

Healthcare industry BW

Ethical discussions take time

In the middle of April, the German Bundestag made a monumental decision. After a long debate – which became very emotional at times, the majority of the German Parliament decided in favour of relaxing the restrictions on the import of stem cells. The new law now entitles German researchers to work with embryonic stem cells created before 1st May 2007. The previous cut-off date was 1st January 2002.

On behalf of BIOLAGO, Martina Keller-Ullrich spoke with the pharmacologist Prof. Dr. Marcel Leist, the only Baden-Württemberg scientist authorised to carry out research involving embryonic stem cells.

Professor Leist, what does the new law mean for your research?

Initially, nothing much will change because it will take quite some time before we will actually be able to work with the new embryonic stem cells. We are required to send an application to the Robert Koch Institute, despite the fact that we've been authorised to work with stem cells since February.

It seems that the shift of the cut-off date will be advantageous for German science. Is that how you see it?

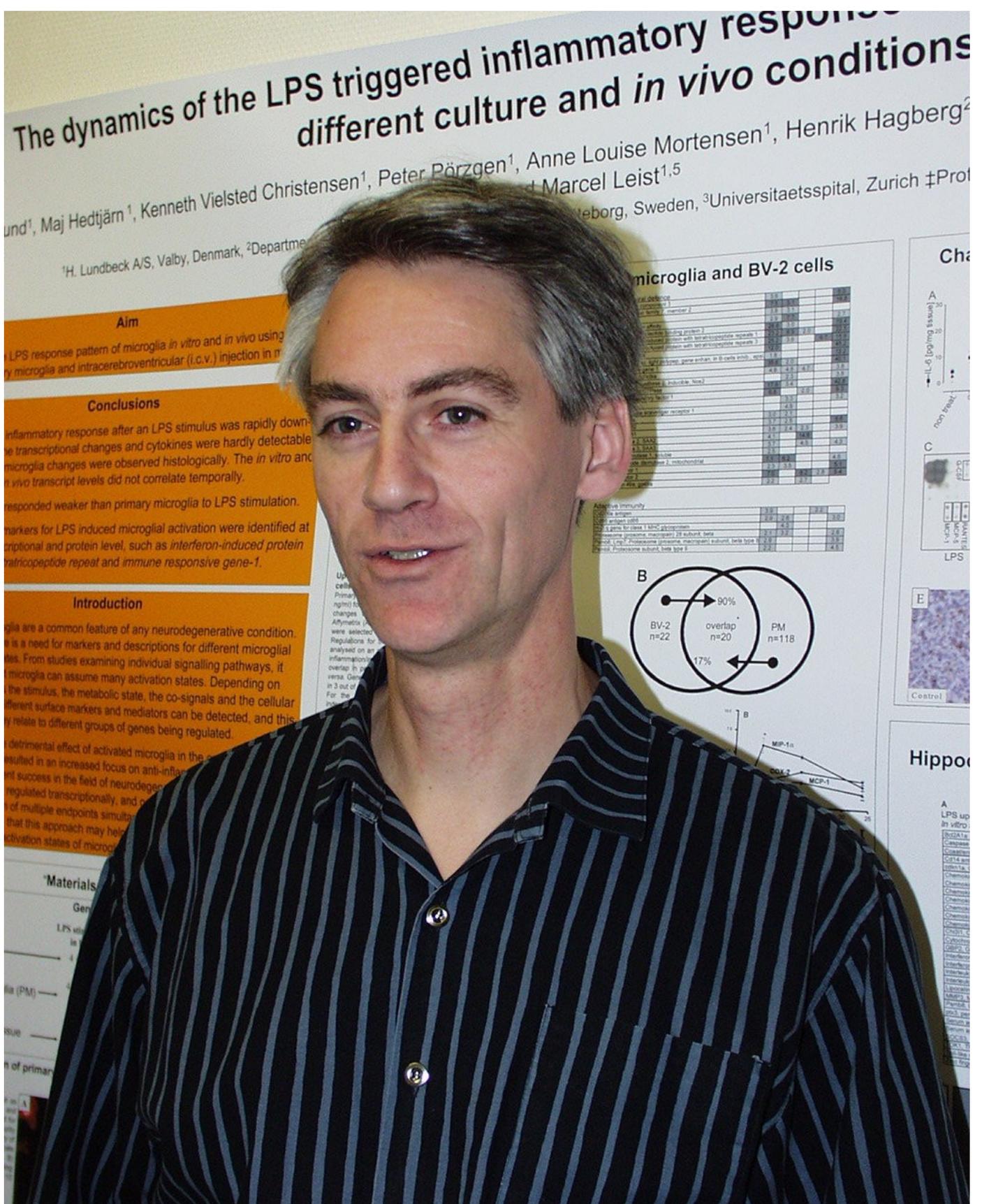


Pharmacologist Prof. Dr. Marcel Leist is looking for alternatives to animal experiments. (Photo: Keller-Ullrich)

Of course, and there are many reasons why this is the case. The first important reason is that up until the 1st of January 2002 only 18 stem cell lines were available. Most of them are about ten years old. Although they still function, i.e. still possess the ability to differentiate, they have of course gone through an ageing process. In addition, at the time these cell lines were created, little was known about the proper storage and growth of stem cells. Back then, they were cultured in bovine serum and were grown on connective tissue cells taken from the skin of mice. These cells have been in contact with animal material, something that poses a problem for many researchers, especially for those working on the human application of stem cells, for example the use of stem cells for transplantation.

