962-92-1214 **Leonid Hanin*** (hanin@isu.edu). *Distribution of the number of clonogenic tumor cells surviving fractionated radiation.*

What is the form of the probability distribution for the number of clonogenic tumor cells surviving fractionated radiotherapy? Assuming that (a) tumor is exposed to a sequence of $n$ equal doses separated by equal time intervals; (b) all tumor cells survive each exposure with the same probability $s$, given that they survived previous exposures; and (c) kinetics of tumor cell population between fractions of radiation is governed by a homogeneous birth and death process, we find, for any non-random initial tumor population size $i$, an explicit formula for the distribution of the number $M$ of surviving clonogenic cells at the end of treatment. Several limiting forms of this distribution are obtained. In particular, it is shown that if $i \to \infty$ and $s^n \to 0$ so that $is^n$ tends to a finite positive limit then the distribution of random variable $M$ converges to a Poisson distribution which generalizes the classical theorem about the Poisson limit of a sequence of binomial distributions. Under natural assumptions on post-treatment tumor development, the distribution of the time to tumor recurrence is computed and used to estimate the model parameters from data on survival of patients treated for prostate cancer. (Received October 02, 2000)