

DNS, A.K.A. Move Like A Child

# THE SECRETS of Movement Medicine

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It's hard enough for a cyclist to ever so slightly move his foot on the pedal; a soccer player to change his cleats; a tennis player to change his strings or a rower to shift in his seat less than 1 millimeter. And, although they will do everything else exactly the same as before, these changes can lead to serious health issues. Or, in a best case scenario, they can eliminate them. At first glance, these seem like minute details, but, it is their exact posture, or correct body alignment, that is the key. Let's take a look at the secrets of dynamic neuromuscular stabilization (DNS) and its influence according to Professor Kolar.

**D**o you recall the recent farewell exhibition for tennis showman Radek Stepanek?

That day, Dr. Kolar, as one of the most recognized experts in the area of physical therapy and sports medicine was invited right onto the court, to be next to sport icons such as Jaromir Jagr, Pavel Nedved, Petr Cech and Andrei Agassi. And, in front of a sold out tennis arena, Radek Stepanek thanked Dr. Pavel Kolar. He gave him a long hug. "He extended my tennis career by several years," admitted the tennis favorite. "If it wasn't for him I would have been done playing hockey long ago," proclaimed Jaromir Jagr on numerous occasions. The same could also be said by the second hero of the evening, a Serbian tennis phenomenon, Novak Djokovic, whom Stepanek selected for his last career match. In his case, it was also true that his tennis comeback in the last few months was orchestrated mainly by Dr. Kolar.

When Dr. Kolar gave an introductory lecture at the international DNS congress held in September in Prague, drawing an interest from people across all medical specialties, he mentioned the Serbian tennis player several times, albeit indirectly. Everyone at the conference suspected who he was referring to, but Djokovic's name was never officially mentioned. And, when a photo was used, his face was blurred. The same was done with regards to the other athletes.

However, Djokovic himself is not secretive about his frequent visits with this Prague specialist. He consulted with Professor Kolar, the Director of Department of Rehabilitation and Medicine of the 2nd Medical School at the Charles University in Prague-Motol, and other specialists from Kolar's team routinely, even long distance by sending x-ray pictures from his cell phone.

Dr. Kolar often used slides showing Roger Federer, a 20-time Grand Slam winner. He used the Swiss legend as an example of how you can play elite tennis despite being 37 years old. "He has ideal movement", said the world renown expert. He pointed out muscle morphology and explained how he preserves his body in contrast to other players, such as another champion, Rafael Nadal. Some movements of the Spanish hard worker are simply unnatural and this was evident when his movement analysis was shown in phases.

"A deficit in postural functions as a result of poorly learned movement is one of the most frequent reasons for chronic overloading leading to structural changes in muscles, tendons, ligaments and joints. The effect is seen not only locally but also systemically because the joints are interconnected like a cogwheel during postural functions.



FOTO: PROFIMEDIA.CZ

^ **Roger Federer and Novak Djokovic, two exceptional tennis players, but only the Swiss favorite demonstrates an ideal movement pattern, while the Serbian star gladly used Dr. Kolar's help.**

Let's count, for example, how many forehands or serves a tennis player makes in a week. One incorrectly executed stroke does not affect much, but long-term repetition will magnify the effect. It is the same as if a drop of water falls on the same spot over time. After a while, it would damage even the most durable material," explained Kolar. This explains why how posture is formed is vital for the prevention of movement deficits caused by overuse.

Let's use a car as an example. If the undercarriage shifts, it will cause a problem somewhere else in the car, maybe even leading to the breakdown of the break pads. The human body is similar. In plain terms: Everything is related to each other.

### DNS as an optimal movement

But let's revisit the term DNS. What does it actually mean? Dynamic Neuromuscular Stabilization (DNS) according to Professor Kolar, is a functional diagnostic treatment approach based on the principles of developmental kinesiology. The DNS concept is based on the fact that correct body posture and correct movement flow are dictated by the body posture and movements of healthy children. During the first years of life, despite not being taught, healthy children automatically attain the ability to maintain body posture and movement in space.

**It is a general belief that sport will always optimize the posture. Unfortunately, the opposite is frequently true.**

All children develop motor skills in the same way because the development of movement is genetically coded and depends on the function of a healthy nervous system. Since the patterns observed in all healthy children are genetically predetermined, the DNS concept assumes that these movements are optimal, meaning that healthy children demonstrate correct body posture as well as correct types of movement behavior. In adults, posture and movement quality are often disturbed as a result of abnormal loading of the movement system. This can be caused by undesirable movements, sports, sedentary work postures or as a result of orthopedic, neurological and other disorders.

