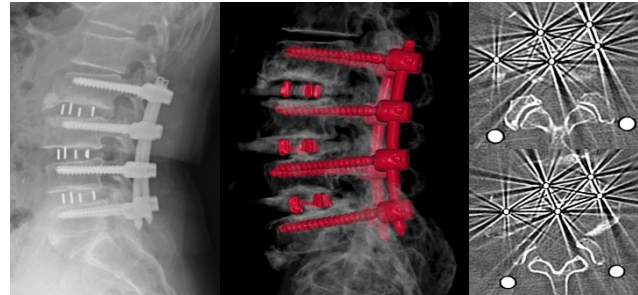
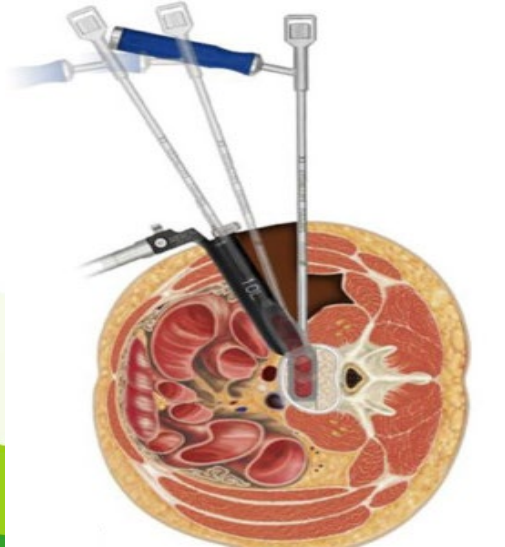


# INTRODUCTION

- Prepsoas app. Oblique lateral interbody fusion (OLIF)
  - Orthogonal maneuver trialing & cage insertion

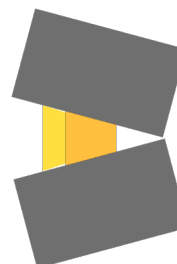


18.2°

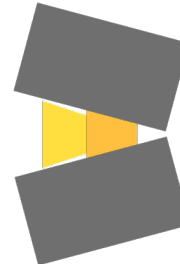
13.7°



0°



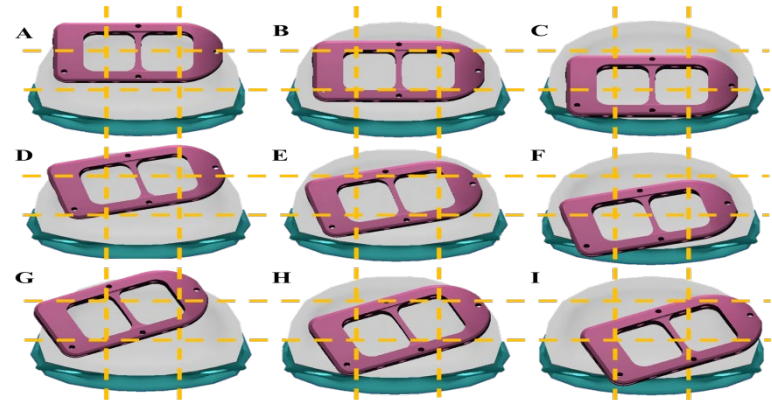
15°



25°

# INTRODUCTION

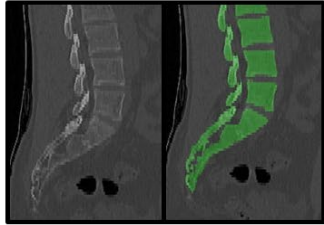
- Purpose of this study
  - to evaluate the biomechanical effect of cage position and insertion angle on postoperative stability and subsidence following OLIF using FE model.
- Output variables
  - Likelihood of yield of cage
  - Risk of subsidence
- Hypothesis
  - Most stable with vertical and anteriorly placed cages
  - Risk of subsidence higher in greater cage insertion angle and more posteriorly placed cages



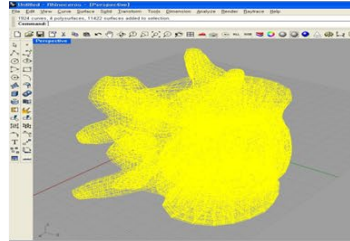
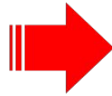
Cage insertion position

