FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: The Development of an Innovative Platform Technology for Human Corneal Endothelial Cell Cultivation and its Use in Regenerative Medicine	
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1. Background of research

Corneal endothelium is the innermost layer of the cornea and it is essential for the maintenance of corneal transparency. Since the proliferative ability of human corneal endothelial cells is severely limited *in vivo*, corneal endothelial damage caused by trauma, intraocular surgery, or disease often results in the severe visual disturbance associated with corneal endothelial dysfunction. Thus, the development of effective and innovative treatments for corneal endothelial dysfunction is a top research priority worldwide.

2. Research objectives

To develop innovative platform technology which enables the proliferation and differentiation of human corneal endothelial cells. Furthermore, to develop new therapeutic modalities for the treatment of corneal endothelial dysfunction by the use of *ex-vivo* expanded human corneal endothelial cells and a medical-based therapy.

3. Research characteristics (incl. originality and creativity)

Previously, we reported the feasibility of cultivated corneal endothelial sheet transplantation in primate animal models and discovered that one of the selective ROCK inhibitors, Y-27632, promotes the proliferation of primate corneal endothelial cells *in vitro*. Currently, we are focusing on the development of a new pharmacological agent for the treatment of corneal endothelial dysfunction which promotes corneal endothelial wound healing. At present, the findings of our research are very promising and our innovative technology is expected to lead to important future clinical applications.

4. Anticipated effects and future applications of research

Our research is expected to provide new medical and surgical treatments to patients suffering from corneal endothelial dysfunction. The basic technologies developed in this project will also be applicable to other fields of regenerative medicine research using pluripotential stem cells and will greatly promote and stimulate future research aimed at the development of clinical applications.