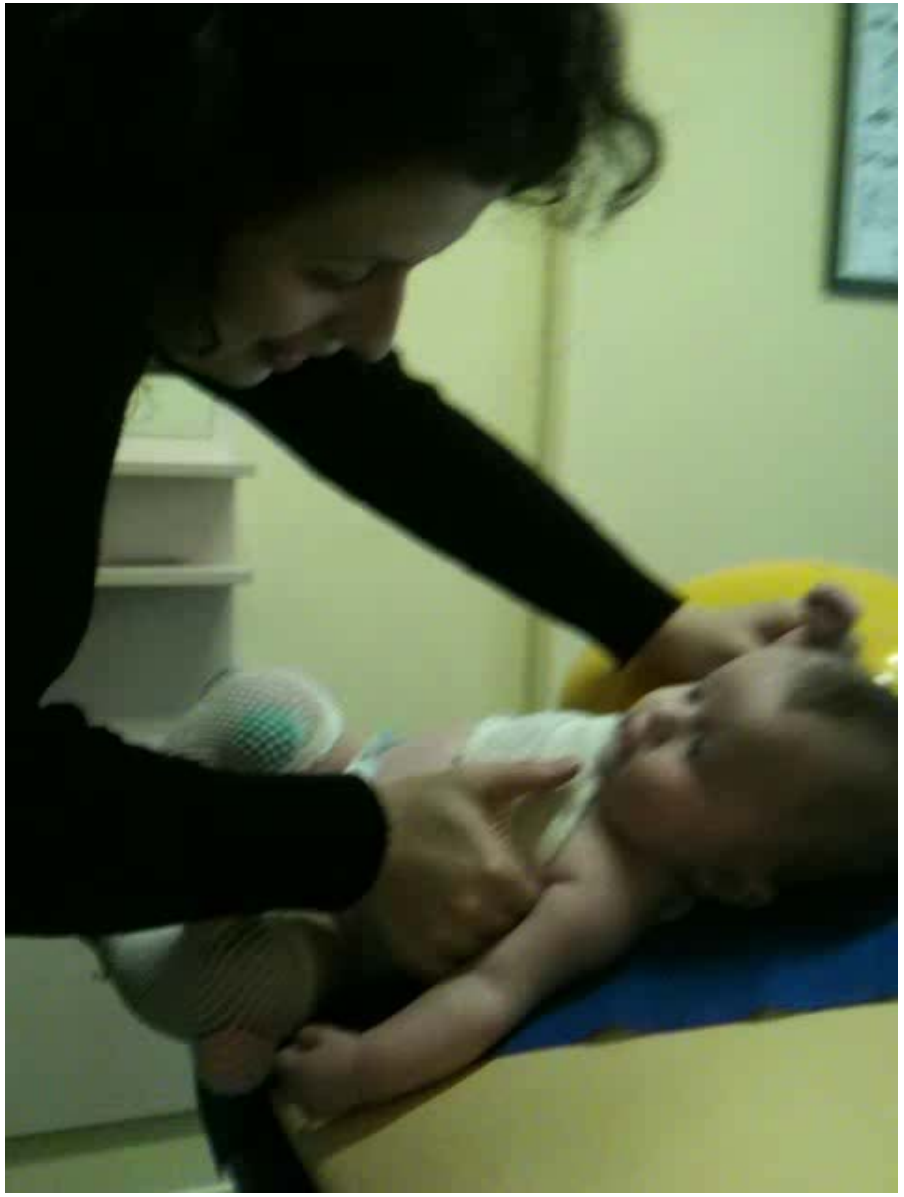
Short summary of the presentation

Basic terms and critical building blocks of VM

1. Autonomic regulation of the posture of the body
1. Autonomic joint centration
1. Autonomic regulation of the muscle tone
1. Basic stereotypical movements

THERAPY OF THE DISORDERS OF THE MUSCULOSKELETAL APPARATUS WITH THE VOJTA METHOD

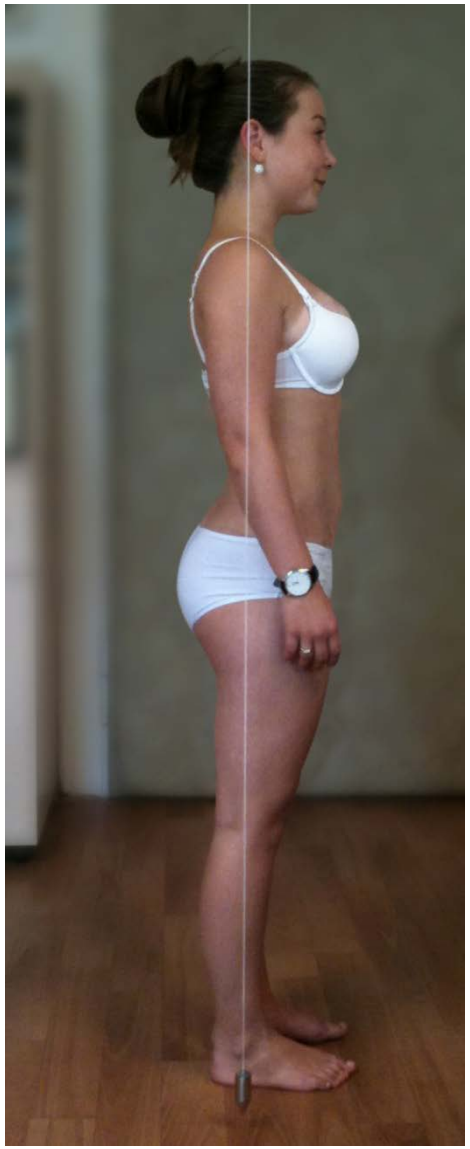
Basic terms and critical building blocks of VM2G



Basic terms and critical building blocks of VM

- **Autonomic regulation of the posture of the body** is independent and fully unconscious

- We can intervene in the regulatory system from a certain age with deliberate correction, but its long-term influence and modifications with conscious “repairs” is quite limited and hard to automate.



Basic terms and critical building blocks of VM2G

Autonomic regulation of the posture of the body

- It’s the ability of the body to assume a position in a space that would ensure dynamic stability of its centre of gravity within the potential of transition to the new position.
- The transition to the new position is highly economical in terms of energy expenditure. It uses kinematic energy of the centre of gravity of the body and extremities. It’s obvious that the performance of this transition is a highly coordinated activity concerning practically all muscles of the body.

Basic terms and critical building blocks of VM2G

- **Autonomic regulation of the posture of the body**

- Its proper performance is not strenuous. Harmonious motion aesthetically impresses the observer. (E.g. dance, ballet, gymnastics or figure skating).
-
    - It develops from birth (refer to Arshavsky and Kryuchkova), and it could be observed from about 4th month of postnatal development.
    - Thus, the automatic regulation of the body's erectness begins in horizontal planes in the supine position, in the position on the side and on the stomach.

