

# "Småfolk" – Rear Seat Safety



Transportation



Potential  
evasive  
event



Crash



# Child safety = Real children in cars



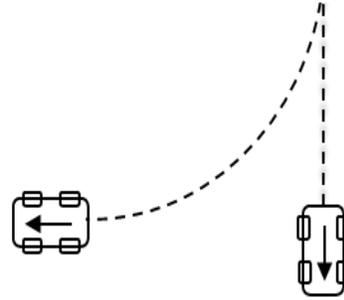
Leaning forward for visibility, communication or activities



Slouching for comfort



# What happens during an evasive event?

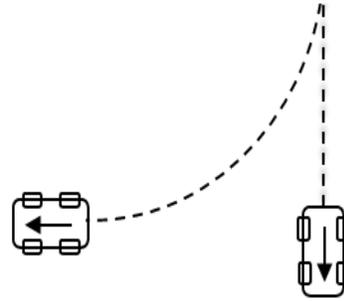


Evasive steering

Evasive braking



# What happens during an evasive event?



# *A seat back might keep the shoulder belt on the shoulder during an evasive event – but is that enough during a crash?*

Evasive steering



*Booster cushion*



*Booster seat*



# Simulating a vehicle drifting into a ditch.

No pre-pretensioner



Pre-pretensioner

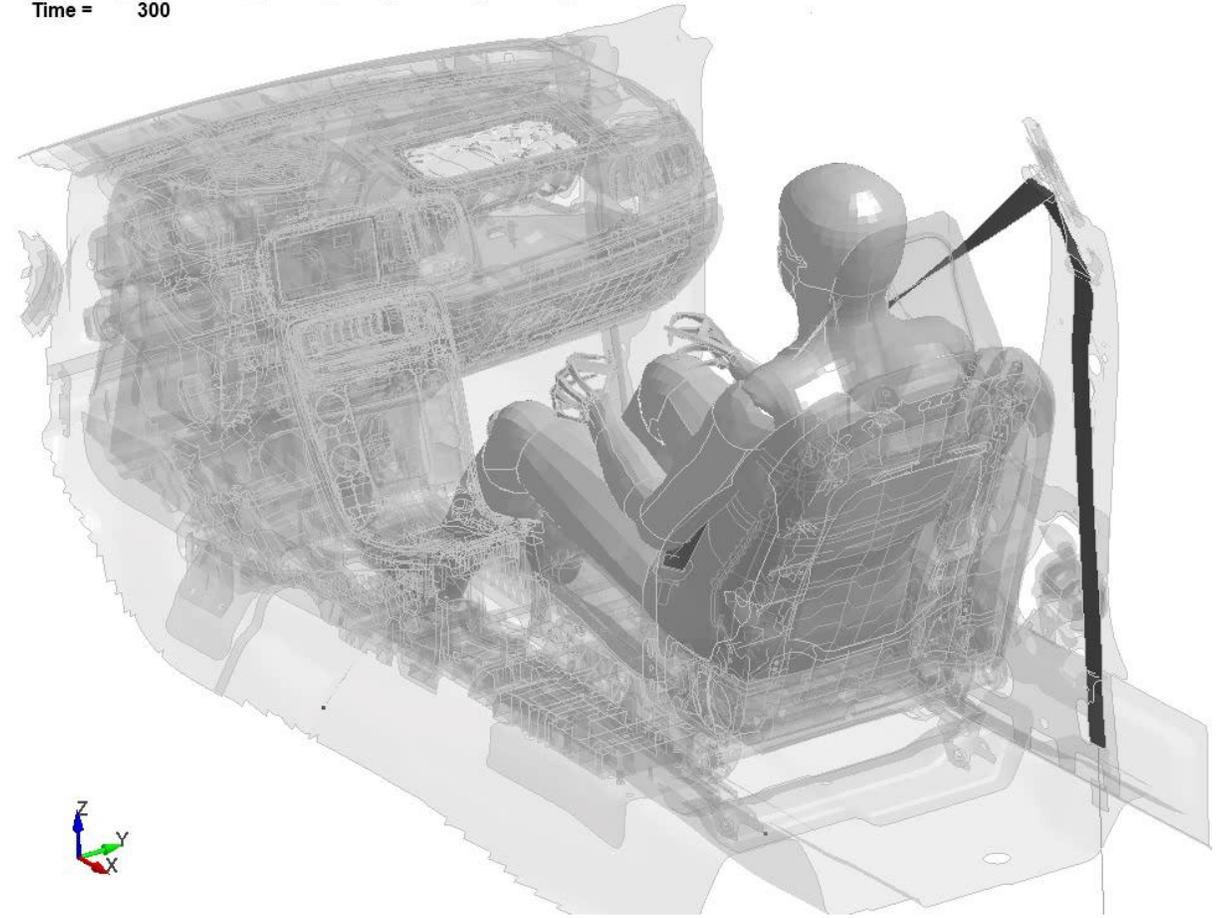


# SAFER Human Body Model (HBM) v 9.0

- Released in January 2018

First of its kind to seamlessly simulate the occupant movement during a turn or brake maneuver AND injury prediction in a subsequent crash

12\_0.5s\_avoidance\_300N\_PPT\_frontal\_56kmh\_crash  
Time = 300

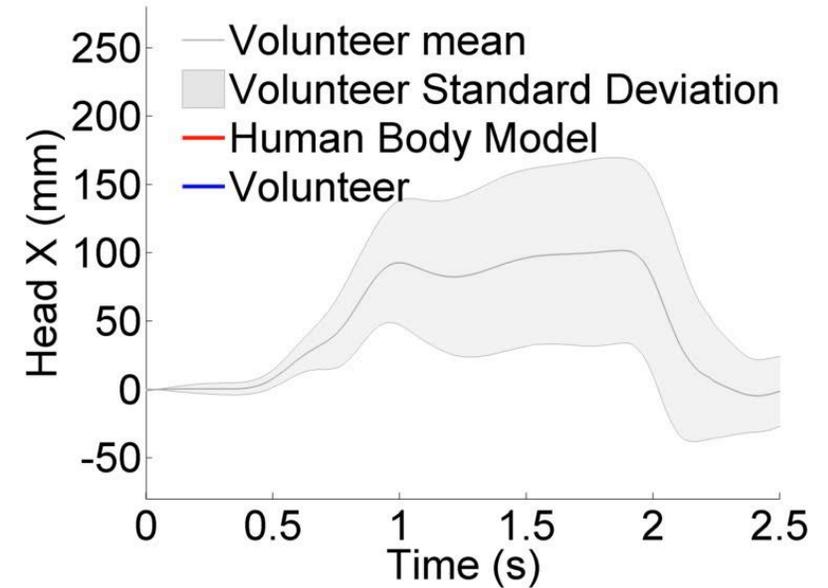
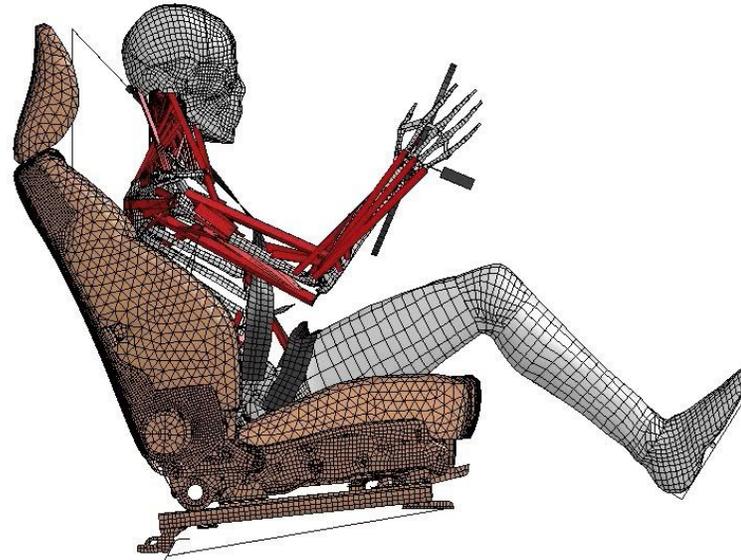
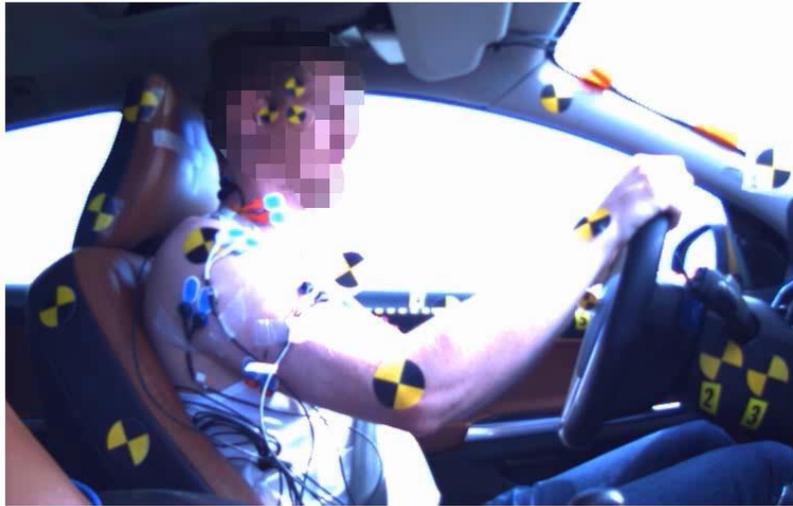


