

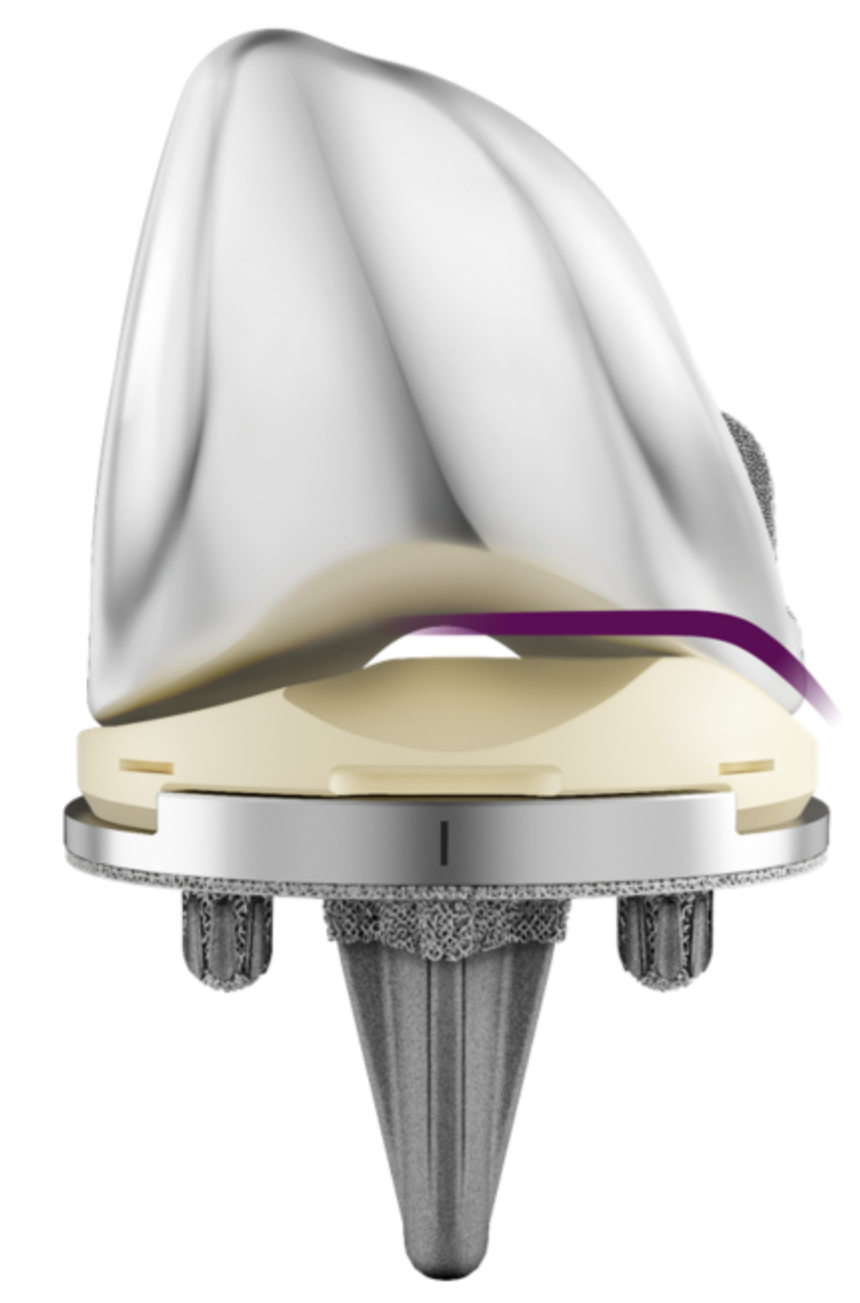
Sagittal Plane Stability of Cruciate-Sacrificing Solutions: Cadaveric and Computational Assessment

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1. Introduction

- In Cruciate Sacrificing (CS) Solutions, both the femoral and the tibial bearings may need additional design considerations, to achieve desired medial stability.
- ATTUNE™ Medial Stabilized (MS) Knee System uses proprietary ATTUNE™ Knee technologies to deliver medial stability, function and versatility in both CR and CS configurations.⁽¹⁻⁵⁾
- Aim:** To study the interaction between a surgeon's passive A-P stability in cadavers and weight-bearing dynamic stability in CS application for ATTUNE MS and two commercially offered medial conformity solutions

