Attention Deficit Disorder / Hyperactivity And The Scientific Osteopathic Approach

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Attention Deficit Disorder / Hyperactivity (ADHD) and the Scientific Osteopathic Approach

1. Introduction and Definition

Attention deficit hyperactivity disorder is a condition that affects patients' behavior.

Although it is normal for children to have trouble focusing and behaving at one time or another, these ADHD patients seem restless, may have trouble concentrating (trouble paying attention) and may act impulsively (without thinking what the result will be) as well as be overly active (hyperactive).

The symptoms of ADHD are mostly noticed at an early age of 6 to 12 years old. At this age, these ADHD children go to school.

ADHD affects some 3 to 5% of school-aged children.

The normal troubles in focusing in children do not disappear, can be severe and can cause difficulties at school, at home and with friends and other social relationships.

Although the symptoms usually improve with age, the adult patients continue to experience problems.

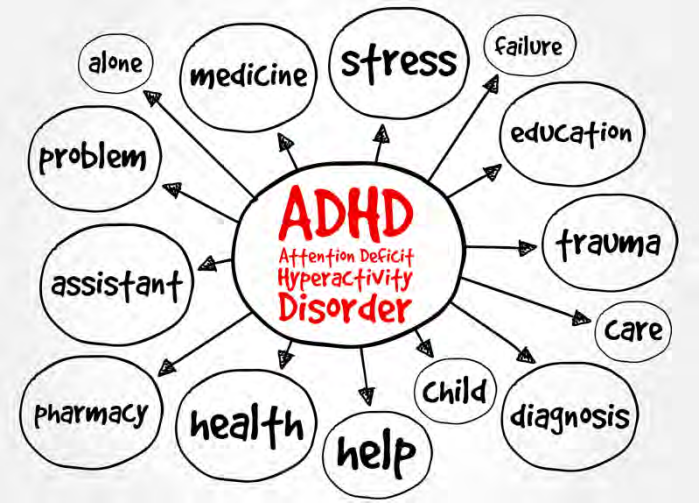

Figure 1 - ADHD

ADHD is technically a mental disease, but it is preferred to call it a disorder.

AGHD is not a disability.

An estimated 5 - 8.4% of children and 2.5% of adults have ADHD.

The diagnose or assessment of ADHD relies primarily on:

- A clinical interview.
- Medical and social history.
- Objective measures (standardized questionnaires).

The clinical course of ADHD is chronic with symptom onset occurring well before adolescence. Most patients have symptoms that continue into adolescence, and some into adulthood.

Sometimes there are associated symptoms such as:

- Depression.
- Disruptive behavior disorders.
- Substance abuse.

Beside the influence on the wellbeing of the children with ADHD, also the wellbeing of their parents is influenced.

The problems of children with ADHD have a significant impact on the parents' emotional health and parents' time to meet their own needs, and they interfere with family activities and family cohesion.

The cause of ADHD is not completely understood although there is evidence for a genetic basis that it is likely to involve many genes of small individual effect.

Consequences of ADHD

ADHD is associated with an increased risk of accidents and early death, underperformance, learning and work problems including school failure, absenteeism and disability, relationship problems and partner violence, teen pregnancy and sexually transmitted diseases, sleep problems, self-harm and suicide attempts, problematic substance use and crime.

The stigma attached to the disorder and disapproving reactions of the environment to the behavior or to lagging school results can lead to a negative self-image.

Brain size and dimensions

Differences in the dimensions of the frontal lobes, caudate nucleus, and cerebellar vermis have been demonstrated.

Anatomical brain changes in ADHD

- Overall reduction in brain size with specific changes in:
    - Caudate nucleus.
    - Prefrontal cortex white matter.
    - Corpus callosum.
    - Cerebellar vermis.

