



USING PERSONALIZED LUMBAR SPINE STRESS PROFILES TO ENHANCE, ASSESSMENT AND REHABILITATION OF LOW BACK PAIN (LBP)

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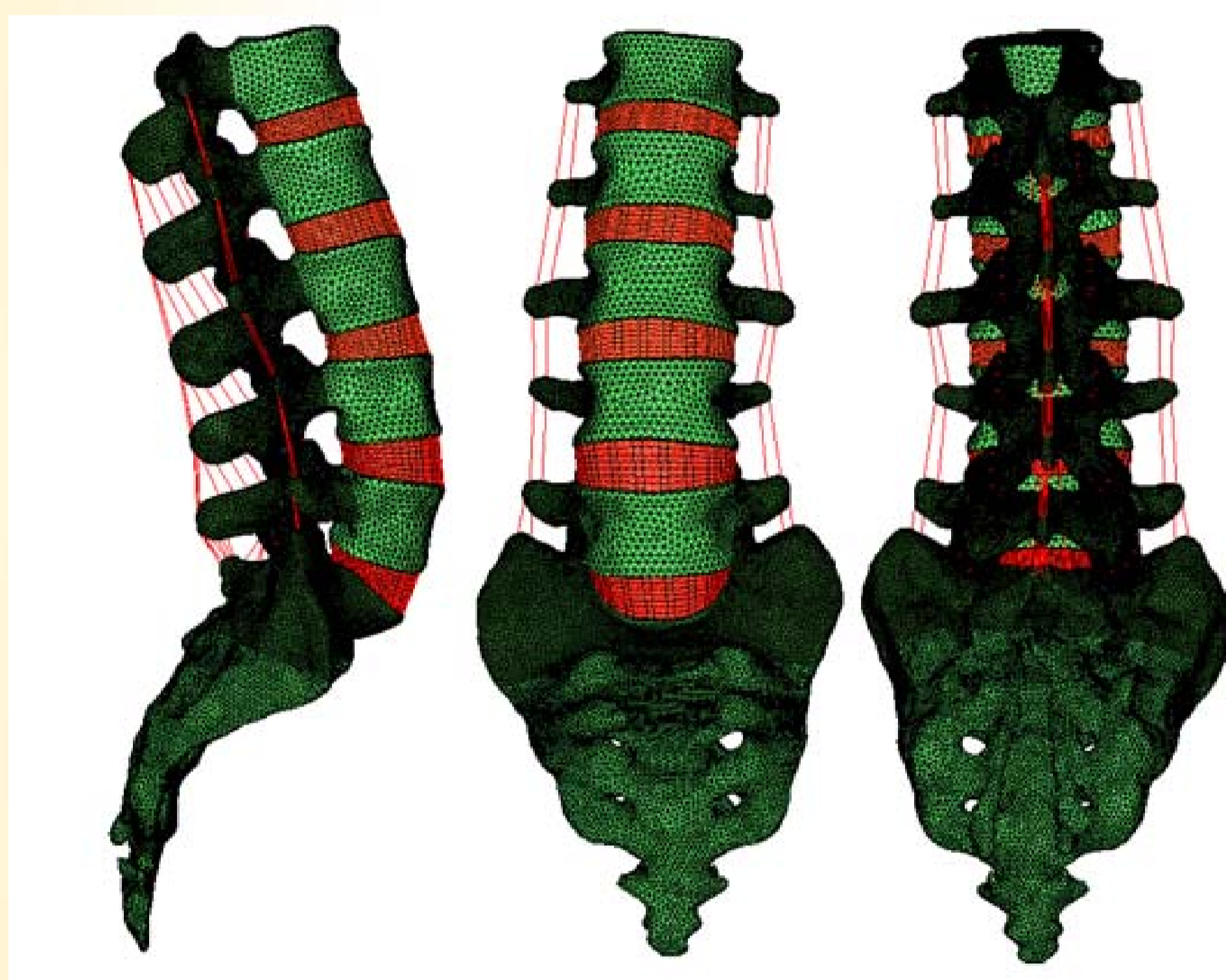
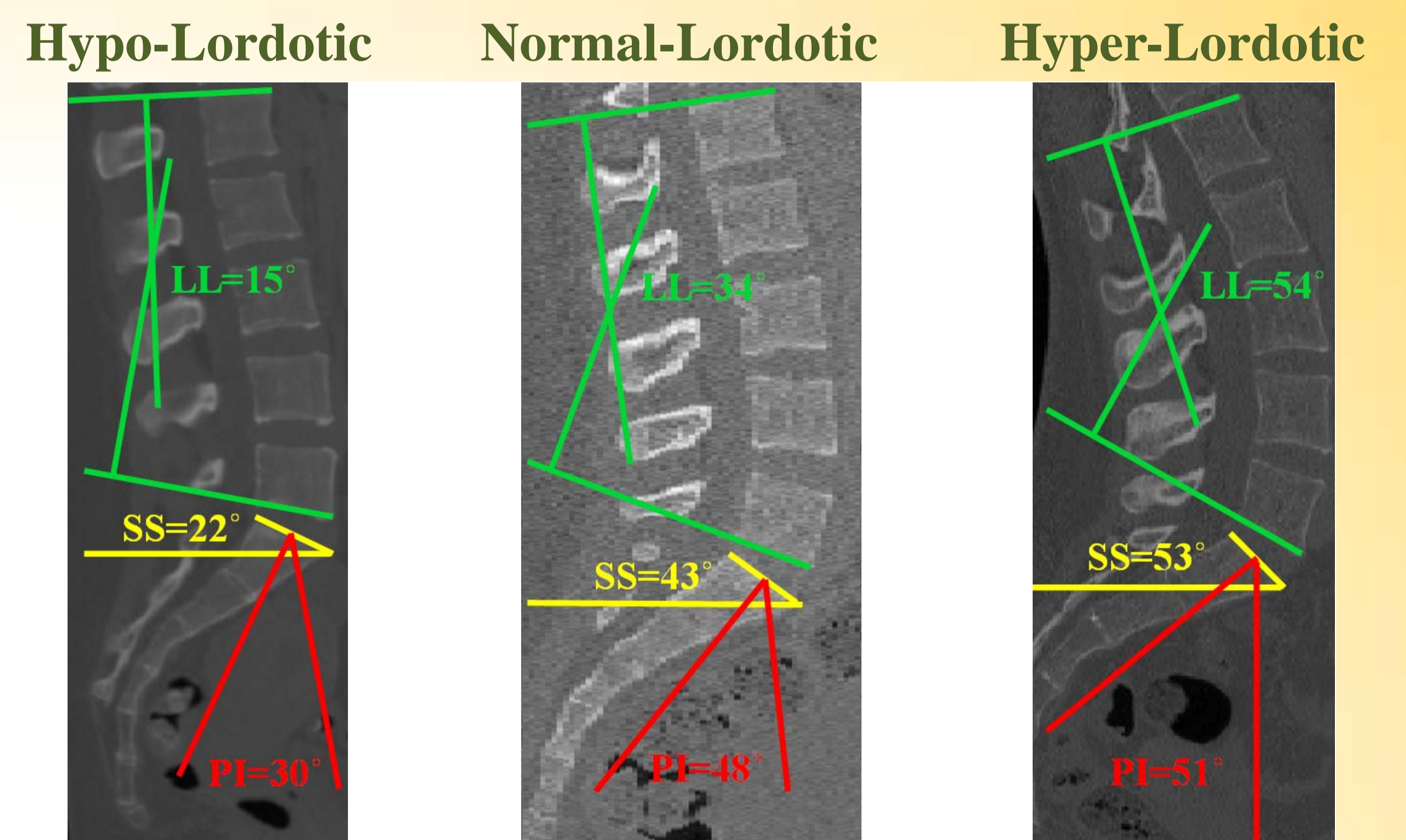
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INTRODUCTION

