



# Changes of vertebral and disk morphology following treatment with MCGR

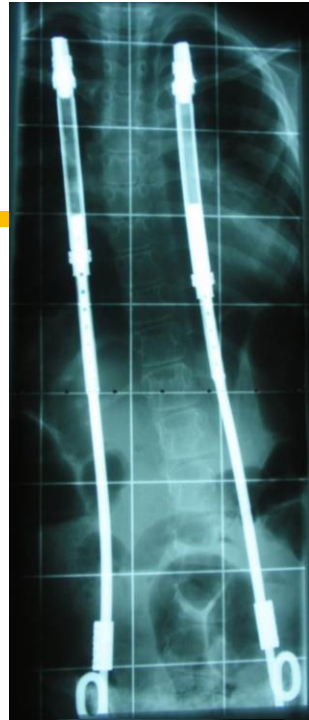
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**Nothing to disclose**

- ◆ Vertebral body growth during growing rod instrumentation: growth preservation or stimulation?
  - ◆ Olgun et al, JPO 2012
  - ◆ More than physiological vertical growth after treatment with TGR
  - ◆ Authors observed narrowing of disc spaces

- ◆ **Metamorphosis of human lumbar vertebrae induced by VEPTR growth modulation and stress shielding**
  - ◆ Hasler et al., J Child Orthop, 2015
  - ◆ VEPTR vs control-group
  - ◆ No increase of a.p. diameter of vertebrae after VEPTR
  - ◆ Vertebral height (mm/year)
    - ◆ VEPTR: 1,4 mm/year, Control: 1,1 mm/year
  - ◆ Most disc spaces reduced in height, but no measurements performed
  - ◆ **VEPTR changes spinal morphology significantly**



- ◆ Non ambulatory patients
- ◆ Instrumentation to L5 or to pelvis
- ◆ Patients with revision surgeries
- ◆ Treatment with 4,5 or 6,0 mm rods
- ◆ Patients < 5 and > 95 percentile for height
- ◆ < 2 years F/U