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VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS



# SAFER Active Human Body Model (A-HBM)

## Simulating braking event



Time: 0.0



# SAFER A-HBM

Lane change event



# Volunteer tests for validation of A-HBM

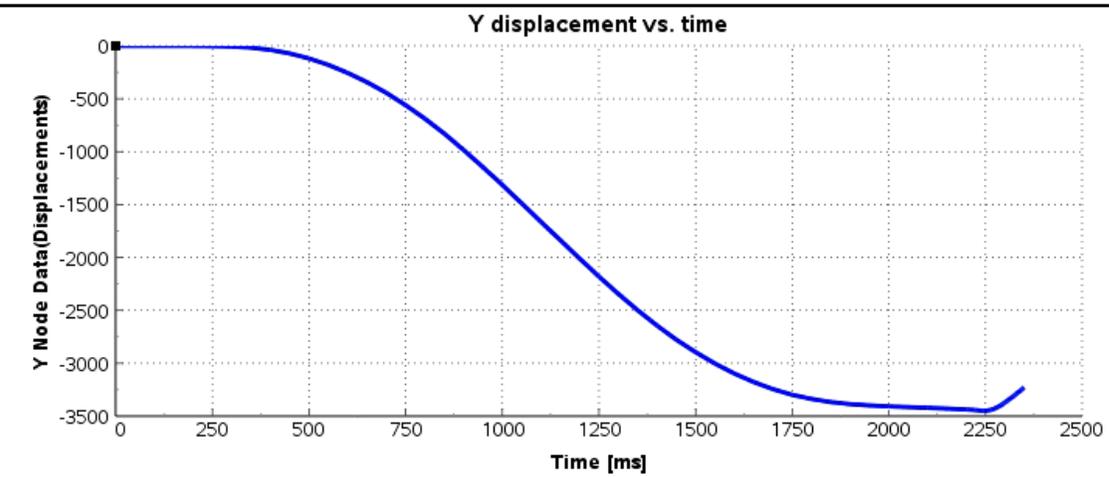
