Special Issue on Retinal Prosthesis

Preface

A retinal prosthesis is a medical device that partially restores vision for blind patients suffering from retinitis pigmentosa and age-related macular degeneration. In these diseases, photoreceptor cells are dysfunctional but some retinal cells are undamaged. Consequently, by stimulating the remaining retinal cells, visual sensation or phosphenes can be evoked. This is the principle of the retinal prosthesis. On the basis of this principle, a retinal prosthetic device stimulates retinal cells with a patterned electrical signal so that a blind patient can sense a phosphene or something like an image. Since the end of the 1990s, a number of studies on retinal prostheses have been reported and some devices have been approved for clinical use in the USA and EU. The performance of such devices still requires improvement; in particular the spatial resolution. To achieve such improvement, a wide area of research is necessary, including fundamental studies of the electrophysiology of the retina, materials development for the stimulus electrodes and coating polymers, design consideration of stimulators, and so on.

This special issue is focused on next-generation retinal prostheses, and we have selected very interesting papers on topics such as high-performance stimulus electrodes, stimulation analysis and optimization, and total system evaluation, amongst others. We consider that these papers have a large impact on retinal prosthesis research and give new insights on the development of retinal prostheses.

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