METHODOLOGY

PHYSIOLOGY: Magnetic Resonance Images (MRI) were used to create a scaled model of the.

MODELING: Three different models were designed all ranging from at-risk OSA to chronic OSA.

RECONSTRUCTION: Two different uvula movements (kinematics 1 and 2) were examined (kinematics 1 and 2), and seven pressure probes were placed strategically to examine real-life adult flow of 20L/min.

RESULTS

VORTEX STRUCTURES: Increased vortex shedding in kinematics 2 model 1 (snoring) than in model 3 (sleep apnea).

SHEAR LAYER: The obstruction of the airway modulates the air flow and causes shear layers to grow.

VELOCITY: Presence of reversed jets around the uvula in kinematics 2 cause flow to go in the opposite direction.

FAST FOURIER TRANSFORM: Different harmonics and vibrations that correspond to sound generation at different stages of OSA were found.

CONCLUSIONS

Geometry affects the vortex structures, shear forces, and velocity of the flow. Amplitudes in each model were quantified to monitor the progression of sleep apnea. Further research will include flow-structural interaction, different age groups and uvula shapes to then create surgical guidelines OSA treatment.