Queen's scientists teaming up to cure premature baby blindness

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Scientists from the School of Medicine, Dentistry and Biomedical Sciences at Queen's University Belfast are teaming up to develop a cure to an illness that can lead to blindness in premature babies, thanks to funding from children's charity Action Medical Research.

Two teams from the Centre for Vision and Vascular Science at Queen's are taking different approaches to a condition called Retinopathy of Prematurity (ROP). The condition can lead to blindness in premature babies, putting the youngest, sickest and smallest babies most at risk, including over 3,000 babies who are born more than 12 weeks early each year in the UK.

ROP is caused by blood vessels in the eye growing abnormally and causing damage to the retina – the light-sensitive inner lining of the eye. Evidence suggests it develops in two stages:

- Stage 1. Premature babies have poorly developed lungs and need extra oxygen to help them breathe. Unfortunately the blood vessels that supply the eye's light-sensitive retina are damaged by this additional oxygen and stop growing properly, meaning the retina does not get enough nutrients.

- Stage 2. Eventually, in response to this damage, new vessels grow, in an attempt to rescue the retina, but they are abnormal and actually damage the eye, causing vision loss.

The first team, led by Dr Denise McDonald, has the aim of tackling the disease at a very early stage, which will minimise the damaging effects of ROP.

The second team, led by Dr Derek Brazil, is investigating whether stem cells from babies' own umbilical cords might have the power to repair their damaged eyes and save their sight.

About one in ten babies with ROP develops severe disease, which threatens his or her sight. If this is detected early enough, laser treatment can save the most important part of a baby's vision – the sharp, central vision we need to look straight ahead. However, this causes permanent loss of a baby's peripheral vision and may induce short-sightedness. What's more, it doesn't always work, meaning some babies still go blind.

Dr Brazil believes it may be possible to protect babies from ROP, and save their sight, by treating them with a special type of stem cell taken from their own umbilical cords. Dr Brazil and his colleagues Dr Michelle Hookham, Dr Reinhold Medina and the Centre Director Professor Alan Stitt, were awarded a two-year grant by Action Medical Research, to undertake this important work.

He said: "We hope our laboratory work will reveal whether vascular stem cells have the potential to repair damage to babies' eyes and save their sight. If so, it is possible that in the future vascular stem cells could be taken from a baby's own umbilical cord just after birth and then grown in the laboratory in case treatment is needed.

Taking a different approach, Dr McDonald and her team are exploring a key step in the early stages of the disease process. While laser treatment tackles stage 2 of the disease process, by stopping abnormal blood vessels from growing, by this stage the disease can already be quite severe.

Dr McDonald and her team are looking for possible new treatments which will protect the retinal blood vessels from the effect of high oxygen which occurs in stage one.

Evidence suggests that certain cofactors protect and encourage normal growth of the delicate blood vessels that supply the retina, as long as they are present in sufficient quantities. In contrast, low levels of these cofactors seem to be linked to the destruction of blood vessels. The researchers are investigating the role of specific cofactors and ways to enhance their function as a possible treatment for ROP.

Dr Denise McDonald and her colleague, Dr Tom Gardiner, were awarded a two-year research grant from Action Medical Research for the project.

Dr Alexandra Dedman, Senior Research Evaluation Manager from Action Medical Research, said: "We are delighted to be funding these two expert research teams in Belfast who both have longstanding track records, recognised internationally. Their work in this area has the potential to change the lives of babies around the world suffering from this condition."

Both Dr Brazil's and Dr McDonald's teams are based at the Centre for Vision and Vascular Science at Queen's University Belfast, which contains state-of-the art facilities and equipment. The centre has a long history of successful research into many of the leading causes of vision loss. Both projects involve collaboration with Dr Eibhlin McLoone, consultant paediatric ophthalmologist at the Royal Victoria Hospital.

Provided by Queen's University Belfast