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Breakthrough for babies born with severe cleft palates after experiments at ISIS

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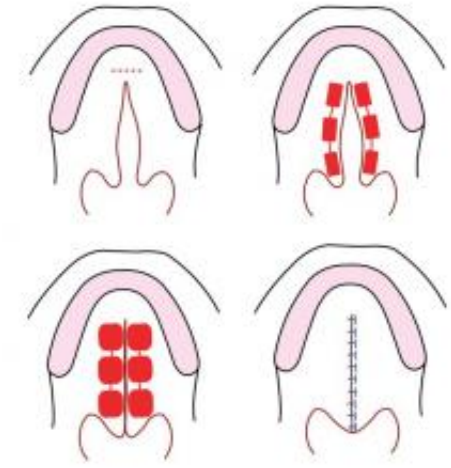

A diagram of how hydrogel plates would work when implanted into a cleft

Scientists working on a treatment for babies born with cleft palates have made a promising breakthrough and the first clinical trials are planned for early next year. Clefts are the most common birth defect in Britain, with one in every 700 babies affected; currently in severe cases radical surgery is required to correct the problem, and in addition future complications can occur as the child grows into an adult. The preliminary results on a hydrogel material studied using the Science and Technology Facilities Council's ISIS neutron source show treatment for severe cleft palates could be carried out without the need for complex surgery.

Cleft palates are currently repaired by surgically repositioning the available palatal mucosa, the tissue structure at the roof of the mouth, in order to cover the gap in the palate. However, if the cleft defect is too wide there may be insufficient local tissue available to close the gap without undertaking quite radical surgery. It is these severe cases that can cause future complications for infants as they develop into adults - particularly with speech and facial growth problems.

A team of researchers at the University of Oxford, the John Radcliffe Hospital in Oxfordshire, and the Georgia Institute of Technology in the United States has used ISIS to look at hydrogel on the molecular level to try and gather enough information to develop materials that could be used for a potential new treatment.

"ISIS provided us with the high level of structural detail we needed to assess the new material. It gives unique and accurate results that we can't get with any other technique," says Professor David Bucknall from the Georgia Institute of Technology.

The new potential treatment for these severe cases involves inserting a small plate made of an anisotropic hydrogel material (similar to that used in contact lenses) under the mucosa of the roof of the mouth of the patient.

The hydrogel gradually expands as fluid is absorbed, encouraging skin growth over and around the plate - a process known as 'tissue expansion'. When sufficient skin has been generated to repair the palatal cleft, the plate is removed and the cleft is repaired by using this additional tissue. The success of the preliminary results of self-inflating anisotropic hydrogel tissue expanders mean clinical trials in this area are expected to take place early in 2011.

"Babies born with cleft palates usually have problems feeding, and may

have speech difficulties in later life, as well as issues with their hearing, dentition and facial growth," says Mr Marc Swan a plastic surgeon at the John Radcliffe Hospital in Oxford, and the instigator of the study. "The severest cases often have the least favourable outcomes and unfortunately these are the most challenging children to treat surgically."

Rosanna Preston, CEO of CLAPA (The Cleft Lip and Palate Association) commenting on the research said; "Facial clefts of the lip or palate are the most common birth defect and it is vital that we continue to explore new treatments to help those affected. This research is particularly interesting as it addresses the most severe cases where the effects on the child's development may be greatest. We will be excited to see the results of the clinical trials."

The study is the first to be carried out using the Offspec instrument at the recently opened second target station at ISIS. Offspec is the world's most advanced neutron instrument for studying new surface structures and can be used for a number of applications including biological membranes and patterned materials for data storage media.

Andrew Taylor, ISIS Director says: "This study shows how fundamental knowledge about the structure of materials can be used to develop new technology. The instruments at the new ISIS second target station build on 25 years of expertise developed in the UK. They are designed to allow new areas of research to flourish - particularly in soft matter and bioscience - and make it easy for research teams to get the important results that they need. We're pleased that at ISIS we can continue to contribute to research affecting everyday lives."

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