# MATERIAL AND METHODS

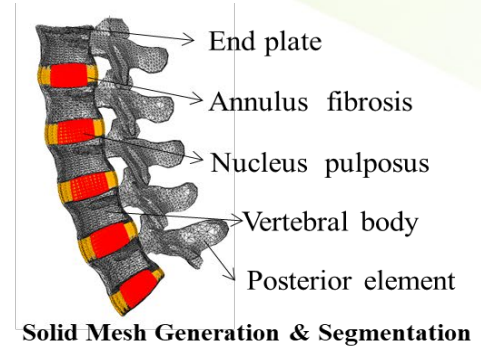
## ■ Construction of Intact model



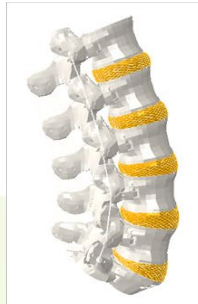
Geometry Data Extraction from CT data  
(Mimics v13.0, Materialise)



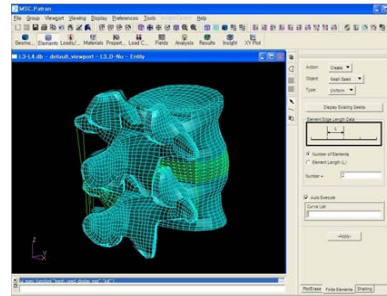
Surface model Generation  
(Rhinoceros 3.0)



Biomechanical comparison of anterior lumbar interbody fusion: stand-alone interbody cage versus interbody cage with pedicle screw fixation - a finite element analysis Choi KC et al. *BMC Musculoskelet Disord* . 2013 Jul 26;14:220.



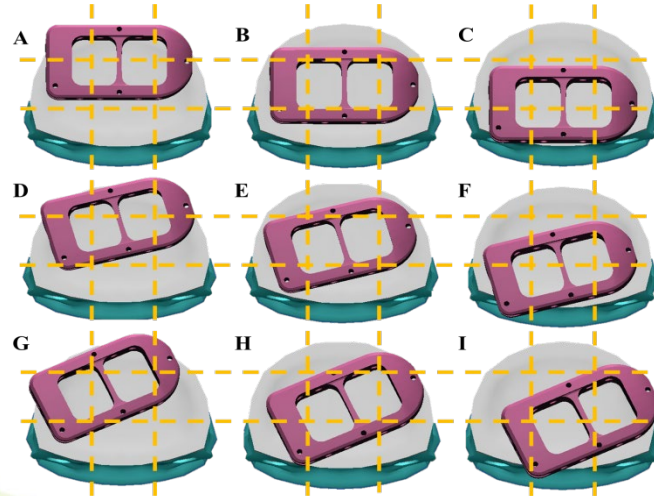
Intact Lumbar FE Model



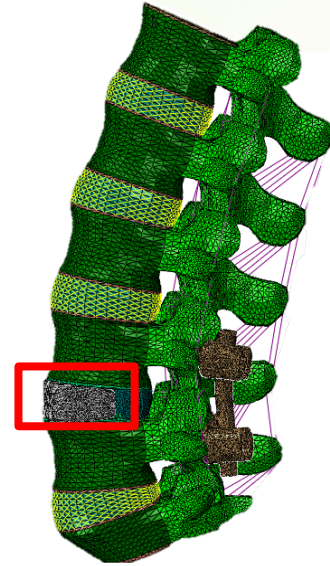
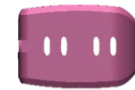
# MATERIAL AND METHODS

## Construction of fusion model ; L4-5 segment

- ① Type A : Ant\_0°
- ② Type B : Mid\_0°
- ③ Type C : Post\_0°
- ④ Type D : Ant\_15°
- ⑤ Type E : Mid\_15°
- ⑥ Type F : Post\_15°
- ⑦ Type G : Ant\_25°
- ⑧ Type H : Mid\_25°
- ⑨ Type I : Post\_25°



