In the period 1962-1977, 205 patients with malignant melanoma had a radical operation performed at the Department of Plastic Surgery, University Hospital of Odense, Denmark. Refer to Appendix of Andersen, Borgan, Gill and Keiding (1993) (pp. 709 – 714) for more details of the dataset. The event recorded is a relapse or death related to the cancer after receiving a radical operation. All covariates used in this analysis were collected at the study entry.

ID: ID

tilde.T: 追蹤時間

Indicator: 1: dead from malignant melanoma

2: alive 1 January 1978

3: dead from other cause

Sex: 1: Male；0: Female

Age: 手術年齡

Year.of.operation: 手術的年份

Tumor.Thickness: 腫瘤厚度 (mm)

Ulceration: 1: 腫瘤有潰瘍；0: 腫瘤無潰瘍

delta: 1: 因malignant melanoma而死；0: 其他

Reference:

Andersen PK, Borgan O, Gill RD, Keiding N. *Statistical models based on counting processes*. Springer Verlag: New York, 1993.

Here, we are interested in the time to death from malignant melanoma. Thus, the death from other cause is the conditionally independent censoring. **Please set the censoring indicator “delta” by yourself.**

[1] Please set categorize the Tumor.Thickness into thre groups by using two dummy variables of skin.1 and skin.2,

Tumor.Thickness<=2，(skin.1, skin.2)=(0, 0)

2<Tumor.Thickness<=5，(skin.1, skin.2)=(1, 0)

5<Tumor.Thickness，(skin.1, skin.2)=(0, 1)

[2] Please complete the following descriptive statistics：

|  |  |  |  |
| --- | --- | --- | --- |
|  | 男性 | 女性 | p-value |
| 樣本數 (n) | 79 | 126 | ---- |
| 追蹤時間 (Days)  (mean SD) | 1945.709  1148.382 | 2282.643 1089.818 | 0.03868 |
| 年齡 (yr)  (mean SD) | 53.89873  17.60652 | 51.56349 | 0.3408 |
| 腫瘤厚度 (mm)  Tumor.Thickness<=2, n (%)  2<Tumor.Thickness<=5, n (%)  5<Tumor.Thickness, n (%) |  |  |  |
| 潰瘍 n (%) |  |  |  |
| 結果 人數 (%)  1 dead from malignant melanoma)  2 alive  3 dead from other causes |  |  | ---- |

[3]

1. Please draw the KM curves stratified by sex and describe what we find.
2. Please test the difference between two survival functions in Question (1) and draw your conclusion.
3. Please draw the KM curves stratified by sex and ulceration. Describe what we find.
4. Please test the difference between two survival functions in Question (3) and draw your conclusion.
5. Analyze the time to death from the melanoma by the Weibull accelerated failure time (AFT) model with sex, age, ulceration, skin.1 and skin.2 we well as the interaction between sex and ulceration.

(a) Please interpret the effect of Tumor.Thickness from the analysis results.

(b) Please interpret the effect of ulceration from the analysis results.

(c) Please test the effect of interaction between sex and ulceration.

1. From the results of (5), should you consider the interaction between sex and ulceration in the model?
2. From the results of (6), please test the effects of 2 dummy variables of skin.1 and skin.2. What is your conclusion?
3. Using the conclusion of Question (6), please calculate the 5-year survival rate and cumulative hazard for male, age 60 with ulceration and tumor thickness 3.5 mm. [限公衛所統資組必寫]