

Characterization of growth and differentiation of goat limbal adult stem cells *in vivo* and *ex vivo*

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This paper reports isolation and characterization of pluripotent stem cells from adult goat eye. The cells were separated from limbal tissue of adult goats, and these primary cells have the ability to format holo-clones. The primary limbal stem cells were sorted by flow cytometric analysis, the selected ABCG2 positive and CD34 negative cells show the characteristics of stem cells, such as the expression of P⁶³, PCNA and high nuclear to cytoplasmic ratio. The RT-PCR result of these cells showed the SC associated markers of P⁶³, ABCG2 and PCNA were highly expressed, and the differentiation markers of CK3³, CK12 and Cx43 were undetectable. Therefore we termed these cells limbal adult stem cells (LASC). We found that when we induced the LASC under a series of procedures, the LASC proliferated and differentiated in culture to produce neurons, cardiomyocytes and osteoblasts. Further, we cultivated LASC on denuded human amniotic membrane to reconstruct artificial corneal epithelium. We successfully transplanted those artificial tissues in goats with limbal stem cell deficiency (LSCD). Our results showed that indeed LASC reconstructed the damaged cornea of goats with total LSCD. These data confirm that LASC can differentiate into different functional cell types *in vivo* or *in vitro*. Due to their high degree of inherent plasticity, and LASC can even be frozen and stored if needed, LASC are excellent candidate sources for clinical cell therapies.

Keywords: adult stem cell, limbal stem cell, plasticity, transplantation

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