Basic terms and critical building blocks of VM2G

- **Autonomic regulation of the posture of the body**

  - Quality of the course and the maturation of the autonomic regulation of the righting of the body is the necessary precondition of the motor skills of the musculoskeletal apparatus in its basic and extension programs.
  - Programs of autonomic regulation of the straightening are primarily “targeted” at the autochthonous musculature of the spine, which forms the very essence of the motor skills
  - Disorder of the activity of this muscular system (or the regulation of the autochthonous musculature, respectively), that has been fully developed since 3 months of age, leads to motor disorders of the Central Coordination Disorder type with subsequent consequences for the autonomiic regulation of the posture of the body and its motor skills.

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Basic terms and critical building blocks of VM2G

- **Autonomic regulation of the posture of the body**

- These disorders subsequently lead to **insufficient extension of the spine** and **to the disorder of the development of the natural spinal curve;** further, they lead to **disorders of rotation of individual spinal segments and the key points particularly** - i.e.:

- Craniocervical transition
- Cervicothoracic transition
- Thoracolumbar transition

Basic terms and critical building blocks of VM2G

Automatic regulation of the body posture always contains points of support – **Punctum fixum**

- The more there are, the more stable the position is.
- The less there are, the more labile the position and the more prone to change is, or more precisely, it is the labile position that enables the change.

Basic terms and critical building blocks of VM2G

Automatic regulation of the posture of the body always contains points of motion – **Punctum mobile**

- The less there are, and the closer to the centre of gravity they are, the more stable the position is.
- The more there are and the farther from the centre of gravity they are, the more labile the position is.

Basic terms and critical building blocks of VM2G

- Puncta fixa and puncta mobile create spatial geometric objects that in essence make the centre of gravity of the body stable or unstable.

- Initially, transitional phases from the stable position to the labile position and back to the stable position are performed only by the basic stereotypical movements and subsequently, as the motor learning develops, by the “overlapping” APPLICATION programs. (FOR EXAMPLE...)

Basic terms and critical building blocks of VM2G

- The regulation of the transitional phases happens automatically and unconsciously. It is provided by the basic operational program of the motor skills.

- Subsequently, motor experience is being gained and motor skills are being learnt; that enables the development of extension application programs.

Basic terms and critical building blocks of VM2G

- **Automatic joint centration** happens automatically and is fully unconscious. It is an integral part of all kinetic programs
  - automatic regulation of the posture of the body
  - basic stereotypical movements
  - all the extension application programs of motor skills

Basic terms and critical building blocks of VM2G

- **Automatic joint centration** has a static and dynamic component
- Providing its correct regulation is necessary both at rest and during the course of the movement, including the unexpected, uncontrolled movements, falls and accidents.

Basic terms and critical building blocks of VM2G

- Its distortion by the deviation of the joint axes is manifested both in the statics and the dynamics of the motion
- The disturbance happens due to internal and external causes:
  - the disorder of the regulation of the basic motor programs (cerebral paresis, stroke, multiple sclerosis)
  - the disorders of regulation of the extrinsic application programs (distortion of the form of motion, overload...)
  - the disorders from general degenerative causes (arthrosis, muscular slackness, osteoporosis...)
  - the disorders based on the traumatic changes (both HW and SW), diseases (acute anterior poliomyelitis), malnutrition...

Basic terms and critical building blocks of VM2G

- Normalizing the automatic regulation of joint centration is an essential and necessary precondition of the correct function of the basic and extrinsic motor skill.
- It is possible to normalize the joint centration by external manipulation (mobilizing)
- But without subsequent maintenance of such centration by normalizing the regulation, it only has a short-term effect; subsequent stress of the musculoskeletal apparatus would lead to deviation of the joint axes and the following development of motor skill disorders

Basic terms and critical building blocks of VM2G

- **Automatic regulation of the muscle tone** also happens autonomously and is fully unconscious.

- It is a fundamental precondition of the following:
  - primary provision of the autonomic regulation of the body's posture
  - basic provision of the autonomic regulation of the joint centration
  - performance of the basic stereotypical movements
  - economic performance of the extrinsic application programs.
- The external stimulation may lead to changes in the muscle tone in the short term.

Basic terms and critical building blocks of VM2G

- **Basic stereotypical movements** are innate automated programs
- Global (it automatically comprises all muscles of the body, both skeletal and smooth);
- Unconscious (it works without the need of volatile control);
- Genetically encoded;
- Functional from the birth through the whole lifespan;
- It cannot be disturbed by any pathological process;
- It is spontaneously “switched on” due to gravity. Based on the reflex, a helpless new-born can develop autonomic standing, gait and grip.

THE BASIC PREMISE OF REFLEXIVE LOCOMOTION IS:

THE FUNCTION IS DEVELOPED BY ITS ORGAN

VM2G is based on the provoking of a reflex, which is:

- It utilizes completely ideal motor patterns, that are strictly individual
- It sets the level of stress on muscles, joints and nerves precisely in accordance with the current physical condition, innate dispositions and biomechanical proportions of the respective individual
- It practically excludes the possibility of overload (muscular, neural, cardiopulmonary...)
- The program cannot be “switched off” by any disease or traumatic condition, even up to the state of deep unconsciousness.
- The program utilizes permanent multifunctional feedback, by which it enables the utilization of all available reserves of the musculoskeletal apparatus.

VM2G – Therapy – Basic Prerequisites for Implementation

Basic knowledge of developmental kinesiology
- **Physiological**
- **And pathological**

Basic positions of reflexive stimulation
- **Reflexive turning 1**
- **Reflexive turning 2**
- **Reflexive belly-crawling**
- **Reflexive crawling on all fours**

VM2G – Therapy – Basic Prerequisites for Implementation

Movement coordination enabling the transition from one position of the body to another

Basic knowledge of straightening reflexes

Knowledge of the system of stimulation zones and their utilization
Combinations of stimulation zones (spatial summation)

System of induced directions of movement of the extremities and the torso (temporal summation)

Possibilities of extension of VM2G

System of inhibition of the induced movement

1. **Resistance with rubber straps**
2. **Restraints/aids**

Stimulation by balance technique, Aktiva Disc, inflatable balls

1. Stimulation by changing the position of the body by tilting the bed, along the longitudinal and transversal axis
2. Stimulation by shifting the centre of gravity of the extremities with the weight
3. Auxiliary techniques, support of the extremities, antalgic positions

Actual performance of the therapy

Basic starting conditions and positions for induction of the reflexes

- On the back – reflexive turning 1
- On the side – reflexive turning 2
- On the stomach – reflexive belly-crawling
- On all fours – reflexive crawling on all fours
- Basic stimulation of reflex zones, position and direction of the stimulation
- Basic inhibition of the induced movement