<Surgical model Types>

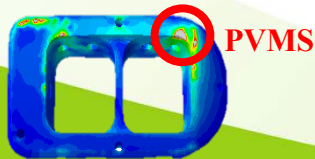


<Cage insertion position>

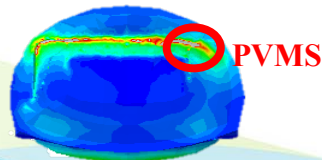
# MATERIAL AND METHODS

## Output variables

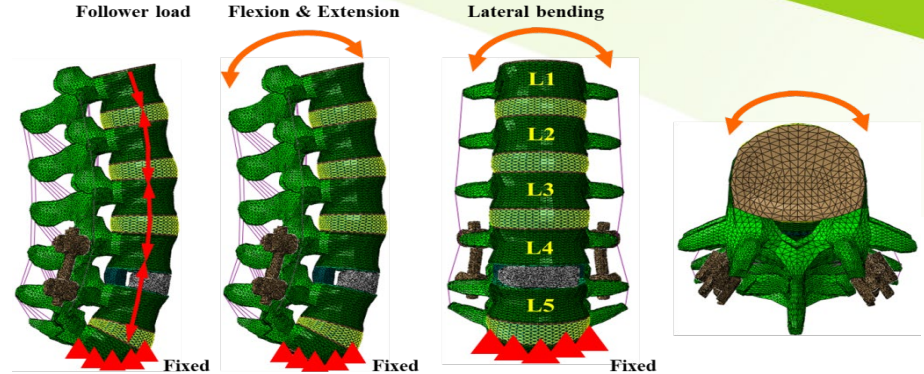
- Likelihood of Yield of implants
  - Peak von Mises stress / Yield strength of material \* 100%
  - Implants (OLIF Cage)
  - Yield strength : 100MPa (PEEK)
- Risk of Subsidence
  - Peak von Mises stress at Vertebral body
  - / Yield strength of cancellous bone \* 100%
  - L4 Lower cancellous bone
  - L5 Upper cancellous bone
  - Yield strength : 16.3MPa (Cancellous bone)



<Likelihood of Yield of implants>



<Risk of Subsidence>



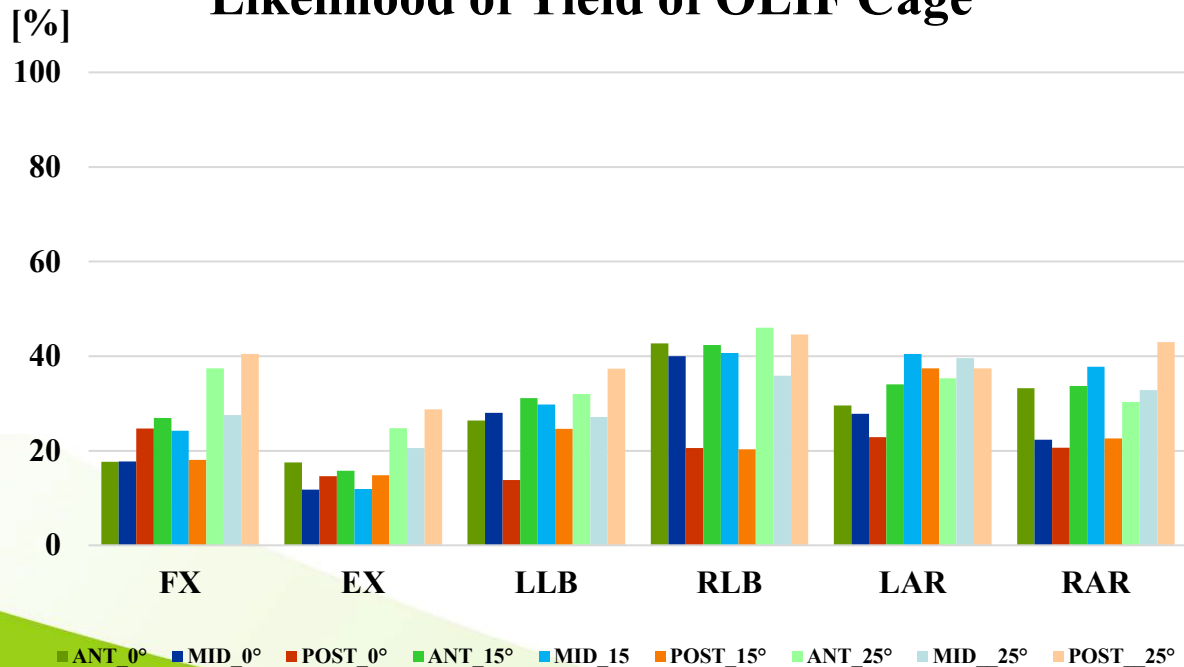
<Loading & Boundary condition>

- Compressive follower load
  - 400N
- Pure moment
  - L1 upper endplate pure moment 10Nm
    - ① Flexion
    - ② Extension
    - ③ Lateral bending
    - ④ Axial rotation
- Boundary condition
  - Pedicle screw - Bone tie contact
  - S1 endplate secured

