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COLUMBIA ORTHOPAEDIC GROUP



# Lumbar facet joint contact space area and volume

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# IMAST E-Poster # 449: In vivo lumbar facet joint

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## 19<sup>th</sup> IMAST Authors Disclosure Information

- a. Grants/Research Support
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- c. Stock/Shareholder
- d. Speakers' Bureau
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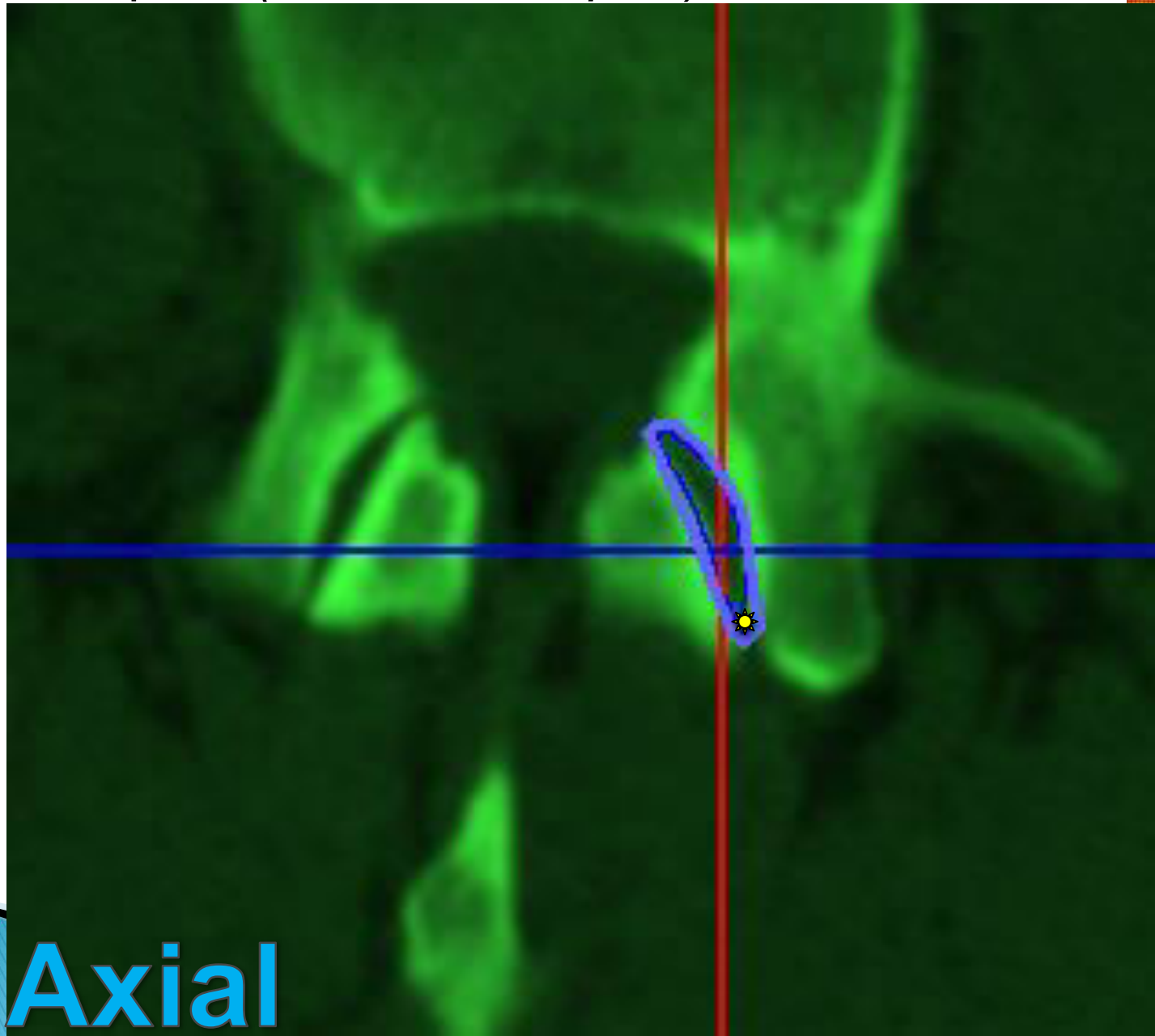
- ▶ Asymmetric degeneration involving facet joints and the inter-vertebral discs leads to degenerative scoliosis.
- ▶ The morphologically changes leading to differential degeneration in the facet joints and intervertebral discs in degenerative scoliosis is not fully understood.
- ▶ Such understanding will improve insight into the pathoanatomy of the disease.