Extension positions and therapeutic accessories forcing the sequence of the reflexes

- Gradual multiple stimulation of reflexive zones
- Partial labilization of pelvis by Aktiva Disc, (wedge underlay of the pelvis with Aktiva Disc)
- Gradual longitudinal tilt of the bed, body lays on the adhesive pad (head goes higher than feet)
- Complete labilization of pelvis by Activa Disc by underlying the chest
- Tilting of the pelvic axis in the transversal direction with a wedge
- Tilting of the axis of the body in transversal direction
- Labilization of other points of support with inflatable balls
- Inhibition of movement with rubber straps
- Inhibition of movement of the extremities with restraints
- Shifting the centre of gravity of the extremities with weights

Supportive positions and the equipment for facilitation of inducing the reflex

Tilt of the bed along the longitudinal axis, with head slightly down

Underlying the feet

Underlying the hands

Underlying the pelvis with solid wedge

Antalgic positions of the extremities and axial skeleton and muscles

External conditions of stimulation

Quiet and peaceful environment that would not disturb the patients

Technical equipment, appropriate accessories

The ability to track duration of individual stimulation and the overall stimulation

Education of the patients

To bring the patient into relaxed state

To explain that it is not necessary to hold the position intentionally; the reflex itself is going to hold his/her extremities in set positions even against gravity

To explain that his/her perception of body scheme is going to be “switched of” gradually and he/she will stop to sense, where his/her limbs are situated

Education of the patients

To explain, that he/she will experience the gradual manifestations of “autonomic joint centration”, i.e. the shiver, tremor and involuntary movement of the extremities and pelvis

Encourage the patient to report any incipient discomfort (pain, tension in muscles, fatigue)

To explain to the children not to “play” with the ongoing reflex and interfere with it; distract them with singing, music, audio books, etc.

Observing the induced reactions of the reflex in the patients

Autonomy of the posture of the extremities against the gravity

Setting the angles of axes of the extremities and their changes

Intensity of the reflexive movements, shivers, tremor

The speed of the onset of fatigue

Whether the stimulation does not cause pathological substitute posture of the extremities

Duration of the uninterrupted stimulation, breaks, overall duration of the therapy

Repeating the therapy in one day

In children preferably 2 to 3 times a day

In adults with respect to their possibilities at least once a day

Actual management of the therapy:

According to actual intensity of the “system” (tremor, size of movements…)

According to patient's individual response (speed of onset of fatigue, pain, discomfort)

According to changes in autonomy of posture of the body

According to changes in autonomy of joint centration

According to changes in basic stereotypical movements

According to changes in “extension” programs of fine and gross motor skills

According to changes in regulation of superior nervous functions, improvement of phatic functions, abatement of dyspraxia, onset of fatigue, irritability

Reflexive response of “the system” of the patient

Autonomic posture of the body and extremities against gravity with no voluntary effort

Gradual “switching off” of perception of the body scheme up to the level preceding falling asleep, the feeling of “loss of the body”

Autonomic joint centration manifested with tremor, shiver and movement automatisms, particularly in hands, feet, whole extremities and pelvis.

Gradual prolonging of the time of the patient's tolerance of the stimulation without discomfort

Reflexive response of “the system” of the patient

Increasing ability to tolerate the increase of load by multiple stimulation, balance discs, tilted and longitudinal position of the bed, tension of rubber straps, weights on the extremities

Involvement of all muscles of the body in specific “MODE” without fatigue during the performance of therapy and afterwards

There is no exhaustion within all stimulation zones; there is no adjustment to the stimulation

The work of muscles reveals specific fatigue, usually localized due to muscle incoordination, which subsides immediately after cessation of the stimulation

Results of the therapy occur at several levels:

Normalizing the autonomic posture of the body at all levels from toes to posture of the head

Normalizing the setting of angles, axes and physiological extents in all joints of the body (influence of autonomic centration)

Normalizing the muscle tone and muscular coordination

Normalizing the autonomic straightening reactions

Normalizing the autonomic balance reactions

Normalizing the autonomic regulation of joint centration in physical activity without a risk of recurrent decentrations, subluxations or blockages

Normalizing the basic stereotypical movements (gait, grip, respiration, swallowing…)

Results of the therapy occur at several levels:

Normalizing the configuration of the body

Posture of the arches of the feet, posture of calcanei and toes
Axes of the lower extremities, particularly the posture of the knees and hip joints
Posture of the pelvis
Posture of the axes of the spine in sagittal and frontal planes
Configuration of the ribcage

Normalizing the configuration of the body

Posture of the shoulder girdles, particularly of the scapulae
Axes of the upper extremities, particularly of the hand
Posture of the head
Posture of mandible
Position of the eyes and coordination of ocular movements

The therapy has a demonstrable positive influence on superior neural functions, including the cognitive functions

Normalizing the stereognosis
Normalizing the disorders of fine motor skills, writing, painting, playing musical instruments
Normalizing the reading, vocal presentation, singing
Normalizing the manifestations of hyperactivity in children with ADHD
Normalizing the practical disorders

It appears to me that pathological progression and the most common manifestations of senile frailty could be slowed down or prevented with the Vojta method. They include particularly the following:

Tiredness during common daily activities
Decreased mobility and restriction of physical activities
Psychomotor slowing
Deterioration of physical condition
Loss of muscular mass and power
Decreasing tolerance of physical exertion
Instability with falls ensuing
Uncoordinated motion
Change in autonomic posture of the body, senile kyphosis of the spine and flexed posture of the extremities
Sensory and especially sensorimotor deficits

It also has secondary positive influences on elderly:

Improvement in the venous return from the lower extremities (improvement of stereotypical gait, longer duration of walks, improvement of muscle tone, improved mechanics of diaphragm drawing the blood from lower extremities)

Improvement in the respiratory mechanics and thus the oxygen saturation (improved posture of the ribcage and the mechanics of the diaphragm)

Improved ability to tolerate mental stress

Reversal of appetite loss and hypobulia

Reversal of weight loss and concurrent malnutrition

Deceleration of memory disorders and cognitive deficits

Decrease in mental apathy

Vojta Method2G – Use with Children

From birth to approximately 3 years of age it is completely irreplaceable

- In diseases of the musculoskeletal apparatus
    - Motor and coordination disorders, peripheral and central neural lesions, e.g. facial palsy,
- Postpartum brachial plexus palsy, scoliosis of new-borns, postpartum valgus ankle, meningocele
    - Orthopaedic developmental disorders of chest, spine, genu varus, genu valgus
-

