Perspectives of stem cell research in ophthalmology

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The current stem cell research in ophthalmology focuses on the following aspects: 1) isolation, purification, and expansion of adult stem cells; 2) differentiation of embryonic stem cells, or trans-differentiation of adult stem cells, into corneal and retinal cells; 3) tissue engineering of ocular surface tissues by three dimensional dynamic culture system; 4) isolation and differentiation of retinal stem cells from human retinoblastomas; and 5) construction of natural animal models of eye diseases with xenografted chimeras, et al. However, problems remained unsolved in 1) signal pathway and molecular mechanism of specific differentiation from stem cell into eye cells; 2) functional reconstruction of ocular surface and retinal tissue; and 3) immune response and inflammation after stem cells transplantation. Fortunately, recent advances offer new insights for ophthalmic stem cell research: 1) establishment of pluripotent cells, from parthenogenesis or reprogramming of somatic cells to avoid ethics and immune rejection for ocular cell regeneration; 2) xenografted chimeras facilities function research of adult stem cells during eye development.

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