

## 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 (see Problem 4.7 in ABG)

# 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

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

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## ★ For Cox regression models:

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