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Understanding Myelodysplastic Syndromes from Blood Cell Counts

Haematopoietic stem cells, found in the bone marrow, are progenitors for the nearly 10^{12} blood cells, of all types, produced daily in an adult human. The blood cell production process, haematopoiesis, is important to understand in its relation to myelodysplastic syndromes (MDS), a group of cancers in which blood cells do not fully mature. In this short talk, I will describe a model of haematopoiesis given by a system of delay-differential equations. By fitting the parameters of this model to blood cell counts in MDS patients, I can identify and provide a mechanism for different types of MDS. I will address the statistical question of the frequency of blood samples needed to identify the MDS type and consider some type-specific treatment options.