

Course work III: Carcinogenesis in mice

EHA September 1 - 25, 2015

Two groups of male mice were given 300 rads of radiation and followed for cancer incidence. One group was kept in germ-free environment. Three different causes of death were recored (reticulum cell sarcoma, thymic lymphoma, other cause). One interesting research question is to study the effect of the environment on reticulum cell sarcoma, while accommodating the risks of thymic lymphoma and other causes of death.

1. Read in the external data file mouse.dat. The data set contains:
time = days until death
group = 0 = control group, 1 = group with germ-free environment
outcome = cause of death:
1 = thymic lymphoma, 2 = reticulum cell sarcoma, 3 = other cause.
2. Present the data by suitable data summaries, stratifying by group. For the analyses, you may remove the four mice in the control group that have exceptionally short times until death (40, 42, 51, 62). Later, explore the sensitivity of the results to these observations.
3. Explore the effect of environment on the overall survival.
4. Calculate the Nelson-Aalen estimates of cause-specific cumulative hazards. For each cause, plot the hazards in the two groups for comparison.
5. Fit a Cox proportional model to the data to study the effect of environment on the incidence of different causes of death. Is the proportionality assumption justified? After fitting the model, you may plot the Breslow-Aalen estimates of cumulative hazard.

References

Kalbfleisch and Prentice, The Statistical Analysis of Failure Time Data, p. 257-259.