

The role of Hox genes in acute myeloid leukaemia

One of the very important projects in the Children's Cancer Centre Research Laboratories is to determine the mechanisms by which the genetic alterations that occur in normal blood cells turn these cells into leukaemia cells. One of the differences between normal white blood cells and leukaemia cells is that the leukaemia cells are blocked in their ability to differentiate (or mature into normal cells).

In this project we are working on a group of genes called "Hox" genes that critically govern the process of maturation of white blood cells (myeloid cells). When these cells become cancerous, they give rise to myeloid leukaemia. In many cases of myeloid leukaemia, Hox genes are deregulated and one effect of this deregulation is to prevent the white blood cells from maturing into a more developed state. This appears to be a critical step along the pathway to leukaemia. The goal of this project is to determine how these genes function to block maturation and determine whether stopping this effect can contribute to the cure of the leukaemia. Understanding how these genes block maturation will lead to a greater understanding of the nature of leukaemia.

Importantly, we have developed unique and powerful tools within the laboratory that permit us to "turn on" these genes (as might occur in a leukaemia) and "turn off" these same genes at our will in order to determine what influence this will have on the behaviour of leukaemic cells. These tools and this project will provide a unique insight into acute myeloid leukaemia and is a vital step towards developing new treatments for this type of leukaemias which is currently difficult to treat.

Additionally, a proportion of these funds will be put towards a piece of equipment called a "Nanospray". This functions to very accurately measure the concentrations of DNA used in the experiments.