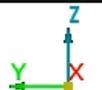
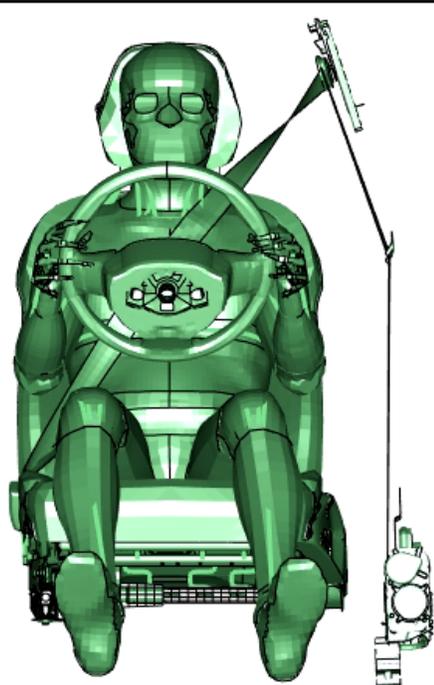
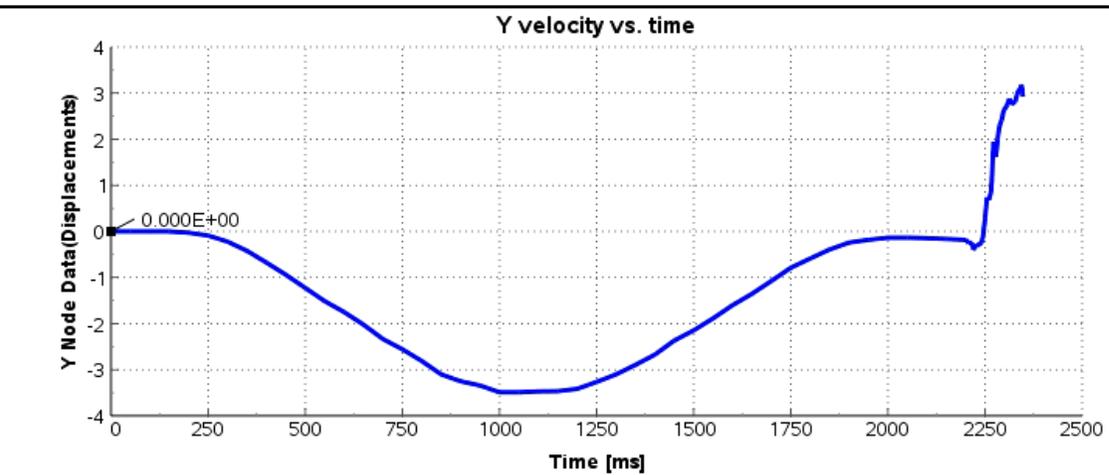
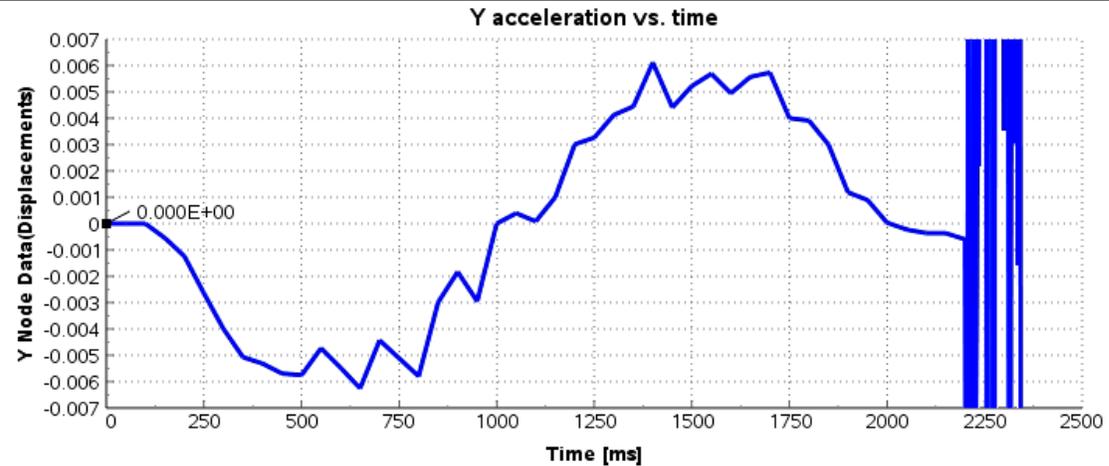
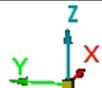
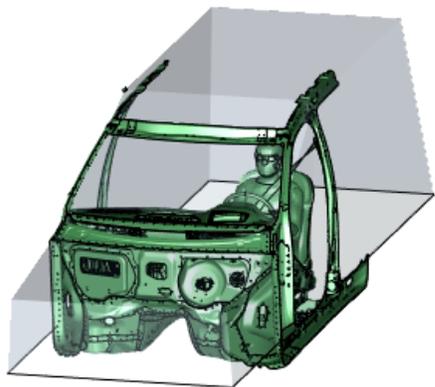
Driver