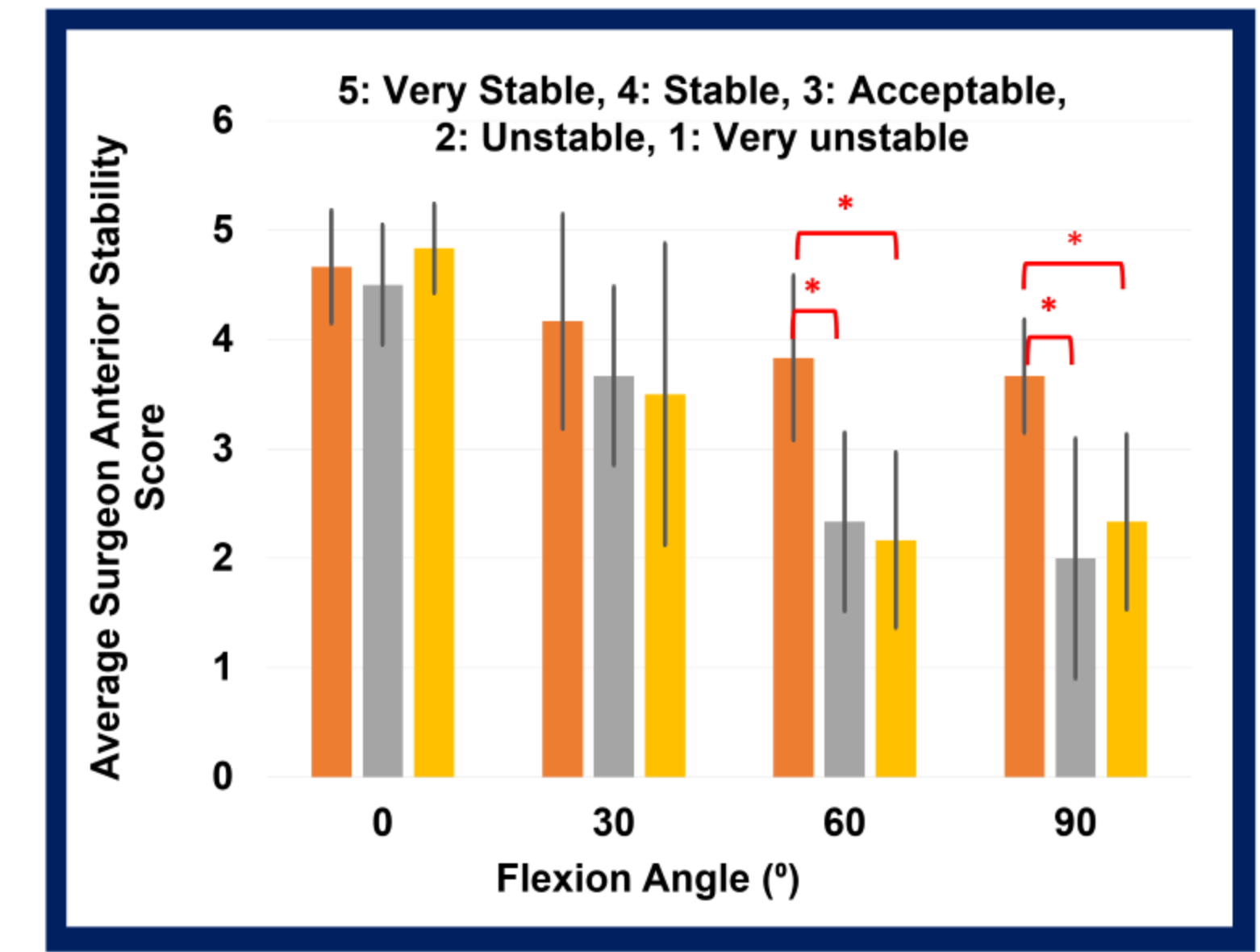


ATTUNE™ Medial Stabilized Knee System

3. Results

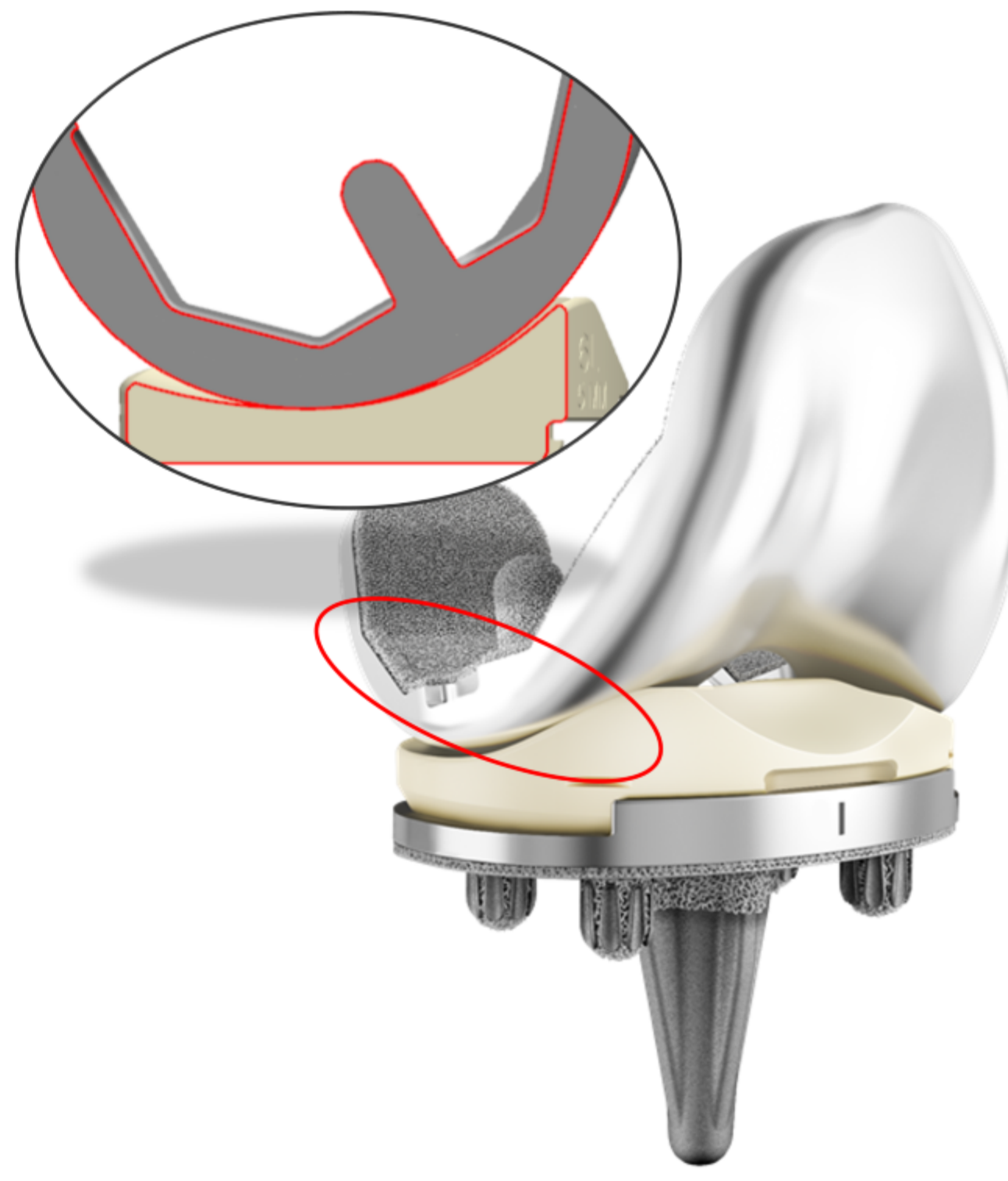
CS Passive Assessment⁽³⁾:

- At all flexion angles, surgeons scored ATTUNE MS construct above acceptable stability
- At 60° & 90° flexion: ATTUNE MS anterior stability scores were higher than those of Competitor-Z and Competitor-S, which had scores averaging 2-Unstable.



4. Discussion

- Higher surgeon assessed Passive A-P stability scores for ATTUNE MS concurrent with the least A-P translation in weight-bearing DKB displays increased sagittal plane stability of ATTUNE MS construct.
- Reduced stability Scores of Competitor-Z and Competitor-S, could be attributed to lower T-F constraint, which reflected in increased medial femoral A-P translation during DKB.



