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*Analysis of blood cancer model: periodic chronic  
myelocytic Leukemia*

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**Abstract**

Periodic chronic myelogenous leukemia(PCML) is a hematological disease that displays oscillations in circulating cell numbers with a period far in excess of what one might expect based on the stem cell cycle duration. In this talk we first present some basic facts of Leukemia including main types, causes, symptoms, medications. Motivated by a desire to understand how long period oscillations can arise in PCML, we construct a stem cell cycle model described by a nonlinear differential delay equation. This periodic oscillation can be analytically constructed when the proliferative control is of a ‘bang-bang’ type (the Hill coefficient involved in the nonlinear feedback is infinite). We further obtain a contractive return map (for the semiflow generated by the functional differential equation) in a closed and convex cone when the proliferative control is smooth (the Hill coefficient is large but finite). The fixed point of this contractive map gives the long period oscillation previously observed both numerically and experimentally. Simulations of the influences of different parameters to the oscillation are also given.