1063-60-66 **Cristian Tomasetti*** (cristian@math.umd.edu), 4146 CSIC Building #406, Paint Branch Drive, College Park, MD 20742, and **Doron Levy**. *The Role of Symmetric and Asymmetric Division of Cancer Cells in Developing Drug Resistance.*

Often, resistance to drugs is an obstacle to a successful treatment of cancer. Clearly, in order to understand drug resistance, it is imperative to have a good model of the underlying dynamics of cancer cells. One of the main ingredients that has been recently introduced into the rapidly growing pool of mathematical cancer models is stem cells. Surprisingly, this all-so- important subset of cells has not been fully integrated into existing mathematical models of drug resistance. In this work we incorporate the various possible ways in which a stem cell may divide into the study of drug resistance. We derive a new estimate of the probability of developing drug resistance by the time a tumor is detected, and calculate the expected number of resistant cancer stem cells at the time of tumor detection. To demonstrate the significance of this approach, we combine our new mathematical estimates with clinical data that is taken from a recent six-year follow-up of patients receiving imatinib for the first-line treatment of chronic myeloid leukemia. Based on our analysis we conclude that leukemia stem cells must tend to renew symmetrically as opposed to their healthy counterparts that predominantly divide asymmetrically. (Received August 03, 2010)