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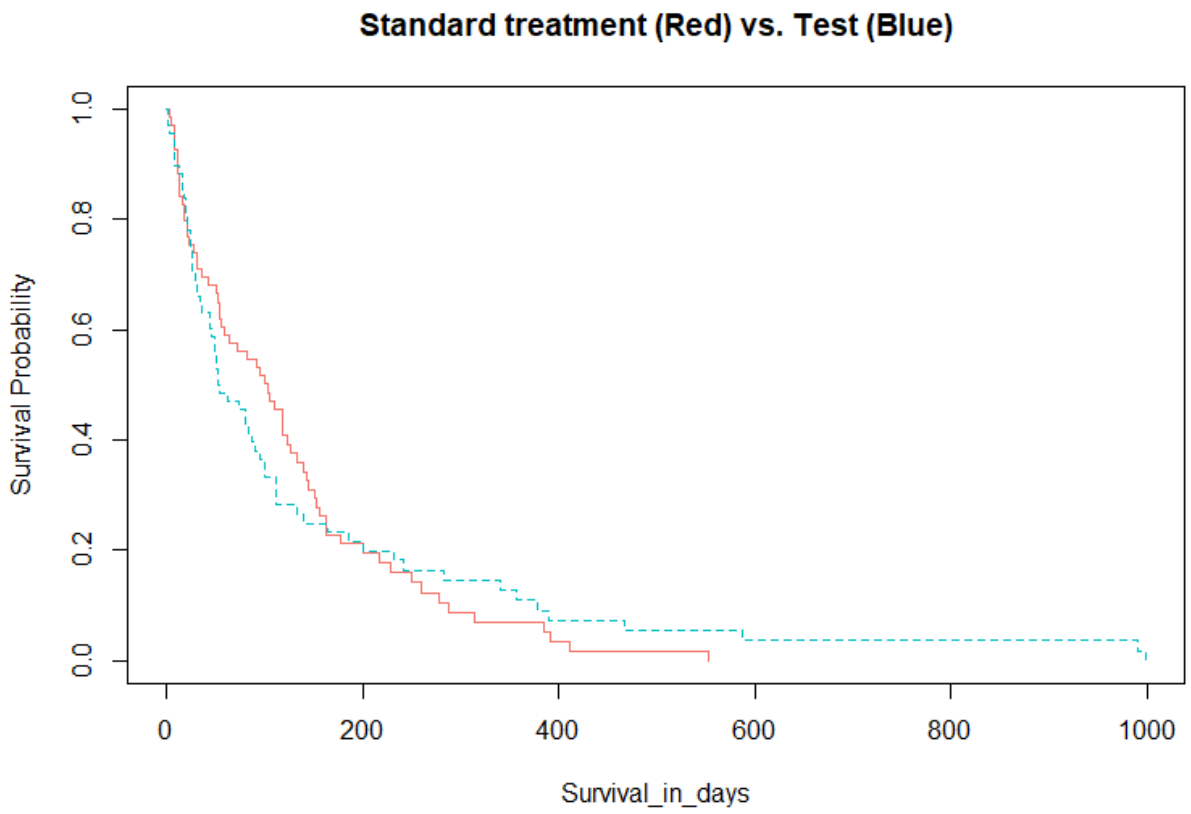
**Kaplan-Meier survival graph:**




- The probability that a patient will survive for 1 year is 7% in the standard treatment and 11% in the test treatment. The probability that a patient will survive for 6 months is 21% in the standard treatment and 23% in the test treatment.

- The mean number of days where a patient can be expected to survive is 115 days with the standard treatment and 128 days with the test treatment.

**Semi parametric model 1:**

```
coxph(formula = Surv(lc$Survival_in_days, lc$Status) ~ Prior_chemo +
    Age + Treatment, method = "breslow")

  n= 137, number of events= 128

                coef exp(coef)  se(coef)      z Pr(>|z|)
Prior_chemo -0.013403  0.986687  0.020116 -0.666    0.505
Age          0.007112  1.007137  0.009673  0.735    0.462
Treatment    0.002125  1.002127  0.183125  0.012    0.991
```

```
            exp(coef) exp(-coef) lower .95 upper .95
Prior_chemo    0.9867     1.0135    0.9485     1.026
Age            1.0071     0.9929    0.9882     1.026
Treatment      1.0021     0.9979    0.6999     1.435

Concordance= 0.507  (se = 0.03 )
Likelihood ratio test= 1.07  on 3 df,   p=0.8
Wald test            = 1.06  on 3 df,   p=0.8
Score (logrank) test = 1.06  on 3 df,   p=0.8
```

**Semi parametric model 2:**

```
coxph(formula = Surv(lc$Survival_in_days, lc$Status) ~ Months_from_diagnosis +
    Karnofsky_score + Cell_type, method = "breslow")

  n= 137, number of events= 128

                          coef exp(coef)  se(coef)      z Pr(>|z|)
Months_from_diagnosis  0.001205  1.001206  0.008484  0.142    0.887
Karnofsky_score       -0.034397  0.966188  0.005186 -6.633 3.28e-11 ***
Cell_type              0.120733  1.128324  0.077555  1.557    0.120
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

                      exp(coef) exp(-coef) lower .95 upper .95
Months_from_diagnosis    1.0012     0.9988    0.9847    1.0180
Karnofsky_score          0.9662     1.0350    0.9564    0.9761
Cell_type                1.1283     0.8863    0.9692    1.3136

Concordance= 0.702  (se = 0.023 )
Likelihood ratio test= 44.04  on 3 df,   p=1e-09
Wald test            = 44.8  on 3 df,   p=1e-09
Score (logrank) test = 46.62  on 3 df,   p=4e-10
```

