An Inexhaustible Source of Neural Cells

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(PhysOrg.com) -- Research scientists in Bonn, Germany, have succeeded in deriving so-called brain stem cells from human embryonic stem cells. These can not only be conserved almost indefinitely in culture, but can also serve as an inexhaustible source of diverse types of neural cell. The scientists have also shown that these neural cells are capable of synaptic integration in the brain. Their results have been published in the latest edition of the *Proceedings of the National Academy of Sciences*.

For years, stem cell research appeared to be divided between two worlds: on the one hand, were the embryonic stem cells – omnipotent, with unlimited development potential, and on the other, were the so-called somatic stem cells, which were obtainable from adult tissue, but have only limited potential for self-renewal and development. Scientists in Bonn have now succeeded in combining these two worlds: they have derived brain stem cells of almost unlimited self-renewal capacity and conservation potential from human embrionic stem cells. Using these stable cell lines, they were then able to obtain a continual in vitro supply of diverse types of human neural cell including, for example, those which fail with Parkinson´s disease.

Using the new cells, researchers are now also able to reduce their requirements for embryonic stem cells, which have hitherto been indispensable as basic material for every individual cell creation process. “The new cells, in contrast, serve as an inexhaustible source: they provide a supply of human neural cells over periods of months and years without demanding any recourse to supplementary embryonic stem cells”, declares Professor Dr. Oliver Brüstle, head of the research team

at the Institute for Reconstructive Neurobiology at Bonn University.

Using animal experiments, the researchers in Bonn provided direct proof that these artificially derived neural cells will also function. Transplanted into the brain of a mouse, these cells made contact with the recipient brain and were subsequently able both to send and receive signals. “This is the first direct evidence that neural cells derived from human stem cells are capable of synaptic integration in the brain”, declares Dr. Philipp Koch, the original author of the study. The scientists in Bonn are now also hoping to exploit this inexhaustible cell source to study neurodegenerative diseases and possible active agents directly in human neural cells.

Brüstle and his team were the first scientists in Germany to receive permission to import human embryonic stem cells. They had played a major role in the public discussion of this hot topic. “Our current results make it clear how smoothly research into embryonic and somatic stem cells can be combined, and at the same time, how important this is”, Brüstle stresses.

More information: Koch, P., Opitz, T., Steinbeck, J., Ladewig, J., Brüstle, O. (2009): A rosette-type, self-renewing human ES cell-derived neural stem cell with potential for in vitro instruction and synaptic integration; *PNAS* dx.doi.org/10.1073/pnas.0808387106

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