In older children

- Peripheral muscular palsies, conditions after surgical interventions on the musculoskeletal apparatus
- Central palsies in children
- Developmental disorders of musculoskeletal apparatus – scoliosis

Vojta Method2G – Use with Adults

- Neurology, neurosurgery

- Degenerative diseases (multiple sclerosis, myopathies, Parkinson disease...)
- Conditions after neurosurgical interventions (on spine, brain)
- Physiotherapy of conditions after stroke
- Physiotherapy of conditions after injuries of spine and peripheral nerves
- Functional disorders of the spine, functional myoskeletal disorders in general

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Vojta Method2G – Use with Adults

-
- Sports medicine
  - Conditions after sport injuries (ruptures of tendons and muscles...)
  - Conditions after inflammations of myoskeletal system
  - Conditions after overload of the musculoskeletal apparatus
-
- Traumatology, surgery
  - Conditions after injuries of the musculoskeletal apparatus (following the acute phase)
  - Burns (after the acute phase)
  - Multiple trauma (after the acute phase)

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Vojta Method2G – Use with Adults

- Orthopaedics
  - Developmental defects (spinal scoliosis, chest deformities, disorders of bearing joints...)
  - Degenerative joint diseases (arthritic changes of the joint cartilages, disorders of bearing joints...)
  - Conditions after joint replacement surgeries
  - Final treatment of traumatic conditions
  - Conditions after orthopaedic surgical interventions

- Anaesthesiology and resuscitation
  - Coma
  - Intensive physiotherapy in patients after long-term unconsciousness

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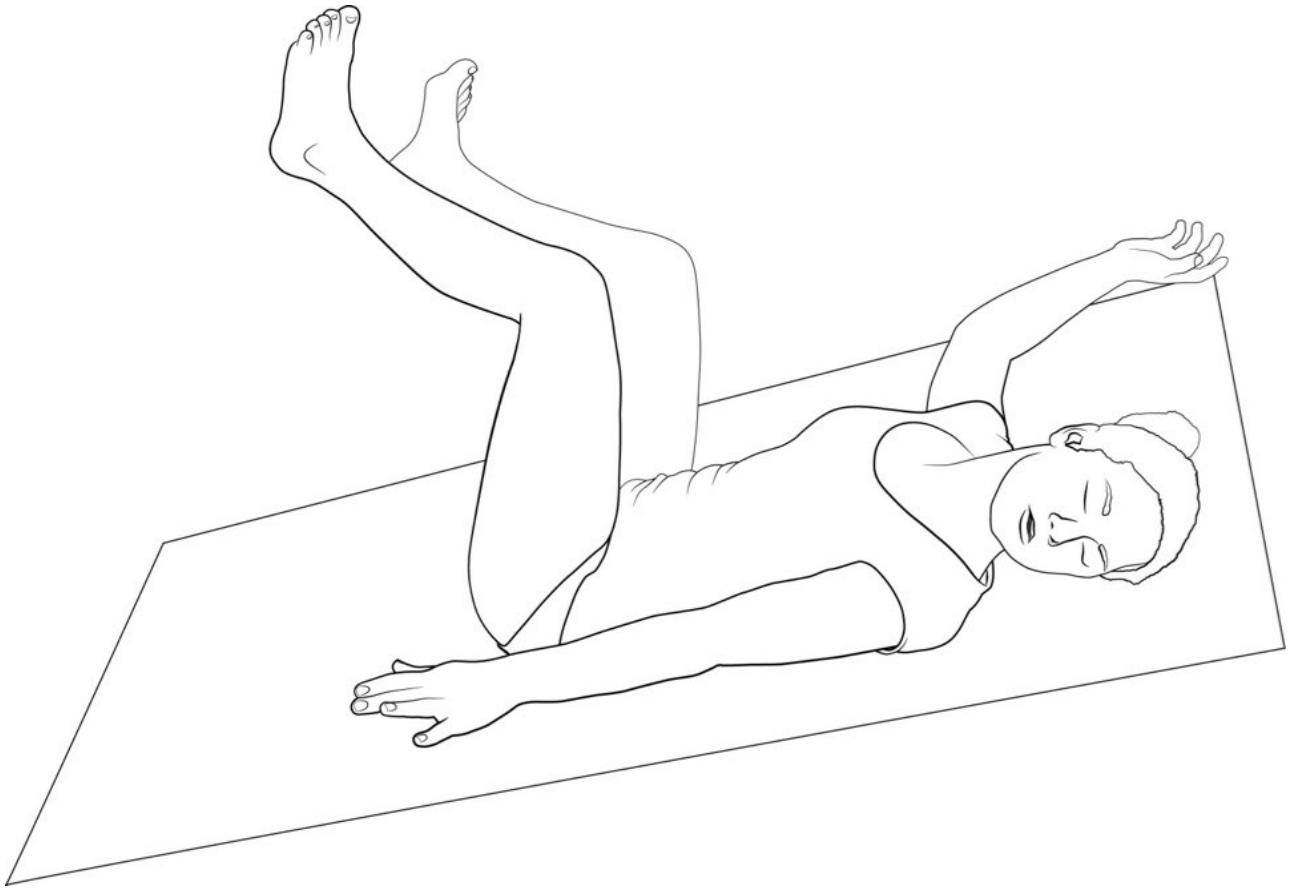
Reflexive turning 1

Reflexive turning I.



Programs of physiological motor skills

Patient suffering from disorder of the body posture

Patient with brachial plexus palsy

Patient with brachial plexus palsy – with home therapist

Patient with congenital disorder of the posture of the feet

Patient with congenital disorder of the posture of the feet

Patient with decentred left lower extremity (When walking, she turns her foot inwards)

Patient with decentred left lower extremity (When walking, she turns her foot inwards)