To determine the feasibility of the process of measuring facet articular area.

This would lead us in further assessments of the *extent of facet joint hypertrophy* that occurs in patients with advanced lumbar spinal degeneration and degenerative scoliosis, and the effect of these changes on the foraminal and canal areas.

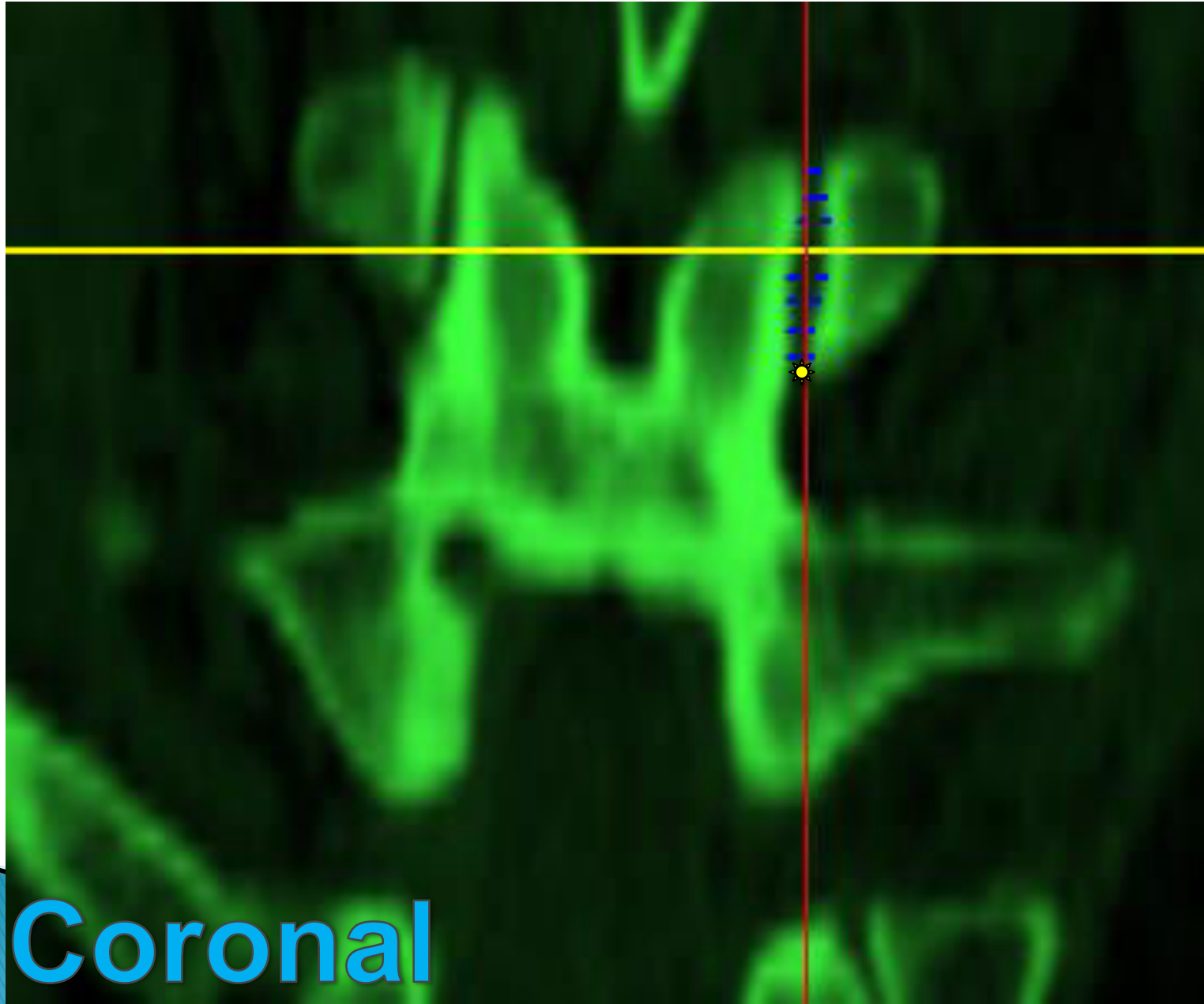
1. Facet joint contact space of a lumbar level was identified from available CT scans of patients.
2. Using Mimics (Materialise, Leuven, Belgium), an abstract identity that occupies the empty space in between the articulating surfaces of a facet joint was defined.
3. Surface areas and volumes of such objects were computed.
4. Following slides demonstrate how this was accomplished from CT scans (for a normal subject).
5. Summarized data for 4 patients is presented in the last two slides.