**Semi parametric model 3:**
**An experimental model taking the log of months from diagnosis. Coefficients may be inaccurate.**

```
coxph(formula = Surv(lc$Survival_in_days, lc$Status) ~
log(Months_from_diagnosis) +
    Karnofsky_score + Cell_type + Prior_chemo + Age + Treatment,
    method = "breslow")

  n= 137, number of events= 128

                               coef exp(coef)  se(coef)      z Pr(>|z|)
log(Months_from_diagnosis) -0.014872  0.985238  0.124004 -0.120   0.9045
Karnofsky_score            -0.035429  0.965192  0.005374 -6.593 4.32e-11 ***
Cell_type                   0.128956  1.137641  0.077643  1.661   0.0967 .
```

```
Prior_chemo                -0.004219  0.995790  0.023910 -0.176   0.8599
Age                        -0.003805  0.996202  0.009165 -0.415   0.6780
Treatment                   0.219787  1.245811  0.189535  1.160   0.2462
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

                           exp(coef) exp(-coef) lower .95 upper .95
log(Months_from_diagnosis)    0.9852     1.0150    0.7727    1.2563
Karnofsky_score               0.9652     1.0361    0.9551    0.9754
Cell_type                     1.1376     0.8790    0.9770    1.3246
Prior_chemo                   0.9958     1.0042    0.9502    1.0436
Age                           0.9962     1.0038    0.9785    1.0143
Treatment                     1.2458     0.8027    0.8593    1.8063

Concordance= 0.706  (se = 0.023 )
Likelihood ratio test= 45.52  on 6 df,   p=4e-08
Wald test            = 46.86  on 6 df,   p=2e-08
Score (logrank) test = 49.24  on 6 df,   p=7e-09
```

- A positive coefficient for the months from initial diagnosis indicates that patients who have been diagnosed longer are more likely to die for all treatment groups. Increasing the number of months a patient has since diagnosis by one will increase the likelihood of death by 0.12%.
- A positive coefficient for patient age indicated that patients that are older are more likely to die for all treatment groups. Each year as patients get older their likelihood of dying increases by 0.7%

**Parametric Models:**

```
Call:
survreg(formula = Surv(lc$Survival_in_days, lc$Status) ~ Age +
    Months_from_diagnosis + Treatment, dist = "exponential")
                         Value Std. Error     z      p
(Intercept)            5.62001    0.62670  8.97 <2e-16
Age                   -0.01437    0.00979 -1.47   0.14
Months_from_diagnosis -0.01081    0.00931 -1.16   0.25
Treatment              0.11467    0.17737  0.65   0.52

Scale fixed at 1

Exponential distribution
Loglik(model)= -749.4   Loglik(intercept only)= -751.2
      Chisq= 3.56 on 3 degrees of freedom, p= 0.31
Number of Newton-Raphson Iterations: 5
n= 137
```

```
--------------------------------------------------------------------------------

Call:
survreg(formula = Surv(lc$Survival_in_days, lc$Status) ~ Age +
    Months_from_diagnosis + Treatment, dist = "weibull")
                       Value Std. Error     z       p
(Intercept)           5.5264     0.7106  7.78 7.4e-15
Age                  -0.0128     0.0111 -1.15   0.249
Months_from_diagnosis -0.0109     0.0104 -1.04   0.297
Treatment             0.0736     0.2062  0.36   0.721
Log(scale)            0.1457     0.0679  2.14   0.032

Scale= 1.16

Weibull distribution
Loglik(model)= -747   Loglik(intercept only)= -748.1
      Chisq= 2.26 on 3 degrees of freedom, p= 0.52
Number of Newton-Raphson Iterations: 5
n= 137


--------------------------------------------------------------------------------

Call:
survreg(formula = Surv(lc$Survival_in_days, lc$Status) ~ Age +
    Months_from_diagnosis + Treatment, dist = "loglogistic")
                         Value Std. Error     z       p
(Intercept)            4.68831    0.73146  6.41 1.5e-10
Age                   -0.00118    0.01121 -0.11 0.91595
Months_from_diagnosis -0.00898    0.01093 -0.82 0.41131
Treatment             -0.21581    0.23724 -0.91 0.36301
Log(scale)            -0.24366    0.07315 -3.33 0.00087

Scale= 0.784

Log logistic distribution
Loglik(model)= -749.5   Loglik(intercept only)= -750.3
      Chisq= 1.59 on 3 degrees of freedom, p= 0.66
Number of Newton-Raphson Iterations: 3
n= 137
```

- A negative coefficient for months from diagnosis indicates that patients who have been diagnosed longer are more likely to die.
- A negative coefficient for age indicates that an older patient is more likely to die.