Patient with disorder of motion of his shoulder

Patient with disorder of motion of his shoulder

Patient with disorder of motion of his shoulder

Patient with decentred shoulder girdle

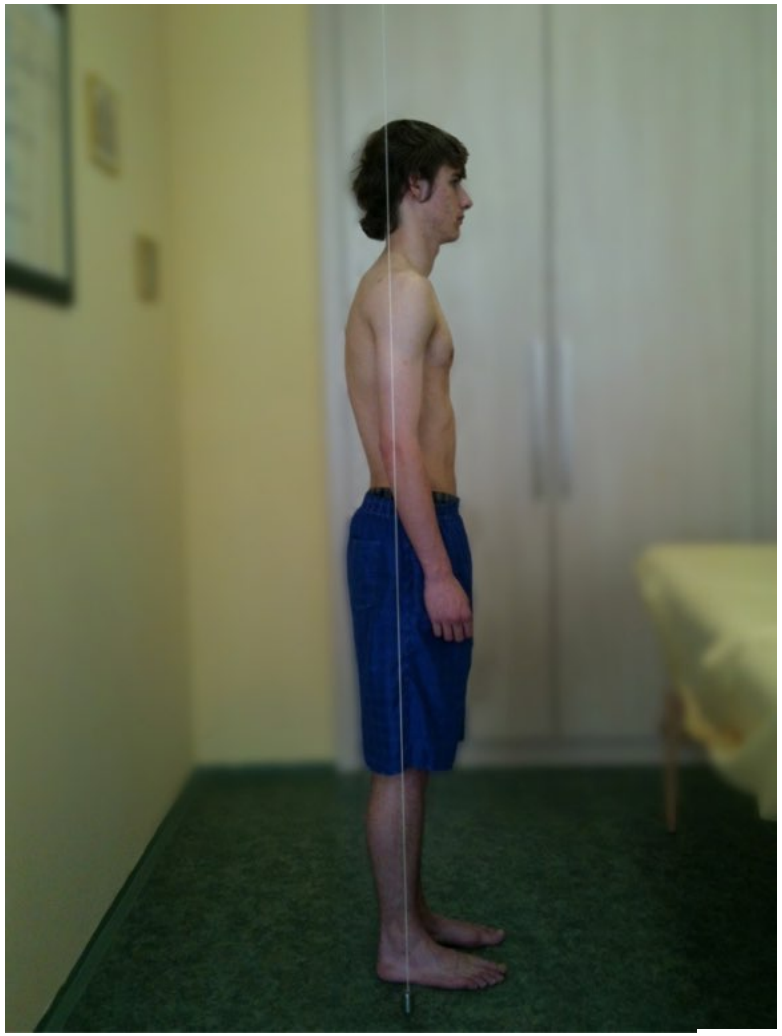
Patient with disorder of his shoulder

Patient with herniated lumbar discs

Patient with congenital disorder of the posture of the feet

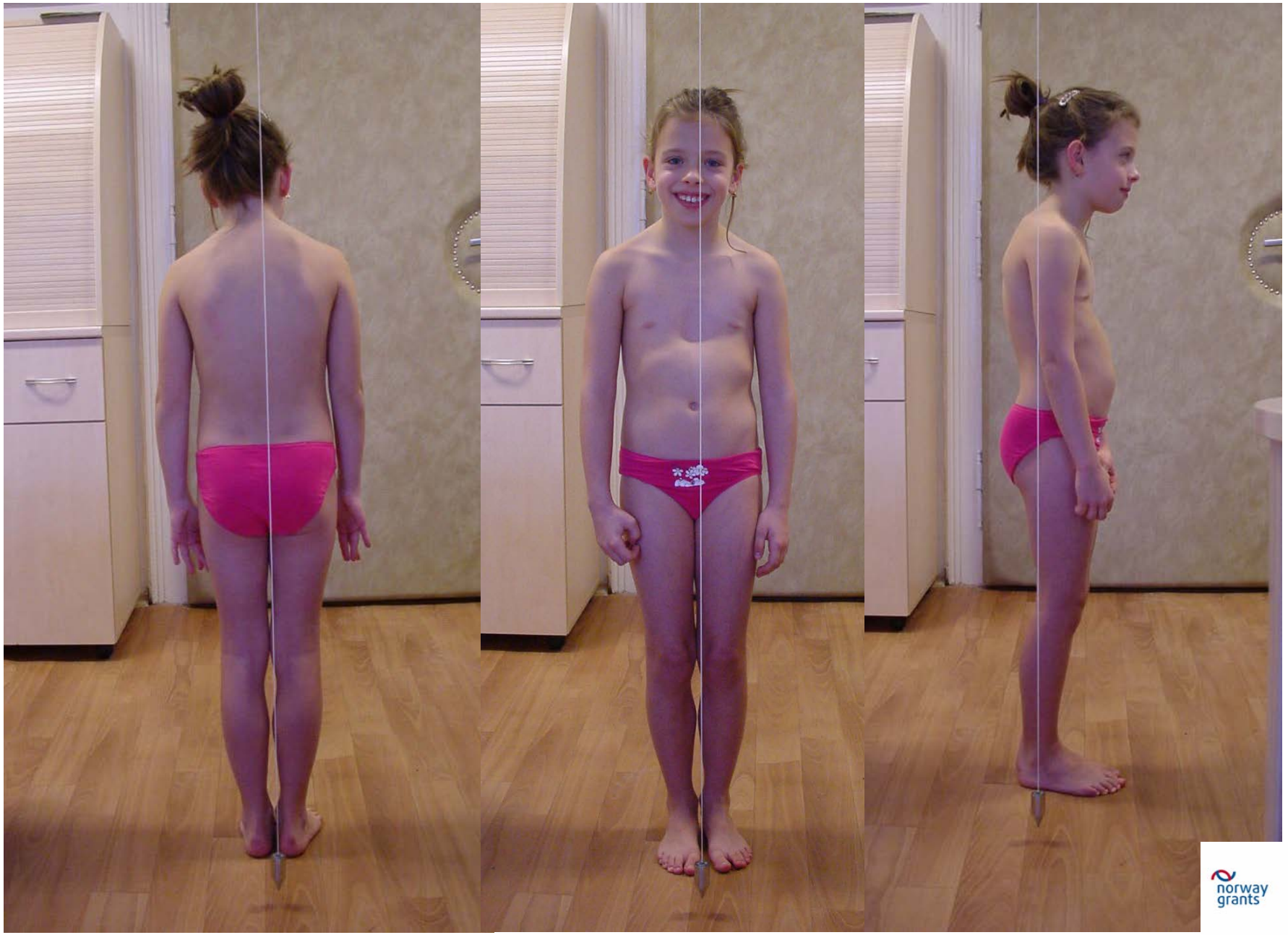
Patient with disorder of autonomic regulation of the stand