# Segmentation of a typical facet joint contact space *(for a normal spine)*



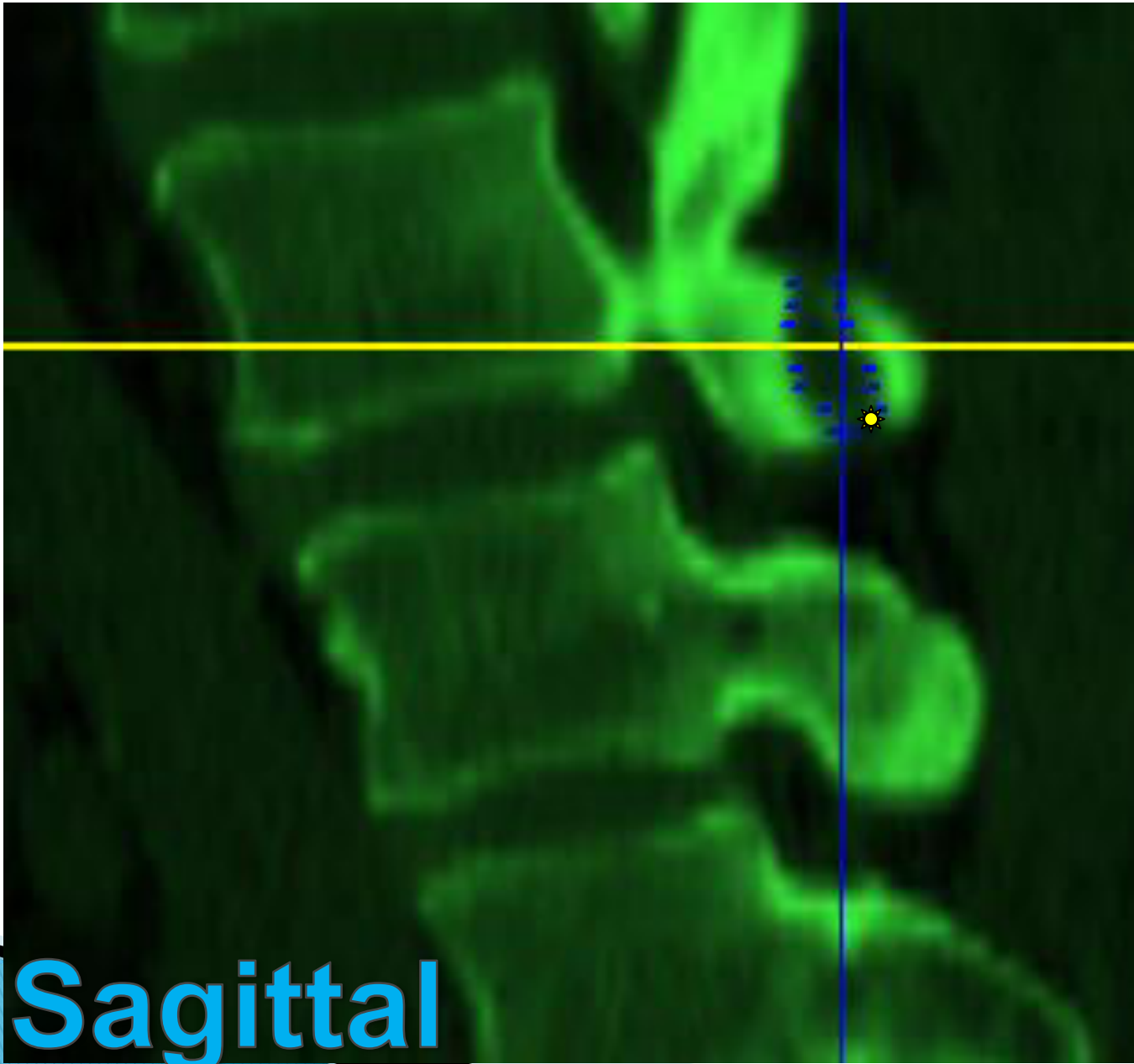
Axial

# Segmentation of a typical facet joint