

**NUS Graduate School for Integrative Sciences and Engineering
Research Project Write-up**

Title of Project : Regulation of neural stem cell proliferation and differentiation

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Short Description

During fetal development birth of new neurons is widespread in the brain but, in both rodents and humans, neurogenesis continues into adulthood only in the subgranular zone (SGZ) of the dentate gyrus of the hippocampus and the subventricular zone. While numerous physiological and cellular factors regulating neurogenesis have been described the in vivo regulation of neural stem cell proliferation and differentiation in these niches remains incompletely described. Our laboratory is particularly interested in the transition from the highly proliferative fetal environment to the lower rates of proliferation seen in adulthood and ageing. We are attempting to understand how “immature” interact with the “adult” brain environment. This research is important as it has potential implications for psychiatric and neurological diseases. For example, drugs that treat both depression and schizophrenia alter adult neurogenesis. Ultimately, if we can understand the factors regulating neurogenesis this knowledge may allow the development of drugs that trigger neurogenesis after brain injury or in neurodegenerative disease in order to stimulate the brain to repair itself.

An example of our work in this area is the discovery of a novel role of TAG1-APP signaling in regulation of fetal neurogenesis (Ma et al., 2008; see Mattson and van Praag, 2008, for commentary). In addition to TAG1-APP signaling we are also exploring roles of 5-HT receptors and potassium ion channels in the regulation of neurogenesis. In the case of potassium channels, there are also interesting parallels with proliferative triggers in certain types of brain cancer.

Ma, QH, T Futagawa, WL Yang, XD Jiang, L Zeng, D Takeda, RX Xu, D Bagnard, M Schachner, AJ Furley, D Karagogeos, K Watanabe, **G S Dawe*** and Z Xiao* "A TAG1-APP signalling pathway through Fe65 negatively modulates neurogenesis". *NATURE CELL BIOLOGY*, 10, no. 3 (March 2008): 283-294. (*Corresponding authors)

Mattson, MP, van Praag, H "TAGing APP constrains neurogenesis". *NATURE CELL BIOLOGY*, 10, no. 3 (March 2008): 249-50.