Relaxed Poisson cure rate models

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The purpose of this paper is to make the standard promotion cure rate model more flexible by assuming that the number of lesions or altered cells after some a treatment follows a fractional Poisson distribution. It is proved that the well-known Mittag-Leffler relaxation function is a simple way to obtain a new cure rate model which is a compromise between the promotion and geometric cure rate models allowing for super-dispersion. So, the relaxed cure rate model developed here can be considered as a natural and less restrictive extension of the popular Poisson cure rate model at the cost of an additional parameter but a competitor to negative-binomial cure rate models. A simulation study and an illustration of the proposed cure rate model from the Bayesian point of view are presented.

Keywords: Bayesian inference; Poisson cure rate model; Fractional Poisson distribution; Mittag-Leffler relaxation function; Relaxed Poisson cure rate model; Geometric cure rate model.