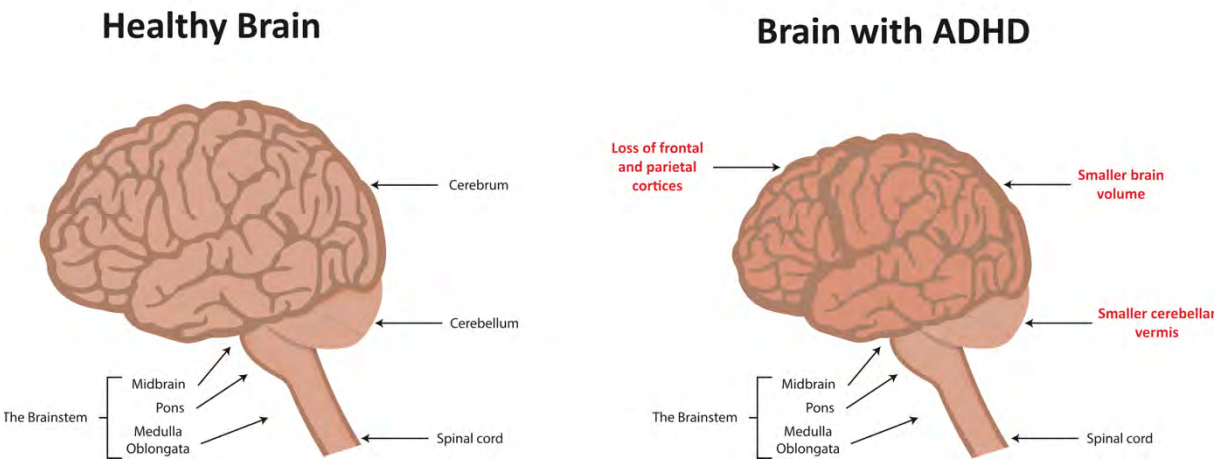

Figure 2 - ADHD brain

Many pieces of evidence indicate that an altered response to reinforcement may play a central role in the symptoms of ADHD. In particular, sensitivity to delay of reinforcement appears to be a reliable common finding.

Despite ADHD's association with learning disabilities, most people with an ADHD nervous system have significantly higher-than-average IQs.

They use that higher IQ in different ways than neurotypical people.

By the time most people with the condition reach high school, they are able to tackle problems that stump everyone else and can jump to solutions that no one else saw.

        - Inattention.
        - Emotional volatility.
3. **The basal ganglia.** In these neuronal circuits, communication within the brain is regulated.
    - Info from all brain regions enter the basal ganglia and is then relayed to the correct sites of the brain.
    - A deficiency in the basal ganglia can cause:
        - Information to short-circuit, resulting in
        - Inattention or impulsivity.
4. **The reticular activating system (RAS).** This is a major relay system in an extensive portion of the brainstem.
    - Most of the neurons comprising the midbrain reticular formation lie dorsal and lateral to the red nuclei.
    - Complex interactions between multiple neurotransmitters modulate the action of the reticular activating system with both cholinergic and adrenergic neurotransmission having key roles.
    - The RAS receives input from visceral, somatic, and sensory systems.
    - The neurotransmitters employed in this system include acetylcholine, serotonin, noradrenalin, dopamine, histamine, and hypocretin
    - A deficiency can cause:
        - Inattention.
        - Impulsivity.
        - Hyperactivity.

These 4 regions interact with each other and this mean that a dysfunction in one of the areas can cause dysfunction in all 4 the regions.

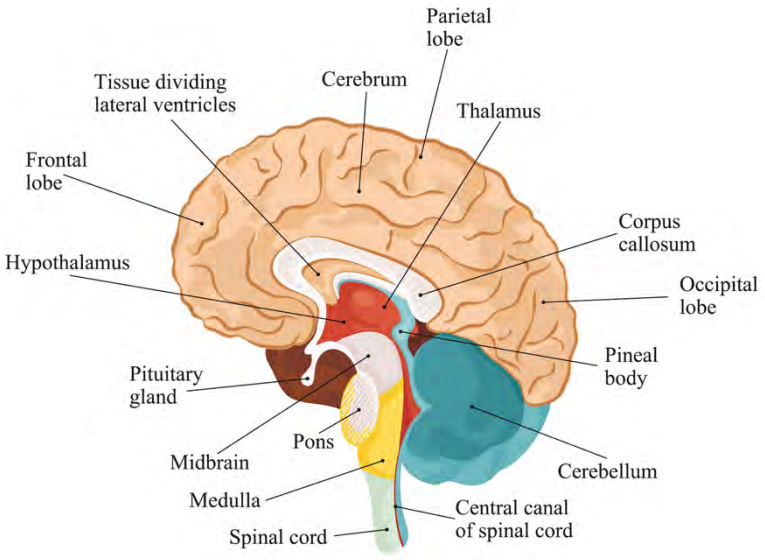

Figure 5 - Frontal cortex (lobe)