Before therapy



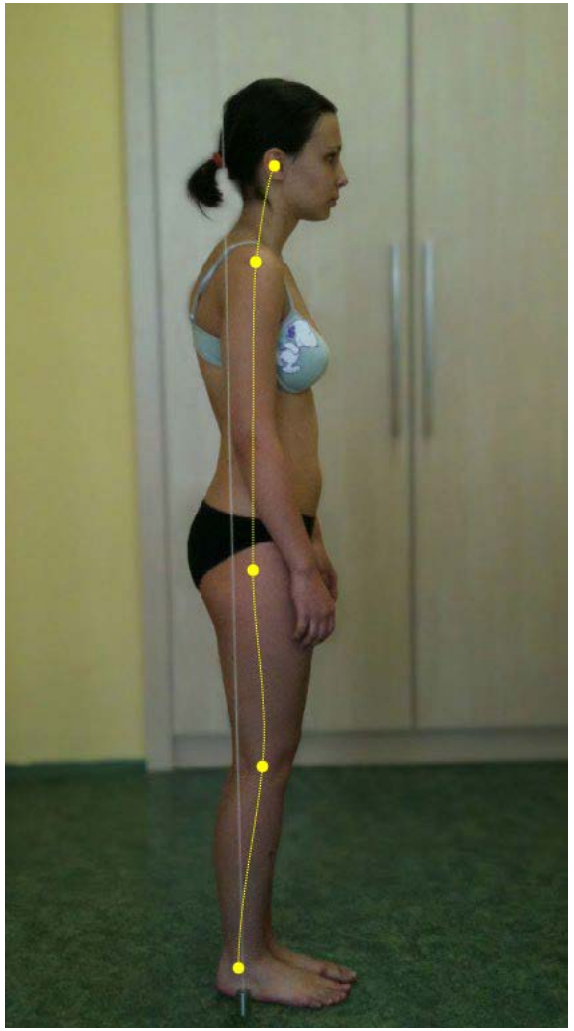
After one year of treatment

Severe developmental disorder of the posture of the body, incipient scoliosis, inverted sternum, funnel-shaped deformity of the chest and anterior position of the head, 9 years of age.

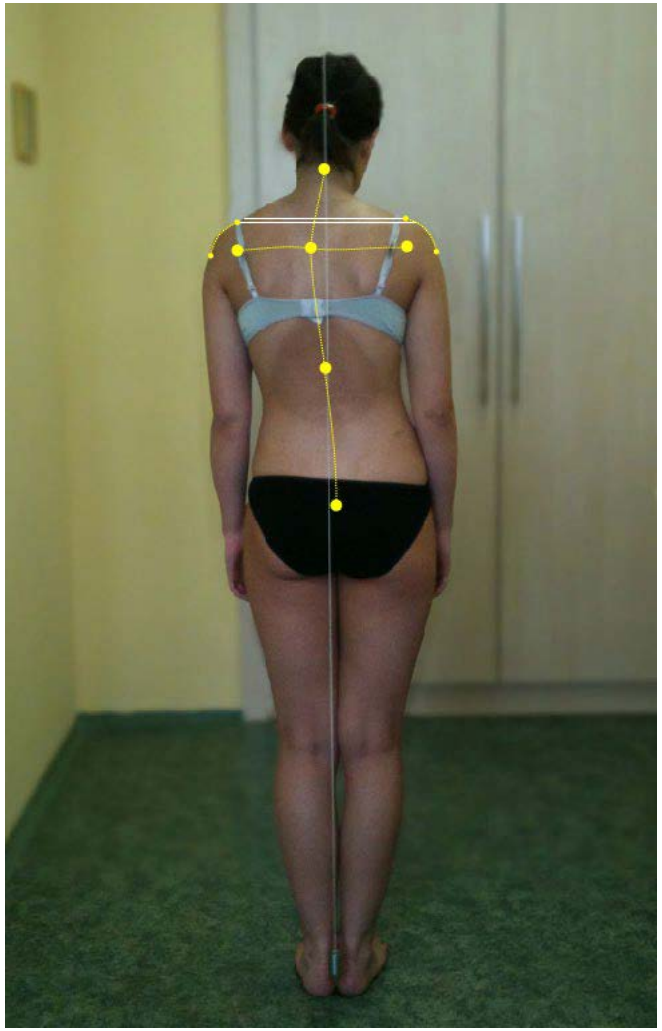


Normalizing the scoliosis, posture of sternum and the shape of the chest; position of the head has improved remarkably; Vojta therapy has been performed for 4 years. 13 years of age.

