Regenerative Medicine Update: First “Proto-Eye” Grown in Lab

Japanese scientists have made a leap in the realm of regenerative medicine by growing the first simple eye in a lab.

PRACTICAL SCIENCE WITH PHIL FREDA

A little over a month ago, I wrote an article covering regenerative medicine. Scientists and doctors are starting to grow human organs in the laboratory that may one day be implemented in medicine.
Recently, Japanese scientists have set another benchmark in the realm of regenerative medicine by successfully completing the first step in producing an eye.

On April 7, their research was published in the scientific research journal *Nature*.

How did they do it?

According to articles on ABC Science, The New Age and "Net Doctor," the research team used stem cells to grow a mouse eye.
Professor Andrew Elefanty from the Monash Immunology and Stem Cell Laboratories says the scientists have taken embryonic stem cells from a mouse and used them to start the experiment.
If you remember my last article on regenerative medicine, stem cells are cells that have not been given a job yet by the body and can be molded into whatever shape, or organ for that matter, that is targeted to be grown.
The researchers injected these stem cells into a medium containing molecules that would normally be found in embryonic stages of normal eye development. Gelatinous proteins to help support the cells and form structure were also placed inside.

What were the results?

The researchers found that the mouse embryonic stem cells developed into retinal-like cells.

The retina's role is to covert light images to nerve cells that are connected to and interpreted by the brain.
In addition, these retinal-like cells started to align themselves into hemispherical structures that began to resemble the optic cup, which is the normal shape of the eye.

After this, the optic cup formed into a layered structure resembling a normal retina.

Surprisingly, the inner layer of the structure started to express genes that are typically related to the nerve function of the retina.
The outer layer of cells also started to express genes, but these genes were typical of the pigmented cells of the retina.

The most important result of the research, though, is *that the cells themselves did all the work.*
They did not have to be coaxed, poked or prodded. The generation process was performed solely by the cells, and it seems that they "knew" what to do.

Unfortunately, no lens-like structures were formed, and the cells started to degrade after about 35 days.

Also, the researchers were not able to test whether the cells in the retina-like structure did, or were capable of, receiving light and transmitting a signal.

Despite these results, the research is a huge leap in the quest to develop a viable and workable eye.

What's next?

The research team is still a long way away from their goal to grow an entire, viable and transplantable eye.

Researcher Yoshiki Sasai of the RIKEN Center for Developmental Biology in Kobe, Japan, said in a release by the center,"It's exciting to think that we are now well on the way to becoming able to generate not only differentiated cell types, but organized tissues ... which may open new avenues toward applications in regenerative medicine."
Sasai realizes that the implications of this research are valuable to the movement of regenerative medicine and that the future holds great achievements.

Sasai also added that this type of research may prove to be integral and relevant for a group of genetic eye conditions known as retinitis pigmentosa, which leads to blindness.
Retinitis pigmentosa attacks vision by damaging the retina of the eye. People affected by this disease slowly lose their vision because the photoreceptor cells that actually catch the light entering the eye degenerate and eventually die.
After reviewing this study, Richard Lang, who is the director of the visual systems group at the Cincinnati Children's Hospital, agrees with Sasai, stating in an AFP report, "As a step forward in the lead-up to cell replacement or even organ therapy, this is a really significant piece of work."
This research is still in its infancy and still has long way to go before a complete eye is grown in the laboratory, but the future is looking promising.

This type of work, including the research highlighted in my previous article, is the new road being traversed in medicine.
Thanks to the research being pioneered by the RIKEN Center for Development Biology in Japan, blindness may one day be a thing of the past. Think about it.