Recognizing that the population inherently has large inter-subject variability, load sharing in individual's low back varies with spine posture. Finding how much stress there is on each part of person's lumbar spine based on his/her own 3D anatomy, it may be possible to create personalized risk profiles for LBP.

OBJECTIVE

To study the effects of lumbar spine posture on stress distribution in the spine.



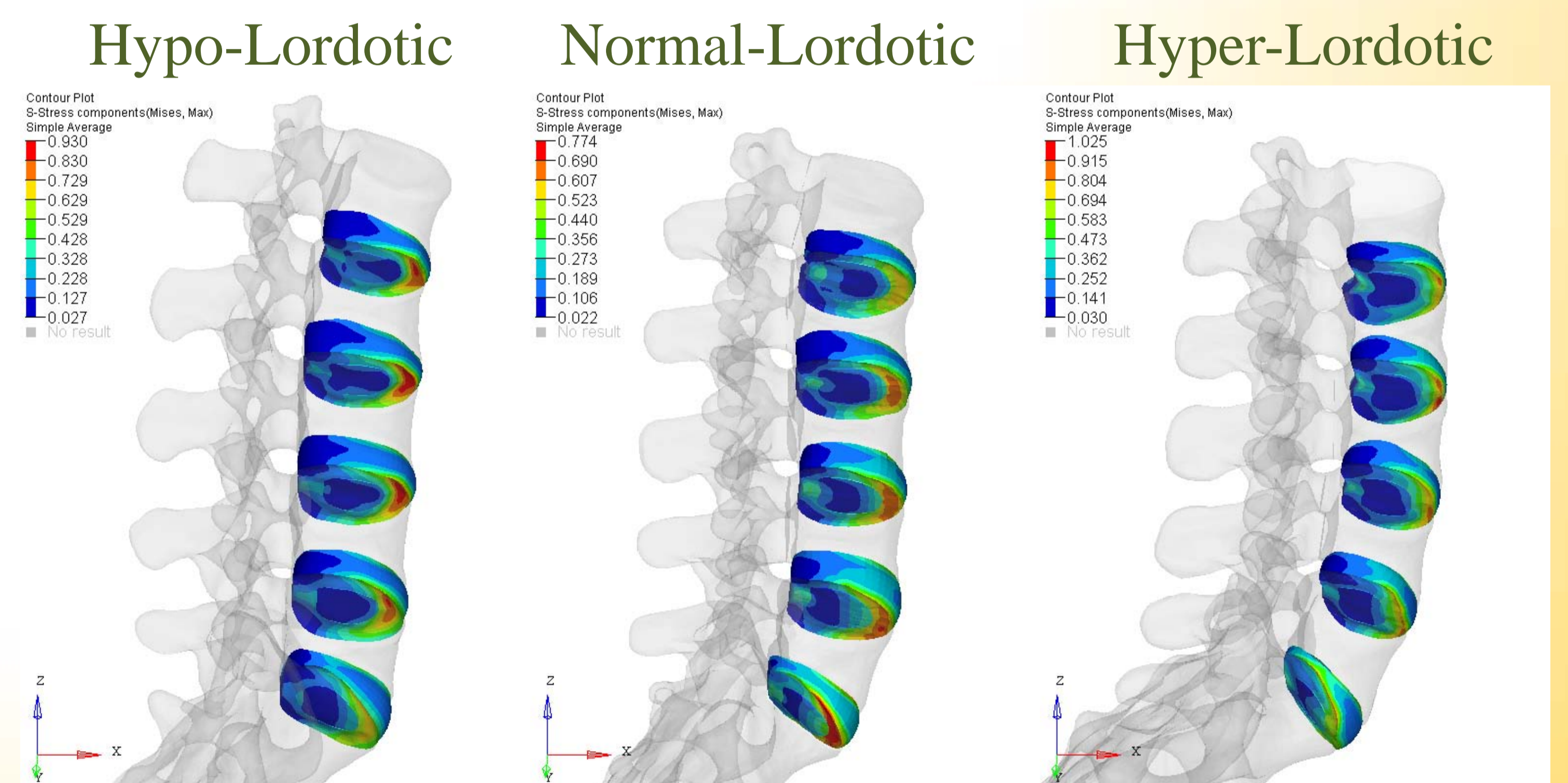
METHODS & MATERIALS

3D geometrically personalized finite element (FE) models of three lumbar spines with varied lumbar lordosis were developed using their own CT scans.