Passenger



0 ms

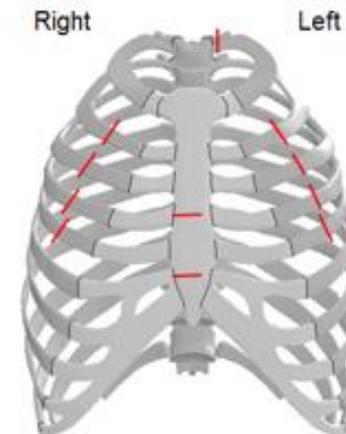


# Simulating real-world scenarios – creating injury criteria



Driver in V70 gen III

Driver in V70 gen I

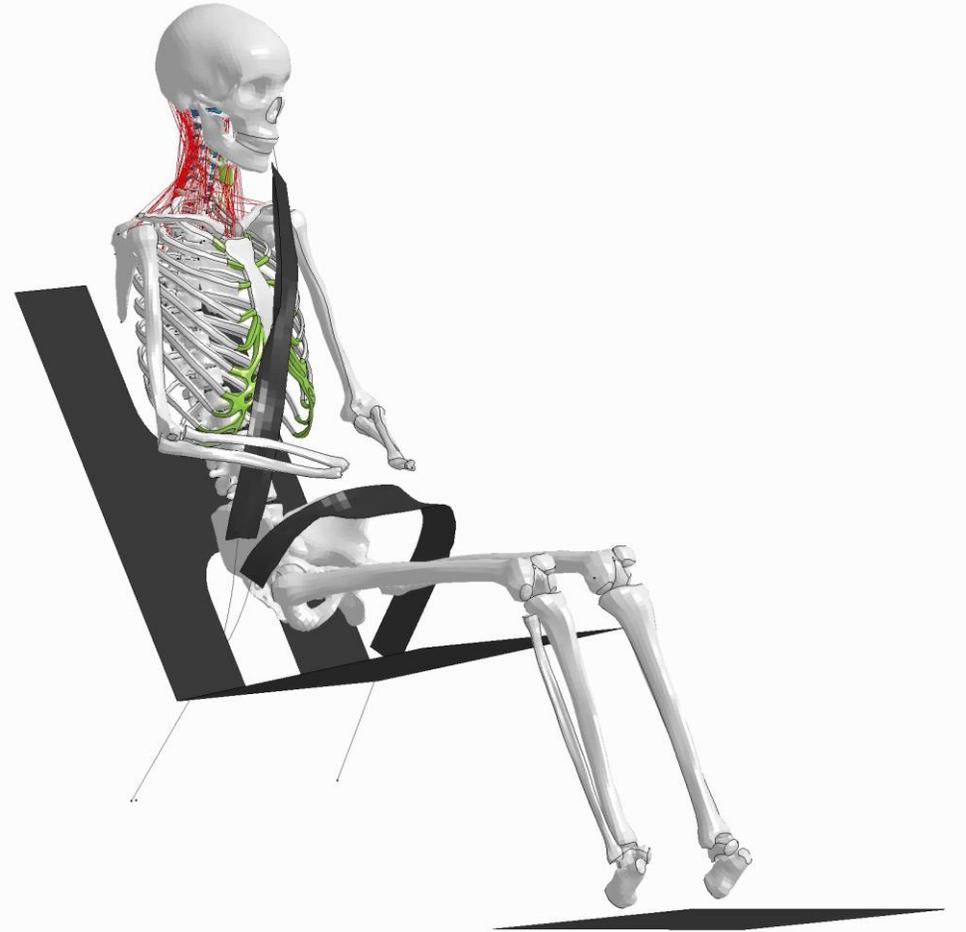


