

## Cardiac Biomedical Science and Engineering Center

### Co-directors

Sylvia Evans, Ph.D.,

*Professor of Pharmaceutical Sciences*

Robert S. Ross, M.D.,

*Professor of Cardiovascular Medicine*


*AVC Health Sciences, Academic Affairs*

Eliot McVeigh, Ph.D.,

*Professor of Bioengineering*

The mission of the **Cardiac Biomedical Science and Engineering Center (CBSEC)** is to synergize the expertise in cardiac research and its translation at UC San Diego and neighboring institutions to combat heart diseases. CBSEC brings together scientists and students from the UC San Diego School of Medicine, the Skaggs School of Pharmacy and Pharmaceutical Sciences, the Jacobs School of Engineering, and other institutions. Together they are creating innovative technologies for cutting-edge cardiac research, elucidating the pathogenic mechanisms of cardiac diseases, and developing novel strategies to improve diagnosis, treatment, and prevention.

The main research areas include cardiac development, cardiac hypertrophy, heart failure, cardiac ischemia/hypoxia, and cardiac regeneration. Unique to CBSEC is the utilization and development of state-of-the-art bioengineering technologies in combination with sophisticated cellular and molecular biological approaches. The bioengineering technologies include biomechanics, tissue engineering, biomaterials, biomedical imaging, biophotonics, systems biology, and multiscale modeling.



UCSD has a strong cardiac mechanics program, which is enhanced by CBSEC's research of the mechanics of ventricular myocardium in relation to heart diseases and tissue remodeling. The interplay between mechanics and electrical activity, which is especially important in heart failure and arrhythmias, is studied by combining in vitro, in vivo, and in silico approaches. Computation modeling and analysis are applied to bedside to improve clinical management of heart diseases. CBSEC is also exploring the great potentials of stem cells and biomaterials for regenerative medicine therapy to restore, maintain, and/or enhance tissue and organ functions.

The Cardiac Biomedical Science and Engineering Center develops innovative approaches to diagnose, treat and prevent heart diseases, trains the next generation of physicians and scientists, and enhances academia-industry interactions.

The focus of the interdisciplinary research is closely linked to the training of the next generation of physicians and scientists, the enhancement of academia-industry interactions, and the translation of research findings to clinical medicine in collaboration with the Sulpizio Family Cardiovascular Center. The ultimate goals are to benefit patients suffering from heart diseases and to improve the health and well-being of all citizens.



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