Lung Cancer

Jose Tamez

2023-04-26

Contents


```
library(survival)
library(FRESA.CAD)
```

```
## Loading required package: Rcpp
```

```
## Loading required package: stringr
```

```
## Loading required package: miscTools
```

```
## Loading required package: Hmisc
```

```
##
## Attaching package: 'Hmisc'
```

```
## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
## Loading required package: pROC
```

```
## Type 'citation("pROC")' for a citation.
```

```
##
## Attaching package: 'pROC'
```

```
## The following objects are masked from 'package:stats':
##
##     cov, smooth, var
```

```
#library(corrplot)
source("~/GitHub/FRESA.CAD/R/RRPlot.R")
source("~/GitHub/FRESA.CAD/R/PoissonEventRiskCalibration.R")
op <- par(no.readonly = TRUE)
pander::panderOptions('digits', 3)
#pander::panderOptions('table.split.table', 400)
pander::panderOptions('keep.trailing.zeros',TRUE)
```

```
data <- model.frame(Surv(time,status)~.*.,lung,na.action=NULL)
colnames(data) <-str_replace_all(colnames(data),":","_")
colnames(data) <-str_replace_all(colnames(data),"\\.","_")

data$inst <- NULL
```

```
data$`Surv(time, status)` <- NULL
dataLung <- cbind(time=lung$time/365,status=lung$status-1,data)
dataLung <- dataLung[complete.cases(dataLung),]
pander::pander(table(dataLung$status))
```

0	1
47	121

```
pander::pander(summary(dataLung$time))
```

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.0137	0.479	0.736	0.849	1.14	2.8

0.1 Modeling

```
ml <- BSWiMS.model(Surv(time,status)~1,data=dataLung,NumberofRepeats = 10)
```

[++++++++++++++++++++++++++++++]..

```
sm <- summary(ml)
pander::pander(sm$coefficients)
```

Table 3: Table continues below

	Estimate	lower	HR	upper	u.Accuracy	r.Accuracy
ph_ecog	4.32e-01	1.194	1.541	1.988	0.679	0.649
sex	-4.59e-01	0.456	0.632	0.876	0.649	0.679
pat_karno	-1.77e-03	0.997	0.998	1.000	0.506	0.720
ph_karno	-4.64e-07	1.000	1.000	1.000	0.577	0.720
age	4.57e-08	1.000	1.000	1.000	0.565	0.720

Table 4: Table continues below

	full.Accuracy	u.AUC	r.AUC	full.AUC	IDI	NRI
ph_ecog	0.601	0.601	0.620	0.600	0.0449	0.405
sex	0.601	0.620	0.601	0.600	0.0285	0.478
pat_karno	0.506	0.585	0.500	0.585	0.0292	0.342
ph_karno	0.577	0.570	0.500	0.570	0.0143	0.280
age	0.565	0.549	0.500	0.549	0.0162	0.195

	z.IDI	z.NRI	Delta.AUC	Frequency
ph_ecog	3.33	2.48	-0.02005	1.0
sex	2.76	2.85	-0.00167	1.0
pat_karno	2.44	2.24	0.08546	1.0
ph_karno	2.22	1.64	0.06998	0.8
age	1.97	1.14	0.04871	0.1

0.2 Cox Model Performance

Here we evaluate the model using the RRPlot() function.

0.2.1 The evaluation of the raw Cox model with RRPlot()

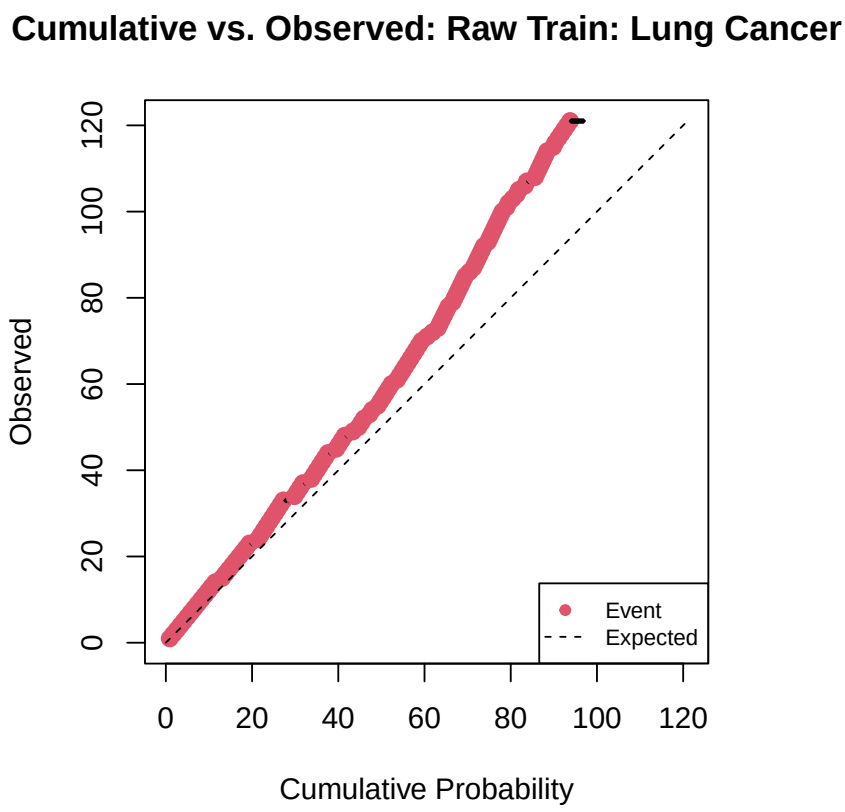
Here we will use the predicted event probability assuming a baseline hazard for events withing 5 years

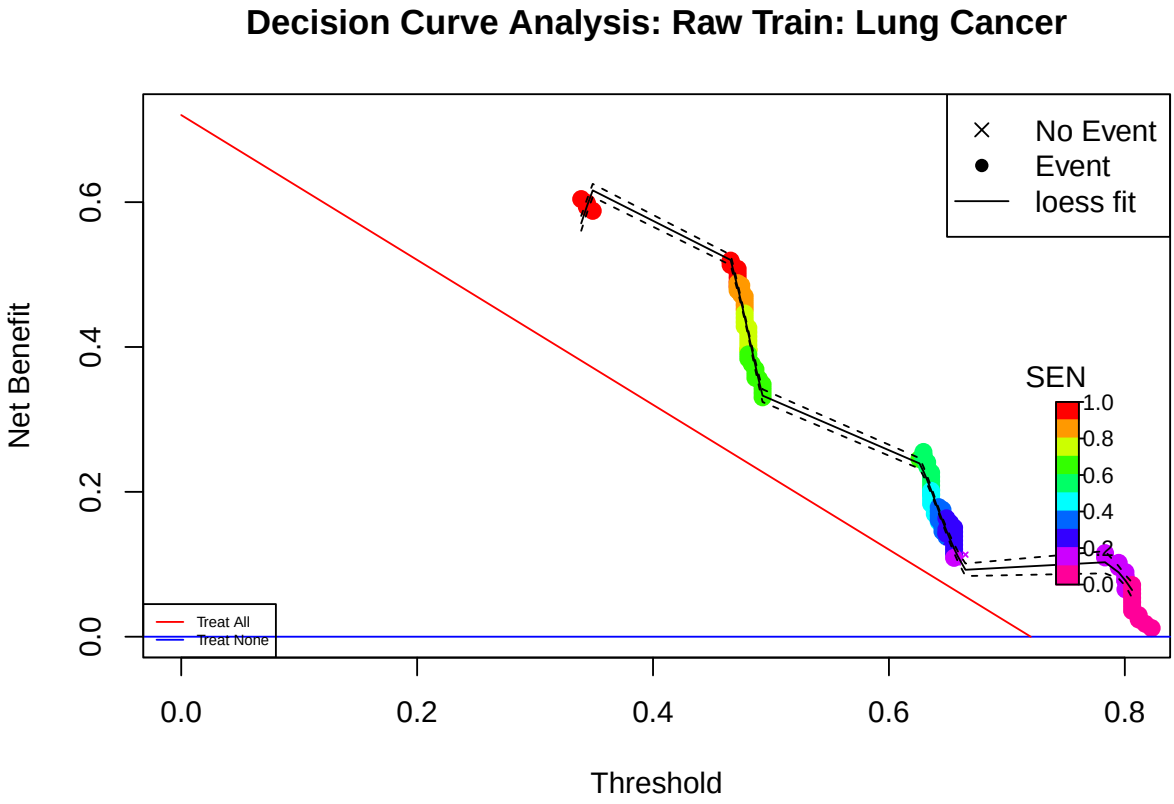
```
timeinterval <- 2*mean(subset(dataLung,status==1)$time)

h0 <- sum(dataLung$status & dataLung$time <= timeinterval)
h0 <- h0/sum((dataLung$time > timeinterval) | (dataLung$status==1))
pander::pander(t(c(h0=h0,timeinterval=timeinterval)),caption="Initial Parameters")
```