The DNS concept compares a patient's posture and their movement patterns to the developmental models of healthy infants. This comparison then identifies the discrepancies that need to be treated with therapy. DNS therapy approaches are based on the principles of exercises in developmental positions. Any developmental position can serve as an exercise position. The emphasis is placed on a precise position in every joint and on the coordination of trunk stabilizing musculature, which include abdominal, pelvic floor and back muscles. Learning correct breathing techniques during exercise is also a vital component of DNS therapy as it is important for the patient to become aware of and master the coordination of the correct breathing and efficient movement patterns. The goal of therapy is to balance the effect of the internal forces of the muscles that act on the spine and the joints. DNS therapy is mainly an educational process that teaches the patient how to optimally engage spinal and joint stabilizers in static positions, as well as, during movement. During therapy, the patient initially exercises under the guidance of a physical therapist who corrects their posture and movement. With time, the patient learns how to recognize and correct mistakes during exercising. The patient practices at home in precisely defined exercise positions and, as a result of these repeated and regular exercises, the patient masters the ideal movements. In an optimal situation, the patient then uses correct posture and coordinated movement during activities of daily living, at work and during sports.

"The correction of movement patterns does not rely on exercising only the muscles. You have to learn to exercise your joints. The position of the joints. To achieve this, we use functions within our central nervous system, including the ones that are based on development", adds Kolar.

### Rowing champion Synek as an example

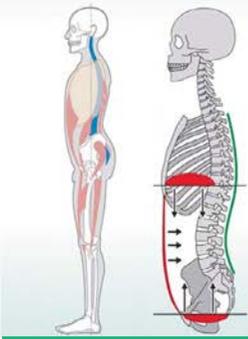
At the congress, during which specialists from other fields including some from abroad presented, Dr. Kolar was a celebrity amongst the sport icons he treats. Wherever he appeared, he was immediately surrounded by a group of attendees. They wanted a photo with him and many wanted his new book, "Labyrinth of Movement", autographed by him. "Me as a celebrity? Hmm, I am not sure about that," he chuckled. "Let's be realistic, I know that success can be fleeting. The fine line is very sensitive."

It may appear that his main job description is to take care of elite athletes, but that's only a picture painted by the media. He spends most of his time treating children and everyday patients. But yes, athletes are often his clients in which the DNS method is utilized. "We integrate it into the training," admits the renowned physical therapist. "If you are a rower, tennis player or a cyclist and your movement pattern is not correct, you are chronically overloading tissues. This does not become apparent right away, but rather in a few years, which is when you can see serious findings in the lumbar spine or the hip joint."

This was the case of rower Ondrej Synek, a five-time world champion. There was a point in time when his career was in trouble. He competed for years with a broken vertebra and it was all caused by an incorrect movement pattern. In rowing, this is especially dangerous, as an elite rower makes on average about 800,000(!) strokes in a year. Within the body, this type of overuse and repetition will cause a change in morphology.

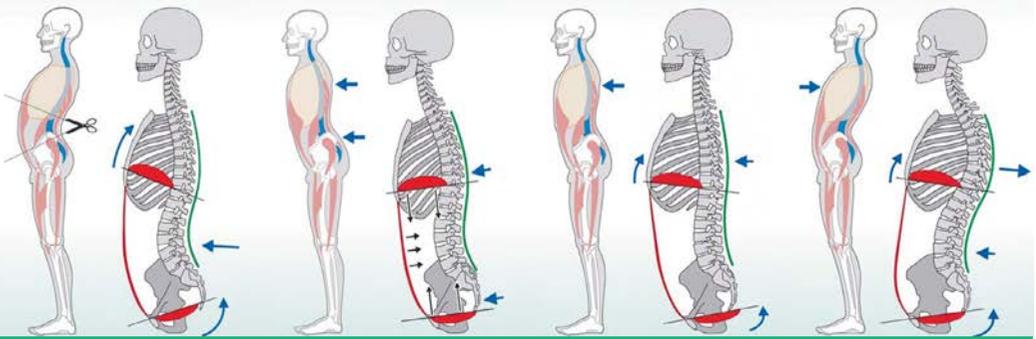
## POSTURE: SPINE-THORAX-PELVIS ALIGNMENT

### Optimal Postural Pattern



**OPTIMAL POSTURE:** the spine is erect; thorax is aligned above the pelvis; diaphragm is horizontal; pelvis is in a neutral position.