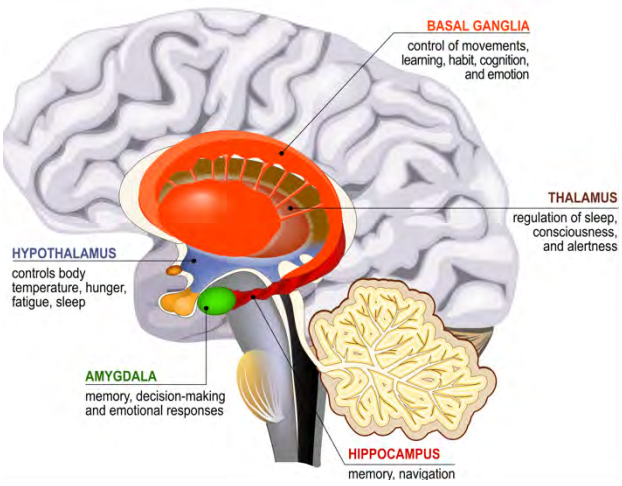

Figure 6 - The limbic system and basal ganglia

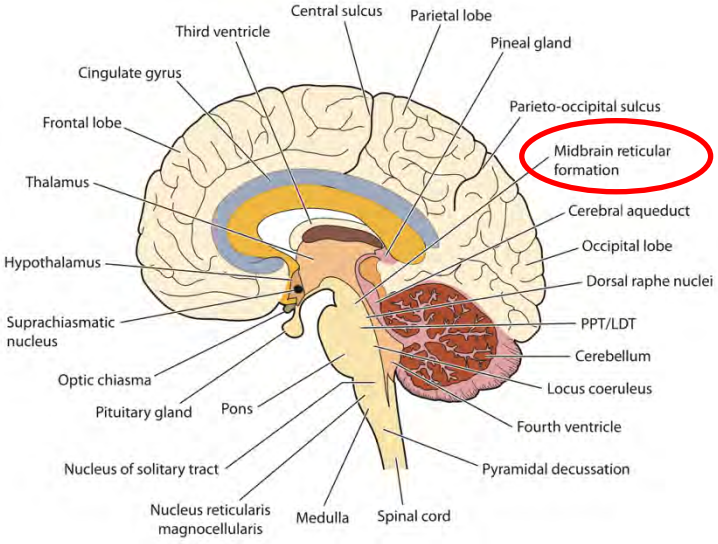

Figure 7 - Midbrain - reticular formation

Dopamine

Dopamine is a messenger hormone in the brain that provides communication between nerve cells in the brain.

It is important for certain functions such as movement, pleasure, attention, mood and motivation.

Dopamine is the thing that helps control the brain's reward and pleasure center.

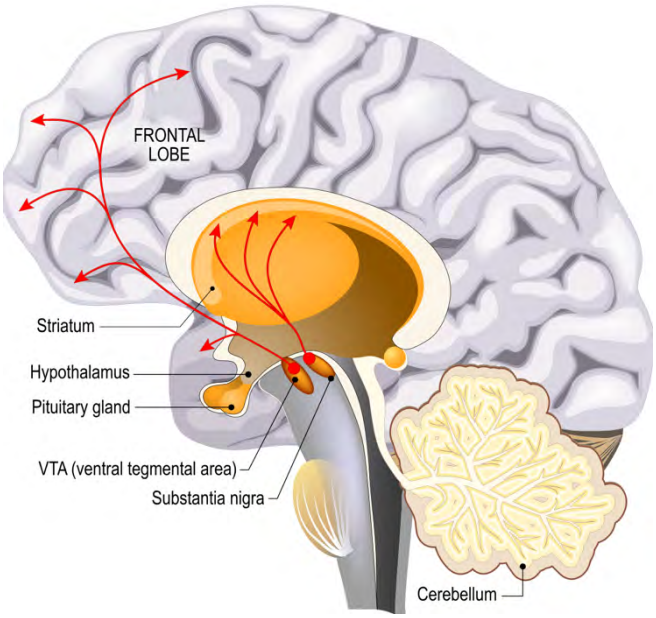

Figure 9 - Dopamine pathway

Dopamine is not released all the time. It is produced when you do things that the brain believes should be rewarded, such as exercising, eating, having sex and being in love.