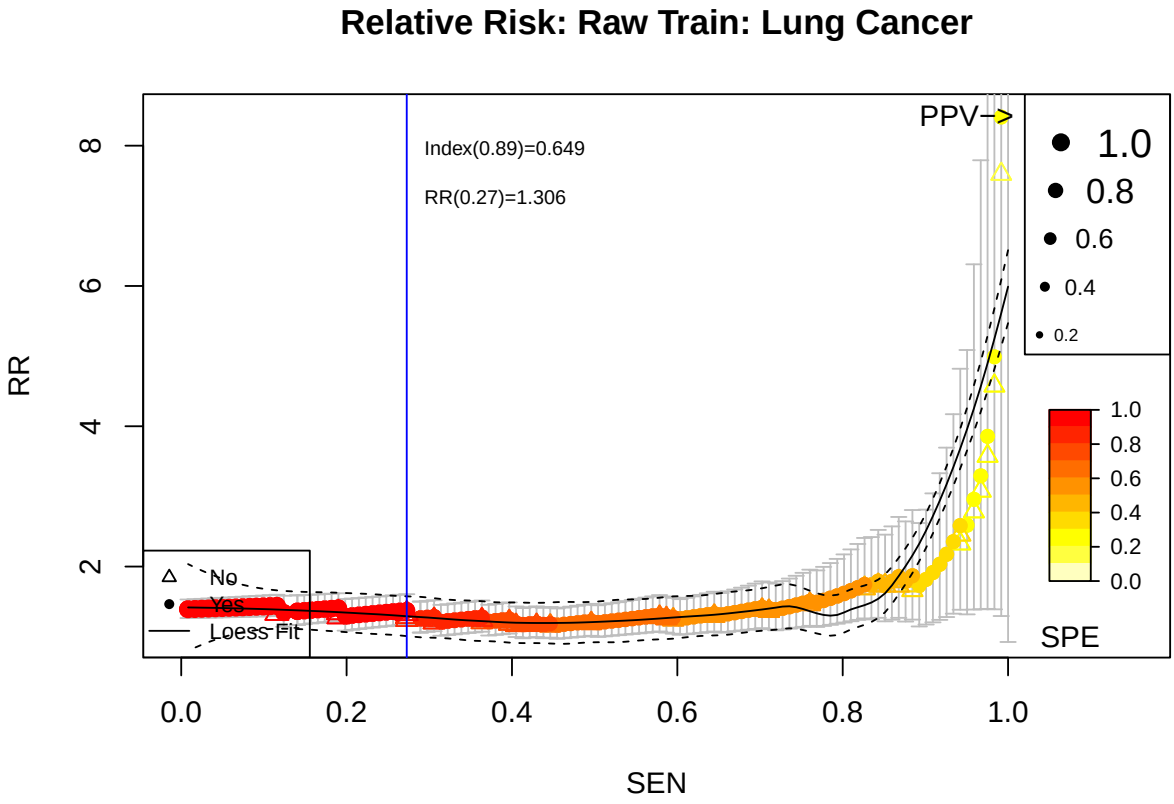
Table 6: Initial Parameters

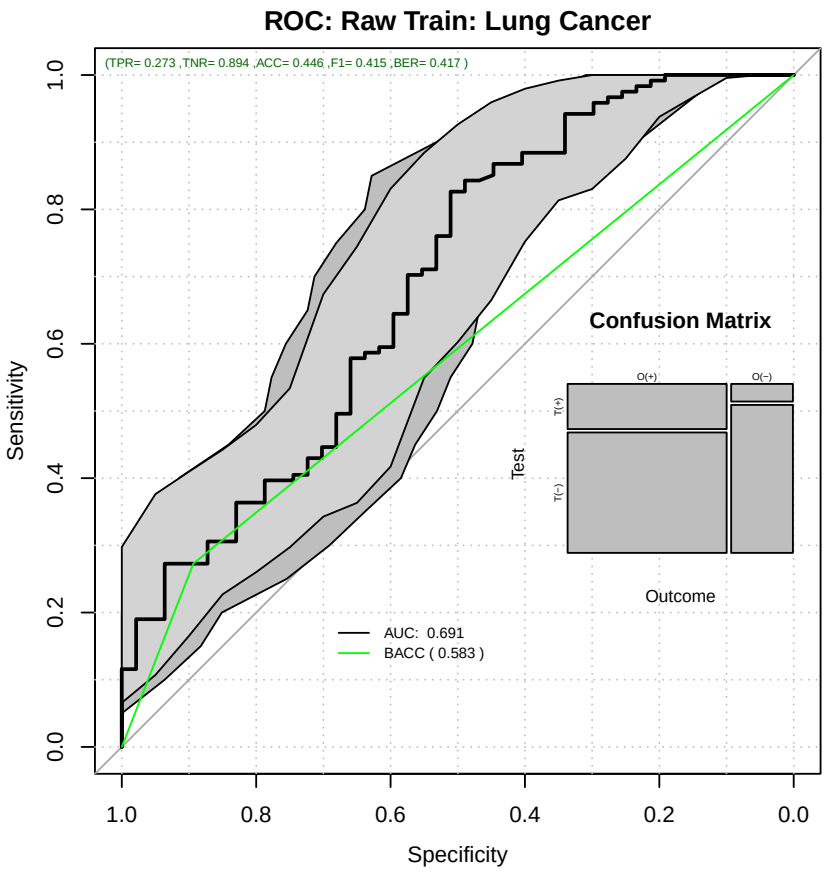
h0	timeinterval
0.85	1.58

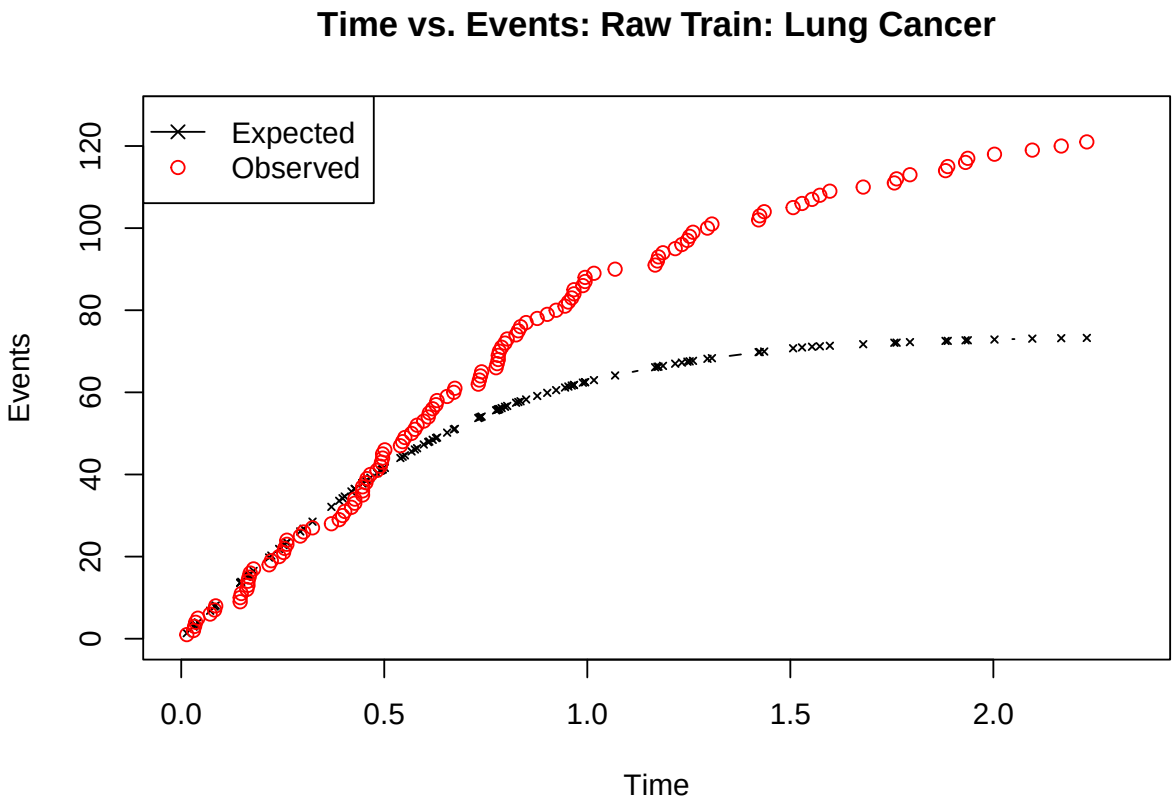
```
index <- predict(ml,dataLung)

rdata <- cbind(dataLung$status,ppoisGzero(index,h0))

rrAnalysisTrain <- RRPlot(rdata,atProb=c(0.90),
                      timetoEvent=dataLung$time,
                      title="Raw Train: Lung Cancer",
                      ysurvlim=c(0.00,1.0),
                      riskTimeInterval=timeinterval)
```

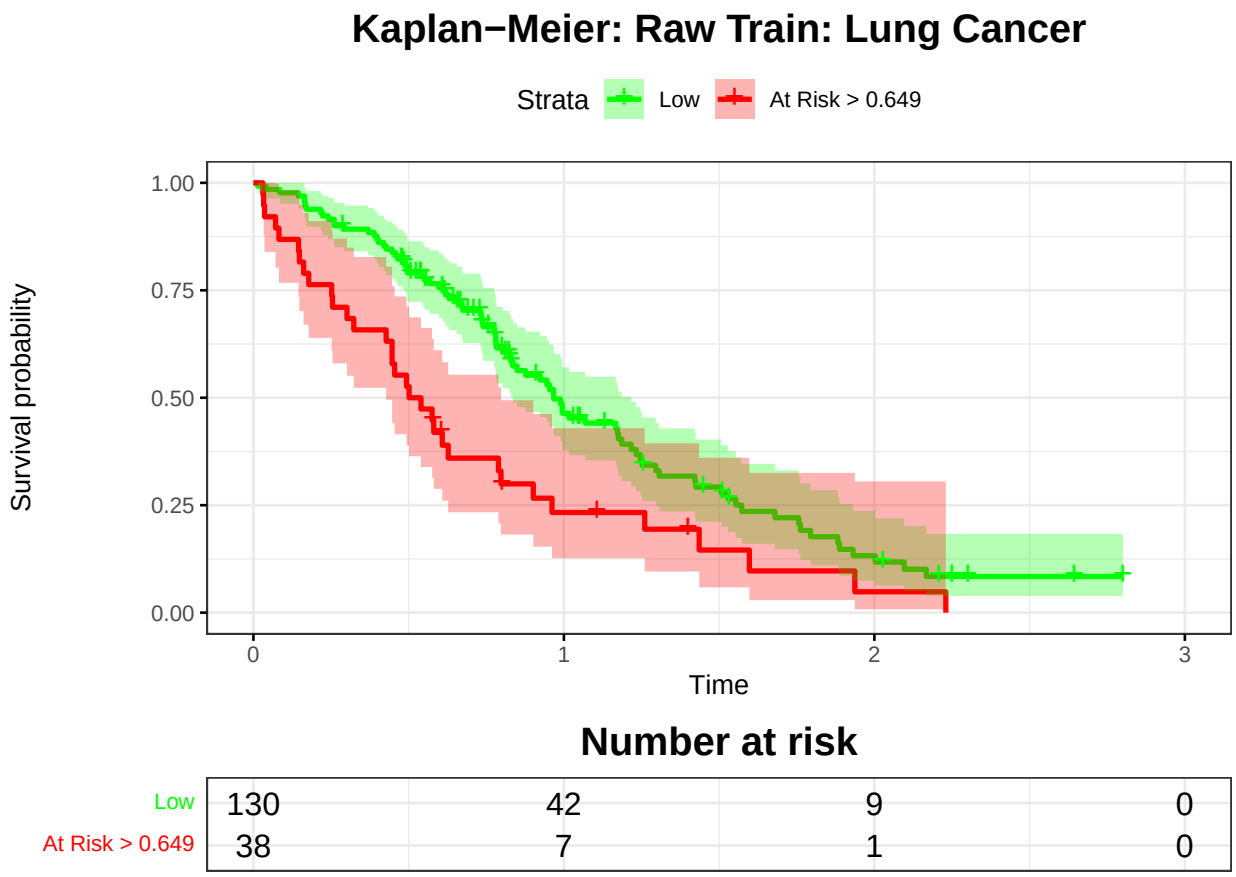

Cumulative vs. Observed: Raw Train: Lung Cancer
Observed
0
20
40
60
80
100
120
Cumulative Probability
Event
Expected


Decision Curve Analysis: Raw Train: Lung Cancer
No Event
Event
loess fit
SEN
1.0
0.8
0.6
0.4
0.2
0.0
Treat All
Treat None
Net Benefit
0.0
0.2
0.4
0.6
0.0
0.2
0.4
0.6
0.8
Threshold


Relative Risk: Raw Train: Lung Cancer
Index(0.89)=0.649
RR(0.27)=1.306
PPV
1.0
0.8
0.6
0.4
0.2
SPE
No
Yes
Loess Fit
RR
SEN
2
4
6
8
0.0
0.2
0.4
0.6
0.8
1.0


ROC: Raw Train: Lung Cancer
(TPR= 0.273 ,TNR= 0.894 ,ACC= 0.446 ,F1= 0.415 ,BER= 0.417)
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC: 0.691
BACC (0.583)
Confusion Matrix
O(+)
O(−)
T(+)
T(−)
Test
Outcome


Time vs. Events: Raw Train: Lung Cancer
Expected
Observed
Events
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
Time



As we can see the Observed probability as well as the Time vs. Events are not calibrated.

