

Regenerative medicine success for muscles

1 April 2011



Great Ormond Street Hospital for Children.

(PhysOrg.com) -- An innovative strategy for regenerating skeletal muscle tissue using cells from the recipient's own body is outlined in UCL research published today.

The paper, authored by Dr. Paulo de Coppi (UCL Institute of Child Health and surgeon at Great Ormond Street Hospital) and colleagues, shows that damaged [muscle](#) tissues treated with satellite [cells](#) in a special degradable hydrogel showed satisfactory regeneration and muscle activity. Muscle activity in repaired muscle in a mouse model was comparable with untreated muscles. This is the first time muscle function has been proved by physiological tests.

The research is published in the *Journal of the Federation of American Societies for Experimental Biology* and represents an impressive development in the growing field of regenerative medicine.

Satellite cells (SCs), freshly isolated or transplanted within their niche, are presently considered the best source for muscle regeneration. They are located around existing

muscles. Hence, a patient's own cells can be used, from a muscle biopsy.

A key issue for regeneration is how cells grow as a structure, as they usually require some form of framework. A hard framework would impede muscle growth and muscle cell penetration. The hydrogel, by contrast, provides a supportive structural skeleton but degrades quickly as muscle tissue returns and the support becomes unnecessary. The gel is initially liquid, hardens in place under UV light, and is easily penetrated by muscle cells.

"We focused on a simple, robust, and reproducible technique that could be easily adapted to clinical requirements" said Dr. De Coppi.

"This is using the patients own cells, without any lengthy culturing process, which means we could take a biopsy, produce the cells in a couple of hours, and implant them where needed - it can be done in theatre as one process. Using the patient's own cells eliminates any tissue rejection."

"Nor are there ethical debates as for embryonic stem cells, or culturing and availability issues, such as amniotic stem cells."

The lab model has the potential to be translated into significant clinical benefit for babies and children born with defective organs, or caused by injury or pathological conditions, that currently require complicated and potentially devastating reconstructive surgery.

Professor Andrew Copp, Director of the UCL Institute of Child Health, said: "This is a very exciting research finding that may significantly advance our ability to repair muscle damage or defects in future. It is a great example of translational research in action, from the laboratory to a near-clinical application."

The focus for initial clinical research in humans will be relatively small muscles at first, like deformities

in the face and palate, or in the hand. It will be technically more demanding to grow larger muscles with more structure, which would require their own nerves and blood supply.

"We want to move to safe and effective human trials" said Dr de Coppi, "but of course we are not there yet. Furthermore scaling up from small muscles to larger structures will undoubtedly be challenging."

More information: [Research paper in The FASEB Journal](#)

Provided by University College London

APA citation: Regenerative medicine success for muscles (2011, April 1) retrieved 17 September 2021 from <https://medicalxpress.com/news/2011-04-regenerative-medicine-success-muscles.html>

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