RESULTS AND DISCUSSIONS

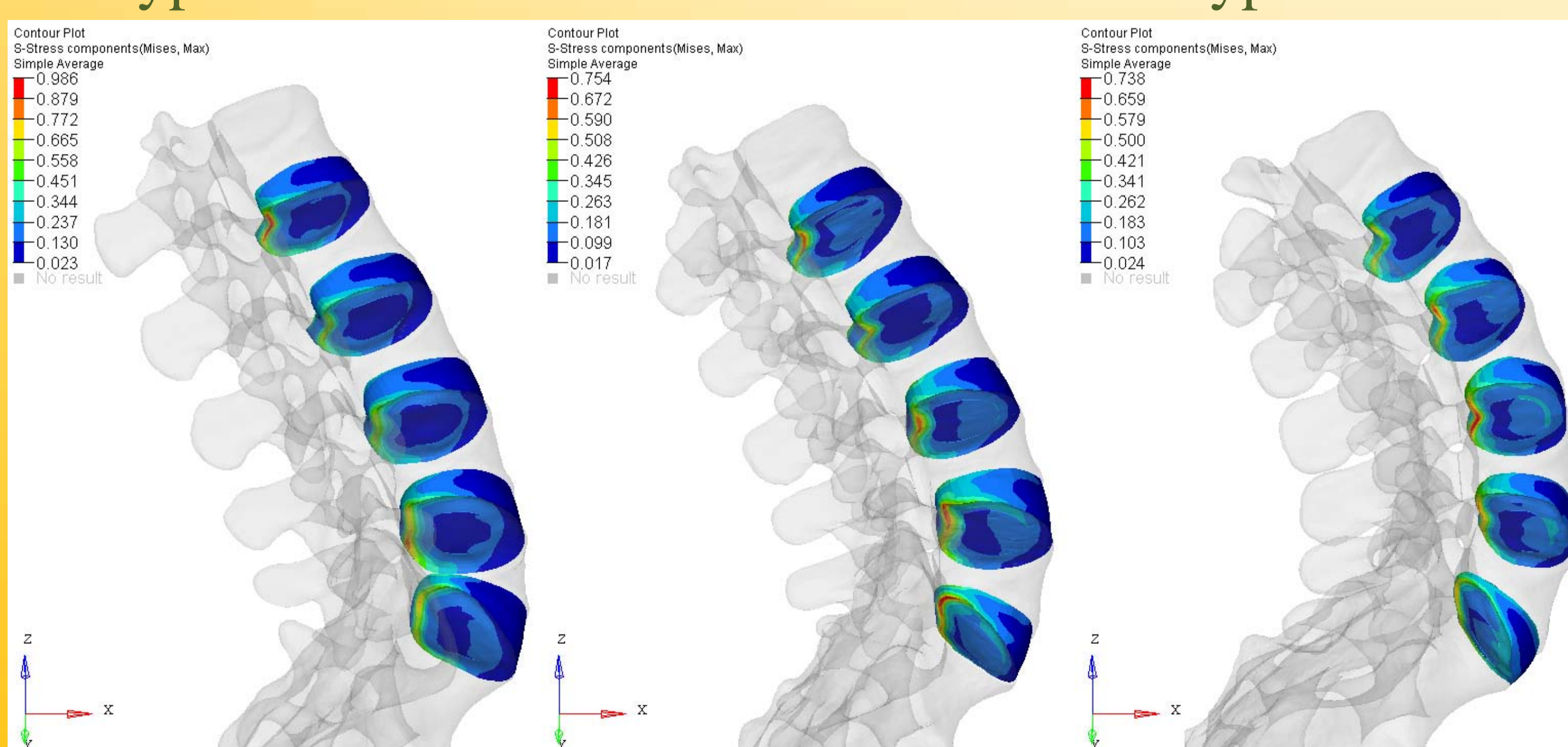
Flexion and extension produced high stress in the anterior and posterior regions of the disc, respectively. Due to the flexion, the highest magnitude occurred in the hypo and hyper-lordotic spines and was located proximally. Due to the extension, the highest magnitude occurred in the hypo-lordotic spine and was located proximally. In both flexion and extension loads the lowest stress produced in normal lordotic spines and concentrated distally.

Distribution of Stress in Discs Due to Flexion



Distribution of Stress in Discs Due to Extension

Hypo-Lordotic Normal-Lordotic Hyper-Lordotic



CONCLUSION

The hypo and hyper-lordotic spines experienced the highest stress and may be at higher risk of LBP.

REFERENCES

Naserkhaki S., El-Rich M., Kawchuk G., Jaremko J.L., (2014) "How Does Lumbosacral Spine Geometry Affect Spinal Load-Sharing? Finite Element Analysis Using Personalized Geometries", 7th World Congress of Biomechanics, Boston, USA.