

Applied Survival Analysis

Solutions to Lab 5: More on Cox Proportional Hazards Model

1. C.I., Wald test and Likelihood Ratio test: MAC Dataset

(a) The hazard ratio of the Karnofsky score status is $HR_{KARNOF} = \exp(-0.0448) = 0.956$. After adjusting for the effect of treatment the hazard of MAC disease is approximately 4% less for each unit increase in the Karnofsky score.

(b) The 95% C.I. is: $[\exp(-0.0656747), \exp(-0.0239843)] = [0.936, 0.976]$. This implies 2% to 6% decrease in hazard of MAC disease for each unit increase in the Karnofsky score after adjusting for the treatment effect.

(c)

$$\left. \begin{array}{l} H_0 : \beta_1 = 0 \\ H_a : \beta_1 \neq 0 \end{array} \right\} \Rightarrow X^2 = \left(\frac{-0.0448}{0.0106} \right)^2 = 17.86 > X_{1;0.05}^2 = 3.84 \Rightarrow \text{reject } H_0, \text{ thus the}$$

Karnofsky score is an important predictor of MAC disease even when adjusted for treatment effect.

(d) $X_{LR}^2 = -2[\log(\hat{L}(1)) - \log(\hat{L}(2))] = -2 * (-754.52813 + 738.66225) = 31.73 > X_{1;0.05}^2 = 3.84$

Which implies that the addition of cd4 in the model contributes significantly in predicting MAC disease. In other words, model 2 is better than model 1.

2. Survival Function, Predicted Medians and P-year Survival: Nursing Home Data

(e) The subgroup of healthy single persons seems to have the longest length of stay.