

Abstract Submitted
for the MAS16 Meeting of
The American Physical Society

Multi-layer Mechanical Model of Glagov Remodeling in Coronary Arteries: Differences between In-vivo and Ex-vivo Measurements¹ PAK-WING FOK, University of Delaware — When blood vessels undergo remodeling because of the buildup of atherosclerotic plaque, it is thought that they first undergo compensatory or outward remodeling, followed by inward remodeling: the lumen area stays roughly constant or increases slightly and then decreases rapidly. The second phase of remodeling is supposed to start after the plaque burden exceeds about 40%. These changes in the vessel were first observed by S. Glagov who examined cross-sections of coronary arteries at different stages of the disease. In this presentation, we use a mechanical model based on growth and elasticity theory to verify the main aspects of Glagov’s result. However, both our model and curve-fitting to the data suggest that the critical stenosis is around 20% rather than 40%. Our model and data from the PROSPECT trial also show that Glagov remodeling is qualitatively different depending on whether measurements are taken *ex-vivo* or *in-vivo*. Our results suggest that the first outward phase of “Glagov remodeling” is largely absent for *in-vivo* measurements: that is, the lumen area always decreases as plaque builds up. We advocate that care must be taken when inferring how *in-vivo* vessels remodel from data.

¹Simons Foundation grant (282579)

Pak-Wing Fok
University of Delaware

Date submitted: 12 Sep 2016

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