q-Bio Summer School
Student Abstract | Maziyar Keshavarzian

Maziyar Keshavarzian is a PhD candidate at The University of Texas at Dallas. His research interests include computational mechanobiology, cardiovascular biomechanics, and multiscale-modeling. Currently, his work is focused on developing a multi-scale computational framework to model hypertension induced remodeling and initiation of atherosclerosis in coronary arteries.

Based on projections by American Heart Association, the global prevalence of cardiovascular disease (CVD) will continued to increase until 2030. High blood pressure, a major risk factor for many CVDs, triggers a net of events that eventually lead to remodeling of the artery- a change in composition and geometry of the artery in an attempt to return to biological and mechanical homeostasis and adapt to new conditions.

The complex nature of bio-chemo-mechanical interactions during hypertension induced remodeling demands development of new tools for studying this process. Computational techniques can be a valuable tool for this purpose. However, majority of existing models are either focused on the underlying mechanics or biology. We have developed a coupled agent based model (ABM) finite element (FE) analysis computational framework to study the interplay of bio-chemo-mechanical factors involved in hypertension induced vascular remodeling. This computational platform can be used as a tool to study emergent aspects of vascular adaptation, or a quantitative measure for comparing results reported by various researchers.