An example of reduction (Project 103-06, Leib)

It is possible to test the suitability of stem cells for treating brain damage using brain slices in cell culture

The transplanting of stem cells as a possible treatment for brain disease has been the subject of intensive research for many years, mainly using laboratory animals. Stephen Leib and his research team at the Institute of Infectious Diseases and the Cluster for Regenerative Neuroscience of the University of Berne developed a system whereby it was possible to maintain fine slices of various areas of the brain in cell cultures and thus test the suitability of stem cells and neuronal progenitor cells for transplanting into damaged areas of the brain. In this way it would be possible to avoid using laboratory animals for testing unsuitable cells.

The brain's limited capacity to regenerate itself following disease such as bacterial meningitis, which can cause permanent damage to the brain, means that such illnesses are difficult to treat. Transplanting stem cells to replace the damaged nerve cells constitutes one of the few hopeful options for treating such brain disease. This method was recognised as a possible therapy in 1987. Since then intensive research has been carried out in this area, largely using laboratory animals.

Stephen Leib and his research team at the Institute of Infectious Diseases and the Cluster for Regenerative Neuroscience of the University of Berne developed a system whereby fine slices taken from areas of the brain are maintained for cell culture. In this way they were able to test the suitability of stem cells and neuronal progenitor cells for transplanting into the damaged parts of the brain.

The first step was to isolate neuronal progenitor cells and to culture them to different stages of development over a period of up to 3 weeks. Various types of stem cells and neuronal progenitor cells were tested for their suitability for implanting into brain tissue. The survival, migration and differentiation of transplanted stem cells were then studied. By studying the electrical fields the researchers were able to show that the transplanted cells had been incorporated into the brain tissue. The cell culture data were tested through a limited number of experiments in vivo. The main question here was whether the cells transplanted into the brains of rats damaged by meningitis would survive and differentiate. The tests were carried out after 1, 2 and 4 weeks. Four weeks after the cells were implanted fully developed neurons could be found in the damaged area of the brain.

By using this method, stem cells from a great variety of sources can be preselected on the basis of their suitability for transplanting. Thanks to the preselection process it is possible to avoid testing unsuitable cells in vivo and the number of laboratory animals required for testing suitable cells is considerably reduced.

http://www.forschung3r.ch/en/projects/pr_103_06.html

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