Scientific breakthrough to pave the way for human stem cell factories

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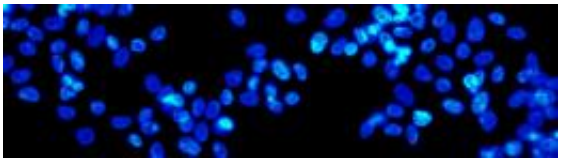

(PhysOrg.com) -- Large scale, cost-effective stem cell factories able to keep up with demand for new therapies to treat a range of human illnesses are a step closer to reality, thanks to a scientific breakthrough involving researchers at The University of Nottingham.

Currently, stem cells are cultured using animal derived products that encourage the cells to reproduce without losing their pluripotency — their ability to be turned into any type of adult stem cell, whether it be a cardio myocyte to be used in treating heart attack victims or a bone cell for growing new bone to graft to a patient's own.

However, the potential for cross-species contamination and the difficulty in reproducing these cells in large numbers means that while they are useful as a research tool, a synthetic alternative would be essential for the treatment of patients.

In a paper published in the September edition of Nature Materials, a

team of Nottingham scientists led by Professor Morgan Alexander in the University's School of Pharmacy, reveal they have discovered some man-made acrylate polymers which allow stem cells to reproduce while maintaining their pluripotency.

Professor Alexander said: "This is an important breakthrough which could have significant implications for a wide range of stem cell therapies, including cancer, heart failure, muscle damage and a number of neurological disorders such as Parkinson's and Huntington's.

"One of these new manmade materials may translate into an automated method of growing pluripotent stem cells which will be able to keep up with demand from emerging therapies that will require cells on an industrial scale, while being both cost-effective and safer for patients."

The research, a collaboration with colleagues Bob Langer, Dan Anderson, Rudolf Jaenisch and Krystyn Van Vliet at the Massachusetts Institute of Technology (MIT), involved using polymer microarrays — standard scientific glass slides with 1,700 polymer spots on the surface. Stem cells tagged with a fluorescent agent which allow them to be seen were placed onto the polymer spots. The scientists were then able to watch the stem cells and observe which polymers were most successful at promoting the most growth while also maintaining the pluripotency of the stem cells. Critically, in this paper the influence of the material properties was investigated though analysis of the polymer micro array spots.

More information: The paper 'Combinatorial development of biomaterials for clonal growth of human pluripotent stem cells' will appear in the September edition of *Nature Materials* and can be viewed online at www.nature.com/nmat/journal/v9 … n9/abs/nmat2812.html

Provided by University of Nottingham