Dutch researcher develops new method of stem cell culture

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Deborah Schop of the University of Twente, The Netherlands, and the MIRA research institute has developed a new method of stem cell culture. With the new method Schop can cultivate stem cells in a closed system. This means a time saving of two weeks in comparison with the old method. Schop obtained her PhD on 19 May from the Faculty of Science and Technology.

Bone marrow is one of the most important tissues as a source of stem cells, because it contains a relatively high number of mesenchymal stem cells. These are cells that have not yet become specialized for a specific task in the way that, for example, muscle cells already have. These stem cells are used for repairing tissues, for example after damage to bone or cartilage.

Cultivating enough stem cells for clinical use has always been extremely difficult and time-consuming, but now Deborah Schop of the University of Twente has developed a new method of mesenchymal stem cell culture, using a closed system: a bioreactor. Because stem cells grow well on a surface, Schop did research into the best carrier material. She also optimized the conditions in the bioreactor and the feeding schedule to give the best possible growth of the stem cells. The PhD student investigated a number of variables, such as the temperature, the amount of oxygen and the degree of acidity. These factors led to a saving of two weeks in growing enough stem cells for clinical use. Instead of 4 weeks, the cultivation of the stem cells now takes just 2-3 weeks.

Until now, stem cells were grown in special culture jars. At least a hundred million cells are needed for practical applications. It is important to achieve this number as quickly as possible, because stem cells are extremely sensitive. The slightest disturbance can lead to differentiation of the cells. When stem cells are first taken from bone marrow for culture, their numbers range from five hundred to five thousand undifferentiated stem cells. To achieve a minimum of a hundred million cells used to take a lot of culture jars, people and time. With Schop's new method many steps in the process can be left out, and the cells are available for clinical uses much more quickly.

Provided by University of Twente

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