0.2.2 Uncalibrated Performance Report

```
pander::pander(t(rrAnalysisTrain$OERatio),caption="O/E Ratio")
```

Table 7: O/E Ratio

est	lower	upper
1.65	1.37	1.97

```
pander::pander(t(rrAnalysisTrain$OE95ci),caption="O/E Ratio")
```

Table 8: O/E Ratio

mean	50%	2.5%	97.5%
1.21	1.21	1.16	1.25

```
pander::pander(t(rrAnalysisTrain$OAcum95ci),caption="O/Acum Ratio")
```

Table 9: O/Acum Ratio

mean	50%	2.5%	97.5%
1.2	1.2	1.19	1.21

```
pander::pander(rrAnalysisTrain$c.index$cstatCI,caption="C. Index")
```

mean.C Index	median	lower	upper
0.651	0.652	0.592	0.712

```
pander::pander(t(rrAnalysisTrain$ROCAnalysis$aucs),caption="ROC AUC")
```

Table 11: ROC AUC

est	lower	upper
0.691	0.598	0.784

```
pander::pander((rrAnalysisTrain$ROCAnalysis$sensitivity),caption="Sensitivity")
```

Table 12: Sensitivity

est	lower	upper
0.273	0.196	0.361

```
pander::pander((rrAnalysisTrain$ROCAnalysis$specificity),caption="Specificity")
```

Table 13: Specificity

est	lower	upper
0.894	0.769	0.965

```
pander::pander(t(rrAnalysisTrain$thr_atP),caption="Probability Thresholds")
```

Table 14: Probability Thresholds

90%
0.649

```
pander::pander(t(rrAnalysisTrain$RR_atP),caption="Risk Ratio")
```

Table 15: Risk Ratio

est	lower	upper
1.31	1.11	1.54

```
pander::pander(rrAnalysisTrain$surdif,caption="Logrank test")
```

Table 16: Logrank test Chisq = 10.879375 on 1 degrees of freedom, p = 0.000972

	N	Observed	Expected	(O-E)^2/E	(O-E)^2/V
class=0	130	88	101.3	1.76	10.9
class=1	38	33	19.7	9.05	10.9

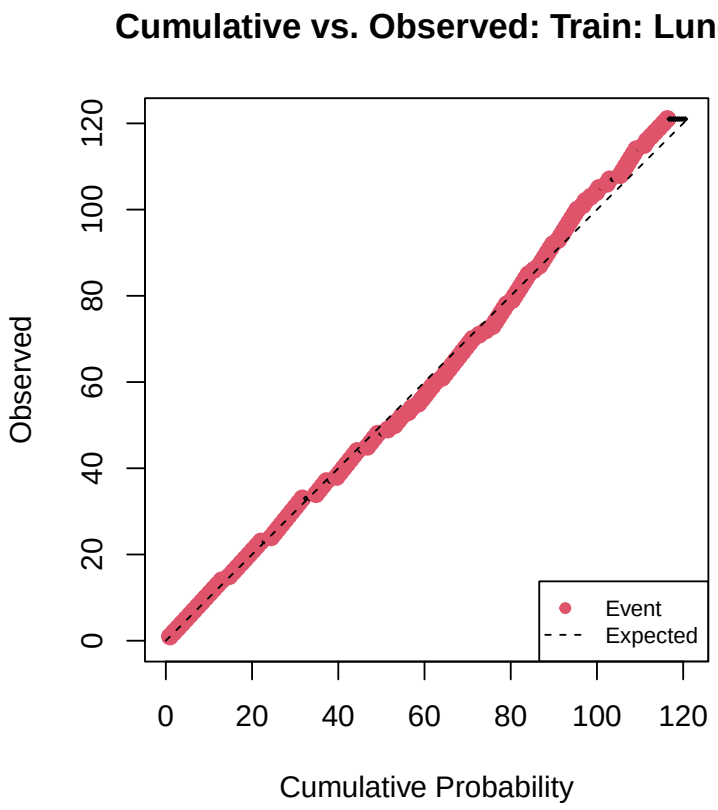
0.2.3 Cox Calibration

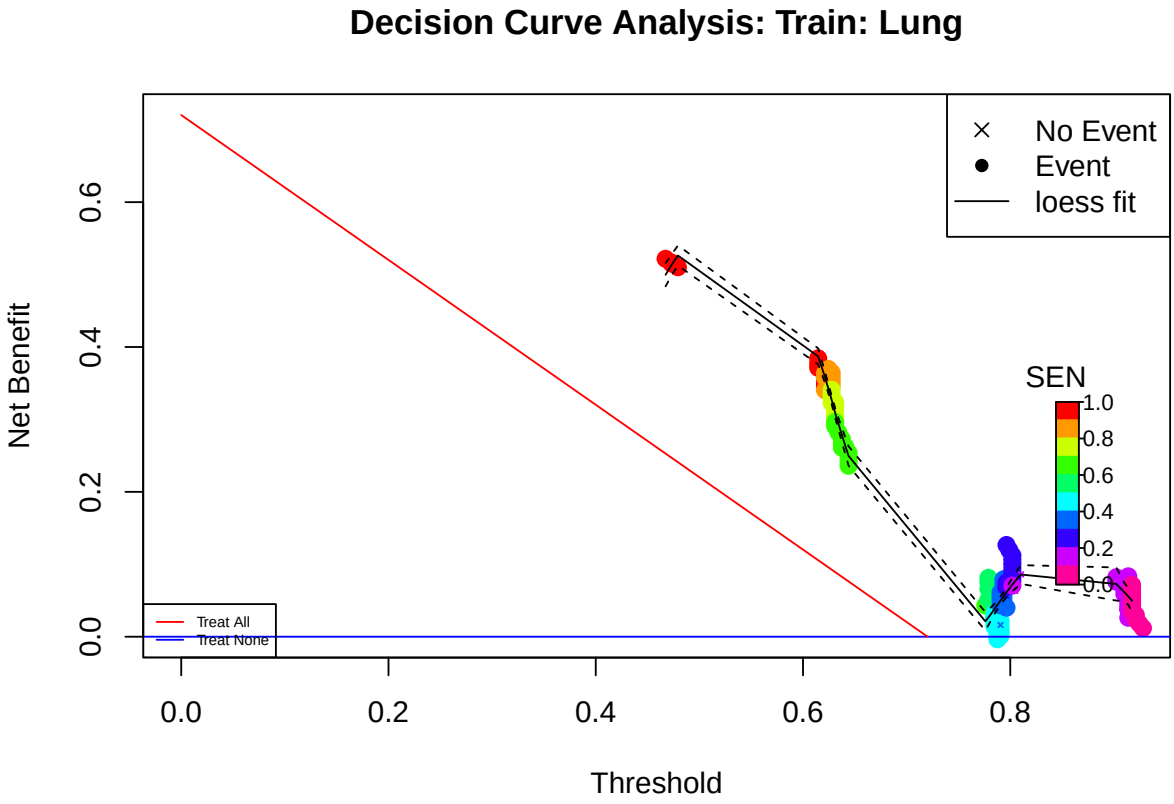
```
op <- par(no.readonly = TRUE)


calprob <- CoxRiskCalibration(ml,dataLung,"status","time")

pander::pander(c(h0=calprob$h0,
                 Gain=calprob$hazardGain,
                 DeltaTime=calprob$timeInterval),
               caption="Cox Calibration Parameters")
```