### Abnormal postural patterns:



**OPEN SCISSORS SYNDROME:** the thorax is elevated; diaphragm is tilted; pelvis is tilted anteriorly.

**FORWARD LEANING ALIGNMENT:** the trunk and pelvic axes are parallel; entire trunk is shifted forward as a result of insufficient hip extension.

**FORWARD SHIFTED TRUNK ALIGNMENT:** the thorax is elevated and aligned anteriorly in relation to the pelvis.

**BACKWARD SHIFTED TRUNK ALIGNMENT:** the thorax is positioned dorsally in relation to the pelvis; thoracic kyphosis is rigid.

## HOW TO STABILIZE THE TRUNK

Whether we want to push-off, kick a ball, throw a javelin, lift a dumbbell or row, trunk stabilization needs to occur. This happens by a “hydraulic” encoring of the trunk which becomes the foundation for all sport activities. It is possible to move the upper and lower extremities independently of the trunk only if trunk stabilization functions well.

### The following conditions are important for correct trunk stabilization:

1. The alignment of the trunk and the pelvis and their interconnection – they need to be aligned above each other. Some typical deviations include: an inspiratory chest position often associated with an increased pelvic tilt; a forward trunk position in relation to the pelvis; or a forward alignment of the pelvis in front of the trunk.
2. The spine needs to be proportionally erect. If it is not reasonably erect, its rotation is affected and compensation will occur in another plane of motion.
3. The diaphragm needs to flatten like a piston. During this flattening, the thoracic/abdominal cavity widen cylindrically. This function is often compensated for by the back muscles and by activation of the upper half of the abdominal muscles. The abdominal cavity will be drawn in. Dysfunction in diaphragm function is often linked to weakness of the lower abdominal muscles leading to overloading of the lower lumbar spine.

In all cases, it is important for an athlete to know their body. They can describe the experience and perceive the movement. This is sometimes a problem in the general population. “In the, quote unquote, normal people it is important to have the experience itself,” describes Kolar.

Everything starts with children. For example, they should perform a push up correctly. “Most exercises are good, but it is important to realize that they need to be done with good technique,” alerts Kolar.

Currently, the DNS concept is taught by 24 Czech and 15 international certified instructors. The courses offered include sport courses for specialists working with athletes (Sport Courses I-III), DNS clinical courses for healthcare professionals (DNS Courses A-D), DNS pediatric courses (Pediatric I-III) and other specialized courses, including courses focused on specific sports, such as golf, tennis, hockey, running, ball sports, fitness, weight lifting, etc.

Next year, a new program called DNS FIT KID will be introduced. It will address movement development in preschool and younger school age children. The attempt is to teach PE teachers, trainers in children’s sport courses and also coaches how to distinguish between incorrect and correct body postures, how to correct the deviations during PE class and practices and how to specifically modify sport practice based on different ages.

A practical manual for DNS FIT KID is being prepared for PE teachers and children’s sport coaches, as is, a journal for children to keep and document for themselves the frequency and duration of the DNS exercises they perform. This can provide them not only with feedback, but also serve as a preparation for keeping a sport journal in the future. For preschool and young school-age children, the individual exercise positions are named after animals. The exercise journal explains correct exercises and signs of incorrect exercises in a playful, age-appropriate form.

Since incorrect body posture in children is considered a serious societal problem by the team of DNS instructors, they applied for a grant to help support the implementation of the DNS program into the schools. It will not be known until spring 2019 whether the funds for this program will be available.

The entire DNS team continues to work on developing the application of DNS concepts into specific sports. A number of DNS instructors closely work with professional sports teams. "I am currently on my way to Nymburk to present at a seminar for 300 coaches. In the time we have been working with coaches, a lot has improved. The general understanding is better," says Kolar after he finished his introductory presentation at the congress.

In this model, educating coaches is the key, especially the ones working with small children. Recently, much progress has been seen. "The Czech Olympic Committee stepped into the process of education very clearly. Today, there should be no excuses. Not a single coach who is interested in the DNS concept should say that information is not available," says Jan Hladik, a conditioning and basketball coach for the 16 and under National basketball team.

### Coaches, no excuses! There is enough information available

"I understand that many coaches live far away and do not have time to come to yet another educational seminar. But if they want they can search the internet and after just a few clicks they can find all information for free. The Czech Olympic Committee and the basketball federation provide videos from the seminars so people can watch them at home. Furthermore, seminars are being held in different athletic clubs. Bottom line, the information is truly available to everyone," adds Hladik.

