Lewis K. Waldman, Ph.D.
CEO, Insilicom, Inc.

Measuring and Predicting Cardiac Function:
From Basic Research to Clinical Decision Support

Abstract: After many years of measuring regional and global cardiac function in animals and correlating the results with multi-scale simulations, University of California, San Diego (UCSD) and Insilicom set out on parallel tracts to address applications in clinical medicine. In 2009, Drs. Andrew McCulloch, Jeff Omens and team in the Cardiac Mechanics Research Group at UCSD began a series of prospective studies on heart failure (HF) patients who were indicated for cardiac resynchronization therapy (CRT). In these basic clinical research studies, extra measurements were made in order to improve correlations with patient-specific computational models and to understand the mechanisms of dyssynchronous HF and the effects of treatment with CRT. In 2010, Insilicom obtained an NIH Small Business Innovation Research grant to perform similar studies. However, the hypothesis behind these retrospective studies is as follows. Rather than making extra clinical measurements that are not typically indicated for CRT patients, can we use available clinical measurements to construct patient-specific heart models, and are they good enough to have clinical value? In the last couple of years, the two methods have begun to converge. Some, if not all, of the extra measurements may not be needed. In this talk, our progress on these parallel tracks will be described. Since dyssynchronous HF often has comorbidities, realistic patient-specific simulations may have broad applications in precision cardiovascular medicine.