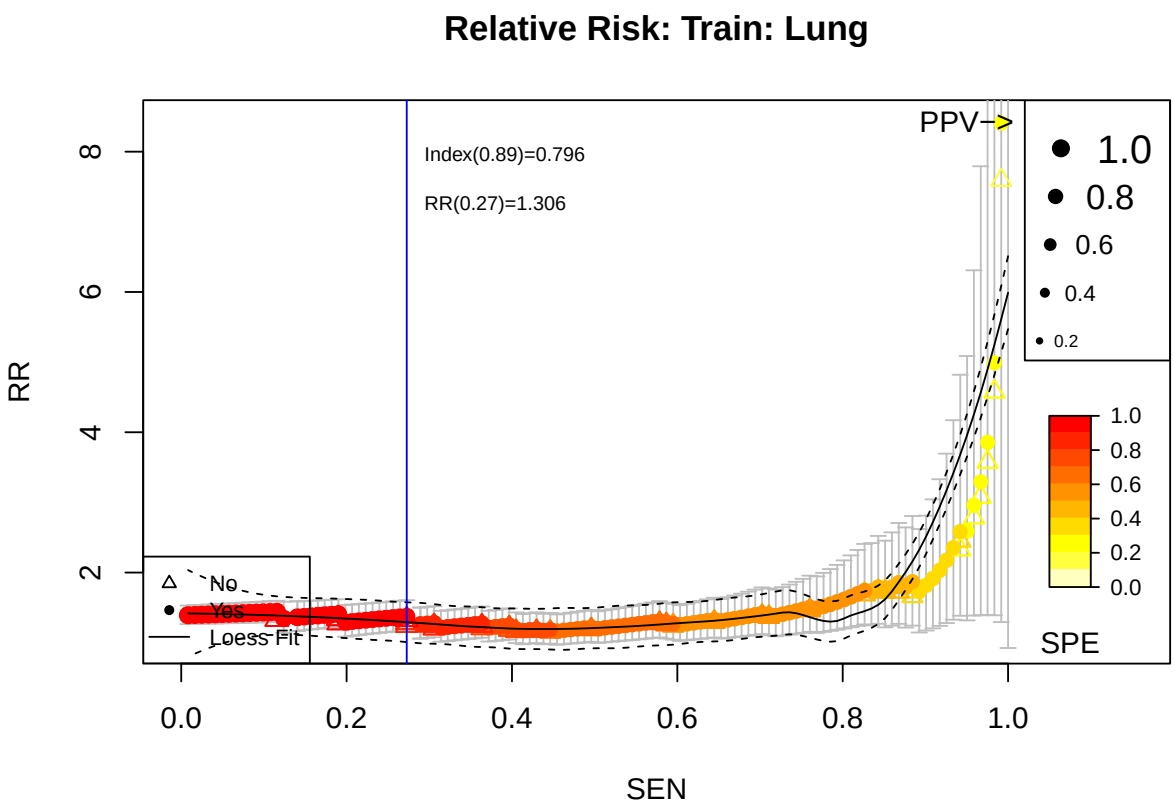
h0	Gain	DeltaTime
1.29	1.52	2.05

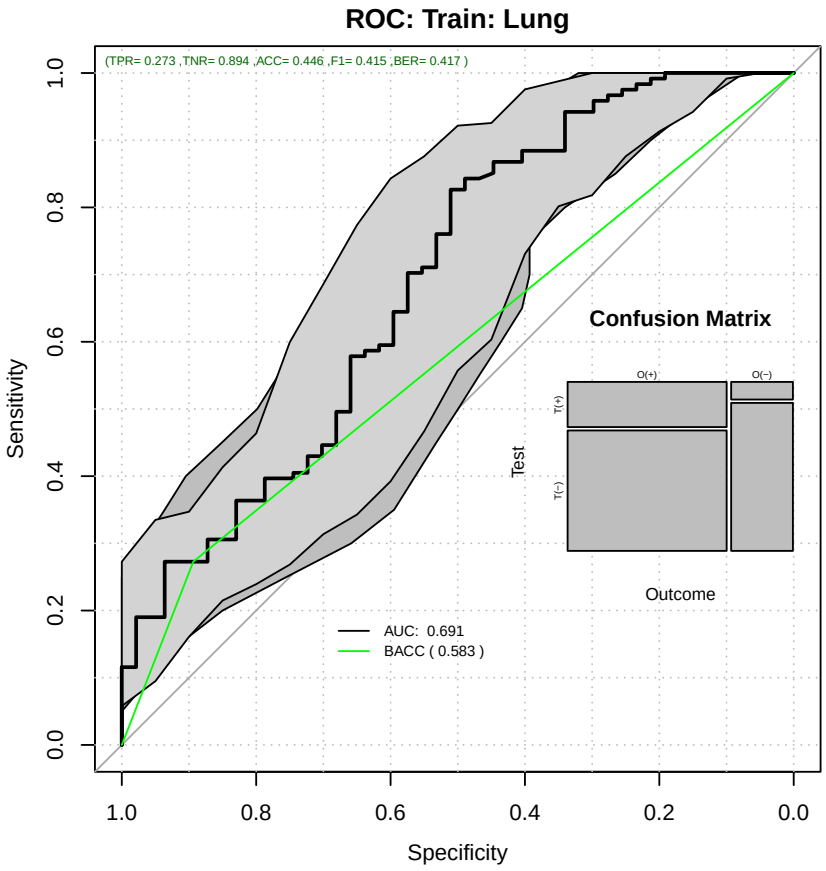
0.2.4 The RRplot() of the calibrated model

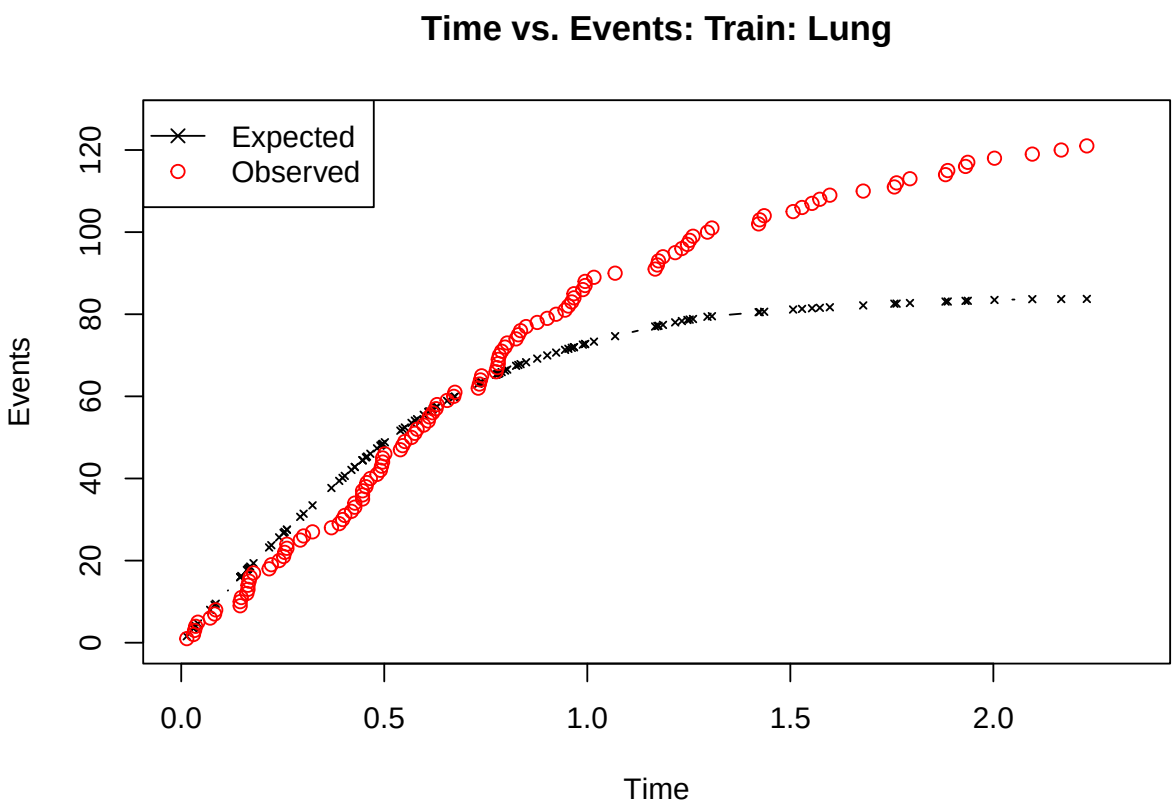
```
h0 <- calprob$h0
timeinterval <- calprob$timeInterval;

rdata <- cbind(dataLung$status,calprob$prob)


rrAnalysisTrain <- RRPlot(rdata,atProb=c(0.90),
                      timetoEvent=dataLung$time,
                      title="Train: Lung",
                      ysurvlim=c(0.00,1.0),
                      riskTimeInterval=timeinterval)
```

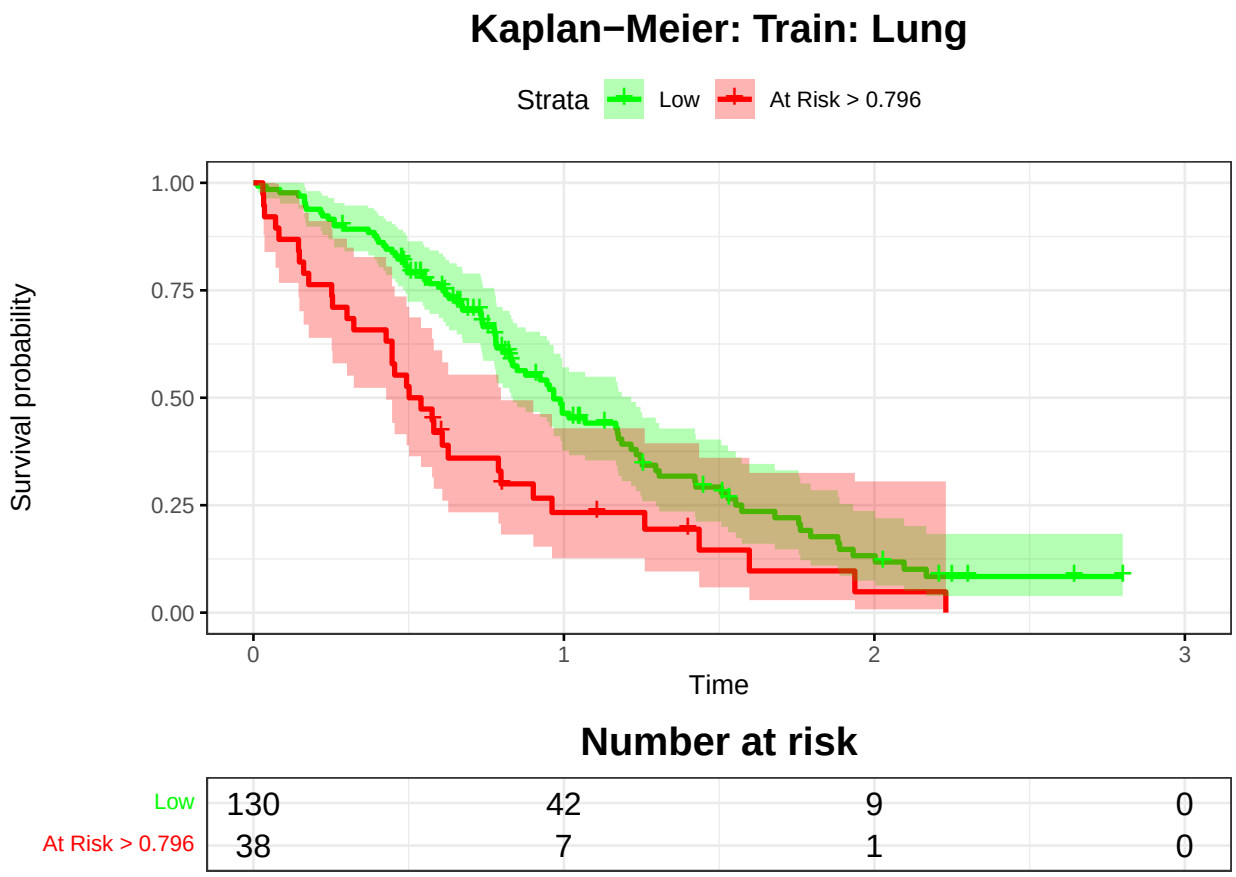

Cumulative vs. Observed: Train: Lung
Observed
0
20
40
60
80
100
120
Event
Expected
0
20
40
60
80
100
120
Cumulative Probability


Decision Curve Analysis: Train: Lung
No Event
Event
loess fit
SEN
1.0
0.8
0.6
0.4
0.2
0.0
Treat All
Treat None
Net Benefit
0.0
0.2
0.4
0.6
0.0
0.2
0.4
0.6
0.8
Threshold


Relative Risk: Train: Lung
PPV
Index(0.89)=0.796
RR(0.27)=1.306
1.0
0.8
0.6
0.4
0.2
1.0
0.8
0.6
0.4
0.2
0.0
SPE
No
Yes
Loess Fit
RR
2
4
6
8
0.0
0.2
0.4
0.6
0.8
1.0
SEN


ROC: Train: Lung
(TPR= 0.273 ,TNR= 0.894 ,ACC= 0.446 ,F1= 0.415 ,BER= 0.417)
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC: 0.691
BACC (0.583)
Confusion Matrix
O(+)
O(−)
T(+)
T(−)
Test
Outcome


Time vs. Events: Train: Lung
Expected
Observed
Events
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
Time



0.2.5 Calibrated Train Performance

```
pander::pander(t(rrAnalysisTrain$OERatio),caption="O/E Ratio")
```

Table 18: O/E Ratio

est	lower	upper
1.45	1.2	1.73

```
pander::pander(t(rrAnalysisTrain$OE95ci),caption="O/E Ratio")
```

Table 19: O/E Ratio

mean	50%	2.5%	97.5%
1.04	1.04	0.998	1.08

```
pander::pander(t(rrAnalysisTrain$OAcum95ci),caption="O/Acum Ratio")
```