Some of the new stem cell lines have gone through better control measures. In addition, and this is important for all those who work with stem cells, the new law provides us with more legal safety. In the past, we were in a kind of a legal grey area and it was difficult to judge whether we were doing something illegal or not. For example, German researchers could not work outside Germany with stem cells that were not approved for scientific application in Germany. Different legislation also made cooperation with international scientists very difficult.

Professor Leist, what are you focusing on and why are stem cells so important for you?



Prof. Dr. Marcel Leist is the first Baden-Württemberg researcher to be entitled to work with human embryonic stem cells. (Photo: Keller-Ullrich)

In our department, we are investigating methods to replace animal experiments. We are particularly interested in how toxins affect the development of the nervous system. For example it is known that lead has a negative effect on human intelligence. At present, it is impossible to test many substances

for their effects on brain and nervous system. We are hoping to use stem cells to investigate the effect of pesticides as early as possible. In the past, we used to work with mouse stem cells. However, these results cannot be directly transferred to the situation in humans. Human embryonic stem cells provide us with results that are of greater significance in terms of human application.

In addition, we are also involved in a new European project that deals with the development of medicines. The work with human stem cells might provide us with quicker and more reliable insights into whether a drug is toxic or not. This would also contribute to speeding up the drug development process.

Wouldn't it be possible to use adult stem cells for this type of research?

This is a question that is often asked. But many people overlook the fact that there are not so many adult stem cells. On the other hand, only embryonic stem cells are able to differentiate into other cell types. A bone marrow stem cell is unable to become nervous tissue. Stem cells from the fatty tissue, although they are available in high enough numbers, cannot become neurons but only connective tissue, muscles or tendons. In addition, adult stem cells age a lot more rapidly and cannot be used as often as embryonic ones.

Will research always require embryonic stem cells or are there theoretically other possibilities?

Perhaps we will no longer need stem cells in five to ten years' time because a lot more will be known. If we succeed in elucidating what actually makes a stem cell a stem cell, then we might potentially be able to confer such stem cell properties on other cells artificially.

How do you turn stem cells into nerve cells and how long does this take?

Of course, we have some basic knowledge on how the differentiation into different cell types works and there is continuous scientific progress in this area. The differentiation into different cell types during embryonic development is brought about by the addition of different hormones; in addition, we are able to influence stem cell growth by selecting a specific matrix in which to culture the cells. The time it takes to turn a stem cell into a nerve cell, for example, depends on the researcher's skills. But in general, it takes about 40 to 60 days.

Stem cell research is often regarded as ethically questionable. A typical argument is that one must not save a life at the expense of another. In the recent Bundestag debate, the term "floodgate" was often heard. What is your opinion concerning these arguments?

I have no problems in accepting that there are different opinions on this topic. However, I don't like the "floodgate" argument which suggests that once the door has been opened it will be difficult to close it again. This argument means the end to any progress. I find that one has to push the limits. However, one must not cross them.

For me it is clear that certain rules have to be followed. The most important rule is that only "waste products" are used and in this respect one need not worry. It is not necessary to produce embryos

specifically for research. No figures are available for Germany; but in the USA, approximately 400,000 embryos are stored in freezers. In vitro fertilisation involves the fertilisation of several eggs, of which only a few are selected for implantation into the womb. Those not required cannot be deep-frozen for more than five years and will simply be disposed of after this time.

We need a discussion about the principle problems, namely about how we should define what "becoming a human" means and when the rights of an individual should first be granted. Are these acquired gradually or are they just there at a certain time? The answers are different and depend on the religious or cultural background of the person asked. Questions on the time of death and transplantation also lead to controversial discussions. Ethical discussions require time, and time and experience will eventually lead to confidence that the right decisions have been made.

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Prof. Dr. Marcel Leist holds the endowed chair of the Swiss Doerenkamp-Zbinden Foundation for Animal-Free Research and of the Thurgau Foundation of Science and Research. The toxicologist and pharmacologist is investigating the effects of toxins on nerve cells at the University of Constance. At the beginning of 2008, Leist was the first researcher in Baden-Württemberg to receive the authorisation to work with stem cells.

Further information:

Biological Faculty

University of Constance

Universitätsstraße 10

78467 Konstanz

Tel.: +49 (0)7531 88-5037

Fax: +49 (0)7531 88-5039

E-mail: marcel.leist@universitaet-konstanz.de

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