Restoring Vision to the Blind: Concluding Remarks

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When we conceived of this initiative to study the progress made so far of restoring vision to the blind, we recognized the enormous diversity of approaches already underway and their complexity. An immediate concern was whether we could get our hands around the topic and present a reasonably comprehensive and useful report; a report that would be helpful to the research community, funding agencies, and foundations. I believe we have succeeded in doing this, thanks to the hard work and time of all the participants who contributed to the project, especially the Chairs and Scribes of the Targeted Sessions who formulated the report chapters. The success of the report, on the other hand, will be determined largely by you, its readers, and by its impact on the field.

This area of research is exceptionally fast moving with new findings and ideas appearing all the time. Let me mention two such examples. The first is a new experimental finding mentioned in the report, but which has received much attention and further development even during the course of the initiative. I am referring to the three-dimensional culture systems using stem cells that result in the formation of eye cups that contain laminated retinal tissue (see Fig. 4.3 and cover micrograph). So far these eye cups are tiny, but that they form retinal tissue much as happens during normal eye development suggests it may be possible eventually to grow eye cups and entire retinas large enough to be useful for transplantation purposes.

The second example is just an idea at present, but is being given serious consideration by a number of clinicians and scientists. This is to transplant whole adult human eyes. The eye surgeons say that this is possible technically, but the biggest obstacle at present is the regeneration of the optic nerve. Whereas we have known for many years that regeneration of axons in the central nervous system including the optic nerve can occur under the right conditions, the number of axons that regenerate is only a few percent of the total number of axons. Which ganglion cells they derive from is not known nor is whether regenerating axons make the correct connections centrally. These are critical questions to answer if the possibility of transplanting an adult human eye is ever to become a reality. Another obvious question is whether there would be enough healthy human eyes available for transplantation purposes.

These two examples undoubtedly represent only the tip of the iceberg of the ongoing experiments and ideas being generated all over the world to conquer blindness. For example, in the United States the National Eye Institute has recently announced an Audacious Goals Initiative that will focus on the regeneration of photoreceptors and ganglion cells in diseased retinas, including optic nerve regeneration. We applaud all of these efforts and are confident that restoring vision to the blind is a reasonable and realistic goal.

This chapter is part of the Restoring Vision to the Blind report by the Lasker/IRRF Initiative for Innovation in Vision Science. The full report, Restoring Vision to the Blind, including a complete list of contributors, is available in the [Supplementary Material](#).

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