Table 20: O/Acum Ratio

mean	50%	2.5%	97.5%
1.01	1.01	0.999	1.01

```
pander::pander(rrAnalysisTrain$c.index$cstatCI,caption="C. Index")
```

mean.C Index	median	lower	upper
0.651	0.653	0.59	0.712

```
pander::pander(t(rrAnalysisTrain$ROCAnalysis$aucs),caption="ROC AUC")
```

Table 22: ROC AUC

est	lower	upper
0.691	0.598	0.784

```
pander::pander((rrAnalysisTrain$ROCAnalysis$sensitivity),caption="Sensitivity")
```

Table 23: Sensitivity

est	lower	upper
0.273	0.196	0.361

```
pander::pander((rrAnalysisTrain$ROCAnalysis$specificity),caption="Specificity")
```

Table 24: Specificity

est	lower	upper
0.894	0.769	0.965

```
pander::pander(t(rrAnalysisTrain$thr_atP),caption="Probability Thresholds")
```

Table 25: Probability Thresholds

90%
0.796

```
pander::pander(t(rrAnalysisTrain$RR_atP),caption="Risk Ratio")
```

Table 26: Risk Ratio

est	lower	upper
1.31	1.11	1.54

```
pander::pander(rrAnalysisTrain$surdif,caption="Logrank test")
```

Table 27: Logrank test Chisq = 10.879375 on 1 degrees of freedom, p = 0.000972

	N	Observed	Expected	(O-E)^2/E	(O-E)^2/V
class=0	130	88	101.3	1.76	10.9
class=1	38	33	19.7	9.05	10.9

