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OXYGEN REDUCES EFFECTS OF RETINAL DETACHMENT

Getting oxygen and getting it fast should be the first priority of anyone experiencing retinal detachment, according to research published in the August issue of the American Journal of Ophthalmology.

Retinal detachment develops in 25,000 Americans annually and can result in blindness. The disease is often caused by holes or tears in the retina, the thin lining of light-sensitive nerve fibers and cells covering the inside wall of the eye. It usually requires emergency surgery.

Even though the current findings are the result of animal studies and not clinical trials on humans, the researchers say the results are so compelling that ophthalmologists everywhere may want to consider supplying oxygen to patients diagnosed with retinal detachment while they await surgery.

Nearsightedness, glaucoma, diabetes, severe eye injury, and advancing age are all risk categories for retinal detachment.

In an accompanying editorial, Thomas M. Aaberg, Sr., M.D., of Emory University, characterizes this recommendation as "bold speculation," and challenges the authors to further their studies in a way that will allow direct assessment of oxygen's ability to reduce a significant long-term effect of retinal detachment, the proliferation of cells on the retinal surface.

Yet he concludes by saying "Nevertheless, these articles increase understanding of retinal repair after retinal detachment, demonstrating the great value of translational research by building a bridge between the basic scientist and the retinal surgeon."

"The bottom line is that oxygen therapy reduces the amount of damage to the photoreceptor cells of the retina," said Steven K. Fisher, Ph.D., director of the Neuroscience Research Institute at the University of California, Santa Barbara, and co-author of the articles. Photoreceptors, the light-sensitive cells of the retina, have the highest metabolic rate of the body, and have only one source of oxygen. Separated from that, they can die very quickly.

Fisher stressed that patients can use the common, everyday-use type of oxygen mask; the therapy need not be specialized.

"Patients diagnosed with retinal detachment should be provided with oxygen immediately," he said. This will protect the cells before the surgeon reattaches the retina.

Warnings of retinal detachment may include flashing lights, new floaters, or a gray curtain which moves across the eye.

During retinal detachment, the retina is separated from its only source of nutrients and oxygen, the choroid, a bed of capillaries that serves to transport them. With oxygen therapy, the retina is supplied with more of those life-sustaining molecules.

"Until now, no one had tested this simple hypothesis," said Fisher. "We thought that if we just provided more oxygen, we could decrease damage to the retina."

The authors state: "The present experiments were designed to test whether supplementing the supply of one of the main energy sources of photoreceptors (oxygen) would enhance photoreceptor survival. Oxygen reaches the outer retina specifically and rapidly when inhaled levels are supplemented."

"Further, oxygen is readily available in most clinical settings and there is much expertise and experience in its administration in cardiac and respiratory disease," according to the article. "That availability and expertise could enable a ready deployment of oxygen to improve the outcome of re-attachment surgery, if the value of supplementation for photoreceptor survival could be established."

Geoffrey P. Lewis, Ph.D., NRI researcher and first author of the second paper, explained that a major complication of retinal detachment -- even after seemingly successful re-attachment -- is the development of a disease called proliferative vitreoretinopathy.

"The re-attached portion of the retina becomes a focus for scarring of cells called 'glial cells' which spread into the surrounding retina, including the retinal areas that were not previously detached and induces their detachment or prevents photoreceptor recovery," said Lewis.

The research described in the second paper shows that providing oxygen during detachment reduced all aspects of this type of cell abnormality induced by detachment.

The two articles represent a collaboration between the laboratories of Jonathan Stone, D.Sc., at the NSW Retinal Dystrophy Research Center, Department of Anatomy and Histology, University of Sydney, and Steven Fisher, Ph.D., at the Neuroscience Research Institute of the Department of Molecular, Cellular and Developmental Biology, University of California, Santa Barbara.

They are entitled: "Limiting Photoreceptor Death and Deconstruction During Retinal Detachment: The Value of Oxygen Supplementation," and "Limiting the Proliferation and Reactivity of Retinal Muller Cells During Detachment: The Value of Oxygen Supplementation."

The work reported in these papers was supported by the Australian Retinitis Pigmentosa Association, the National Health and Medical Research Council (Australia), the Medical Foundation of the University of Sydney, the National Eye Institute and the Santa Barbara Cottage Hospital.

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