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Letter to Editor

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# Current Strategies and Views on Regenerating Cornea

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## Letter to Editor

It's fitting to start with a comment from Charles Bonnet, a pioneering researcher in regenerative studies who lost his vision and thus had to abandon a promising career. In the 1740s, Bonnet did some of the earliest research on regenerating animals, or those that can "recover following cutting." Bonnet understood the possibilities that regeneration offered for science and medicine, and he was particularly intrigued by the thought of a "germe" within tissues that could regenerate—perhaps a forerunner to the stem cell concept. By the age of 25, he was an experienced naturalist who favored nature and philosophy to his work as a lawyer, but his vision began to weaken, forcing him to change his studies. He detailed the unsettling effects of eyesight loss on his life. Charles Bonnet syndrome is the result of visual hallucinations that he linked to alterations in visual perception. The tremendous physical and emotional obstacles of vision loss, compounded by a loss of independence and a reduction in life quality, job prospects, and earning opportunities, have always been major motivators to find innovative techniques to restore sight, and they continue to be so today [1].

The human eye is a remarkable structure that results from the coordinated development of several tissues, including neuroectodermal, ectodermal, and mesodermal contributions. Blindness can result if any of these key eye tissues are compromised. Tissue transplantation, laser therapy, and the recent approval of the first gene therapy for RPE-65-based retinal degeneration are just a few examples of groundbreaking work in ocular medicine. We might think of the eye as a pioneer in cell therapy for advanced disease involving cell loss, and the prospect of future combinations of cell and gene therapy is attractive. However, before we can attain these therapeutic goals, we must overcome enormous challenges in cell manufacturing, surgical delivery, and drug development. as well as functional repair Here, we assess the current clinical status of ocular regenerative therapies, analyses some of the most promising preclinical studies, discuss the obstacles, and look ahead to what might be accomplished in the next decade [2].

We evaluate the situation of the field from the cornea to the retina, summarizing the advances for each target tissue. The cornea serves as a barrier and a lens to focus light entering the eye, acting as a window to the visual system. Reduced eyesight due to loss of corneal integrity and transparency. To present, stem cell-based applications have shown that function can be restored in each of the three major corneal layers: the surface epithelium, stroma, and inner endothelium [3] .The corneal epithelium (CE) is a self-renewing tissue that is kept alive by stem cells in the limbus. Limbal stem cells create transitory amplified daughter cells that migrate centripetally to regenerate the epithelium. Limbal stem cell deficit occurs when the limbal stem cell niche is destroyed (LSCD). LSCD, whether congenital or acquired, hinders CE regeneration, leading to progressive opacification, chronic ulceration, conjunctivalization, and neovascularization, as well as a variety of other symptoms. Pain, blindness, and ugliness are all possible outcomes. Transplantation of limbal biopsy tissue including stem cells was shown to help people with LSCD as early as 1965. More recently, a modified technique of transplanting limbal tissue fragments adhered to an amniotic membrane has shown a high rate of success in 190 patients with good underlying stroma transparency [4].

Pellegrini and colleagues were the first to use cultivated autologous limbal epithelial cells for transplantation in clinical trials. Interestingly, corneal regeneration could be achieved in over 70% of cases if the limbal cell cultures contained a sufficient number (over 3%) of limbal stem cells, which were detected as holoclones expressing high levels of the p63 transcription factor after more than 10 years of clinical follow-up (Rama et al., 2010). Enzymatic extraction of limbal stem cells from a tiny biopsy was performed, and the cells were grown on a fibrin glue support. The European Union has approved this approach, making it the first time stem cells have been used for eye therapy. Many groups have replicated cultured autologous limbal epithelial cell transplantation utilising various supports, culture conditions, and cell sources. Amniotic membranes containing growth factors are now the most common carriers [5].

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## Conflict of Interest

None

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