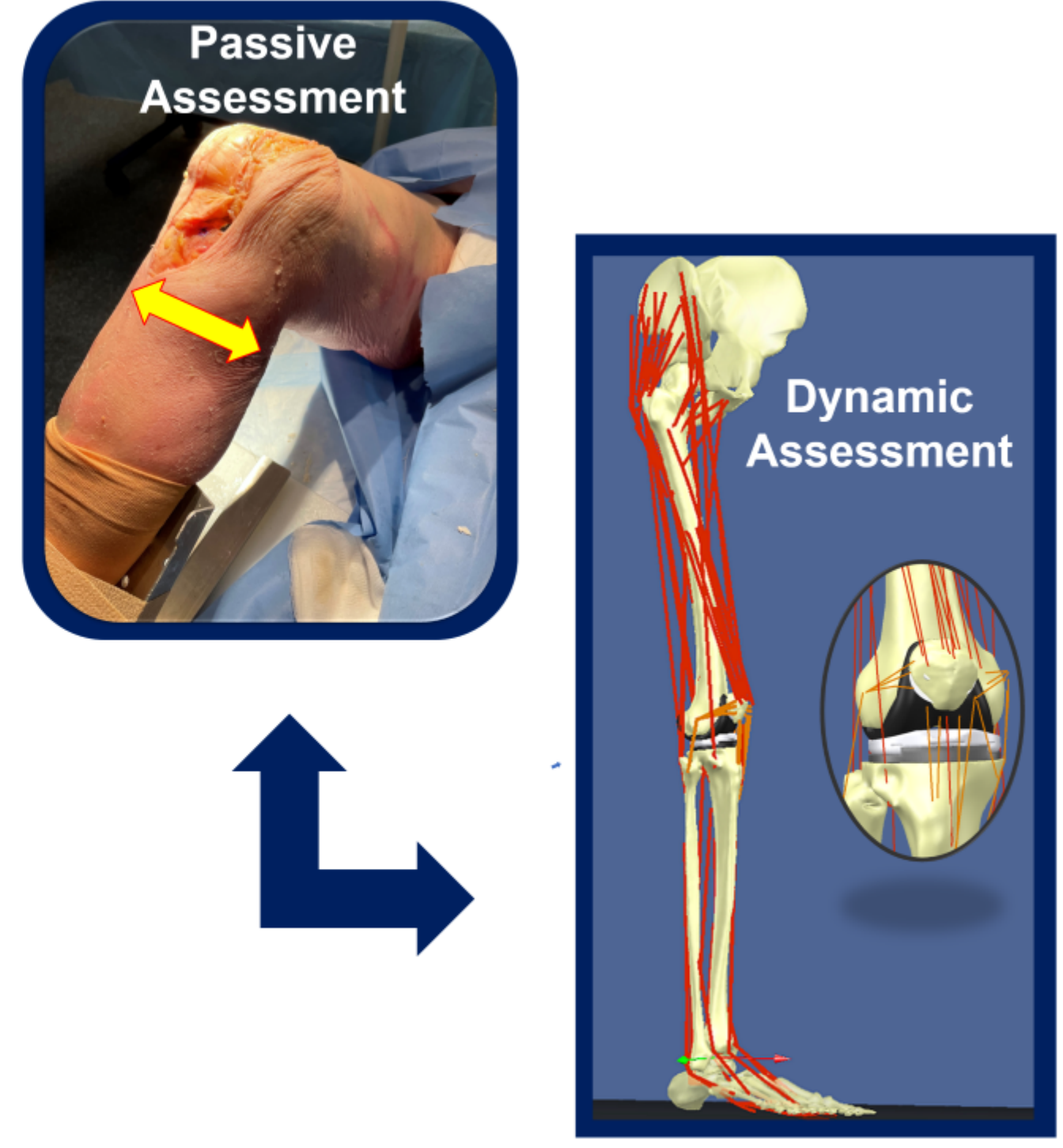
2. Methods

- Constructs Analyzed:**
- ATTUNE Medial Stabilized construct
 - Competitor-Z: medial conformity construct
 - Competitor-S: cruciate sacrificing construct

- CS Passive Assessment:**
- Six surgeons, blinded to implant type, scored femoral anterior stability in two cadavers.
 - Scoring: 5- Very Stable; 4- Stable; 3- Acceptable; 2-Unstable; 1- Very Unstable

- CS Dynamic Assessment:**
- Previously validated knee model⁽⁶⁾ used to simulate deep knee bend (DKB) activity in six simulated patients (N=6).

