Yale

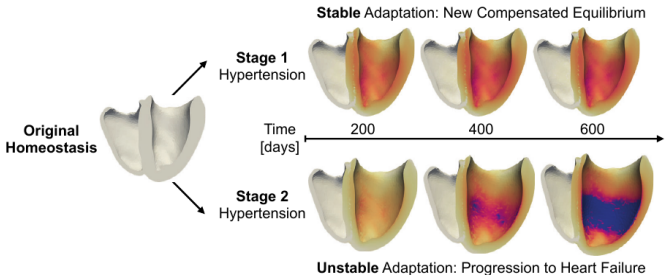
Postdoctoral Fellowship in Computational Cardiac Biomechanics

NIH T32: Training in Multi-Modality Molecular and Transitional Cardiovascular Imaging

The postdoctoral fellowship is funded through an NIH T32 program that prepares fellows for academic careers as independent investigators. Appointments are 2–3 years at Yale's Postdoc compensation levels. The project pairs computational modeling in the **Computational Biomechanics Laboratory** (Martin Pfaller, PhD) with experiments and imaging in the **Yale Translational Research Imaging Center** (Albert Sinusas, MD). While the work focuses on computational modeling, the fellow will participate in acquiring and analyzing images (echo, CT, SPECT), learning firsthand how medical images are produced and processed.

Research project

The fellow will build the computational core of a newly funded NIH R01 on image-guided intramyocardial delivery of therapeutic hydrogels after myocardial infarction. In a porcine model of reperfused infarction, hydrogels are injected into the infarct region to reduce the post-infarction remodeling that drives heart failure. Subject-specific left-ventricular models will quantify these mechanical changes and guide delivery. Model predictions will inform injection sites, and each new dataset will test the models. Beyond the core project, the fellow can branch into related funded efforts, including physics-informed estimation of myocardial stiffness from echocardiography and microstructure-based models of long-term cardiac growth and remodeling (see Figure).



Long-term simulation of cardiac growth and remodeling: stable adaptation vs. progression to heart failure (Gebauer et al., BMMB, 2024).

Fellow profile

- US citizenship or permanent residency (NIH requirement)
- PhD in mechanical or biomedical engineering, applied mathematics, or a related field
- Background in nonlinear continuum mechanics, finite element methods, and biomechanics
- Experience in cardiovascular modeling, inverse problems, or open-source solvers
- Proficiency in scientific programming (git, Python, C++) and high-performance computing
- Interest in cardiovascular biomechanics and physiology and technical aspects of cardiovascular imaging and image analysis

How to apply

Email a CV, a brief statement of research interests, and contact information for 2-3 references to Martin Pfaller (martin.pfaller@yale.edu). We review applications on a rolling basis. The start date is flexible before June 2027.