BIOSTATISTICS 740 (BIOS7400)
Clinical Trials

Lecture 23

Parametric Models II,
Introduction to Bayesian Inference

Weibull Model

Cox PH Model $h_i(t, \mathbf{X}_i) = h_0(t)\exp(\beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_p x_{pi})$

Unspecified, and is constant for all individuals

Weibull PH Model $h_i(t, \mathbf{X}_i) = pt^{p-1}\exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_p x_{pi})$

Intercept is included

λ (scale parameter)

$p = 1$

$= [\exp(\beta_0)pt^{p-1}]\exp(\beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_p x_{pi})$

Specified parametrically

Exponential PH Model

Weibull PH Model for Leukemia Clinical Trial *Example*

$$h(t, \text{TRT}) = p\lambda t^{p-1}$$ *Weibull* hazard function

$$\lambda = \exp(\beta_0 + \underline{\beta_1}\text{TRT})$$

Hazard ratio (TRT = 1 vs. TRT = 0)

$$\text{HR} = \frac{\exp(\beta_0 + \underline{\beta_1})pt^{p-1}}{\exp(\beta_0)pt^{p-1}}$$

$$= \boxed{\exp(\underline{\beta_1})}$$

Does not depend on *t*, and *PH* assumption is satisfied