Poster II-70

Research and Education in Computational Systems Biology: Advancing the Treatment of Type 1 and Type 2 Diabetes Mellitus

Straume, Martin*, Kovatchev, Boris P.
Center for Biomathematical Technology, University of Virginia, Charlottesville, VA, USA

The University of Virginia recently established its Center for Biomathematical Technology in response to the growing need for non-standard interdisciplinary quantitative approaches to complex biomedical research problems. The objectives of the Center are:

1. To establish the concept of biomathematical technology as the integrated process of creation, development, and implementation of *custom quantitative solutions* for biomedical research problems that cannot be addressed by standard statistical techniques;
2. To provide advanced *quantitative support* to biomedical research projects that would significantly benefit from non-traditional approaches to their problems, including projects in behavioral science, biological rhythms, cancer research, cardiology, electroencephalography, pediatrics, pharmacology, psychology, and temporal patterns;
3. To create a training environment and initiate an interdisciplinary research-oriented educational program through an annual undergraduate Summer Institute in Biomathematical Technology, as well as graduate, post-graduate, and professional development training opportunities [we have already received NIH funding (1-R25-DK064122-01, PI-Straume) to develop a cross-disciplinary NIDDK educational program in Computational Applications in Diabetes and Endocrinology].

The initial major research focus of this center is quantitative diabetes and endocrinology, coupled with an interdisciplinary educational mission in biomathematics. In collaboration with the new Diabetes Endocrine Research Center at UVA, our focus is on interdisciplinary projects allowing development of a hierarchically integrated system of quantitative solutions to problems in diabetes/endocrinology research and clinical practice. The intent is to cover the problem spectrum from a molecular and sub-cellular level (e.g., differentiation of insulin producing cells from stem cell precursors), through physiology and networked hormone interactions (e.g., disturbances in hormonal rhythms resulting from insulin overtreatment), to human glycemic control and self-treatment behaviors. This approach will allow, for the first time, integration of the genetics, physiology, pathology, and treatment of Type 1 and Type 2 diabetes as a hierarchically interconnected, coherent system from a quantitative perspective.

NIH NIDDK R25-DK064122-01 (Straume); NIH NIDDK R01-DK51562-08 (Kovatchev); NIH NIDDK P30-DK063609 (Barrett; UVA Diabetes Endocrine Research Center/Integrated Data Management Project)