Medial A-P translation between Full extension and different flexion angles



Surgeon's blinded passive assessment and simulated weight-bearing dynamic assessment^(3,6)

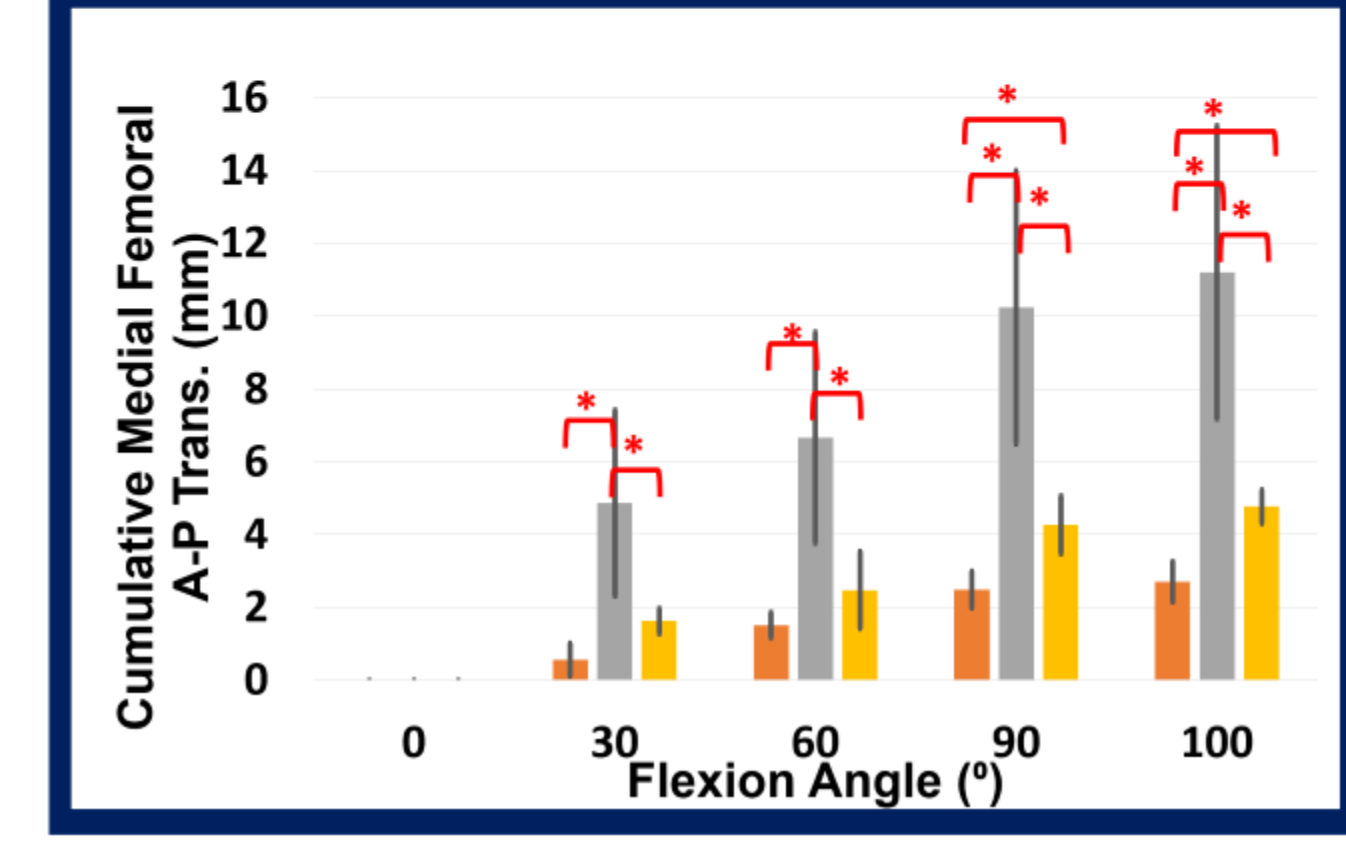
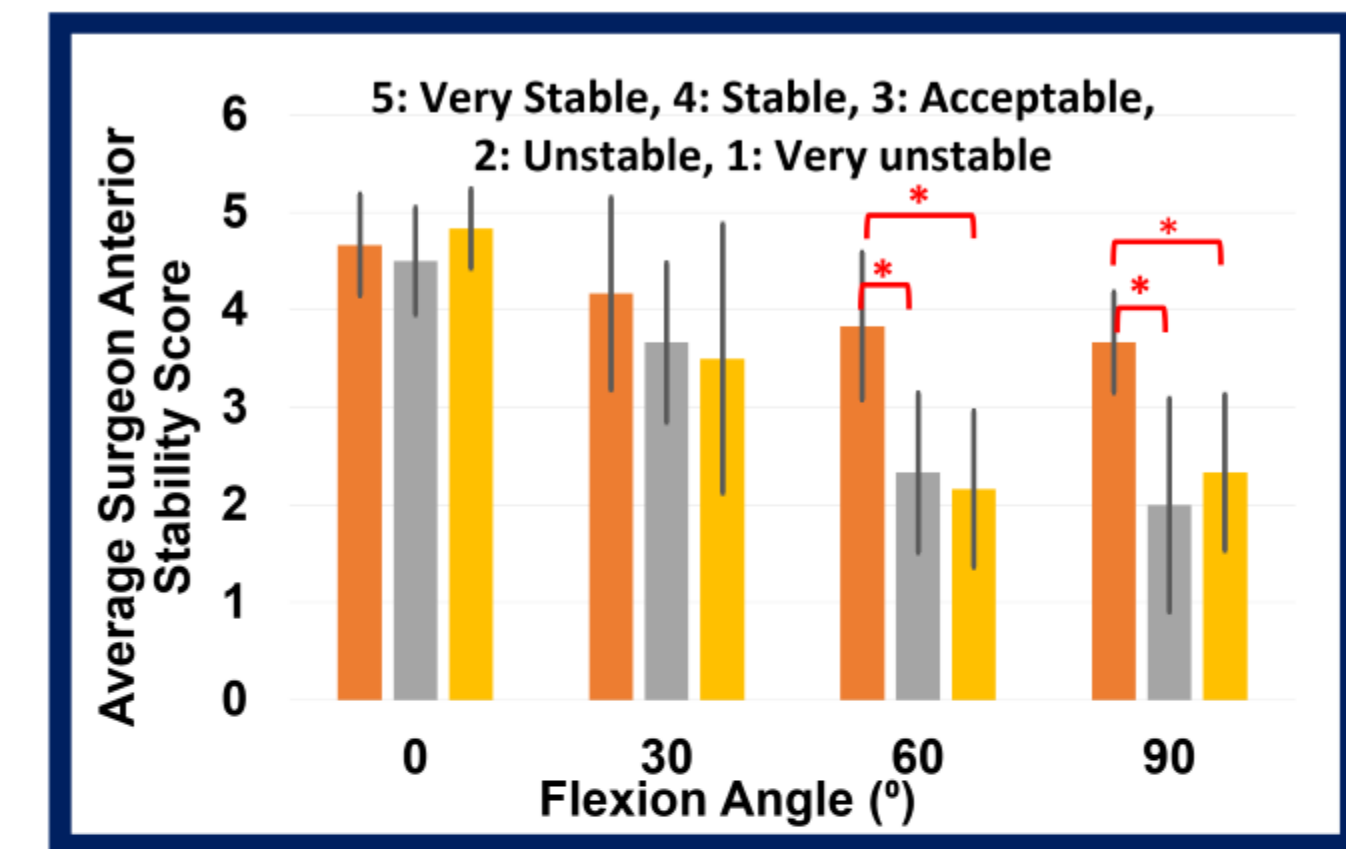
3. Results (Cont.)