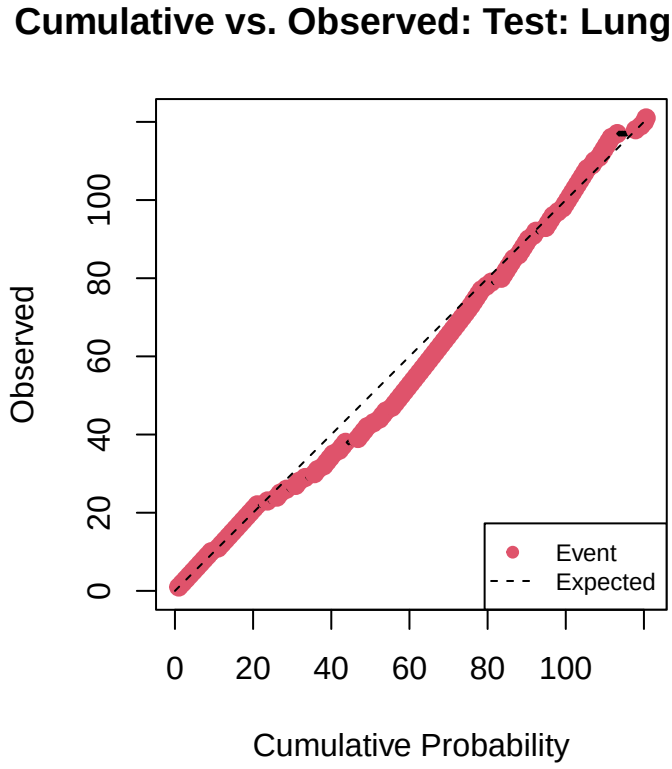
0.3 Cross-Validation

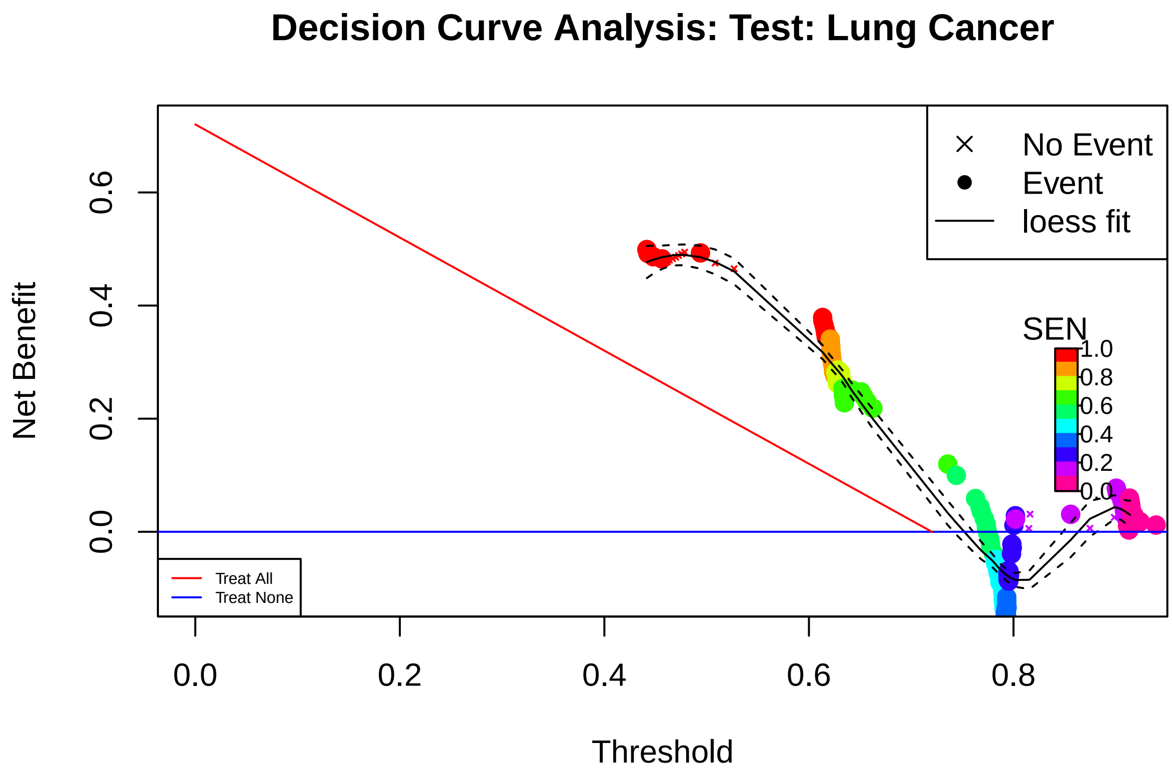
```
rcv <- randomCV(theData=dataLung,
                theOutcome = Surv(time,status)~1,
                fittingFunction=BSWiMS.model,
                trainFraction = 0.95,
                repetitions=200,
                classSamplingType = "Pro"
         )
```

```
## .[++].[+].[+++].[+++].[++].[+++].[+++].[++].[++].[+++]10  Tested: 79 Avg. Selected: 3.4 Min Tests: 1
## .[++].[+++].[++].[+++].[+].[+].[++].[+++].[+++].[+++]20  Tested: 110 Avg. Selected: 3.35 Min Tests:
## .[++++].[+].[+++].[+++].[++].[++].[+++].[++].[++].[+++]30  Tested: 136 Avg. Selected: 3.4 Min Tests:
## .[+++].[++].[++++].[+++].[+].[++].[+++].[+++].[+++].[+++]40  Tested: 148 Avg. Selected: 3.475 Min Tes
## .[+++].[+++].[++++].[+++].[+++].[+++].[+++].[++].[+++].[++]50  Tested: 153 Avg. Selected: 3.56 Min Te
## .[+++].[+++].[+++].[+++].[+++].[++].[++-].[+++].[+++].[+++]60  Tested: 160 Avg. Selected: 3.6 Min Tes
## .[+++].[++-].[+++].[++].[+++].[++].[+++].[+++].[+++].[++]70  Tested: 164 Avg. Selected: 3.6 Min Tests
## .[+++].[+++].[+].[+++].[+++].[++].[+++].[+++].[+++].[++]80  Tested: 167 Avg. Selected: 3.6 Min Tests
## .[+++].[+].[++-].[+++].[+++].[+++].[+++].[++].[+++].[+++]90  Tested: 168 Avg. Selected: 3.6 Min Tests
## .[+].[+++].[+++].[+++].[+++].[++].[++].[++-].[+++].[+++]100  Tested: 168 Avg. Selected: 3.59 Min Tes
## .[+++].[++++].[++].[++].[+].[+++].[++-].[+++].[++].[+++]110  Tested: 168 Avg. Selected: 3.581818 Min
## .[+++].[++].[+++].[+++].[++++].[++].[++-].[+++].[++++].[++]120  Tested: 168 Avg. Selected: 3.6 Min Te
## .[++++].[+++].[+++].[++].[+++].[+++].[+++].[+++].[+++].[++-]130  Tested: 168 Avg. Selected: 3.623077
## .[+++].[++].[+++].[++++].[+++].[+].[+++].[++-].[++].[++-]140  Tested: 168 Avg. Selected: 3.614286 Mi
## .[++].[+].[+++].[++-].[+++].[+++].[+++].[+++].[+++].[++]150  Tested: 168 Avg. Selected: 3.606667 Min
## .[++].[+++].[+++].[+++].[+++].[+++].[+++].[++].[++].[++]160  Tested: 168 Avg. Selected: 3.60625 Min
## .[++++].[++].[+++].[+++].[+++].[+++].[+].[++++].[+++].[++]170  Tested: 168 Avg. Selected: 3.617647 M
## .[+++].[++].[++].[+++].[+++].[+++].[++].[++-].[+++].[++]180  Tested: 168 Avg. Selected: 3.611111 Min
## .[+++].[+++].[+++].[++++].[+++].[+++].[+++].[+++].[+++].[+++]190  Tested: 168 Avg. Selected: 3.63684
## .[++].[+++].[++++].[++].[+++].[+++].[++].[+++].[+++].[++]200  Tested: 168 Avg. Selected: 3.64 Min Tes
##
```

```
stp <- rcv$survTestPredictions
stp <- stp[!is.na(stp[,4]),]

bbx <- boxplot(unlist(stp[,1])~rownames(stp),plot=FALSE)
times <- bbx$stats[3,]
status <- boxplot(unlist(stp[,2])~rownames(stp),plot=FALSE)$stats[3,]
```

```
prob <- ppoisGzero(boxplot(unlist(stp[,4])~rownames(stp),plot=FALSE)$stats[3,],h0)

rdatacv <- cbind(status,prob)
rownames(rdatacv) <- bbx$names
names(times) <- bbx$names

rrAnalysisTest <- RRPlot(rdatacv,atProb=c(0.90),
                      timetoEvent=times,
                      title="Test: Lung Cancer",
                      ysurvlim=c(0.00,1.0),
                      riskTimeInterval=timeinterval)
```






```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
```

```
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

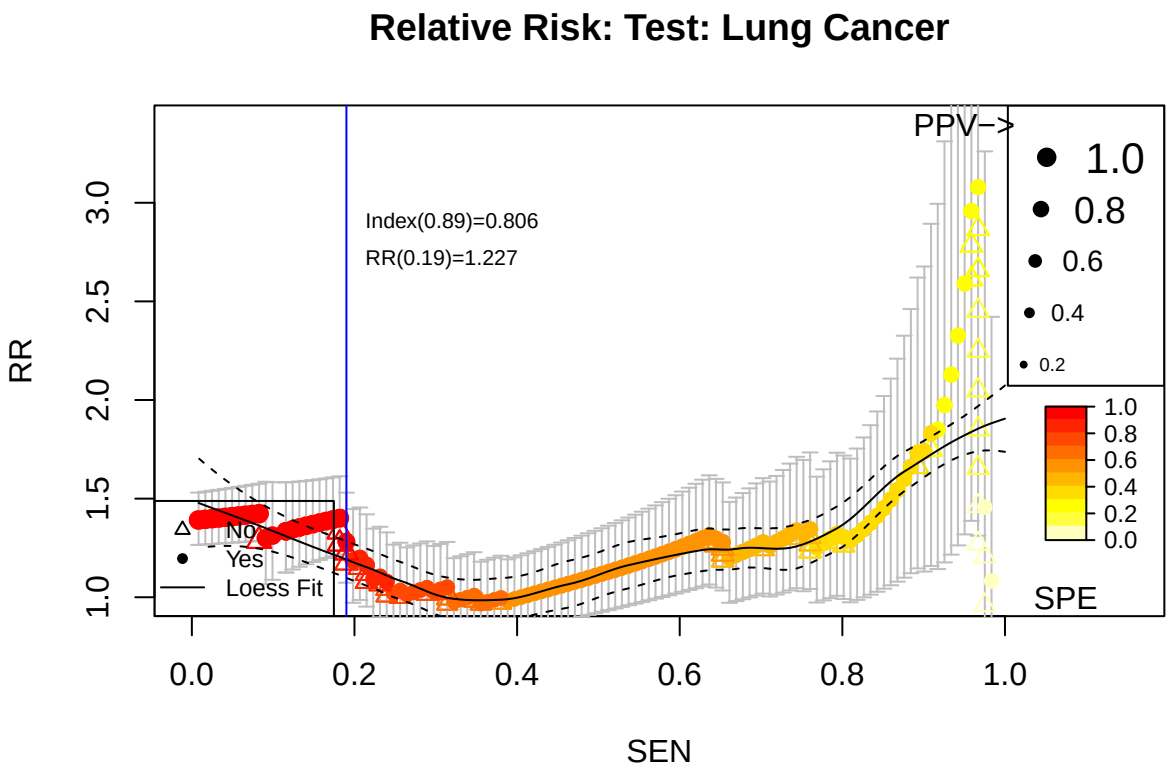
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

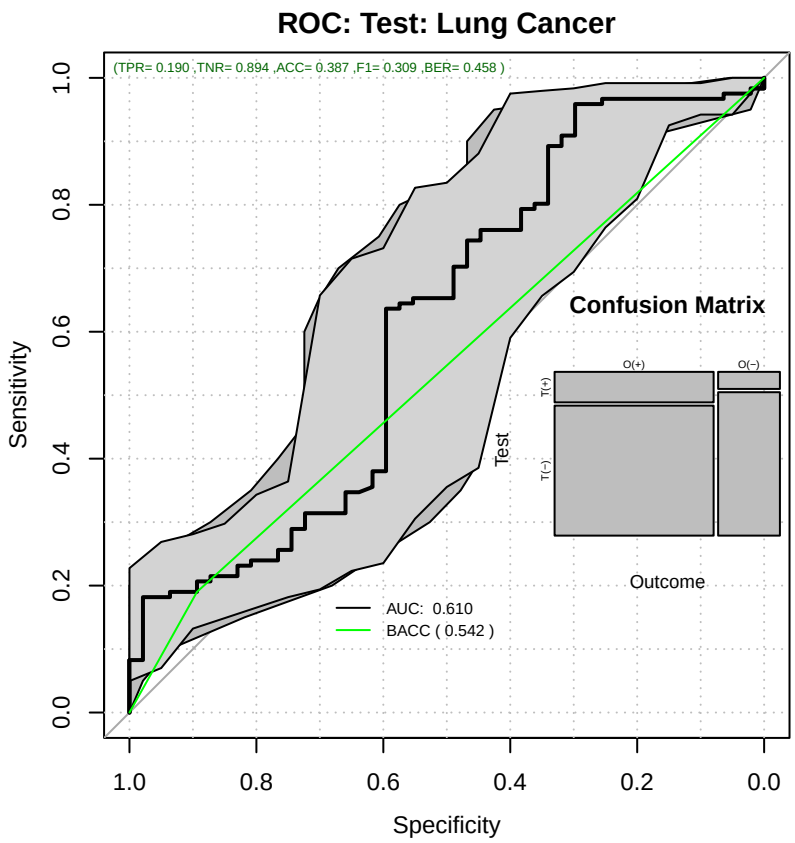
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

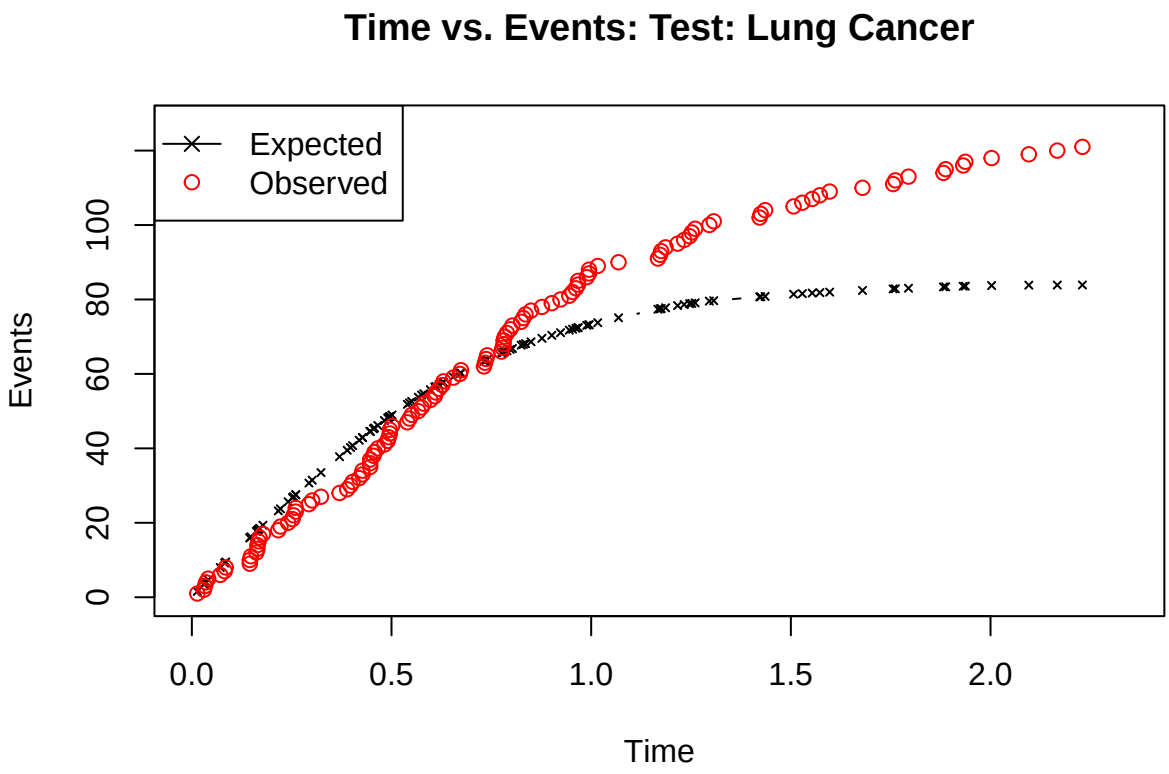
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

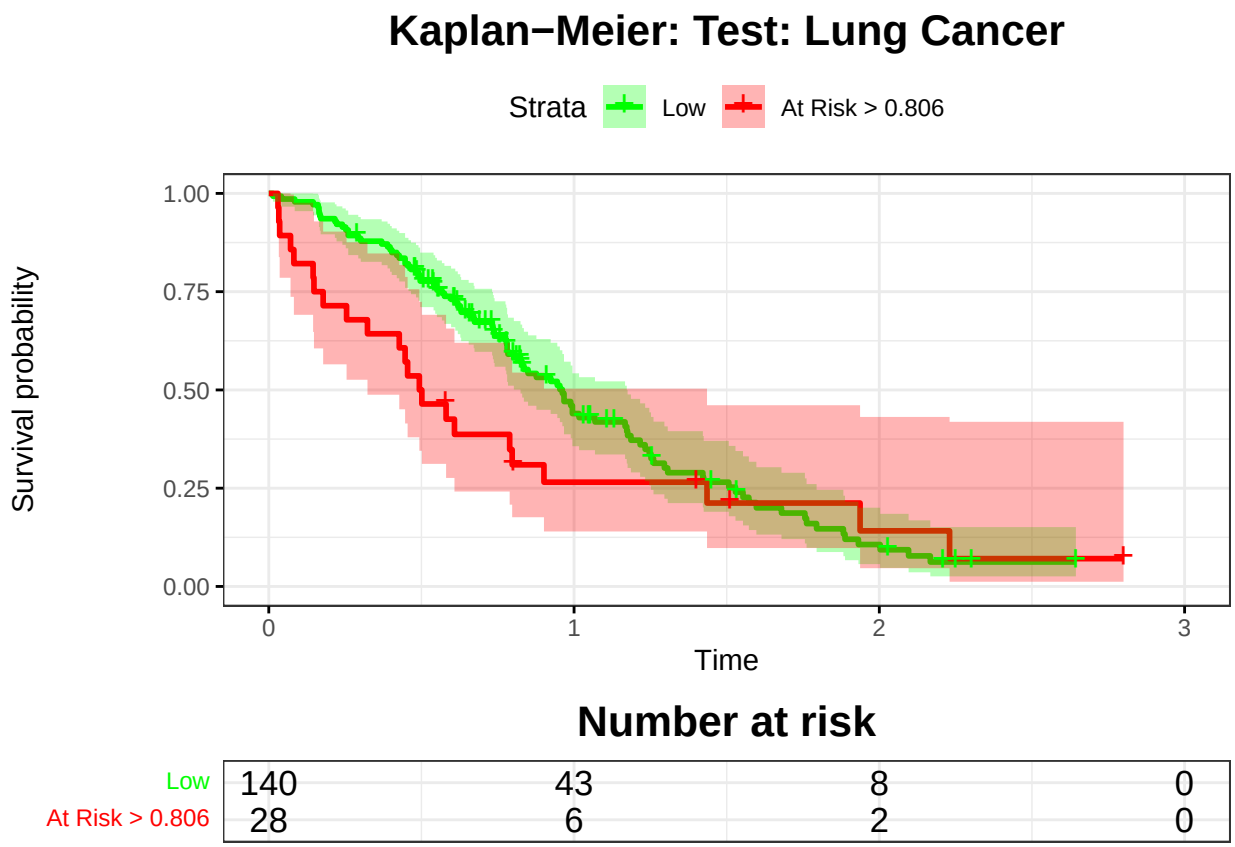
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```


Relative Risk: Test: Lung Cancer
PPV−>
1.0
0.8
0.6
0.4
0.2
Index(0.89)=0.806
RR(0.19)=1.227
1.0
0.8
0.6
0.4
0.2
0.0
SPE
No
Yes
Loess Fit
RR
1.0
1.5
2.0
2.5
3.0
0.0
0.2
0.4
0.6
0.8
1.0
SEN