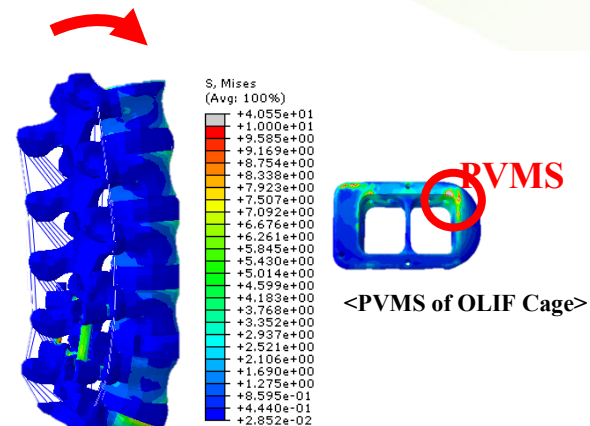


# RESULTS

## Likelihood of Yield of OLIF Cage

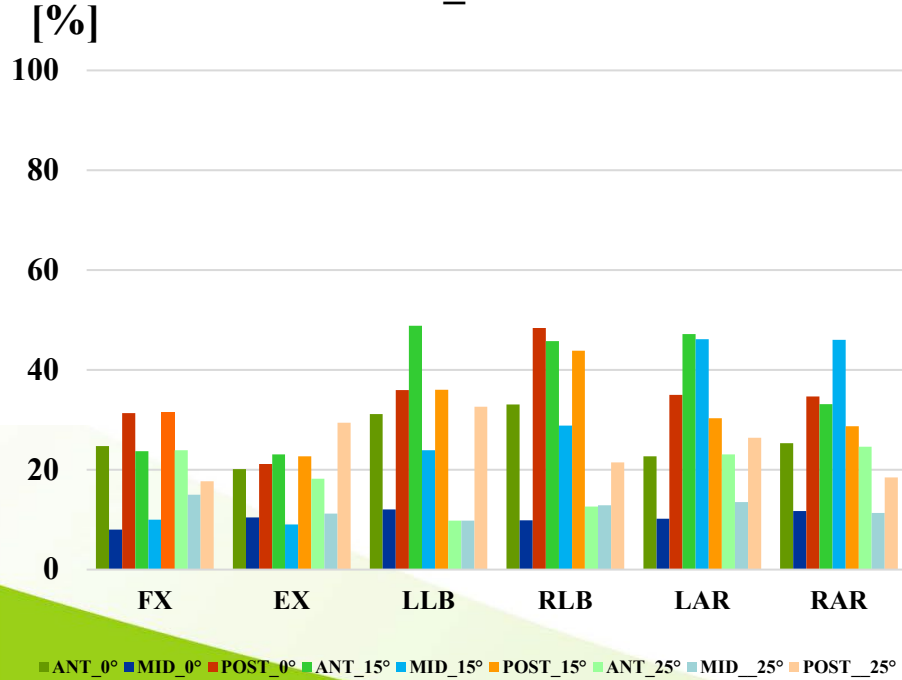


<Likelihood of Yield of implants>

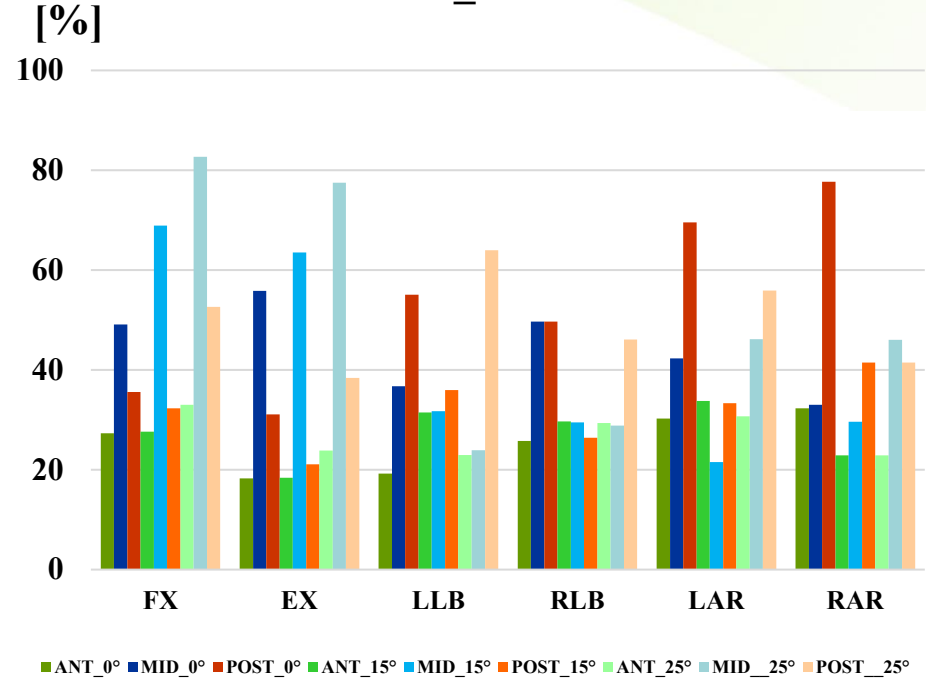


# RESULTS

## Risk of Subsidence\_L4 Cancellous bone



## Risk of Subsidence\_L5 Cancellous bone





## CONCLUSION

- **Our study demonstrated that during OLIF, insertion of cage more anteriorly with less insertion angle provided better stability and less chance of subsidence.**
- **This study suggests that cage should be inserted more anteriorly and vertically during OLIF procedure to maintain postoperative stability and to reduce cage subsidence.**