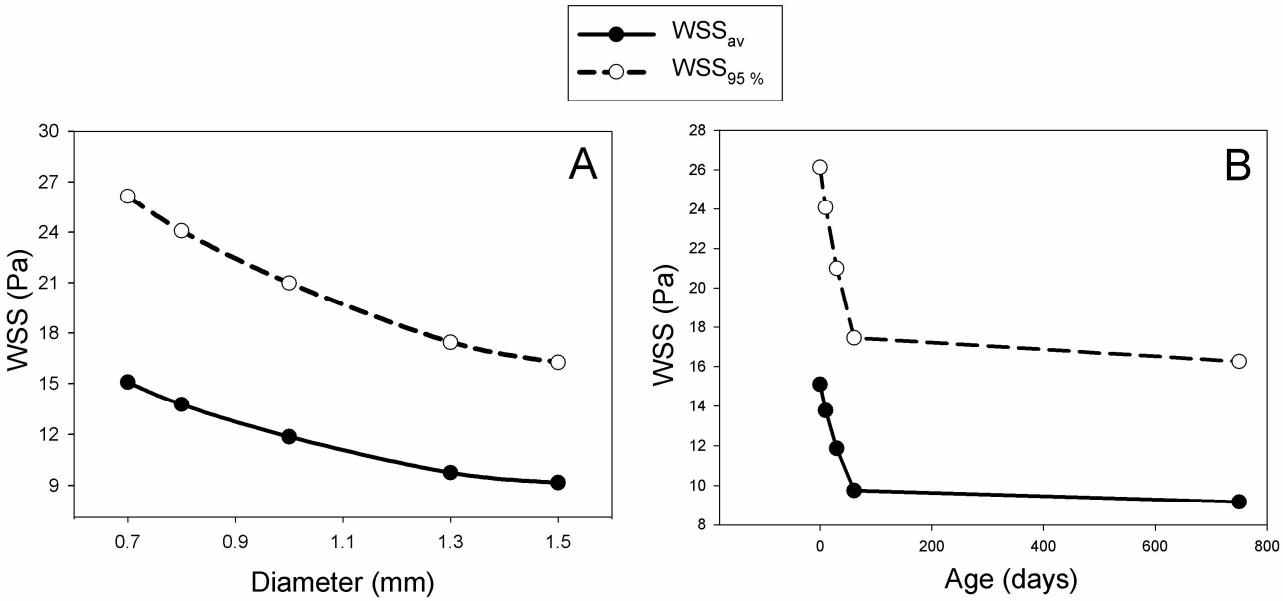
# Wall shear stress : a key determinant in normal arterial growth?

**Background**. According to Glagov's phenomenon, wall shear stress (WSS) is believed to be a key determinant of vascular remodeling in arterial pathology. Little is known, however, about a role of WSS in normal arterial growth. **Materials and Methods**. A 3D model of a mouse aortic arch was created based on a micro-CT scan of a vascular corrosion cast of an 8-week old wild type mouse. This model was then rescaled to obtain 5 models with aortic root diameters corresponding to different stages in the mouse life cycle, varying from 0.7 mm (late fetal) to 1.5 mm (old adult). Fluent was used to solve the Navier-Stokes equations for the flow. For each model the time-averaged distribution of WSS over a cardiac cycle was determined. In order to quantify the difference in WSS between the models, spatially averaged WSS ($WSS_{av}$) was computed for each time-averaged model as well as the 95% WSS value ($WSS_{95\%}$ ; only 5% of WSS values are higher than this value) as a marker of highest WSS values. **Results and discussion.** WSS was found to effectively vary throughout the animal's life span, with values estimated to decrease by 38% over a life span of 9 months (cfr. Figure 1). The decrease in WSS with aortic size supports a mediating role for WSS in arterial growth, with high WSS in early life being a stimulus for outward arterial remodeling. Figure 1 suggests that this feed-back process is stable, leading to a plateau value of WSS in adulthood. On the other hand, it is to be stressed that our data do not allow to assess a cause-effect on the contribution of WSS in development and growth. They are only supportive for a potential role of WSS in this process and should be confirmed by experimental longitudinal follow-up studies.




**Tracking Code = [HTA08-ABS-2436-69-15084-20080904112347]**