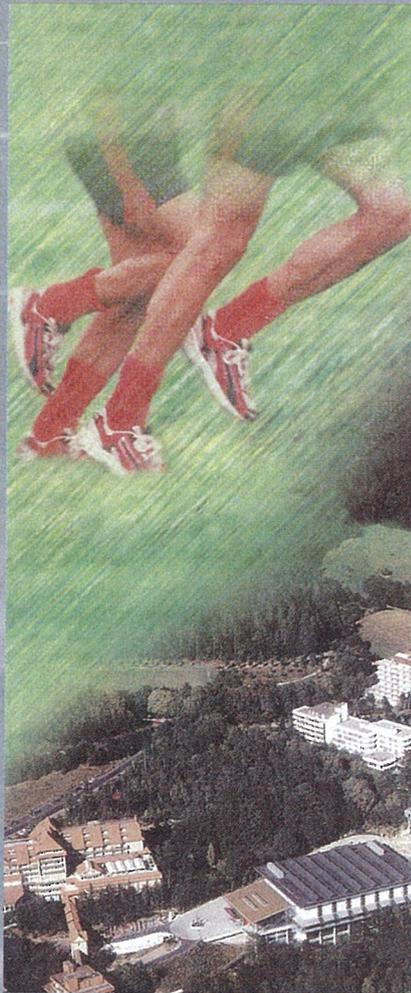


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### Abstracts

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## D-V135

### The influence of motoric demands on spinal curvature in water polo

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The aim of this investigation was to determine the dimension of adaptation of the thoracolumbar spinal profile to sport-specific mechanical loading in water polo.

Therefore, the process line of the thoracolumbar spine (C7 to S2) of 51 male competitive water polo players ( $27.8 \pm 3.7$  years) with an averaged sporting exposure of  $18.3 \pm 4.6$  years and of 1347 male non-sportsmen ( $24.2 \pm 4.1$  years) was recorded in the upright bipedal standing position by means of the ultrasonic-topography.

In the sagittal plane, the water polo players showed a significant greater thoracic kyphosis ( $46.7^\circ \pm 7.1^\circ$ ) and inclination ( $3.4^\circ \pm 3.8^\circ$ ), as well as a tendentially increased lumbar lordosis ( $28.3^\circ \pm 6.5^\circ$ ) than the control group ( $37.4^\circ \pm 6.7^\circ/2.3^\circ \pm 3.2^\circ/27.6^\circ \pm 5.1^\circ$ ). Likewise, there were statistical relevant differences in the frontal and transversal projection. A significant line up of the lateral inclination ( $2.5^\circ \pm 5.7^\circ$ ), the shoulder-pelvic obliquity ( $3.3^\circ \pm 6.1^\circ$ ) and the shoulder-pelvic rotation ( $4.3^\circ \pm 7^\circ$ ) to the right side of the body has been manifested in the water polo group. However, in the control group only a slight deviation of spinal shape to the right side could be proved ( $0.9^\circ \pm 3.5^\circ/1.1^\circ \pm 3.2^\circ/0.9^\circ \pm 4.2^\circ$ ).

The modifications of spinal curvature verified can be interpreted as functional adaptations of the vertebral column to the motoric demands in water polo consisting of swim-specific movement patterns inducing an increasing thoracic kyphosis and of throwing the ball involving asymmetrically spinal loading. Further investigations have to scrutinize, whether the sport-specific spinal shape in water polo possesses any kind of pathogenetic potency or if the spinal modifications are to be seen as a pre-condition for succeeding in sporting competition.

## D-V136

### Golfer's spine-stabilizing muscles and their dependence on handicap and back pain

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**Problem:** 50–80% of golfers are stated to have back pain. The main part of golf-induced orthopaedic injuries concern the spine.

**Questions:** Does strength of the lumbar extensors, flexors, lateral flexors and rotators differ between golfers with back pain, golfers without back pain and a reference group of untrained persons without complaints? Is there a difference in strength between golf professionals and amateurs?

**Method:** 102 male amateur golfers (47 with and 55 without back pain) with different handicaps and 16 golf professionals without complaints were analysed. The reference group consisted of 286 male untrained persons without complaints. Torque was meas-

ured during maximal isometric contractions at FPZ-Systems (Schnell Co.).

**Results:** Golfers with back pain have considerable strength deficits in all directions. All golfers show a strong muscular dysbalance in sagittal and transversal plane. Better handicaps correlate with higher strength values. The golfers (all right-handers) tend to, or have, significantly stronger trunk muscles on left side. **Conclusion:** Golf sets increased demands on spine. Nevertheless, many golfers show poor conditional state. Above all the flexors, which are highly stressed when hitting into the ground, are deconditioned frequently. Because there is also a correlation between strength level and handicap, strength training of spine-stabilizing muscles seems to be advisable for two reasons: Firstly as protection from overload and injury, secondly it could support improvements in handicap.

## D-V137

### Influence of the educational concept "Bewegte Grundschule" on the neuromuscular constitution and spine statics of children in primary school

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The intention of the educational concept "Bewegte Grundschule" ("school in motion") is not only to change school education in general but also, literally, to replace sitting by movement. Movement of the pupils during classes is used to support teaching. In addition, the program aims to mediate physical exercise as a fundamental part of healthy living and more specifically, to improve posture, coordination and physical control.

During the period of 1996–2000, the program "Bewegte Grundschule" was installed and scientifically controlled in four primary schools in Saxony and in one school in Rhineland-Palatinate. In this work, anthropometric values, strength and mobility (functional muscle tests by Janda, Kendall), as well as posture (video recording of standardized positions which allows the analysis of the sagittal spine relief) were studied. 183 children at the five test schools and for comparison, 88 children at four control schools were included in the analysis. Measurements were taken at the beginning of the first year and at the respective ends of the first to fourth year.

Data revealed that the children of the schools which participated in the program showed a better development with respect to coordination, muscle strength and posture during the first four years of primary school.

## DV138

### The effect of different low back training programs on lumbar spine kinaesthesia

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Reduced kinaesthetic perception can impair the sensorimotor functions of the lower back and may result in an increased risk of injuries. The degree to which special low back training programs can improve kinaesthetic sensibility of the lumbar spine has not been satisfactorily determined previously.