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New Cells for the Heart

Hans Schöler, the director of the Max Planck Institute for Molecular Biomedicine in Münster, co-ordinates a joint project

Hans Schöler, the director of the Max Planck Institute for Molecular Biomedicine in Münster, co-ordinates a joint project as part of the regenerative medicine programme from the Federal Ministry of Education and Research

Since September, the Federal Ministry of Education and Research, known as the BMBF, has been sponsoring a project named "Reprogramming of Somatic Cells for Heart Disease Therapy". It is planned at first for three years and is part of the programme "Cell-Based Regenerative Medicine". Funding for the project is approximately 1.4 million euros. Professor Hans Schöler, the Director of the Max Planck Institute for Molecular Biomedicine in Münster, is heading up plans for the research. The fundamental cellular biological work itself will be carried out at the Institute.

The goal of the research is to rejuvenate the cells of an adult mouse (known as "somatic cells") by fusing them with embryonic stem cells. This would produce a cell line, from which new cells would be derived for treatment of ischaemic heart disease, a condition which involves inadequate blood supply to the heart and can lead to heart attacks. This new cell line would be "pluripotent"; meaning that it can further develop into any cell type for the organism. This process of "reprogramming" produces cells with double the yield of genetic information (chromosome sets). They then, in part, divide themselves into cells with simple chromosome sets.

Stem cell experts have been part of investigations to determine to what extent the new cell lines, derived from the rejuvenated cells, are suitable for transplantation into the heart. The department led by Professor Jürgen Hescheler, Director of the Institute for Neurophysiology at the University of Cologne, will examine the character of the cells in detail using electrophysiological and immunological methods. Professor Bernd Fleischmann, the head of the Institute for Physiology at the University of Bonn, will deal with questions of functional integration ("engraftment"), the immunology of rejection of the transplanted cells, and also with safety questions - for instance, possible tumor development (teratoma). Professor Martin Zenke, the head of the Institute for Biomedical Technologies at the University Hospital in Aachen, is running a platform, networked to all the working groups, on the topic of the gene expression analysis of the various cell types. And in order to be able to use the whole technology platform on pigs, Professor Heiner Niemann, the head of the biotechnology research area at the Institute for Animal Breeding in Mariensee near Hanover is focusing on bringing fusion technology to pig cells and breeding genetically modified pigs

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which carry the appropriate marker for the tracing of the transplanted cells.

Heart disease was chosen as a suitable area for cell-based regenerative medicine because there is already clinical experience with cell transplantation, out of bone marrow, in cases of ischaemic heart disease - for example, after a heart attack. Therapeutic use is, however, still controversial. It is thus necessary to urgently evaluate other cells as therapeutics. Cardiovascular illnesses are currently the most common cause of death. This problem is going to become much more acute because of demographic change, and increased life expectancy, in western countries. Estimates are that the US health care system will spend about 18 billion dollars yearly alone for the treatment of people over 65 years old.

Professor Schöler's research group is thus developing cell therapeutic treatment strategies, based on the latest findings, which will make a better middle-term therapy possible for patients. It should thus reduce the negative socio-economic consequences of ischaemic heart disease.

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