Multiple  
rib fractures

Driver in V70 gen I  
Ct-scan evaluation



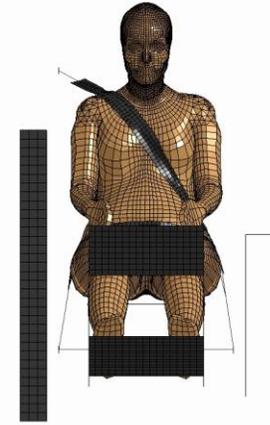
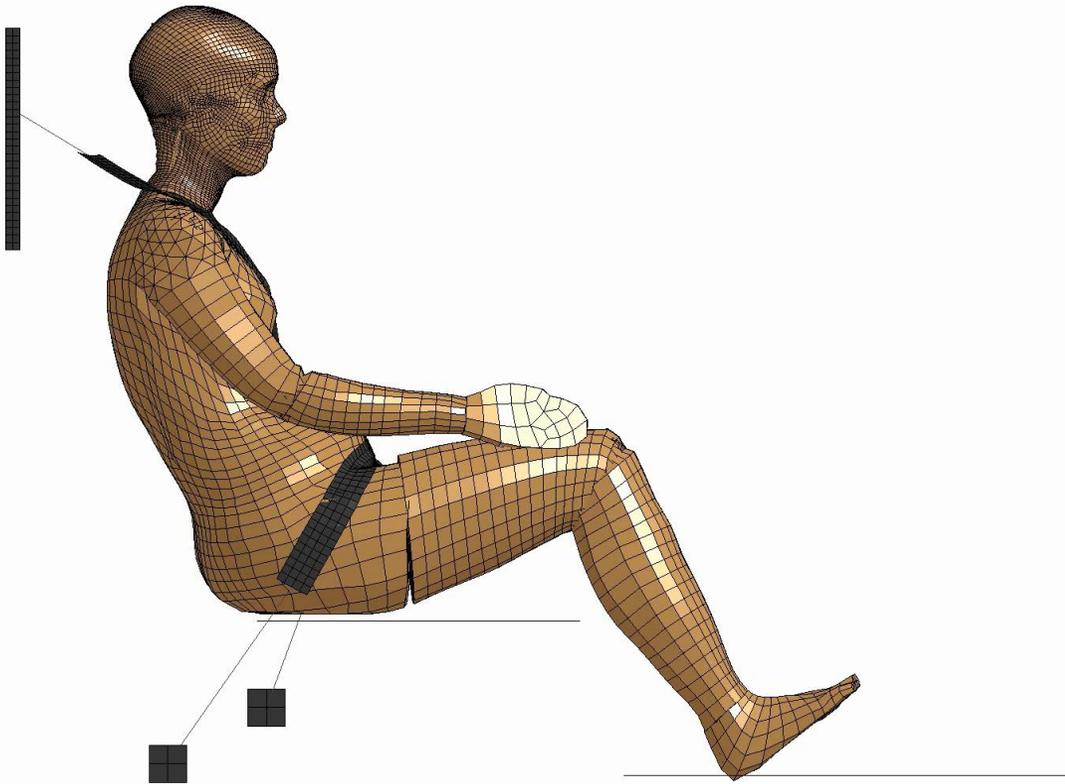
# ViVA – Open source model, mid-sized female



