Proliferation and stemness – P53

Identification and manipulation of endogenous adult stem cells
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Published on 23 Oct 2010

Stem cells (SC) are characterized by the ability to renew themselves through symmetric and asymmetric cell division and to differentiate into a diverse range of specialized cell types. This implicates their potential for therapy in regenerative medicine. However, our understanding of how SCs are maintained or replenished during life-time until senescence is poor. In this project signaling cascades involved in the self-renewal process of SCs are examined. Furthermore, since SCs display an undifferentiated phenotype, novel genetic approaches are needed to specifically address SCs. Modern genetic techniques not only enable researchers to visualize individual cells in order to identify morphological characteristics but also place them in a position to simultaneously manipulate cellular responses. In order to monitor and trace stem cells we have generated and tested novel reporters to monitor Notch as well as Oct4 positive stem cells in vitro and in vivo. In combination with conditional gene inactivation and cell ablation experiments these reporters provide new tools to characterize endogenous adult SCs and will give valuable information not only for researchers but also for clinicians in search for novel therapeutic approaches.