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**E m b a r g o e d until: Monday, September 12, 2011, 1:00 PM**

**Professor Birchmeier: Cancer Stem Cells and Cancer Diseases**

**Stem cells, which can be generated from embryonic cells but also from adult human somatic cells, are highly potent – they can divide indefinitely and differentiate into different tissues. They thus have great potential for medical research and therapy. “Consequently, today stem cells are considered to be a miracle cure for future developments, although we are only at the beginning of a comprehensive understanding of the biology of stem cells,” said Professor Walter Birchmeier, research group leader at the Max Delbrück Center for Molecular Medicine (MDC), in a statement to the press at the international conference “Stem Cells in Development and Disease”, which is being held from September 12-14 from in Berlin-Buch.**

The MDC conducts research on the etiology and pathogenesis of cardiovascular and neuronal diseases as well as specific cancer diseases. Current biomedical research investigates the complex processes during embryogenesis and the later development of the human body at the molecular level. Here research on stem cells plays a central role. “The focus of our fascination and interest is not only on questions related to the nature of stem cells, but also on the extraordinary potential that these cells may have for regenerative therapies,” Walter Birchmeier added. Malfunctions of stem cells – for example in cancer stem cells – have consequences in the development of diseases.

The main concern of the conference is to use the findings of developmental biology for the biomedical application of stem cells, Professor Birchmeier, a molecular biologist engaged in cancer research, went on to say. The scientists attending the conference conduct research on fundamental questions regarding stem cells and cancer stem cells of humans and in model systems (fruit flies, planaria, fish, mice). Part of the conference deals with the role of stem cells in tissue regeneration.

Approximately 430 stem cell experts from the U.S., Europe and other countries from around the world are participating in the conference, which will last until September 14, 2011. “German researchers, working here in Germany but, for instance, also in the U.S., are among the internationally recognized experts in the field of stem cells and are leaders in Europe,” Professor Birchmeier said. He pointed out that Rudolf Jaenisch, for example, together with his laboratory in Cambridge, Massachusetts, had provided important data on the epigenetic regulation of stem cells and the reprogramming of somatic cells *(see Jaenisch press release)*. Hans Schöler in Münster identified a key factor which serves to maintain the undifferentiated state of embryonic stem cells *(see Schöler press release).* Conferences on the basic principles and mechanisms of stem cell biology which are attended by international participants have great significance for the further development of this line of research in Germany.

**Stem cell research at the MDC**

Research at the MDC is especially oriented towards using the insights gained in the laboratory in collaboration with clinicians of the Charité to develop new therapeutic concepts. The biology of stem cells and of cancer stem cells have therefore been the main research focus of the MDC during the past decade and have led to important publications. New groups of the MDC increasingly develop and use these new technologies.

Background

**Studies on stem cell research at the MDC:**

The group of Walter Birchmeier has shown that a specific molecular pathway, the Wnt**/β-**catenin pathway, is important for the differentiation of skin stem cells, but also that the deregulation of this pathway can lead to cancer stem cells and skin tumors (Huelsken et al. 2001, Cell, 18, 533-545, Malanchi et al. 2008, Nature, 452, 650-653).

The group led by Ruth Schmidt-Ullrich and Claus Scheidereit has dealt extensively with hair follicle stem cells (Zhang et al. 2009, Dev. Cell, 17, 49-61).

The group of Carmen Birchmeier is interested in satellite cells, the stem cells in muscle, and showed how with the aid of specific signals these cells communicate (Vasyutina et al. 2007, Proc. Natl. Acad. Sci USA, 104, 4443-4448).

The group of Daniel Besser recently showed that a cell adhesion molecule, E-cadherin, plays a key role in the establishment and maintenance of the undifferentiated state in mouse embryonic stem cells. E-cadherin is also required for the induced reprogramming of somatic cells into undifferentiated stem cells. The molecule can replace the central factor Oct4 during the reprogramming (Redmer et al. 2011, EMBO Rep., 12, 720 - 726).

The group of Achim Leutz has made fundamental contributions to the field of hematopoietic stem cells. Here the important influence of the signal molecule β-catenin on blood stem cells could be shown (Scheller et al. 2006, Nat. Immunol. 7, 1037-1047).

Mathias Treier’s lab is working on elucidating the function of the factor Sall4 in undifferentiated embryonic cells (Elling et al. 2006, Proc. Natl. Acad. Sci. USA, 103, 16319-16324) and has gained important new insights about the significance of FoxL factors in the development of ovaries (Uhlenhaut et al. 2009, Cell, 139, 1130-1142).

The group of Michael Bader conducts research with undifferentiated cells in the system of the rat (Chuykin et al. 2010, PLoS One, 5, e9794).

Nicholas Rajewsky’s laboratory conducts research on stem cells in flatworms (planaria), which have a particularly high regenerative potential (Friedländer et al. 2009, Proc. Natl. Acad. Sci. USA, 106, 11546-11551).

Matthew Poy’s research focuses on the development of beta cells, insulin-producing cells of the pancreas (Poy et al. 2009, Proc. Natl. Acad. Sci USA, 106, 5813-5818). Some groups are currently also seeking to intervene in cancer stem cell processes, i.e. to inhibit tumor growth, for example through interference with small molecules.

Walter Birchmeier, b. 1943 in Würenlingen (Switzerland)

1963 Diploma as teacher

1973 PhD in Biology, University of Zurich

Postdoctoral training | Cornell University, Ithaca, New York & University of Basel & University of California, San Diego

1978 – 1981 Junior group leader, Biochemistry Laboratory, ETH Zurich

1982 – 1988 Head of Independent Research Group, MPI Tübingen

1988 Professor for Molecular Cell Biology at the University of Essen

since 1993 Research group leader and coordinator of Cell Biology at the MDC

since 1996 Professor at the Charité

2004 - 2008 Scientific Director of the MDC

MDC research group “Signal Transduction, Invasion and Metastasis of Epithelial Cells”

Various scholarships and fellowships in Switzerland and Germany

1990 Award for Cancer Research, Wilhelm Warner Foundation Hamburg

1992 Meyenburg Award for Cancer Research, DKFZ Heidelberg

1999 German Cancer Award

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