

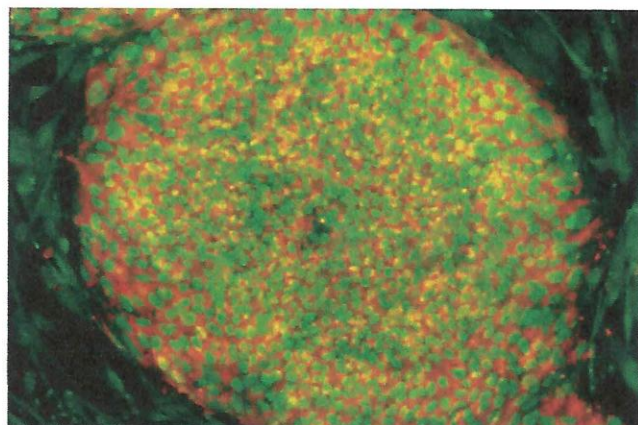
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Stem Cell Engineering

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Human embryonic stem cells (hESCs)

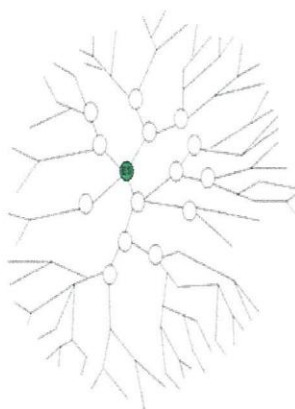
Engineering Therapeutic Cells

ViaCyte was the first company to engineer human embryonic stem cells into definitive endoderm, the gatekeeper cells that differentiate into pancreas, liver and other cells, tissues and organs.

“Engineering stem cells into definitive endoderm and then pancreatic endoderm were pivotal discoveries that changed the diabetes cell therapy landscape.”

Kevin D'Amour, Ph.D., VP Research and Chief Scientific Officer, ViaCyte

Stem Cell Engineering Basics



Stem cell engineering refers to the ability to manipulate and control the powerful potential of stem cells. ViaCyte is focused on human embryonic stem cells (hESCs) due to their exceptional capacity to expand to large numbers as well as the ability to generate a variety of potentially therapeutic, specialized cell types.

Expansion – Harnessing the growth potential of stem cells requires an understanding of the signals that instruct them to undergo self-renewal (dividing to make copies of themselves) without transforming into more specialized cell types. ViaCyte has developed advanced stem cell growth media and conditions for expanding as well as cryopreserving undifferentiated hESCs thus providing the necessary foundation for scale-up and manufacturing of hESC-derived cell products.

Differentiation – Stem cells have the capacity to transform into more specialized cell types through a process known as differentiation. Since an hESC can, in theory, generate any cell type present in the body through sequential steps of specialization, graphically depicted below, it is especially critical to control the very first steps of this process in an efficient and homogeneous manner. This relies on the ability to precisely change the environment of the stem cells to cause them to undergo specific, sequential steps in a differentiation pathway.

From hESCs to PEC-01™ Cells

During development of an organism, cells transition through highly orchestrated regional and temporal changes leading to specialized cell types (differentiation). These specialized cells make up the tissues and organs of the body that carry out specific functions like the beta cells in the pancreas which control blood sugar levels.

By leveraging the studies of developmental biologists, ViaCyte invented a reproducible process for differentiating hESCs into pancreatic endoderm cells (PEC-01) through a patented multistep process. The process recapitulates the natural development of the human pancreas. During each step, prescribed types and amounts of growth factors, growth media and supplements induce hESCs to progress along the differentiation pathway until they become PEC-01 cells. Once implanted under the skin of a patient with diabetes, PEC-01 cells are expected to mature into functional beta cells.