



Center for Engineering in Diabetes

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Diabetes is a growing, world-wide problem with potentially devastating consequences for individuals with the disease as well as for society as a whole. There is a clear and urgent need for new approaches to address challenges in treatment, diagnosis, and prevention of diabetes and its related complications using state-of-the-art scientific and engineering approaches.

The goals of the **Center for Engineering in Diabetes (CED)** are to stimulate research, development and clinical translation of new technologies for the treatment of diabetes. The CED will facilitate interdisciplinary collaborations between clinicians, engineers, research scientists, and industry, as well as train a new professional workforce of student graduates with specialized engineering skills and meaningful clinical perspectives to work hand-in-hand with clinicians and the medical device industry. The focus of the CED will be on a variety of new technologies.

These new forms of therapy will be based on effective replacement of the beta cell, either by some form of cellular technology.

Such as islet replacement, regeneration from stem cells, or islet preservation, constituting a form of “bioengineered pancreas”, or by some combination of implanted sensor and automated delivery technologies that comprise an automatic “mechanical artificial beta cell”.

Biological approaches will be explored as a cellular replacement strategy for islet cells. This will require a fundamental understanding of how the pancreas matures from an outgrowth of the duodenum into a highly ordered structure of exocrine and endocrine cells. The maturation process for beta cells in the Islets of Langerhans is guided by spatiotemporally regulated cell interactions, including growth factors, cell-cell signaling, and extracellular matrix components.

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Development of a bioengineered pancreas seeks to mimic those interactions to recapitulate the natural development process in a dish, resulting in an in vitro, engineered environment that can produce fully functioning insulin-producing beta cells. All advances will involve industrial collaborate on, and San Diego has one of the most vibrant biotech industries in the country, with an unusually high concentration of diabetes biosensor, medical device and tissue engineering companies. The CED will provide a platform for interaction with industry, as this is a key component of translation of new technologies to the clinic.