```
## Warning in cstat$cstatCI <- cstatCI: Coercing LHS to a list
```


Time vs. Events: Test: Lung Cancer
Expected
Observed
Events
0
20
40
60
80
100
0.0
0.5
1.0
1.5
2.0
Time



0.3.1 Cross-Validation Test Performance

```
pander::pander(t(rrAnalysisTest$OERatio),caption="O/E Ratio")
```

Table 28: O/E Ratio

est	lower	upper
1.44	1.2	1.72

```
pander::pander(t(rrAnalysisTest$OE95ci),caption="O/E Ratio")
```

Table 29: O/E Ratio

mean	50%	2.5%	97.5%
1.03	1.03	0.996	1.07

```
pander::pander(t(rrAnalysisTest$OAcum95ci),caption="O/Acum Ratio")
```

Table 30: O/Acum Ratio

mean	50%	2.5%	97.5%
0.953	0.953	0.943	0.964

```
pander::pander(rrAnalysisTest$c.index$cstatCI,caption="C. Index")
```

mean.C Index	median	lower	upper
0.602	0.602	0.537	0.669

```
pander::pander(t(rrAnalysisTest$ROCAnalysis$aucs),caption="ROC AUC")
```

Table 32: ROC AUC

est	lower	upper
0.61	0.508	0.711

```
pander::pander((rrAnalysisTest$ROCAnalysis$sensitivity),caption="Sensitivity")
```

Table 33: Sensitivity

est	lower	upper
0.19	0.124	0.271

```
pander::pander((rrAnalysisTest$ROCAnalysis$specificity),caption="Specificity")
```

Table 34: Specificity

est	lower	upper
0.894	0.769	0.965

```
pander::pander(t(rrAnalysisTest$thr_atP),caption="Probability Thresholds")
```

Table 35: Probability Thresholds

90%
0.806

```
pander::pander(t(rrAnalysisTest$RR_atP),caption="Risk Ratio")
```

Table 36: Risk Ratio

est	lower	upper
1.23	1.01	1.48

```
pander::pander(rrAnalysisTest$surdif,caption="Logrank test")
```

Table 37: Logrank test Chisq = 2.346444 on 1 degrees of freedom, p = 0.125569

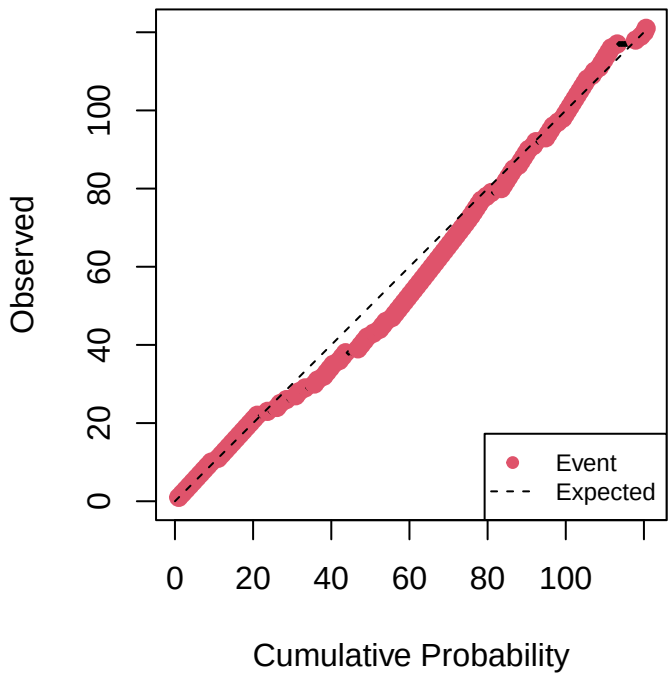
	N	Observed	Expected	(O-E)^2/E	(O-E)^2/V
class=0	140	98	103.8	0.328	2.35
class=1	28	23	17.2	1.981	2.35

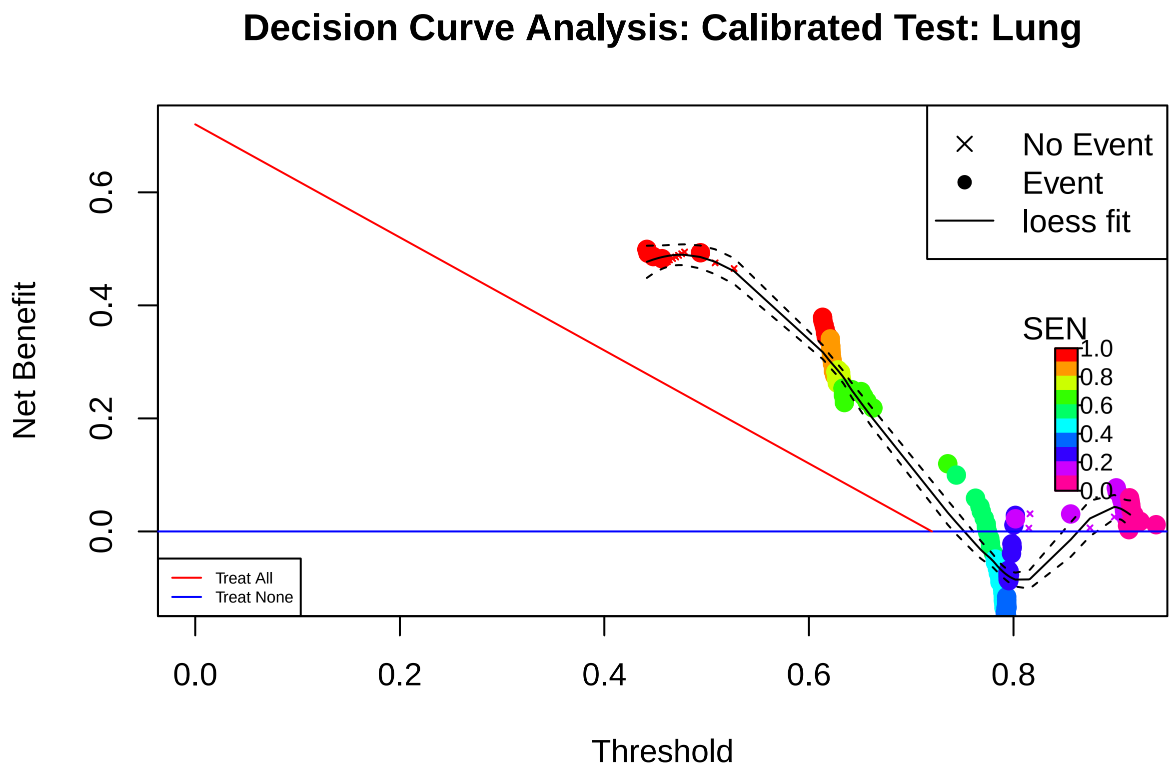
0.3.2 Calibrating the test results

```
rdatacv <- cbind(status,prob,times)
calprob <- CalibrationProbPoissonRisk(rdatacv)

pander::pander(c(h0=calprob$h0,
                 Gain=calprob$hazardGain,
                 DeltaTime=calprob$timeInterval),
               caption="Cox Calibration Parameters")
```

h0	Gain	DeltaTime
0.85	1	2.06

```
timeinterval <- calprob$timeInterval;

rdata <- cbind(status,calprob$prob)


rrAnalysisTest <- RRPlot(rdata,atProb=c(0.90),
                     timetoEvent=times,
                     title="Calibrated Test: Lung",
                     ysurvlim=c(0.00,1.0),
                     riskTimeInterval=timeinterval)
```


Cumulative vs. Observed: Calibrated Test: Lung
Observed
0
20
40
60
80
100
Event
Expected
0
20
40
60
80
100
Cumulative Probability




```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
```

```
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

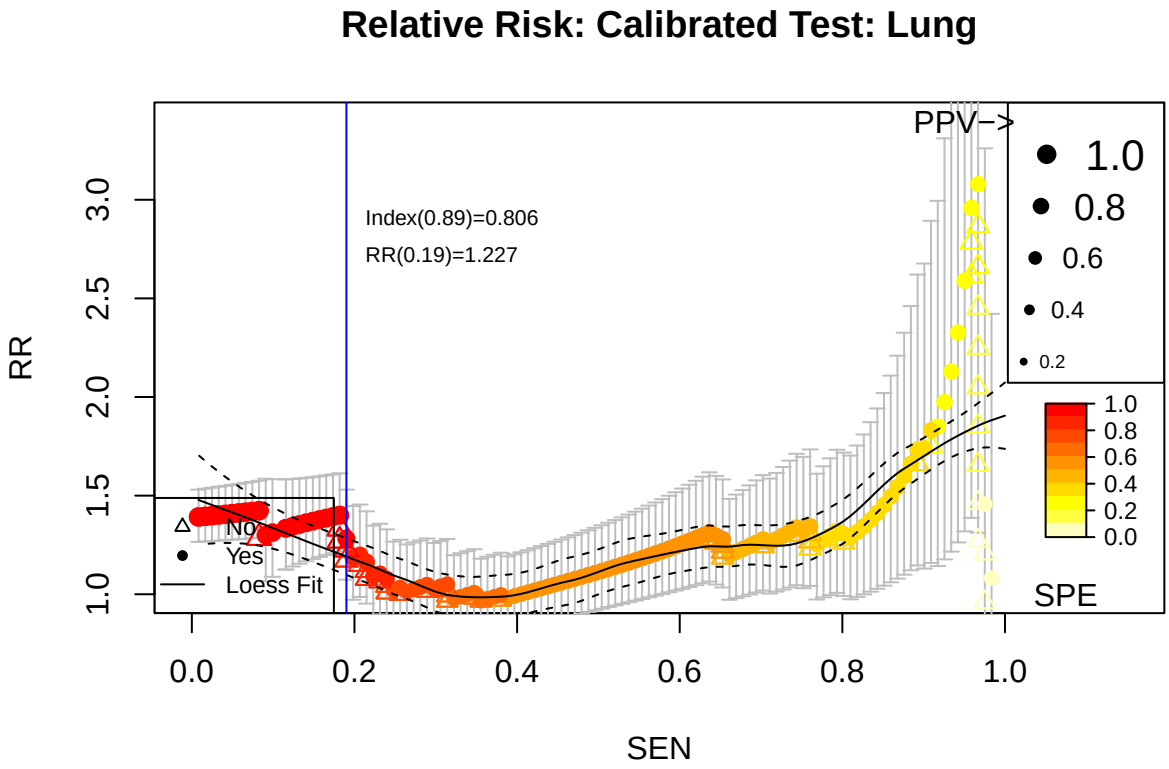
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