CS Passive Assessment⁽³⁾:

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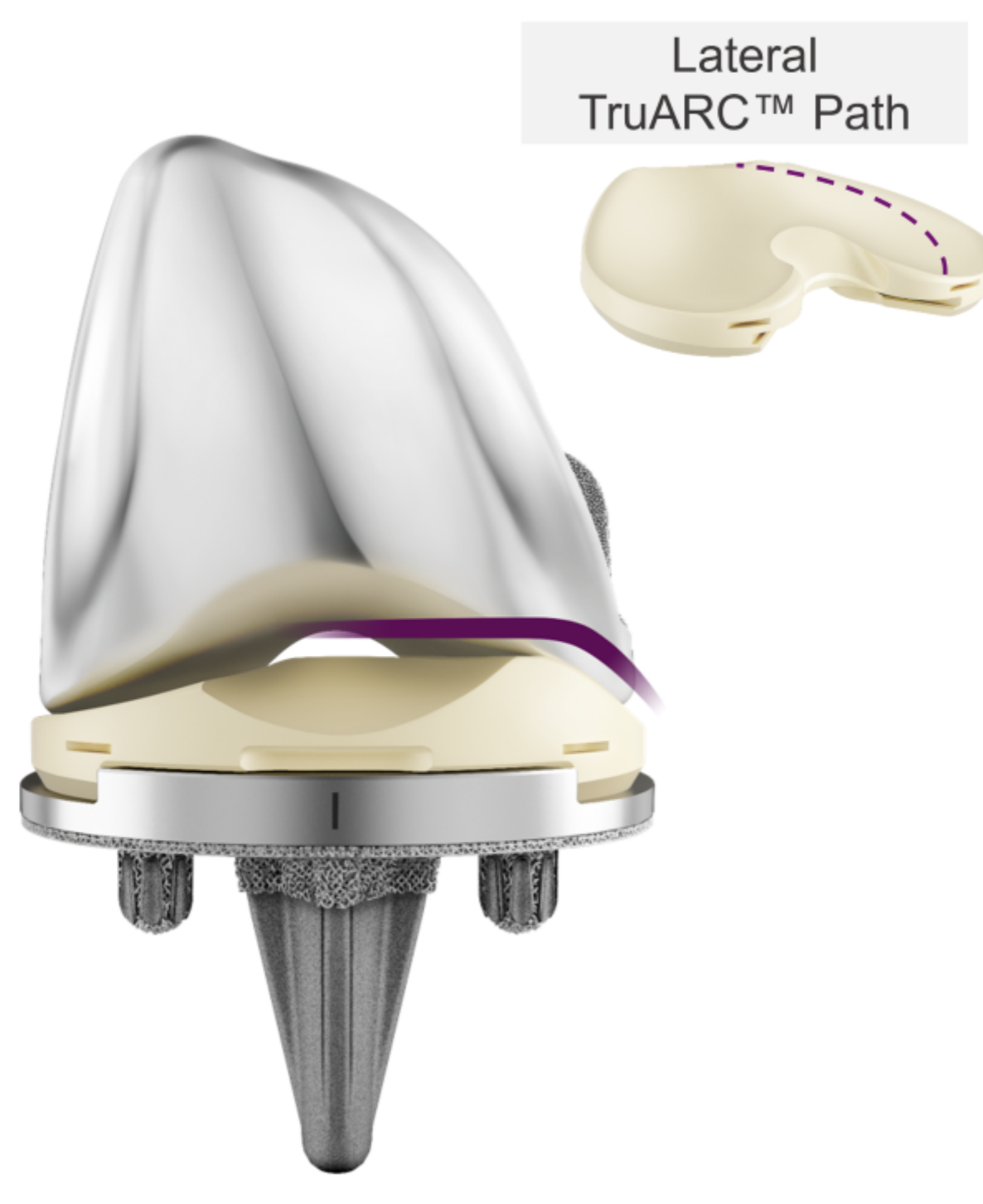
Dynamic Assessment⁽³⁾:

- ATTUNE MS demonstrated the least amount of medial A-P translation at all flexion angles.
- Competitor-S experienced significantly larger ($\alpha=0.05$) A-P translation at all flexion angles.
- At 90° & 100° flexion: ATTUNE MS showed significantly smaller ($\alpha=0.05$) A-P translation than Competitor-Z.



5. Conclusion

Optimal sagittal plane TF conformity in **ATTUNE MS construct demonstrated above acceptable level of stability** in passive assessment, concurrent with the least amount of femoral A-P translation, i.e. most A-P stability, during weight-bearing DKB activity.



References:
 [1] Johal et al., Tibiofemoral movement in the living knee. A study of weight bearing and non-weight bearing knee kinematics using 'interventional' MRI, J. of Biomech., 2005, 38, [2] Mane et al., Evaluating TKA implant and soft-tissue interaction using multi-patient forward dynamics modeling approach, Paper # 317, ORS-2022, [3] Mane et al., Sagittal plane stability of Cruciate-Sacrificing solutions: cadaveric and computational assessment, Paper # 883, ORS-2022, [4] Mane et al., Medial compartment biomechanics in Cruciate Sacrificing solutions, Paper # 1067, ORS-2021, [5] Mane et al., Assessing sensitivity of highly constraining Ball-and-socket TKA to tibial rotational alignment, Paper # 875, ORS-2022, [6] Khasian, et al – A validated forward solution dynamics mathematical model of the knee joint: can it be an effective alternative for implant evaluation? J. of Arthr., 2020, 35(11)

