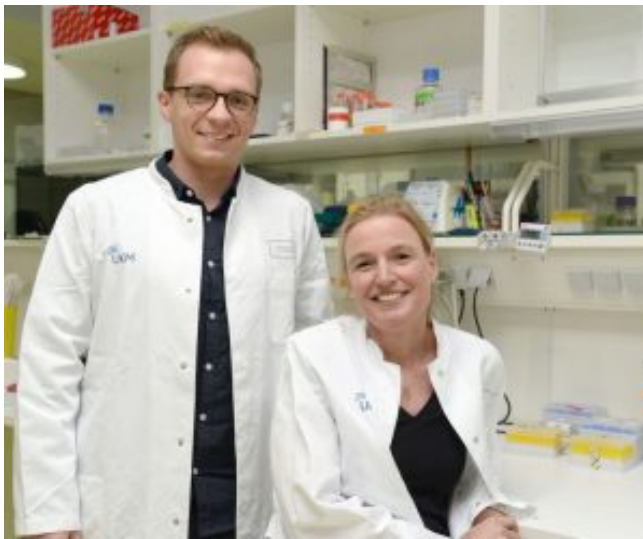


SFB Scientists reprogram skin cells to brain cells to facilitate neurological research

Münster. (mfm/jr) Whether it be math, writing, reading or learning a new language: brain cells give us astonishing brainpower every day. When these cells are damaged by neurological diseases, cells cannot be simply sampled and analyzed in a petri dish. Scientists from the University of Münster and the Max Planck Institute for Molecular Biomedicine developed a new protocol to generate their brain cells of interest, oligodendrocytes, from skin. The team in Münster belongs to the few labs worldwide that have established this technique successfully in their lab; however the team in Münster can do this now much faster and more efficiently – with significant benefit for research.



SFB scientists Prof. Tanja Kuhlmann und Dr. Marc Ehrlich generate oligodendrocytes from skin cells (photo: FZ/E. Deiters-Keul)

Comparable to the insulation of wires that prevent short circuits, the axonal processes of neurons are covered by a lipid-rich sheath that allows the rapid transmission of nerve impulses. In Multiple Sclerosis and other neurological diseases this insulation – the so-called myelin sheath which is formed by oligodendrocytes – is destroyed. Despite intensive research efforts, there is still no cure for these diseases of the central nervous system as scientists still do not know enough about the underlying disease mechanisms. One reason for this lack of knowledge is the limited access to brain cells from patients due to the inaccessibility of the human brain and the high risk for patients undergoing brain surgery.

In order to obtain access and analyze human nerve cells regardless of this major obstacle, researchers from the Institute of Neuropathology in Münster chose the “do-it-yourself” option. Dr. Marc Ehrlich and Prof. Tanja Kuhlmann, both members of the SFB 128, developed in close collaboration with Prof. Hans Schöler and his colleagues from the Max Planck Institute for Molecular Biomedicine in Münster a new method to generate human oligodendrocytes from patients without the need to access the human brain. To accomplish this, the scientists took skin cells from patients and reprogrammed them into induced pluripotent stem cells. These stem cells were subsequently turned into oligodendrocytes using a combination of proteins. “The three proteins we used regulate processes within the cell and start a

maturation program that turns stem cells into oligodendrocytes”, explains neuropathologist Prof. Tanja Kuhlmann the procedure.

By this means, oligodendrocytes very similar to those in the human brain form a new insulation layer in less than one month.

Alternative techniques available so far require 70 to 150 days to generate human oligodendrocytes from stem cells. Due to its high efficiency this new method enables researchers for the first time to obtain large amounts of human oligodendrocytes and test large libraries of drug candidates on these cells. “This helps us to better investigate the underlying pathogenic mechanisms of complex diseases such as Multiple Sclerosis and will hopefully facilitate the identification of new therapeutic agents in the future”, Dr. Marc Ehrlich points out the impact of their findings for future research projects.