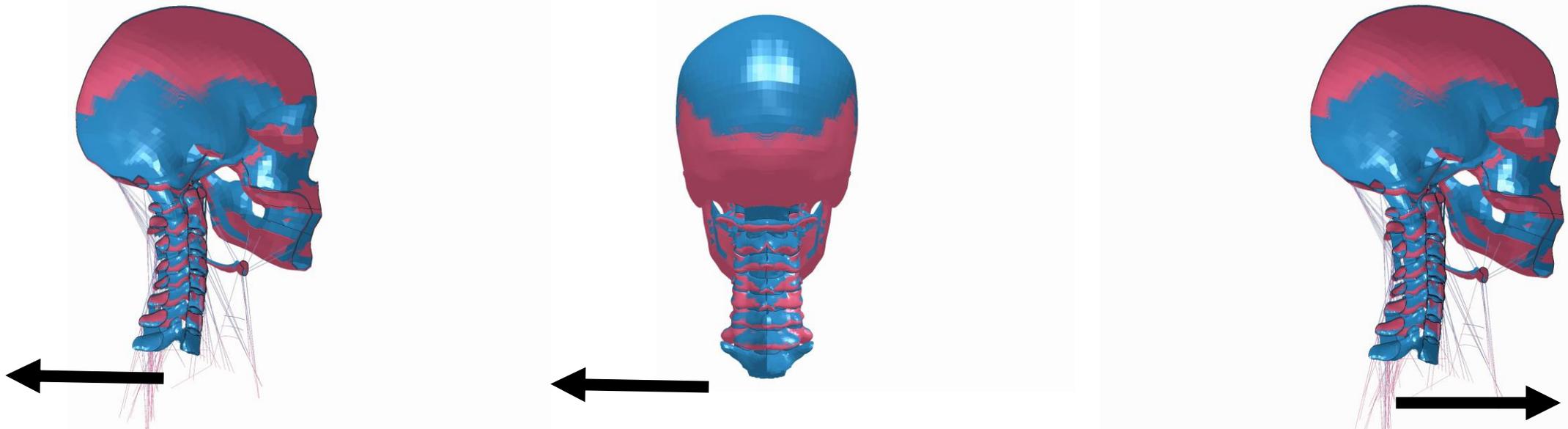
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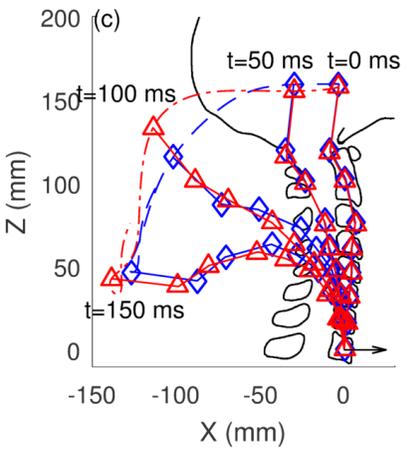
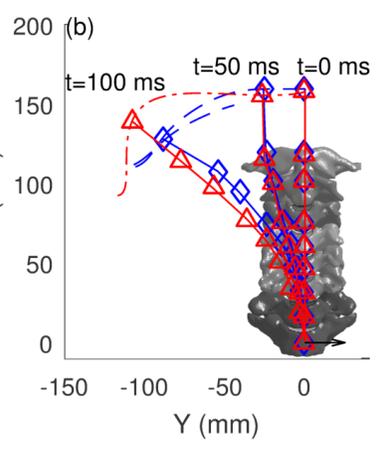
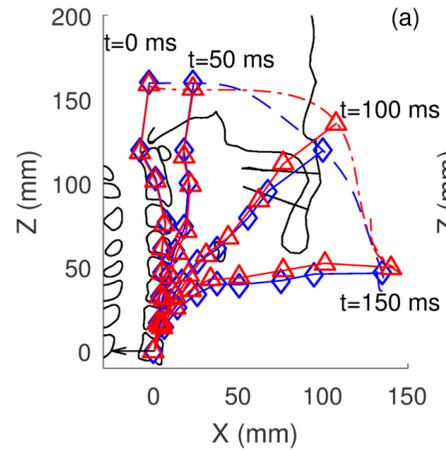
# ViVA – Open source model, mid-sized female



# ViVA - Isolated Head-Neck Simulations



◆ Detailed neck   
 ▲ Simplified Neck   
 — HCG trajectory, detailed neck   
 - - - HCG trajectory, simplified neck



■ Detailed neck  
■ Simplified neck