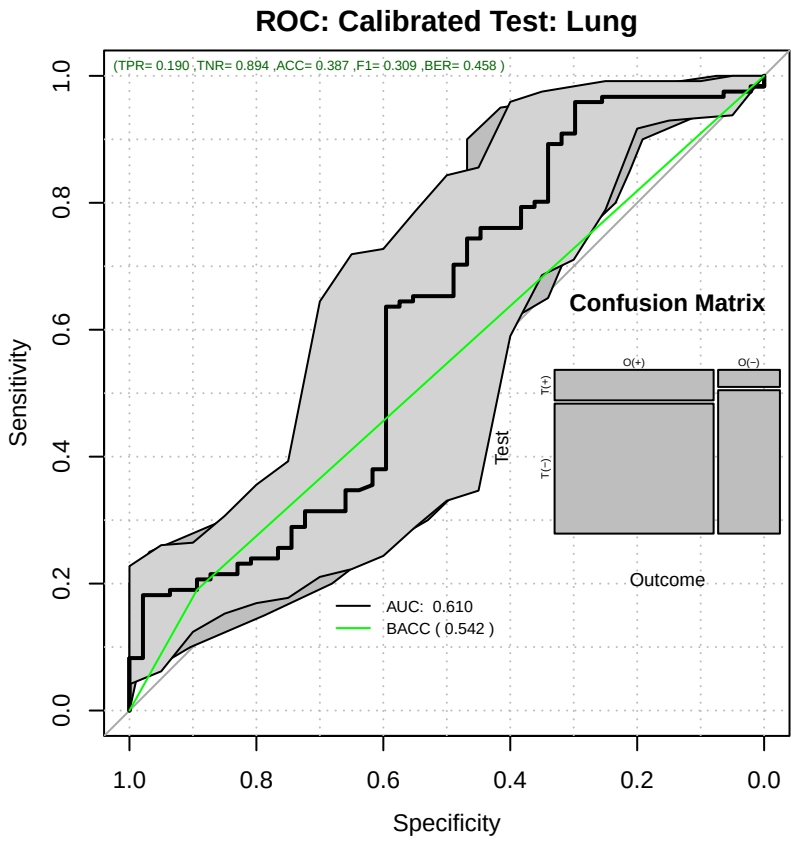
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1

## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```

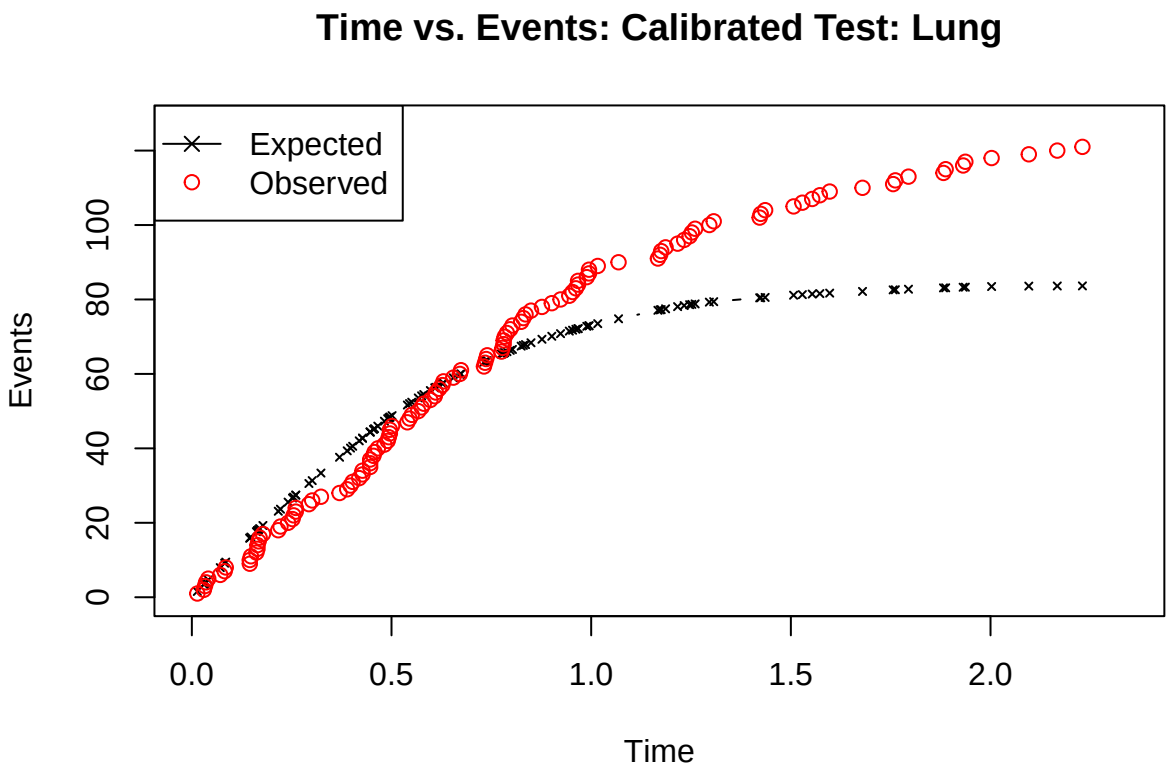
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
```

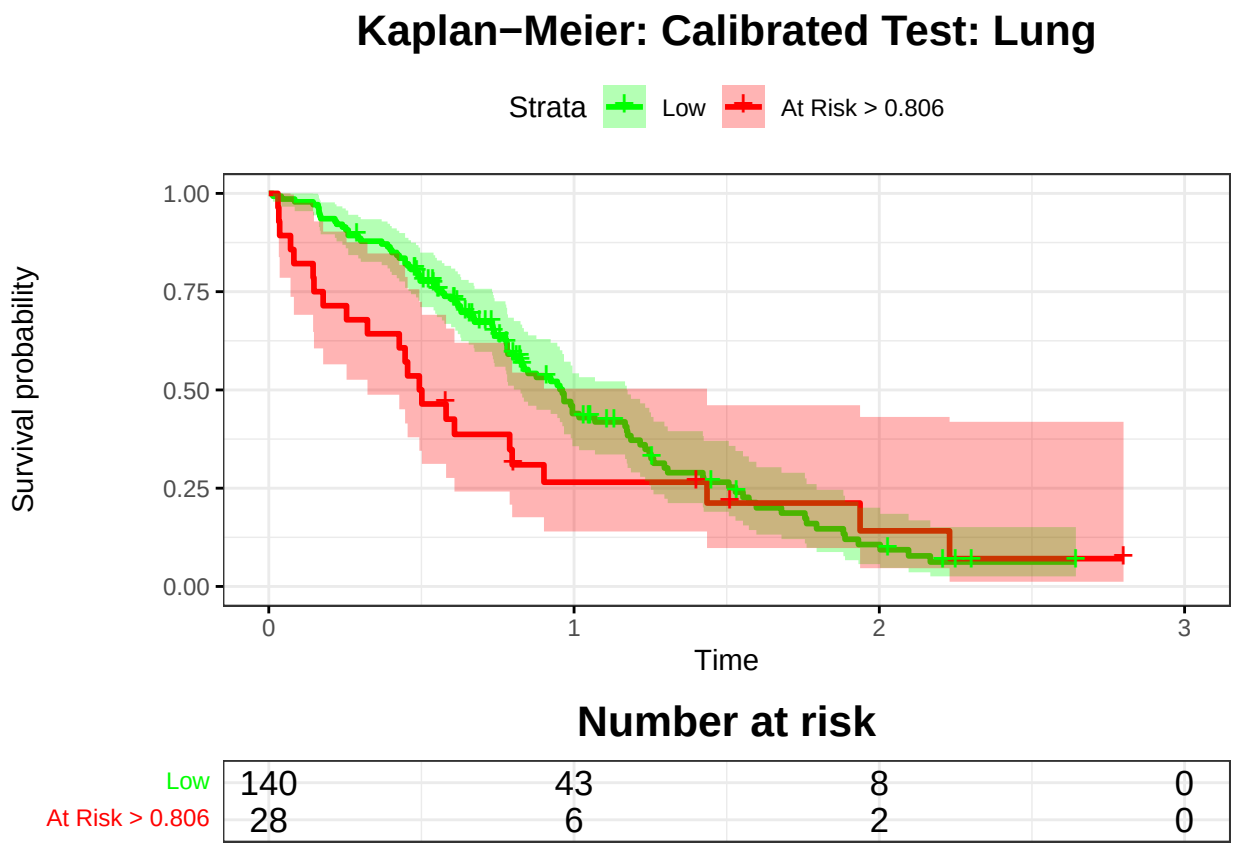
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font width unknown for
## character 0x1
## Warning in plot.xy(xy.coords(x, y), type = type, ...): font metrics unknown for
## character 0x1
```


Relative Risk: Calibrated Test: Lung
PPV−>
1.0
0.8
0.6
0.4
0.2
Index(0.89)=0.806
RR(0.19)=1.227
No
Yes
Loess Fit
1.0
0.8
0.6
0.4
0.2
0.0
SPE
RR
1.0
1.5
2.0
2.5
3.0
0.0
0.2
0.4
0.6
0.8
1.0
SEN




```
## Warning in cstat$cstatCI <- cstatCI: Coercing LHS to a list
```


Time vs. Events: Calibrated Test: Lung
Expected
Observed
Events
0
20
40
60
80
100
0.0
0.5
1.0
1.5
2.0
Time



0.3.3 Calibrated Test Performance

```
pander::pander(t(rrAnalysisTest$OERatio),caption="O/E Ratio")
```

Table 39: O/E Ratio

est	lower	upper
1.45	1.2	1.73

```
pander::pander(t(rrAnalysisTest$OE95ci),caption="O/E Ratio")
```

Table 40: O/E Ratio

mean	50%	2.5%	97.5%
1.04	1.04	0.998	1.08

```
pander::pander(t(rrAnalysisTest$OAcum95ci),caption="O/Acum Ratio")
```

Table 41: O/Acum Ratio

mean	50%	2.5%	97.5%
0.953	0.953	0.942	0.964

```
pander::pander(rrAnalysisTest$c.index$cstatCI,caption="C. Index")
```

mean.C Index	median	lower	upper
0.602	0.602	0.532	0.667

```
pander::pander(t(rrAnalysisTest$ROCAnalysis$aucs),caption="ROC AUC")
```

Table 43: ROC AUC

est	lower	upper
0.61	0.508	0.711

```
pander::pander((rrAnalysisTest$ROCAnalysis$sensitivity),caption="Sensitivity")
```

Table 44: Sensitivity

est	lower	upper
0.19	0.124	0.271

```
pander::pander((rrAnalysisTest$ROCAnalysis$specificity),caption="Specificity")
```

Table 45: Specificity

est	lower	upper
0.894	0.769	0.965

```
pander::pander(t(rrAnalysisTest$thr_atP),caption="Probability Thresholds")
```

Table 46: Probability Thresholds

90%
0.806

```
pander::pander(t(rrAnalysisTest$RR_atP),caption="Risk Ratio")
```

Table 47: Risk Ratio

est	lower	upper
1.23	1.01	1.48

```
pander::pander(rrAnalysisTest$surdif,caption="Logrank test")
```

Table 48: Logrank test Chisq = 2.346444 on 1 degrees of freedom, p = 0.125569

	N	Observed	Expected	(O-E)^2/E	(O-E)^2/V
class=0	140	98	103.8	0.328	2.35
class=1	28	23	17.2	1.981	2.35