

Plan for this lecture

- ★ A few expressions for the relative risk regression
 - specification of the situation
 - hazard rate and intensity process
 - partial likelihood
- ★ Cox regression as profile likelihood

Relative risk regression

★ Situation:

- n individuals
- individual i has covariate vector $x_i(t)$
- individual i has hazard rate and intensity process

$$\alpha(t|x_i(t)) = \alpha_0(t)r(\beta, x_i(t))$$

$$\lambda_i(t) = Y_i(t)\alpha_0(t)r(\beta, x_i(t))$$

- $N_i(t), Y_i(t), N_{\bullet}(t), Y_{\bullet}(t), \lambda_{\bullet}(t)$

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★ Partial likelihood

$$L(\beta) = \prod_j \left[\frac{r(\beta, x_{i_j}(T_j))}{\sum_{\ell=1}^n Y_{\ell}(T_j)r(\beta, x_{\ell}(T_j))} \right]$$

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★ For Cox regression models:

$$r(\beta, x_i(t)) = \exp\{\beta^T x_i(t)\}$$