

# Saving the sight of premature babies

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Scientists at Australia's Vision Centre have made an important breakthrough that could save the sight of premature babies.

The researchers found that treatment with near-infrared (NIR) light can prevent the development of retinopathy of prematurity – a disease that can cause blindness in children born prematurely.

"As our sight develops, blood vessels grow at the back of our eyes to provide nutrients and [oxygen](#) to the retinas," says Dr Krisztina Valter of The Vision Centre and The Australian National University explains.

"However, in [premature babies](#), these retinal vessels are not fully developed, and when these babies are placed under [oxygen therapy](#) to support their [immature lungs](#), the high levels of oxygen can release [free radicals](#) in the retina, causing damage in the tissue.

"Most importantly, the cells that are important for the proper growth of blood vessels are the targets of the damaging free radicals. That means that once the babies can be returned to normal air when their lungs are fully developed, they now have [blood vessels](#) growing uncontrollably in all directions in the eyes. These vessels bleed easily, which can result in severe changes and damage of the retina, causing irreversible loss of vision."

This retinopathy of prematurity is a leading cause of infant blindness in developed countries. The treatment is surgery or using a laser to seal off the bad vessels, Dr Riccardo Natoli of The VC and ANU explains.

"However, these treatments are expensive, invasive and often have side effects, including destroying portions of the child's [peripheral vision](#)."

Now, using animal models that mimic the disease, Vision Centre researchers have found that shining gentle near-infrared light (NIR) at 670 nanometres (nm) is a potential treatment that is less invasive, inexpensive and free of side effects.

"We found that NIR treatment can greatly decrease the risk of developing retinopathy of prematurity," Dr Natoli says. "There were fewer vessels growing in the wrong directions, and also a significant decrease of bleeding from the newly grown vessels."

"While there were still some vessels that grew out of bounds in the experimental animals, they were far fewer than in animals that did not receive NIR treatment."

"We don't fully understand the process of how the NIR light protects the eyes, but we suggest that the light sends a signal to the mitochondria – the 'powerhouse' of every animal cell – to use oxygen more efficiently, resulting in fewer free radicals and less damage."

The researchers say this is the first study to show that NIR therapy can protect the retina from exposure to high levels of oxygen, and are currently running human trials to test NIR light in premature babies.

"Compared to conventional methods, NIR light therapy is cheaper and less invasive because it prevents long term damage to the retina, by halting incorrect vessel growth from occurring in the first place," says Dr Natoli.

"As premature babies who have under-developed lungs still need oxygen to grow, the key is to treat them with moderate amounts of the light,"

says Dr Valter. "The fantastic thing about the treatment is that as little as a few minutes of NIR every day, by encouraging the cells to use oxygen more efficiently, could help stop retinopathy of prematurity from developing.

"Modern medicine is increasing the chances of survival of premature babies around the world, but there's also the risk of complications, such as retinopathy of prematurity. So we must find ways to decrease these complications, and we believe that NIR [light](#), by saving premature babies from having to compromise their sight, is one of them."

The researchers have started a trial to treat newborns with NIR at the Canberra Hospital, with Associate Professor Alison Kent of The Australian National University.

The study is titled "670nm Photobiomodulation as a Novel Protection against Retinopathy of Prematurity: Evidence from Oxygen Induced Retinopathy Models."

**More information:** Natoli, R. et al. 670nm Photobiomodulation as a Novel Protection against Retinopathy of Prematurity: Evidence from Oxygen Induced Retinopathy Models, *PLoS ONE*. [DOI: 10.1371/journal.pone.0072135](#)

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