Patient with disorder of autonomic regulation of the stand

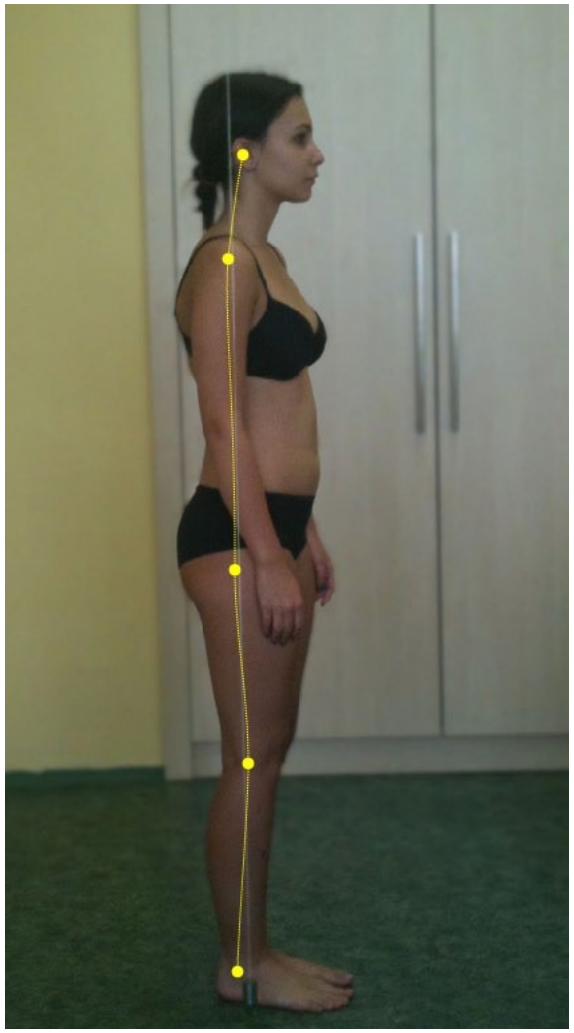


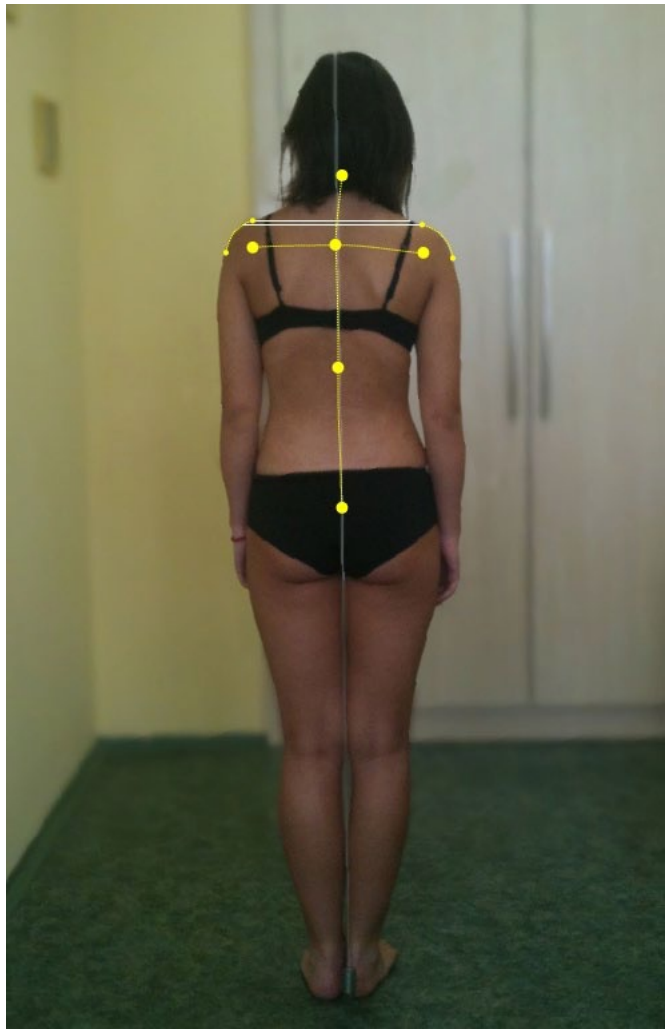
Before therapy



Before therapy

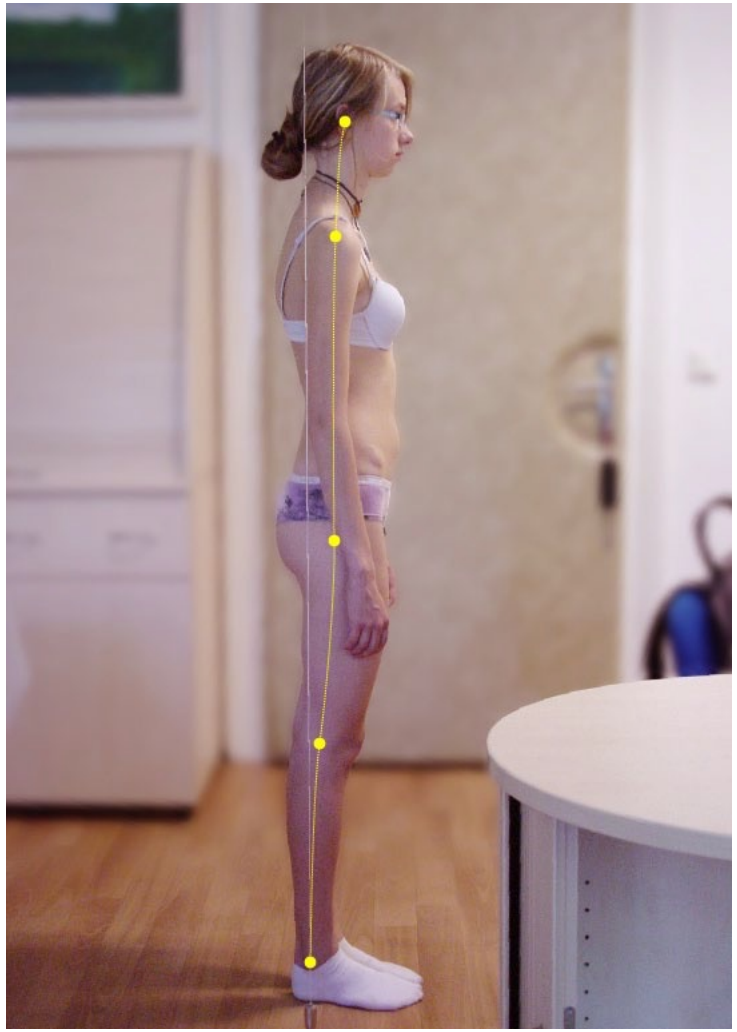
Patient with disorder of autonomic regulation of the stand



