Mechanistic Principles of Health and Disease

Institute of Stem Cell Research

The **Institute of Stem Cell Research** addresses the basic molecular and cellular mechanisms of stem cell self-renewal and differentiation by using complementary experimental approaches with stem cells from all three germ layers, neural, hematopoietic and endodermal.

Primary stem cells of adult and embryonic origin, and murine embryonic stem cell lines are used as model systems. In order to answer long-standing questions in stem cell biology, the Institute of Stem Cell Research uses novel technologies for in vivo and in vitro molecular manipulation, such as conditional mouse mutagenesis, chimeric and mosaic analyses, a variety of pseudotyped viral and RNAi vectors, as well as approaches to purify and culture different types of stem cells in combination with state-of-the-art bioimaging techniques.

Research at the Institute is integrated into the Helmholtz programme on **Comparative Genome Research** to which it contributes the work on the regulation and differentiation of stem cells.

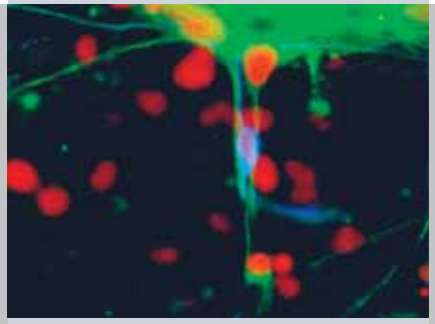
Besides numerous collaborations within the GSF and other Helmholtz institutions, the Institute of Stem Cell Research collaborates with German laboratories at Max Planck Institutes and universities in Berlin, Bochum, Dresden, Hannover, Frankfurt, Freiburg, Kiel, Leipzig and Munich. In addition, current international joint research projects include groups in Europe (Austria, Belgium, Denmark, France, Italy, Spain, Switzerland and the U.K.), Australia, Canada, Japan and the USA (e.g. Princeton and Harvard University, NIH, Sloan Kettering and Einstein College of Medicine in New York and Gladstone in San Francisco).

The Institute was founded in 2004 and the number of people involved in its research increased over the years. At the end of 2005 there were 11 scientists, 12 postgraduate students, 4 visiting scientists, and 8 technicians at the Institute.

Research Spotlight

Pax6 Promotes Formation of New Brain Cells

In the adult brain dead nerve cells can practically not be replaced. The olfactory bulb is a small section of the brain, in which new nerve cells can be formed after all. Studies on adult mice showed that the transcription factor Pax6 is required for neurogenesis in the olfactory bulb. In particular Pax6 promotes the formation of nerve cells using dopamine as a messenger substance. These studies first demonstrated how new dopaminergic cells are formed in the brain. Since Parkinson's is due to the dying of dopaminergic nerve cells, this newly discovered mechanism could also be a starting point for new therapies.



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Further Information
http://www.gsf.de/neu/Forschung/Institute/isf_intro_en.php