contact space *(for a normal spine)*





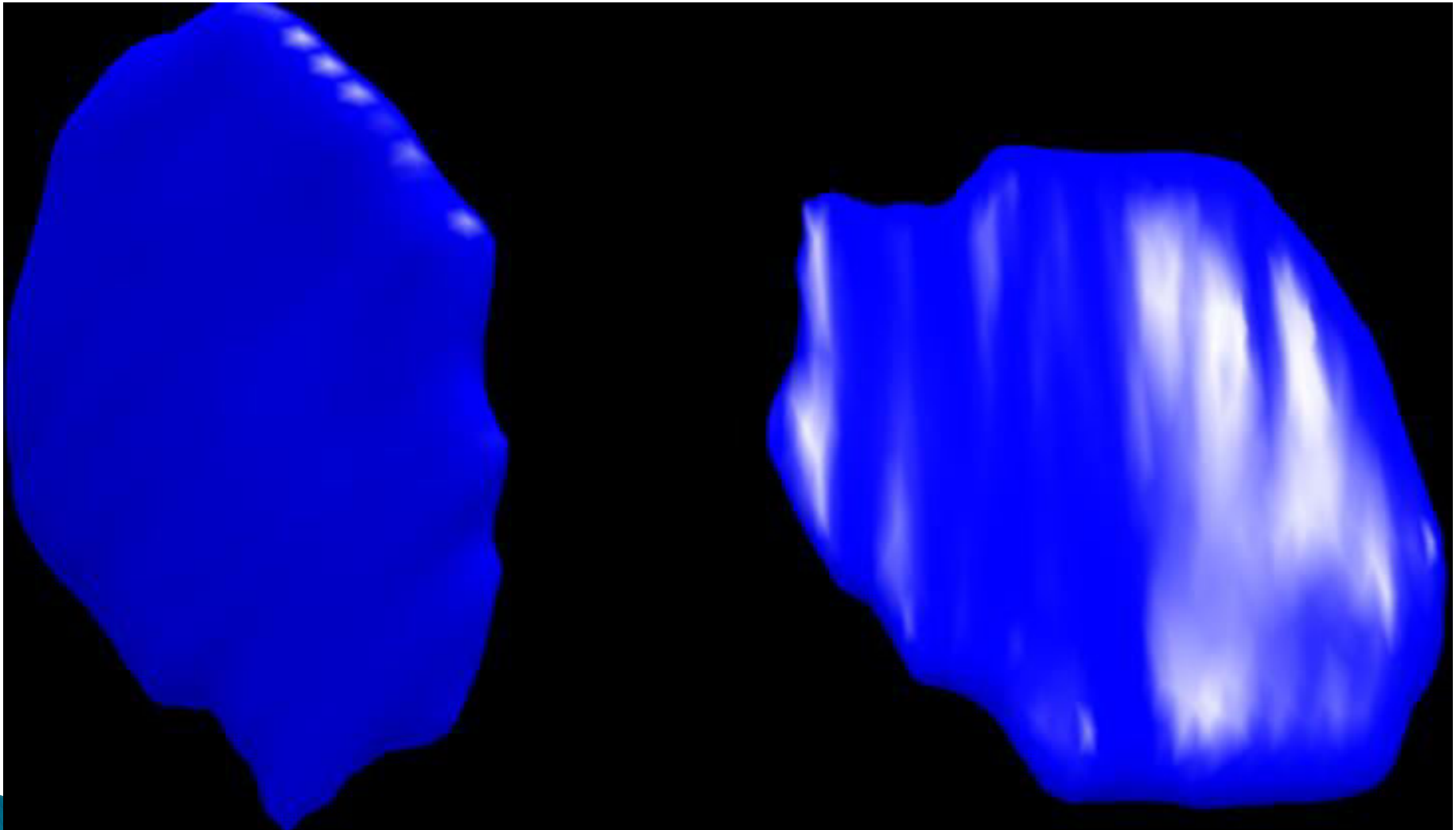
# Segmentation of a typical facet joint contact space *(for a normal spine)*