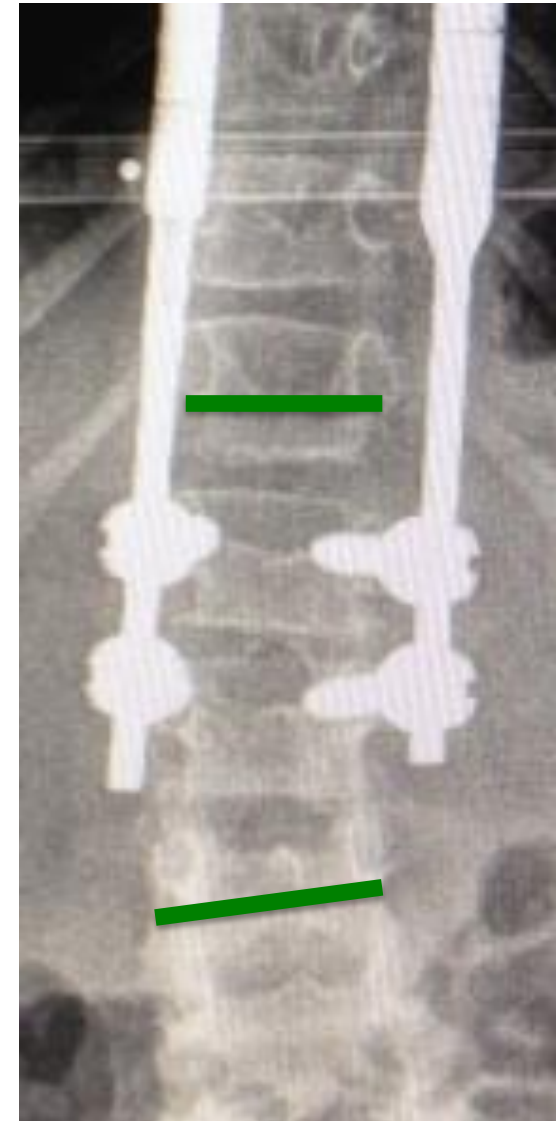
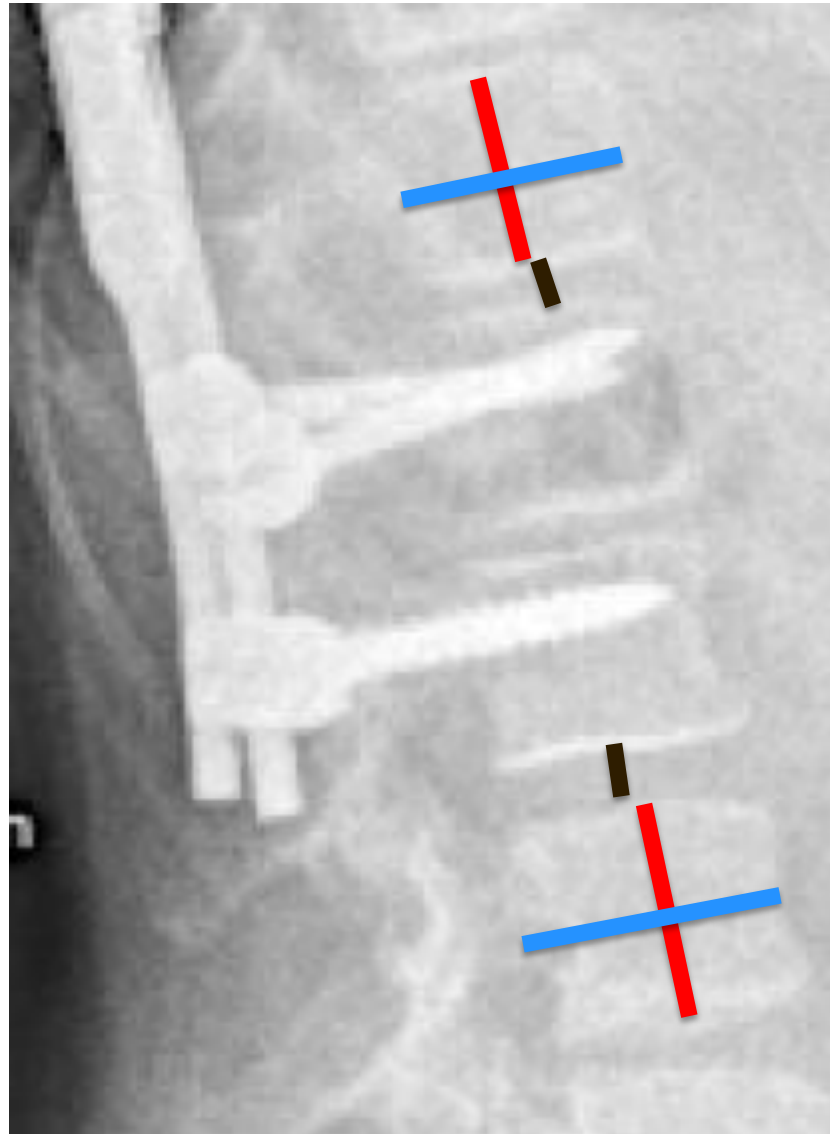
Changes of vertebral and disk height after treatment with MCGR were compared to a control group of patients treated by observation or bracing

<b>MCGR group n=30</b> 21 girls 9 boys	<b>Control group N=19</b> 12 girls, 7 boys
<b>Age at surgery: 8+9</b> (4+7 – 11) years	<b>Age at treatment onset: 7+9</b> (3+6 – 10+4) years
<b>F/U: 45 months</b> (24-56 months)	<b>F/U: 42 months</b> (24-65 months)

Distraction protocol:  
Every 4 months, Dimeglio data  
Always double rod: 5,5 mm