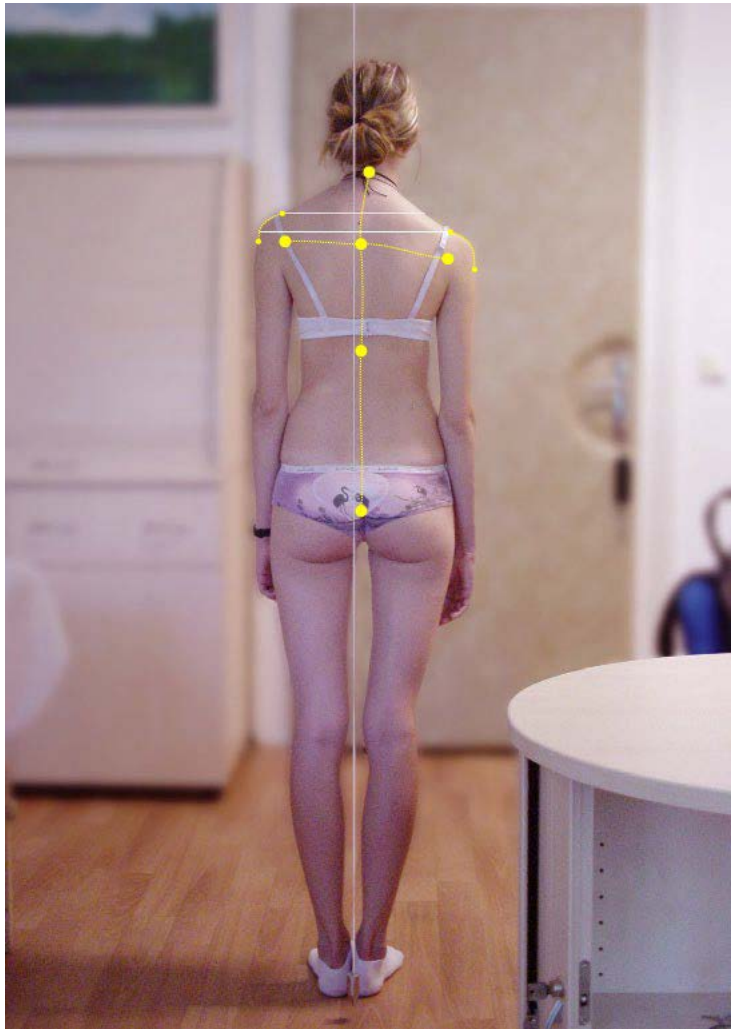


After approximately one year of treatment

Patient with disorder of autonomic regulation of the stand

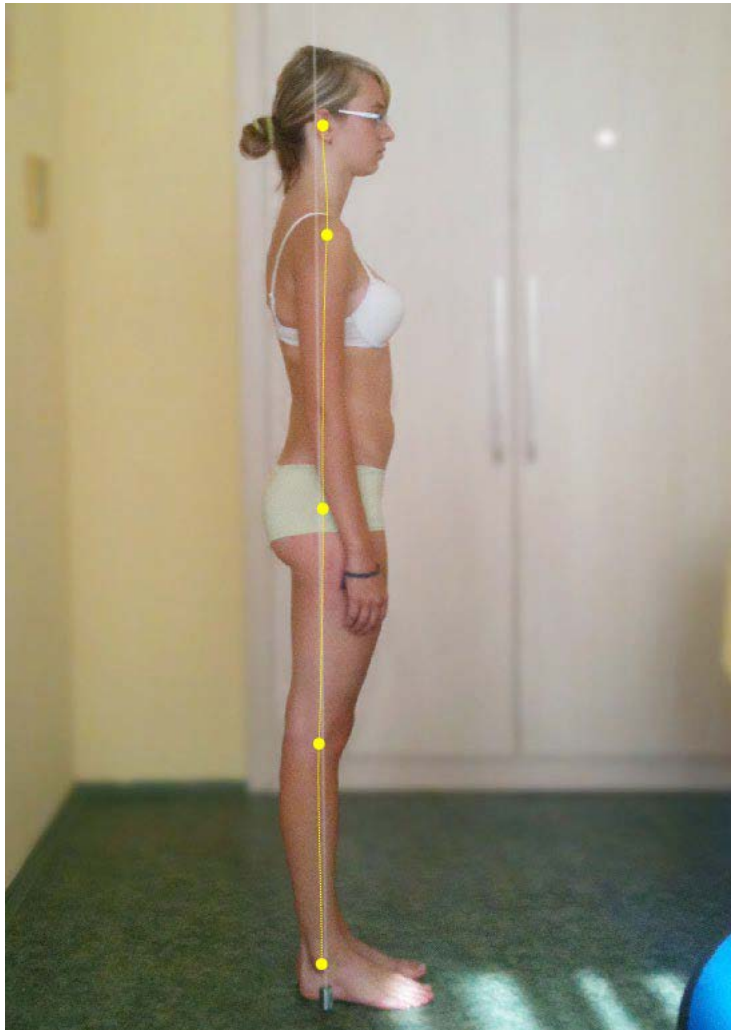


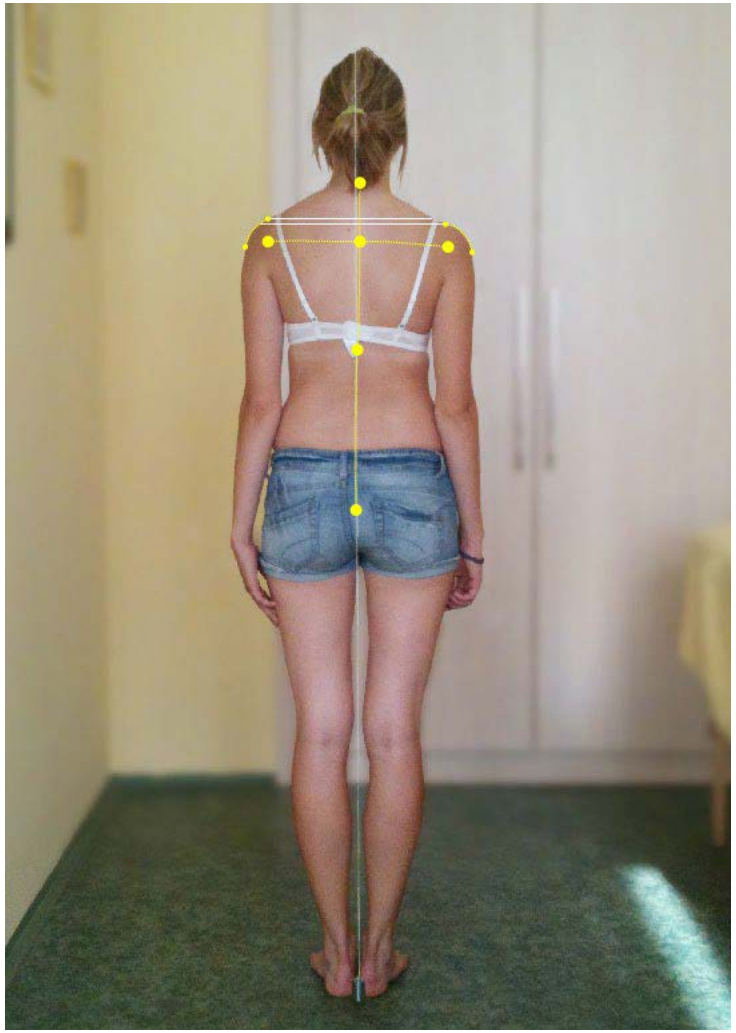
Before therapy



Before therapy

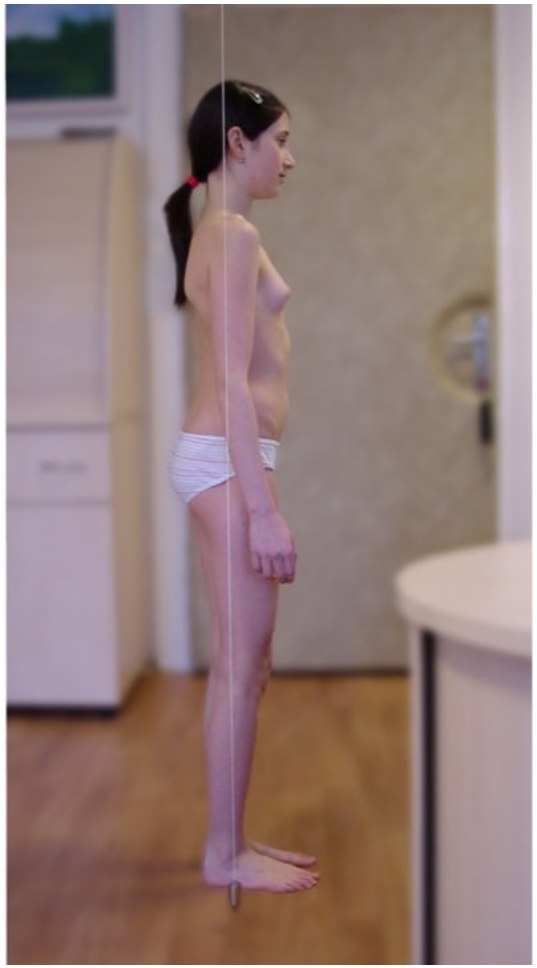
Patient with disorder of autonomic regulation of the stand





After 4 years of treatment

Patient with disorder of autonomic regulation of the stand



Patient with disorder of autonomic regulation of the stand

Literature :


MOZKOVÉ
HYBNÉ PORUCHY
V KOJENECKÉM
VĚKU


Vojtův princip


Heidi Orth
Dítě
ve Vojtově terapii
Příručka pro praxi


PFLAUM
Vaclav Vojta/Edith Schweizer
Die ideale
Bewegungsentwicklung
im ersten Lebensjahr

Thank you for your attention!