Focus on Faculty #14
Alain Nepveu

Dr. Alain Nepveu is a Professor in the Gerald Bronfman Department of Oncology as well as in the Departments of Biochemistry and Medicine at McGill University and holds a James McGill Professor award. His laboratory is situated at the Goodman Cancer Research Centre.

Dr. Nepveu is old enough to have been one of the first people to clone genes during his M.Sc. studies in bacterial genetics at Université de Montréal. He obtained a Ph.D. in microbiology from the Université de Sherbrooke and did postdoctoral studies at the State University of New York at Stony Brook in a laboratory that had recently cloned the c-Myc oncogene. There, he used the c-Myc gene to study mechanisms of transcriptional regulation and established that gene expression can be regulated at the level of transcription elongation. He obtained his first position as an independent investigator with the Ludwig Institute for Cancer Research in 1988 and joined the Department of Oncology at McGill University in 1992.

Dr. Nepveu's work in recent years has been focused on understanding the molecular bases for the paradoxical roles of the *CUX1* gene in tumour suppression and tumour progression. *CUX1* is a haplo-insufficient tumour suppressor gene. This means that loss or inactivation of one allele is sufficient to increase cancer risk. Paradoxically, *CUX1* gene copy number is increased in ~70% of cancers and its expression inversely correlates with patient survival. His group showed that the two main CUX1 protein isoforms ensure maintenance of genomic integrity and proper chromosome segregation. Yet, the function of each protein is coaxed by cancer cells which are acutely dependent on elevated *CUX1* expression. Such enhanced requirement for the function of otherwise "normal proteins" has been referred to as “non-oncogene addiction”.

Dr. Nepveu’s group currently investigates how alterations in DNA repair and DNA damage responses contribute to the initiation and progression of cancer, how certain cancer cells become dependent on base excision repair, and how efficient DNA repair mechanisms can enable cancer cells to resist radiotherapy and chemotherapy. One goal is to identify "druggable" biochemical activities that are essential to cancer cells but dispensable to normal cells, in order to develop novel

therapeutics that will sensitize cancer cells to treatments while causing no or minimal adverse effects.

Dr. Nepveu bicycles to work throughout the year and is now considering early retirement from hockey, although he has been saying that for the last 20 years.

We asked Dr. Nepveu to list a few of his articles whose work he is particularly proud or enjoyed the most. This is what he provided:

Sansregret, L., J. Livingstone, C. Vadnais, N. Kwiatkowski, A. Awan, C. Cadieux, L. Leduy, M. Hallett, and **A. Nepveu**. CUX1 causes chromosomal instability by promoting bipolar divisions after mitotic failure. Proceedings of the National Academy of Sciences of the USA, 108(5):1949-1954. 2011. http://www.pnas.org/content/108/5/1949.full

Ramdzan, Z., R. Pal, C. Vadnais, G. Vandal, C. Cadieux, L. Leduy, S. Davoudi, L. Yao, A. K. Karnesis, M. Paquet, D. Dankort, and **A. Nepveu**, A. RAS-Transformation in Cancer Cells Requires CUX1-Dependent Repair of Oxidative DNA Damage. PLoS Biology 12 (3), e1001807 (17 p.). 2014. http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001807

Ramdzan, Z., and **A. Nepveu**. *CUX1*, a Haploinsufficient Tumour Suppressor Gene Overexpressed in Advanced Cancers. Nature Reviews Cancer 14: 673-682. 2014.
www.mcgill.ca/gcrc/files/gcrc/webform/nrc3805.pdf