BAYESIAN MODELLING OF LIVER CANCER INCIDENCE TRENDS BASED ON INCIDENCE TO MORTALITY RATE RATIOS

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Estimates from the year 2002 indicate that liver cancer remains the fifth most common malignancy in men and the eighth in women worldwide. The geographic variability in incidence of primary liver cancer is largely explained by the distribution and the natural history of the hepatitis B (HBV) and C (HCV) viruses. An increase of liver cancer incidence was detected in France and Italy at the end of the 90s, being it likely to continue for some decades. In Spain, where HBV and HCV prevalence are similar to those of Italy and France, time trends of liver cancer have not been assessed.

Bayesian autoregressive age-period-cohort (APC) models have been used to evaluate time trends of liver cancer incidence and mortality, whereas the incidence/mortality ratio has been used to project incidence trends. These models allow summarizing information related to disease rates with the aim of assessing the effect of these three factors on the rates. In order to smooth effects on each scale on time, Gaussian autoregressive prior models in the forward direction were proposed by Breslow and Clayton and later by Berzuini and Clayton and Bray. We denote these models by APC1. In APC1 models it was assumed that second order differences are independent normal covariates. Trends corresponding to age, period and birth cohort were smoothed using second degree autoregressive smoothing (non-parametric smoothing with autoregressive error component). An alternative approach has been described by Bashir and Estève. They modelled the full age-period-cohort model based on APC1 but adding a constraint on the second order differences related only with the age parameters. We have denoted this model as APC2. Alternative methods of projection will be discussed based on permuting the constraints on the first and second order differences of the APC model parameters.