Modelling the Effect of Accumulating Recurrences and Progression in Bladder Cancer Data

Cristina Santamaría[1], Belén García-Mora[1], Gregorio Rubio[1], Juan R. González[2][3][4]

[1] *Instituto de Matemática Multidisciplinar, Universidad Politécnica de Valencia, Spain*
[2] *Center for Research in Enviromental Epidemiology (CREAL), Barcelona, Spain*

Multiple sequential recurrences are one of the most important characteristics of superficial transitional cell carcinoma of the bladder. Many investigations have been performed to identify predictive factors for the first recurrence, but very few studies have investigated the effect of accumulating multiple recurrences of this cancer and its clinicopathologic factors associated and the aggressive *progression* as a terminating event. We consider different models for analyzing time-to-recurrences which incorporate the effect of accumulating reoccurrences as well as the correlation within individuals using a frailty term. We use the penalized likelihood estimation to nonparametric estimation of the continuous hazard function. Besides, two approaches are considered in this analysis to represent different aspects of the bladder cancer: the first one attempts to focus on the effect of the clinico–pathological factors effects on recurrences by regarding a progression before the recurrence as a censoring event, meanwhile the second one analyzes these same effects on either recurrence or progression, whichever comes first.

References

[1] García B, Rubio G, Santamaría C, Pontones JL, Vera CD and Jiménez JF (2005) A predictive mathematical model in the recurrence of bladder cancer. Mathematical and Computer Modelling 42:621-634.

[2] González JR, Pea EA and Slate EH (2005) Modelling intervention effects after cancer relapses. Statistics in Medicine 24(24):3959-3975.

[3] Li QH and Lagakos SW (1997) Use of the Wei–Lin–Weissfeld method for the analysis of a recurring and a terminating event. Statistics in Medicine 16:925-940.

[4] Lin DY (1994) Cox regression analysis of multivariate failure time data: the marginal approach. Statistics in Medicine 13:2233-2247