The release of dopamine brings a wave of happiness.

The pleasurable feeling you get makes you want to repeat the dopamine-inducing behavior. Things that provide an immediate reward have a greater value to the brain than things that benefit you in the long run.

Changes in dopamine signaling might account for altered sensitivity to positive reinforcement in children with ADHD.

The dopamine transfer deficit

In children with ADHD there is diminished anticipatory dopamine cell firing, which is called the dopamine transfer deficit (DTD).

The dopamine transfer deficit explains the symptoms of inattention as the child fails to give close attention to details and makes careless mistakes and cannot maintain on-task behavior as there is an absence of the continuous reinforcement of attending by anticipation of dopamine release.

The dynamic developmental theory

This theory hypothesizes that there is a dysfunction of dopamine transmission in the frontal-limbic circuits, which is responsible for a steeper delay-of-reinforcement gradient and slower effects of extinction.

Due to the steep delay of reinforcement there is a critical window during which reinforcement of behavior can occur in children or adults with ADHD. The steep and shorter delay of reinforcement is caused due to lower levels of tonic dopamine.

A reinforcer loses its value relatively quickly, which makes it difficult to change behavior. Only short sequences of responses can be reinforced due to the short critical window in which behavior can be reinforced.

Children therefore, tend to respond better to immediate rewards over delayed rewards and only show learning when rewards are received immediately and frequently.

Decreased sensitivity of dopaminergic (D4) receptors and heightened dopamine reuptake by presynaptic dopamine transporter are both suggested to result in diminished dopaminergic activity within executive centers.

These defects are not necessarily permanent, because as children with ADHD grow up, the brain develops normal dopamine activity, and anatomic variations lessen; ADHD symptoms also tend to improve with time.

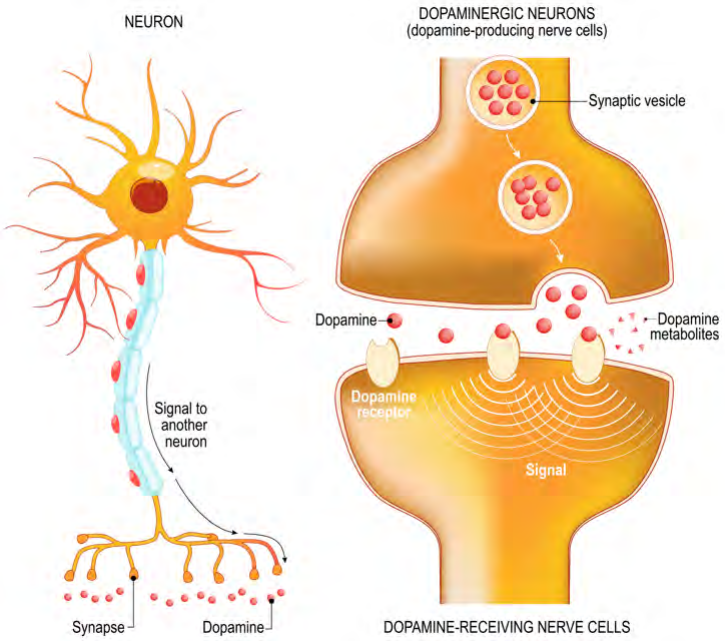

Figure 10 - Dopaminergic neurons

Velvet beans

Velvet beans, also known as Mucuna pruriens, naturally contain high levels of L-dopa, the precursor molecule to dopamine. However, keep in mind that velvet beans are toxic in high amounts. Make sure to follow dosage recommendations on the product label.

Figure 21 - Velvet beans

Carbohydrates

They are to be avoided.

Processed sugars and carbohydrates may have an effect on a child's activity level.

These sugars produce a rapid increase in blood glucose levels because they enter the bloodstream so quickly.

A child may become more active due to an adrenaline rush produced by this blood sugar spike.

Decreased activity in the child is sometimes noted as the adrenaline levels fall. However, there has been no proof to date that sugar actually causes ADHD.

Exercise

Animal research suggests that exercise can boost dopamine levels in the brain.

Sports are important for children and adults with ADHD.

Sleep

Getting regular, high-quality sleep may help keep dopamine levels balanced and help you feel more alert and high-functioning during the day.