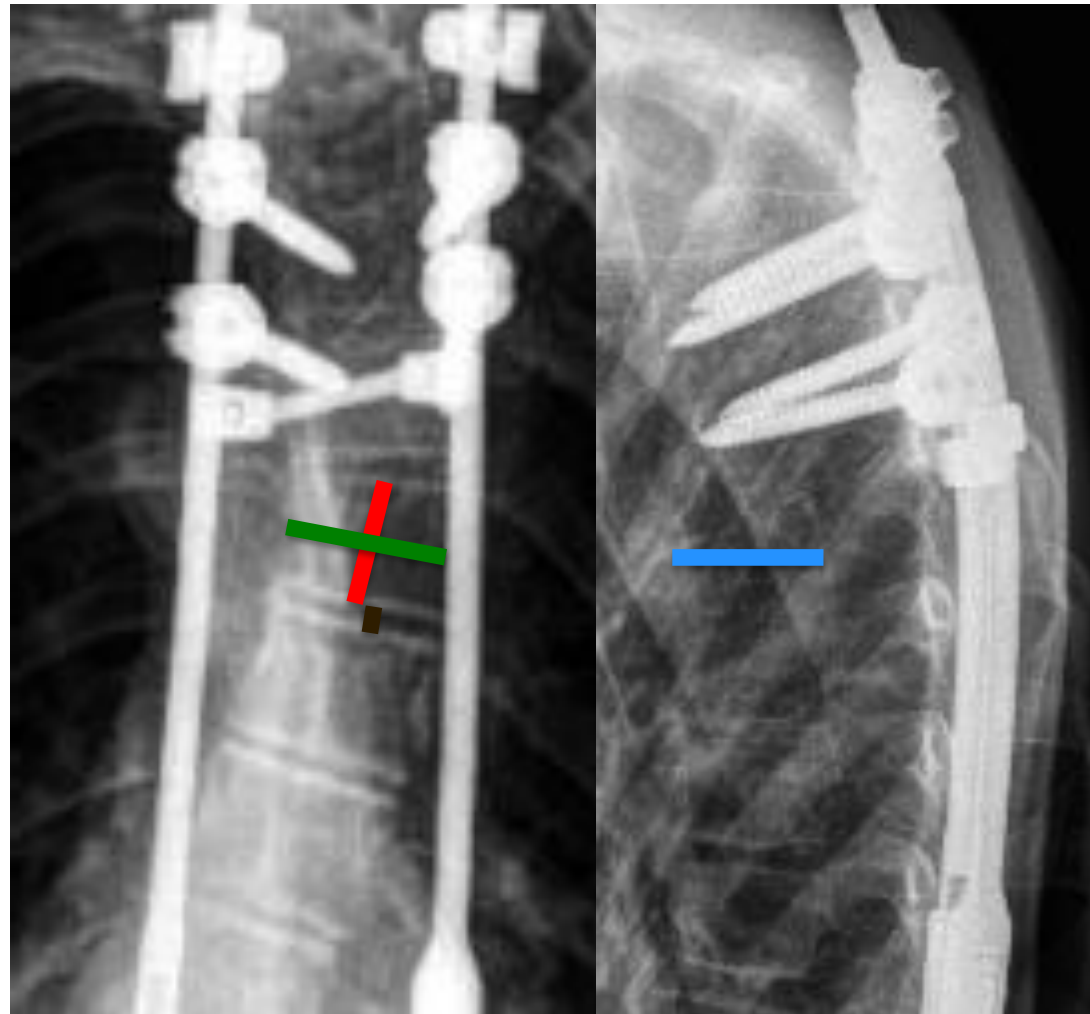
# Measurements on x-rays Lumbar area

- ◆ LVH wD
- ◆ LVH bD
- ◆ LVW wD
- ◆ LVW bD
- ◆ LVD wD
- ◆ LVD bD
- ◆ LDH wD
- ◆ LDH bD

