NUS Graduate School for Integrative Sciences and

Title of Project: Biology of Fetal Neural Stem Cells, and directed differentiation

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Short Description

Neural stem cells are multipotent cells found within the central nervous system which can give rise to all three neural lineages of neurons, glial and oligodendrocytes. While they have immense potential for cellular therapy, limited knowledge of their identity and control of self-renewal and differentiation have hampered their clinical introduction.

At present, human fetal neural stem cells have been isolated from first trimester fetal diencephalon, telencephalon and second trimester subventricular zone, spinal cord and cerebral cortex, contrasting their more limited presence in the subventricular zone and dentate gyrus of an adult human.

In this project, we aim to identify new sources of fetal neural stem cells and ascertain the functional and phenotypic differences between regionally derived fNSC through immunophenotypic studies and expression profiling. Key regulators of differentiation identified will be validated through knock down / co-culture experiments before in vivo validation in xenotransplantation models of development and injury.

This work of identification of novel fetal neural stem cells sources and defining of the regulators controlling their self-renewal and differentiation can lead to safer and more effective cellular replacement therapies.