Sagittal

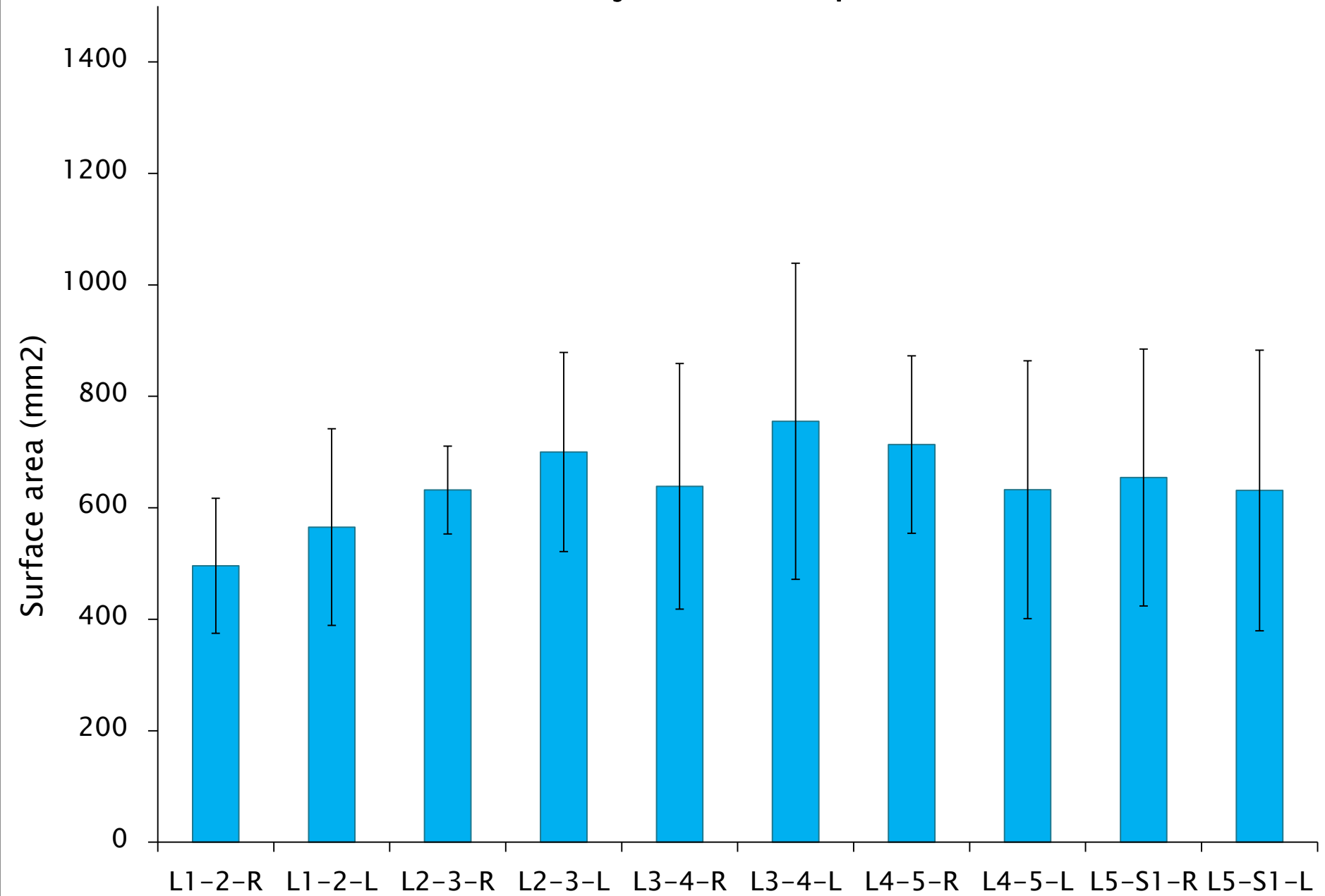


# Two views of a typical facet joint contact space *object* (for a normal spine)

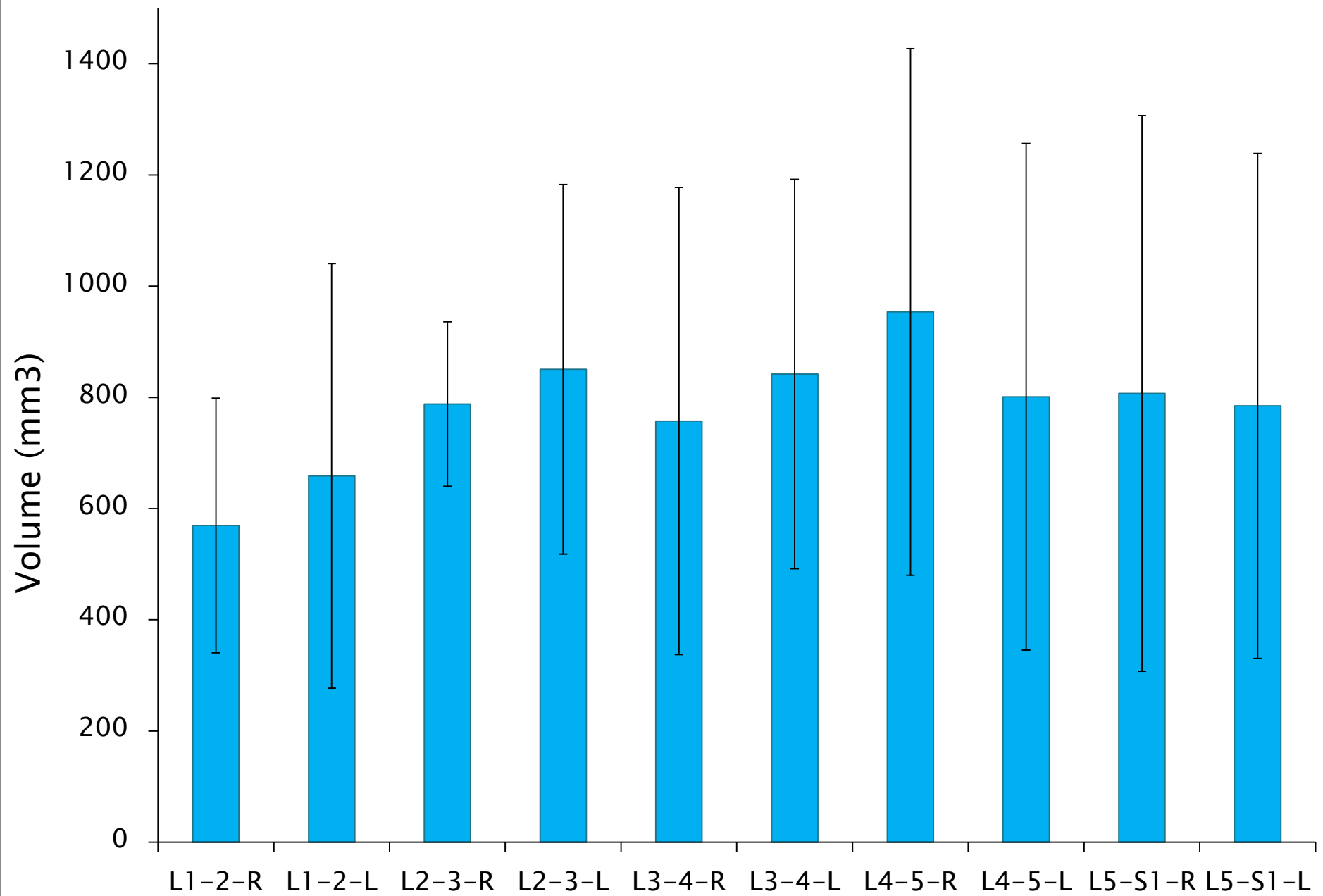


Volume (mm <sup>3</sup> )	Surface area (mm <sup>2</sup> )
309.50	404.25

Surface area of the facet joint contact space (mean  $\pm$  stdev)



Volume of the facet joint contact space (mean  $\pm$  stdev)



# Summary of results

	*Surface area (mm <sup>2</sup> )	Joint volume (mm <sup>3</sup> )
Analogue facet joint		
Right	480	756
Left	360	675
Human subject facet joint		
Right	404	310
Left	396	305

- ▶ Error in the measurement process is below 1%.
- ▶ This study provides us with the required confidence for future studies.

**\* Comparative studies:**  
 Badgley, C. E.: 360 mm<sup>2</sup>  
 Swanepoel et al.: 158±43 mm<sup>2</sup>  
 Otsuka et al.: 130-250 mm<sup>2</sup>  
 Panjabi et al.: 166-232 mm<sup>2</sup>  
 Tanno et al. 195-293 mm<sup>2</sup>

# References

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