Abstract EURETINA 2012, Rome

Photoreceptor transplantation into the adult retina

Marius Ader, Dresden, Germany

The prime reason for disability in industrialized countries is vision impairment and blindness caused by degeneration of the main light sensing cells of the retina - the photoreceptors. Replacement of lost photoreceptors by cell transplantation represents a possible treatment option for affected patients. Indeed, recent preclinical studies demonstrated that young photoreceptors have the potential to correctly integrate into the adult, non-neurogenic mouse retina following transplantation. Integrated donor cells developed the elongated morphology of mature photoreceptors including axonal terminals and inner- and outer segments. Importantly, recent studies from our lab demonstrate that disk-filled outer segments are not only formed by integrated photoreceptors but also by donor cells remaining in the sub-retinal space in a mouse model of retinal degeneration. Thus, transplanted donor cells generate all requirements for proper light detection and these findings might therefore offer the possibility of functional photoreceptor replacement in retinas completely devoid of endogenous photoreceptors. Furthermore, we developed a method for the enrichment of photoreceptors based on cell surface antigens and magnetic associated cell sorting. Such purification procedures will be important for the selection of in vitro generated, stem-cell derived photoreceptors for transplantation studies and represent an indispensable prerequisite for possible future clinical applications.