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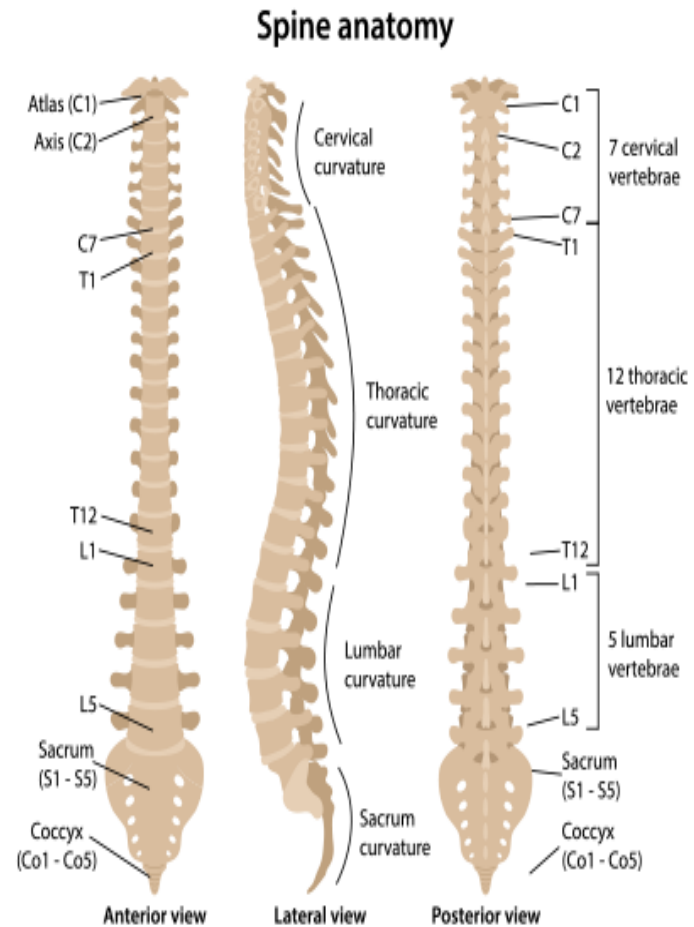
# Biom echanic of spine

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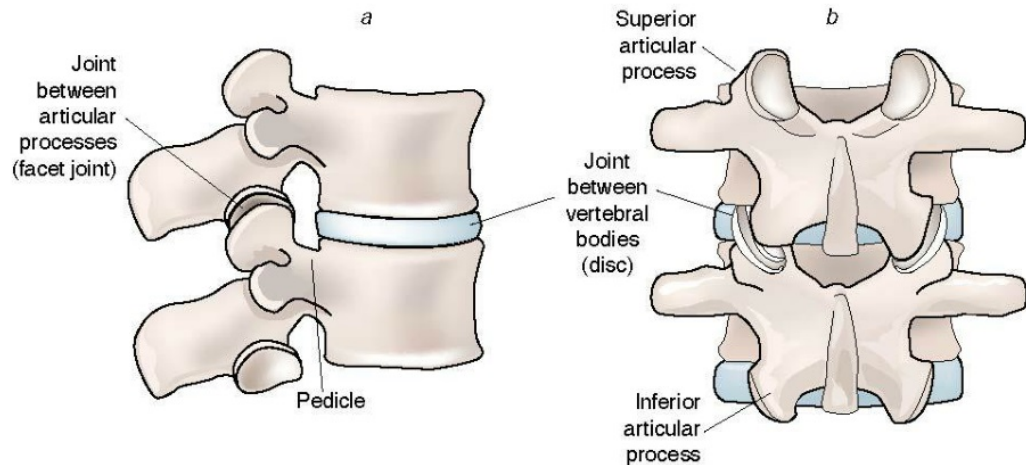


## Biomechanic of spine



- Approx 65 % of musculoskeletal disorders in Hungary are spinal disorders
  - Sitting position in work
  - Heavy physical exertion
  - Poor posture
  - Sedentary lifestyle
  - Sick pay
- 
- It must be stable and mobile in same time
  - Delmas index: physiologically 94-96
    - under 94 are enhanced curvatures
    - over 96 are reduced curvatures

## A Vertebral Motion Segment (Functional Spinal Unit)



Adapted from W. Liemohn, 2001, *Exercise prescription and the back* (New York: McGraw-Hill), 8, by permission of the McGraw-Hill Companies.

### Movement segment

- Brueger – A and B, as front and rear column
- Schmorl- passive and active segments