A similar situation is seen in floorball. A sport that has been experiencing a boom in the recent years. "We try to obtain more and more information. Mostly from various seminars by the Czech Olympic Committee. In the last few years, the area underwent huge improvements. It is great that we can exchange knowledge with specialists from other sports," says Jaroslav Berka, the head coach of Sparta's floorball team and an assistant of the Czech Junior National team.



He has been insisting on educating the children that he takes care of at Sparta. "The main idea with the youngest ones is simple. First, do no harm to the kids. We pay careful attention to overall movement development since we know that they do not only play floorball. Because it is a one-sided sport with unilateral loading of the back and spine, it is important that they perform other movements," explains Berka who regularly participates in various seminars. "Right now, I am reading a new book by Professor Kolar (Labyrinth of Movement). It is an excellent read."

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**How to move correctly?  
 Naturally, just like  
 during the first year of  
 life!**

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 not apply only to muscles.  
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 joints to exercise as well."**

Coach Berka tries to educate even the youngest floorball players by emphasizing the importance of stretching after practice. "They need to learn that practice is not enough. When they are young, it is not as important, they are still flexible and stretchy. But they need to get in their heads that stretching must be a habit. We really emphasize and follow that," describes Berka. It can be seen in each practice. The practice does not end with the young players dropping the stick on the floor and heading for the locker rooms, but rather they sit down on the floor and spend time stretching.

DNS is a continuation of theoretical and practical findings and is an experience based on the founders of the Prague School of Rehabilitation. Another important influence was Dr. Kolar's close work with athletes, as well as, his own personal experience as a high level gymnast who competed for a number of years.

Dr. Kolar started regularly teaching abroad in the 90s. At the turn of the century, based on the experiences from his own teaching and from discussions with course participants from various backgrounds, Dr. Kolar developed his own system of functional examination and therapy for clients with pathology within the movement system.

His specific diagnostic-therapeutic rehabilitation approach quickly gained a number of supporters. In September 2007, the first international course for instructors was held in Prague. In 2009, a request to register was submitted and DNS earned an international trademark. Since January 2012, an electronic registration of all course participants began. To date, more than 22,000 students have registered for the courses. More than 1,300 courses have been held in more than 50 countries.



FOTO SPORT: BARBORA REICHOVA



FOTO: ARCHIV KONGRESU DNS

## Body as an intelligent, self-regulating mechanism

One of the goals of the September congress was to not interpret DNS as an isolated technique. DNS is a general diagnostic-therapeutic concept based on facts and principles of neurology, [neuro]physiology, anatomy, biomechanics, kinesiology and other scientific medical fields. DNS is not Dr. Kolar's closed technique, but rather a set of theoretical findings and practical experiences that he integrated, described and carried into practice.

During the conference, the interconnection of DNS with other related medical fields was shown. The possibility of using these findings not only in functional diagnostics and therapy for patients with movement dysfunction, but also in sports to prevent overload injuries and to improve sport performance was demonstrated.

"It is not common in the Czech Republic, for specialist across various fields to come together. So, from this perspective, the congress was very beneficial. Developmental kinesiology interests me and I try to familiarize myself with various findings. Everything is based on the teachings of the Prague School. Science today begins to confirm what this school asserted a long time ago," claimed basketball Coach Hladik.

As you can imagine, when coach tries to implement his findings into practice, sometimes he encounters a problem and mainly it is the parents.

"When I tell them that their child has some kind of an issue and that they should go to rehabilitation, they stare at me and don't really believe me. Maybe, if it came from Professor Kolar himself, they would believe it. But regardless, it is a problem. Add to it the fact that the children bring bad habits from school, are not prepared, lack skills and they do not have basic movement habits. There is a curriculum that clearly states what they should be able to do, but it does not seem to apply to practice. Some PE teachers simply do not care," says Hladik. Often, the children are a reflection of their parents. The passion for movement carries over to the kids if they have parents who are active and play sports and vice versa.

Hladik, who along with coaching also managed to graduate with three college degrees including economics and politics, describes the human body as an exceptionally intelligent, self-regulating mechanism. "And, if you have a problem, maybe with a fallen foot arch, the body will limit the force impulse even if the body is strong and athletic. It does that so that it does not harm itself. That is why posture is so important," he always goes back to the fundamental term.

Athletes are not the only ones who should remember it. Coaches should, too. Thanks to the seminars and congresses about movement systems in sports, they have more and more information available to them.

There was an overwhelming interest in the Medicine of the Movement System congress held in Prague. The interest in the information in this area is growing.

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The number of countries in which DNS courses have been held.

