Stem cell researchers map new knowledge about insulin production

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Scientists from The Danish Stem Cell Center (DanStem) at the University of Copenhagen and Hagedorn Research Institute have gained new insight into the signaling paths that control the body's insulin production. This is important knowledge with respect to their final goal: the conversion of stem cells into insulin-producing beta cells that can be implanted into patients who need them. The research results have just been published in the journal *PNAS*.

Insulin is a hormone produced by beta cells in the pancreas. If these beta cells are defective, the body develops diabetes. Insulin is vital to life and therefore today the people who cannot produce their own in sufficient quantities, or at all, receive carefully measured doses – often via several daily injections. Scientists hope that in the not-so-distant future it will be possible to treat diabetes more effectively and prevent secondary diseases such as cardiac disease, blindness and nerve and kidney complications by offering diabetes patients implants of new, well-functioning, stem-cell-based beta cells.

"In order to get stem cells to develop into insulin-producing beta cells, it is necessary to know what signaling mechanisms normally control the creation of beta cells during fetal development. This is what our new research results can contribute," explains Professor Palle Serup from DanStem.

"When we know the signaling paths, we can copy them in test tubes and thus in time convert stem cells to beta cells," says Professor Serup.

The new research results were obtained in a cooperative effort between DanStem, the Danish Hagedorn Research Institute and international partners in Japan, Germany, Korea and the USA. The scientific paper has just been published in the well-respected international journal *PNAS* (*Proceedings of the National Academy of Sciences*) entitled Mind bomb 1 is required for pancreatic β-cell formation.

Better control of stem cells

The signaling mechanism that controls the first steps of the development from stem cells to beta cells has long been known.

"Our research contributes knowledge about the next step in development and the signaling involved in the communication between cells – an area that has not been extensively described. This new knowledge about the ability of the so-called Notch signaling first to inhibit and then to stimulate the creation of hormone-producing cells is crucially important to being able to control stem cells better when working with them in test tubes," explains Professor Palle Serup.

This new knowledge about the characteristics of the Notch signaling mechanism will enable scientists to design new experimental ways to cultivate stem cells so that they can be more effectively converted into insulin-producing beta cells.

Provided by University of Copenhagen