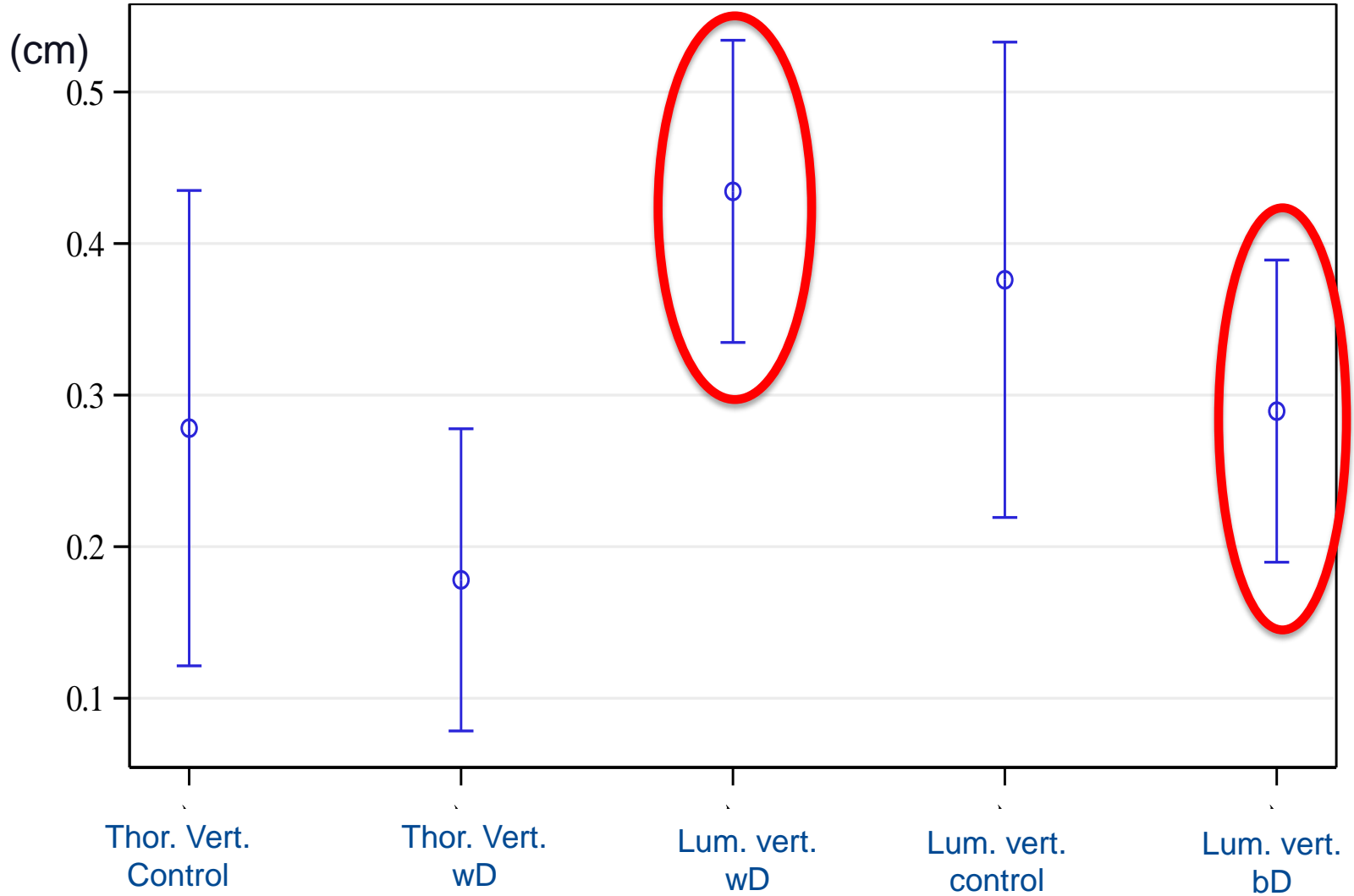




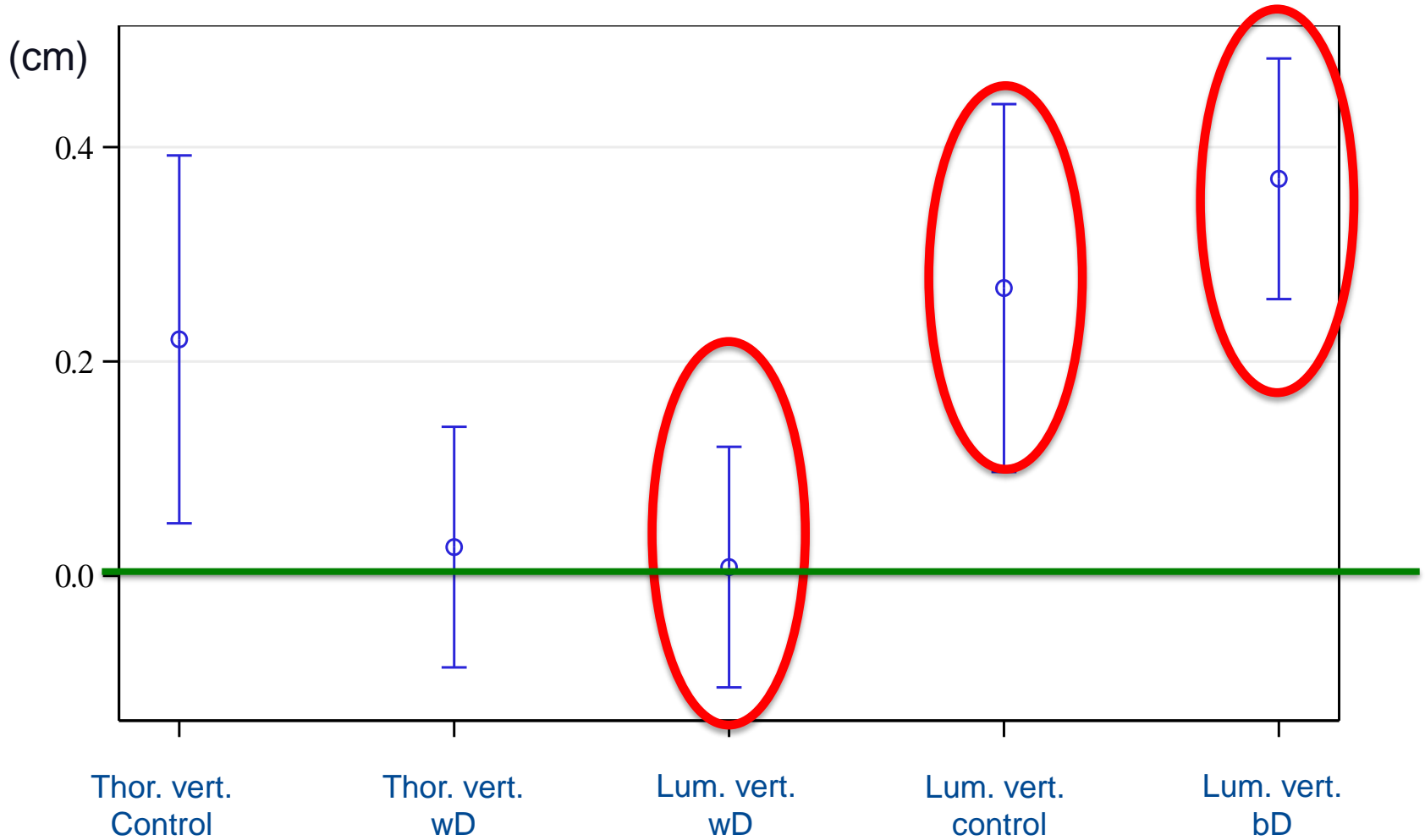
- ◆ TVH wD
- ◆ TVW wD
- ◆ TVD wD
- ◆ TDH wD