### Relative displacement of vertebrae

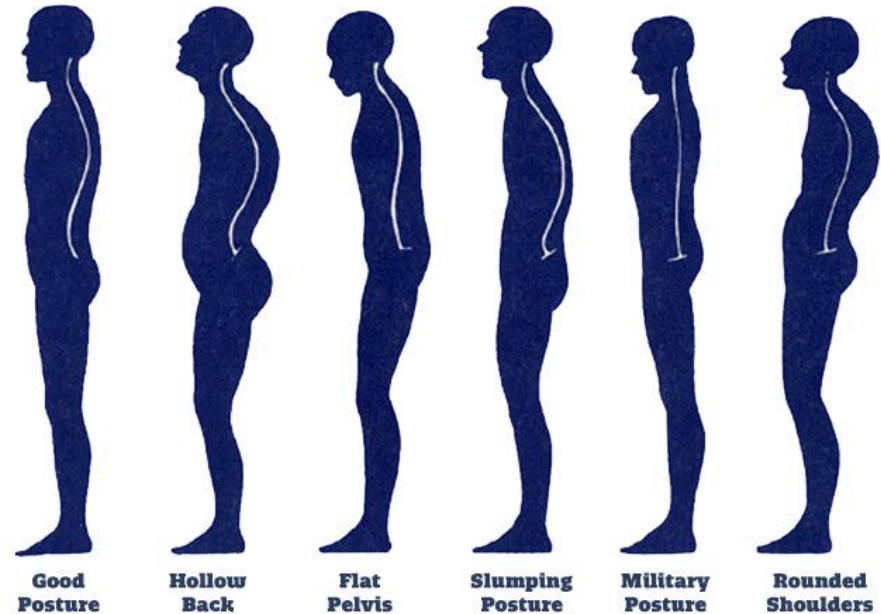
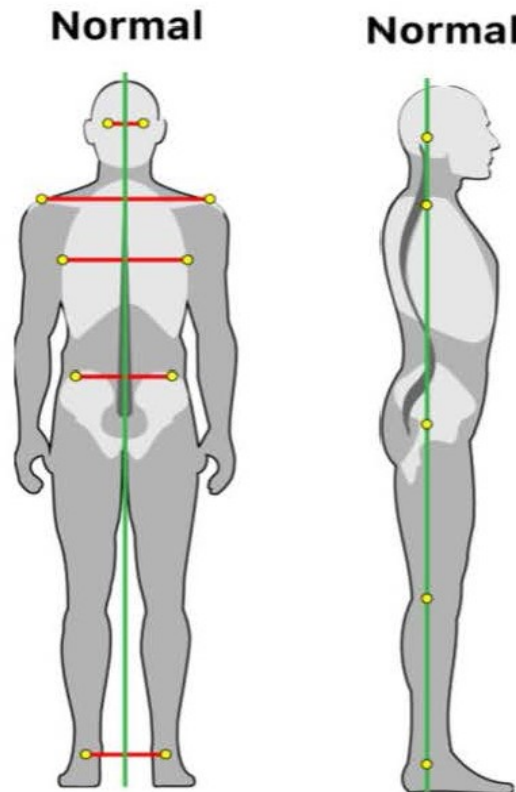
- Arthrokinematic – translation (side, ap, compression-dystraction)
  - rotation (in frontal, horizontal, and sagittal plane)
- Osteokinematic – flexion-extension, lat.flexion, rotation
- Never independently: always lat.flexion + rotation + minimal flexion together but in different directions in different sections

## The biomechanically correct and poor posture

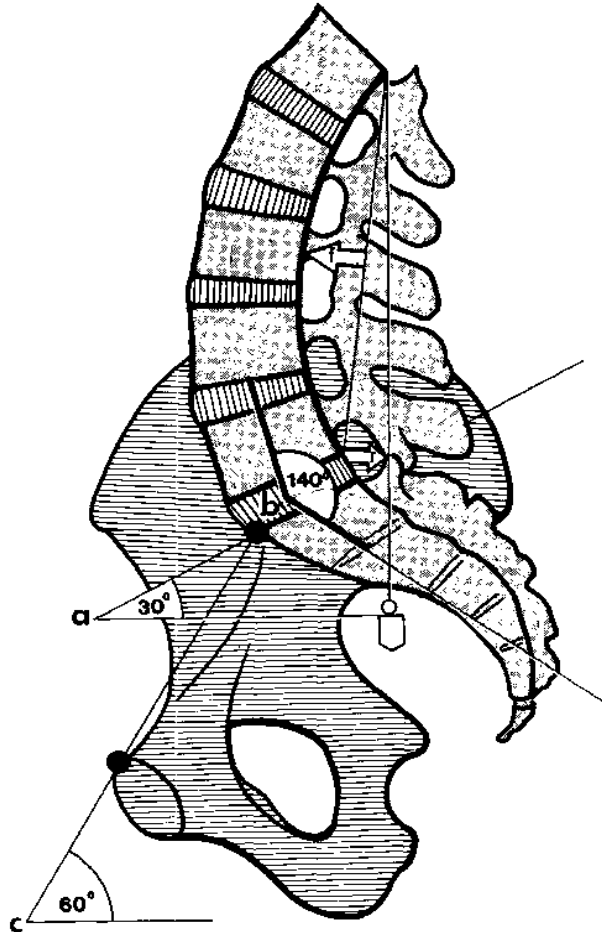
**Biomechanically correct posture:** a dynamic state of equilibrium maintained by continuous activity of the muscles and thus physiological tension of the joint capsule and ligaments.

### Poor posture:

sagittal curvatures of the spine are different from physiological, but those are mobile and can be corrected by active muscular force



## Biomechanically correct posture - pelvis



- Angle of inclination of sacrum = 30 degrees = line drawn on the surface of S1 is formed by the horizontal
- Tilt angle of pelvis = 60 degrees = line joining symphysis to S1 with the horizontal
- Lumbar angle = 140 degrees = L5 axis and sacrum axis form
- Determine the position of the hip and sagittal curves



## Biom echanically correct posture

If physiological curves are increased

muscles of the spine have to work against a greater load arm

requires greater strength

overuse, wear and tear of joints, calcifications



If physiological curves are flattened (inflexible)

the running of the muscles that move spine is altered

become inactive (weakened)

overuse, wear and tear of joints, calcification



## Muscles responsible for posture (Janda division based on fibre composition)

### Tonic muscles

- mobilization
- white fibres
- prone to shrinkage
- reacts quickly
- slow to tire
- regenerates quickly
- requires stretching

### Phasic muscles

- antigravity muscles, stabilisation
- red fibres
- prone to weakening
- slow to react
- tires quickly
- slow to recover
- needs reinforcement



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# Thank you for attention!

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