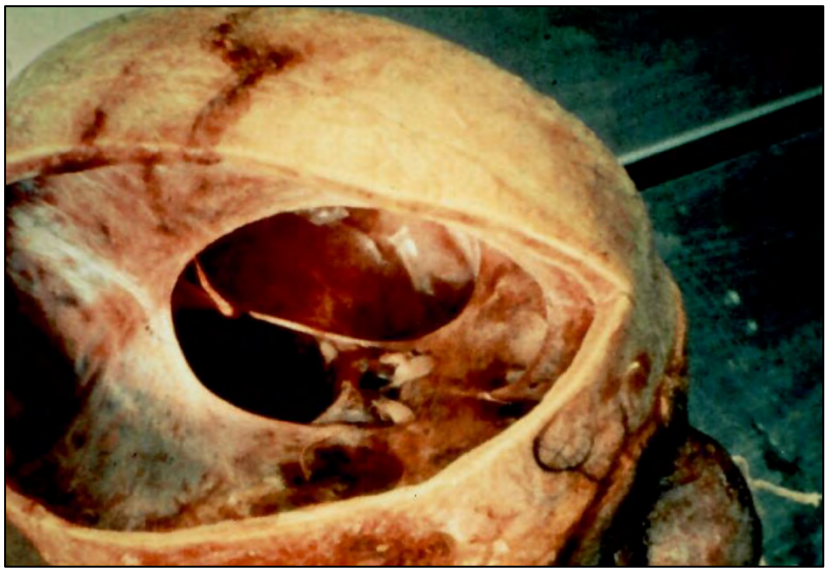

Figure 24 - Membranous system

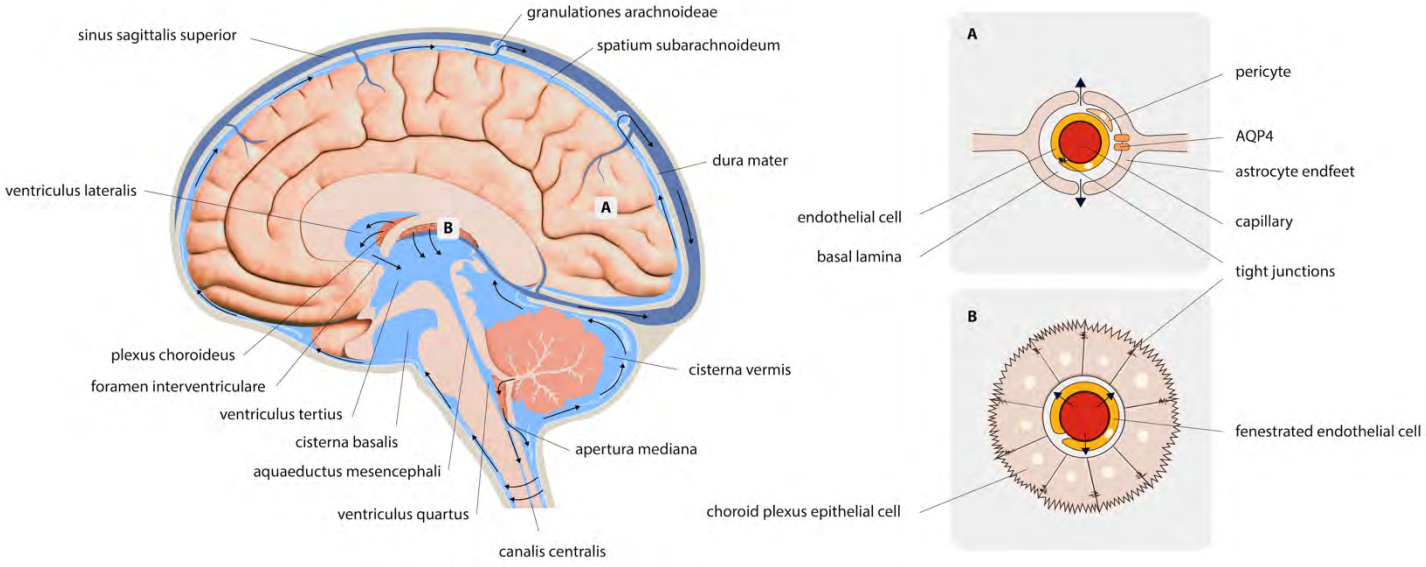

Figure 25 - Cerebrospinal fluid

The following tests and techniques are shown and described on adults, but the same tests and techniques can be applied on children.