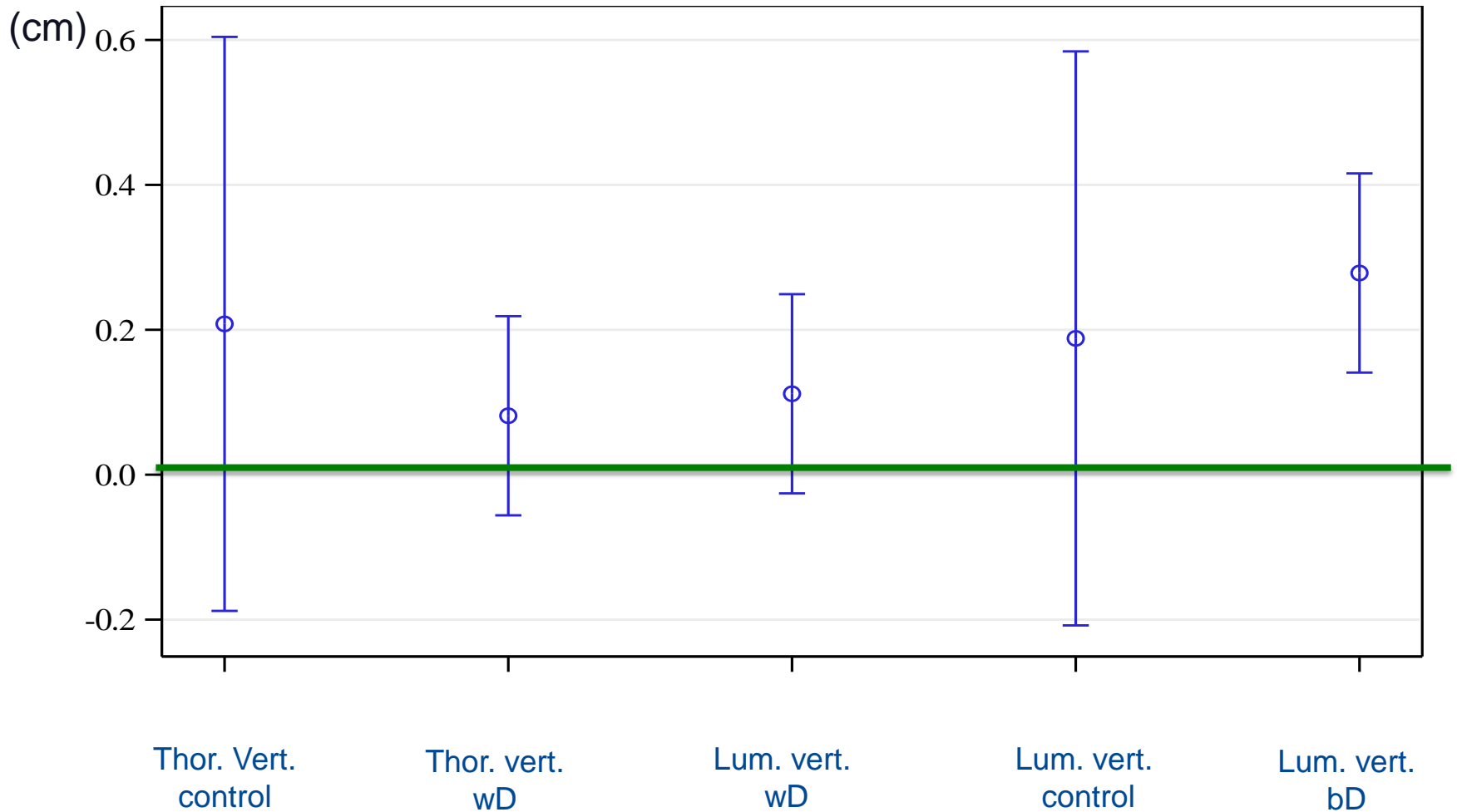




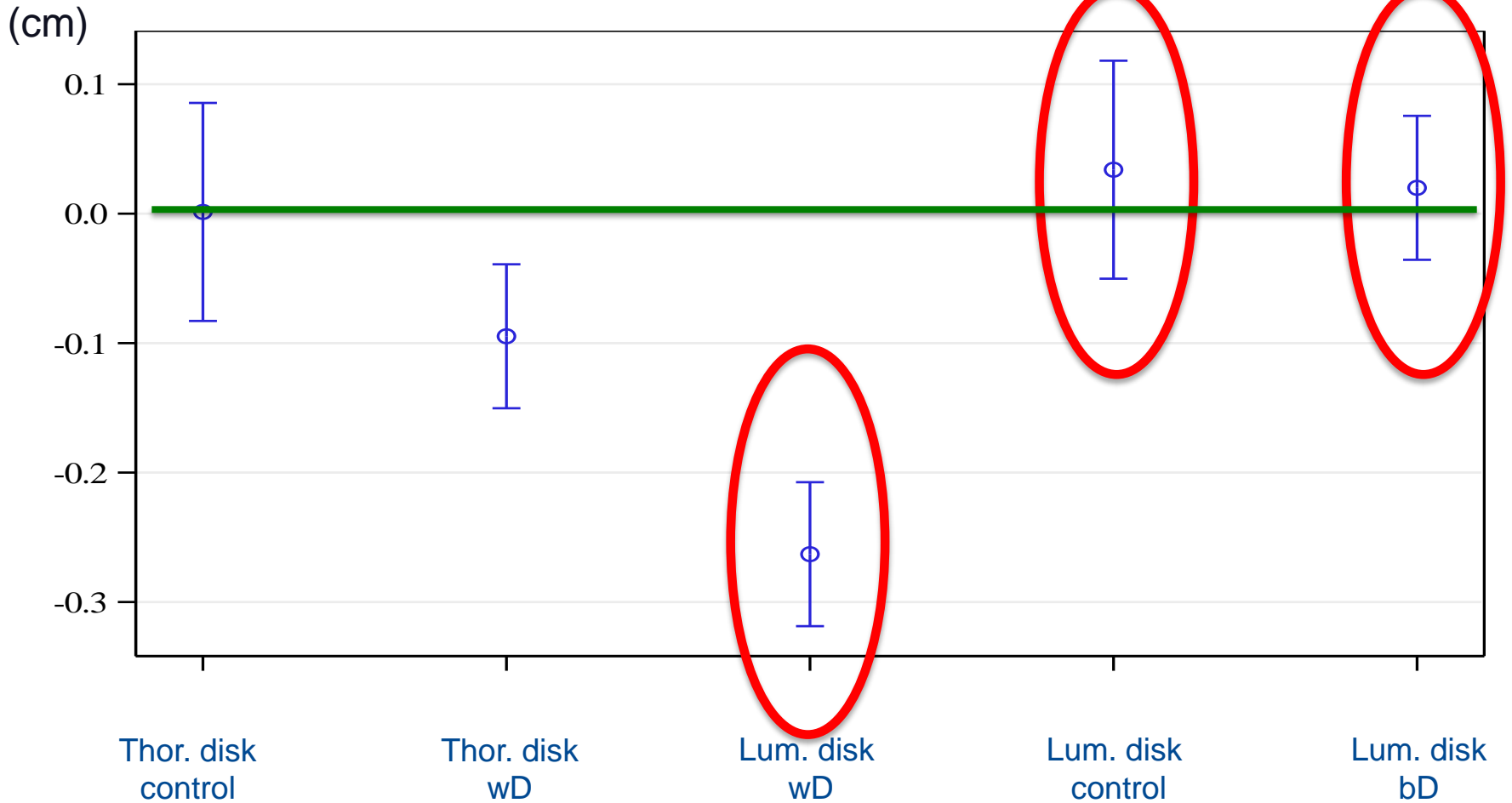
**O** = significant



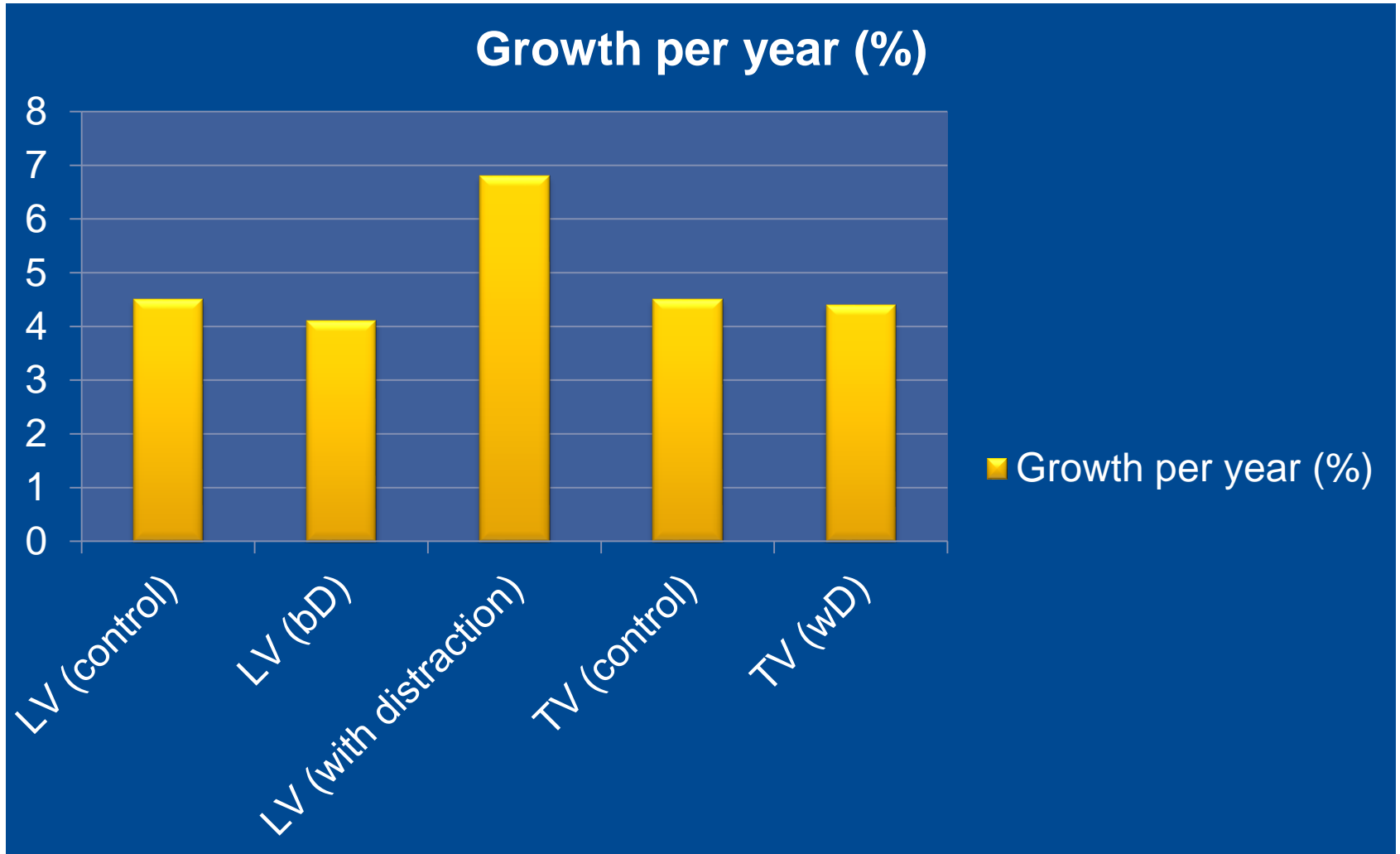
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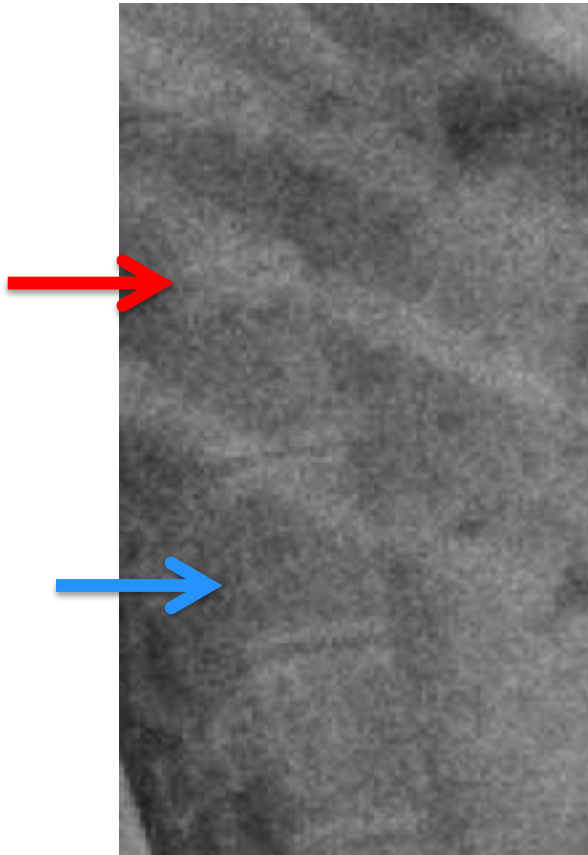
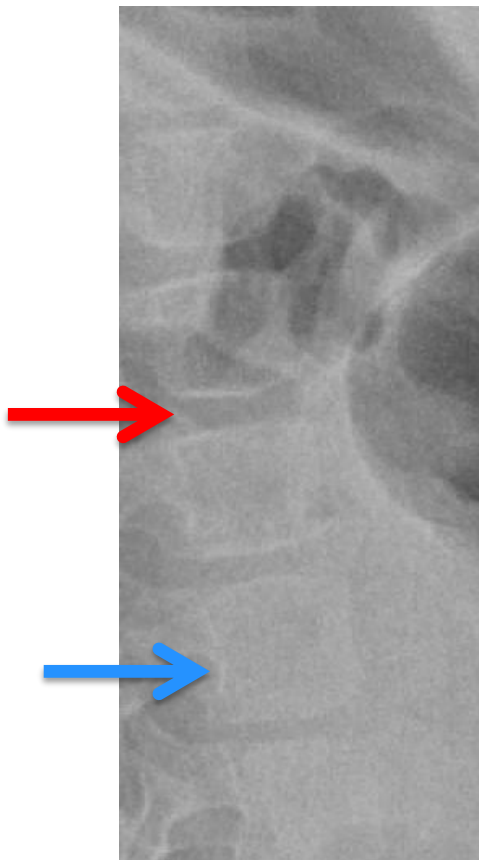
No significant changes



 = significant



# Close-up of lumbar region. Development before and 3 years after MCGR



- ◆ Lumbar vertebral height under distraction is significantly increased compared to lumbar vertebra below instrumentation
- ◆ Lumbar disk height within distraction is significantly reduced compared to lumbar disk height below instrumentation and control group
- ◆ Lumbar width is significantly decreased under distraction
- ◆ Lumbar depth is not significantly changed under distraction
- ◆ Thoracic vertebral and disk morphology is not significantly changed
  - ◆ Rib cage may offer protection against significant changes in morphology of vertebra and disk



- ◆ There is more than physiological growth of vertebrae
  - ◆ Are distraction forces still too high?
- ◆ There is significant loss of disk height
  - ◆ Is the construct too rigid ? → 4,5 of 5,0 rods?
  - ◆ Insufficient load sharing of vertebrae and disks ?
  - ◆ Distraction and rigidity of construct seem to lead to degeneration of motion segments