Strong force is never applied.

Passive sidebending test of the occiput

With the head in extension

Method:

- The patient is supine.
- The osteopath palpates bilaterally between the tip of the mastoid process and the lateral tip of the atlas.
- The head (occiput) is placed in sidebending and the gapping on the opposite side is palpated.

Figure 26 - Gapping between mastoid process and lateral part of the atlas

For example: when sidebending right the distance between the left mastoid and atlas is palpated.

If this distance does not increase the occiput is in lesion **S_L**.

Because the test is in extension then it becomes a lesion in **FS_L**.

At this vertebral level rotation and sidebending are always opposite and the sidebending precedes the rotation.

Therefore, the occiput lesion is in **FS_LR_R**.

With the head in flexion

Method:

- The patient is supine.
- The osteopath palpates bilaterally between the tip of the mastoid process and the lateral tip of the atlas.
- The head (occiput) is placed in sidebending and the gapping on the same side is palpated.

For example: when sidebending right the distance between the left mastoid and atlas is palpated.

If this distance does not increase the occiput is in lesion $\mathbf{S_L}$.

Because the test is in flexion then it becomes a lesion in $\mathbf{ES_L}$.

At this vertebral level rotation and sidebending are always opposite and the sidebending precedes the rotation.

Therefore, the occiput lesion is in $\mathbf{ES_LR_R}$.

Video 2 - Passive sidebending test of the occiput

Video 3 - Possible findings

Simple frontal lift

The patient is supine on the table.

The osteopath sits at the head of the patient.

He/she places both thumbs on the lateral side of the frontal bone and lifts the frontal bone in a ventral/anterior direction.

Video 14 - Frontal lift

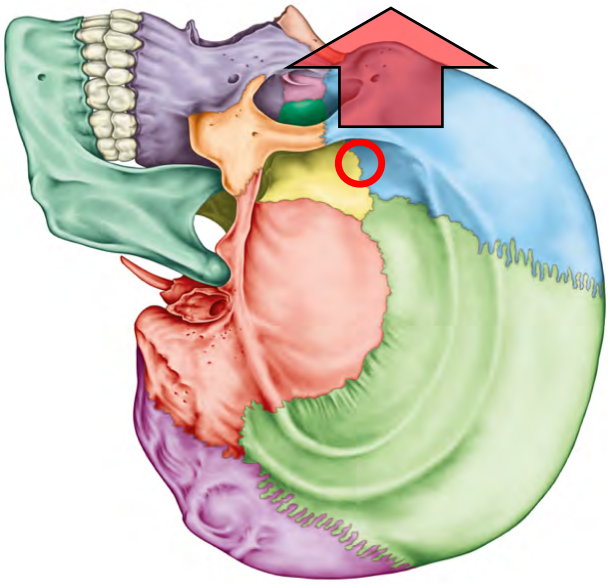

Figure 30 - Contact point for frontal lift and lift direction

ANNEX 1

Self-report questionnaire on attention problems and hyperactivity for adulthood and childhood

Patient Name……

Date……

Birth date……..

Circle the number that best describes your behavior over the past six months.

Always indicate one score (0, 1, 2 or 3).

0 = never or rarely
1 = sometimes
2 = often
3 = very often

	0	1	2	3
1. I do not pay enough attention to details in my work.				
2. When I sit, I fidget with my hands or feet.				
3. I make careless mistakes in my work.				
4. I sit wiggling and twisting in my chair.				
5. When I am busy with something, I have trouble keeping my attention on it.				
6. I get up from my chair quickly in situations in which I am expected to stay seated.				
7. I listen poorly when others say something to me.				
8. I feel restless.				
9. I am easily bored.				
10. I have trouble following directions.				
11. Work that I start, I do not finish.				
12. I have difficulty relaxing in my free time.				
13. During my vacation or free time I look for an environment with bustle and noise.				
14. I find it difficult to organize my activities or tasks.				

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Luc Peeters is an osteopath since 1985. He was the Joint-Principal of the largest Academy of Osteopathy in Europe from 1987 till 2020. He provided curricula, syllabuses and academic recognition from several universities.

This book gives a practical overview of patients with attention deficiency disorders (ADHD) and their scientific osteopathic approach.

The theory and procedures in this book are checked on their scientific background and esotericism is avoided.

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