

Lung Cancer

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2023-05-11

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1 Detailed Survival analysis of the Survival lung data.

1.0.1 Libraries

```
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
op <- par(no.readonly = TRUE)
pander::panderOptions('digits', 3)
pander::panderOptions('keep.trailing.zeros', TRUE)
```

1.0.2 Libraries

```
data(lung)

## Warning in data(lung): data set 'lung' not found

lung$inst <- NULL
lung$status <- lung$status - 1
lung <- lung[complete.cases(lung),]

pander::pander(table(lung$status))
```

0	1
47	121

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

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
5	175	268	310	416	1022

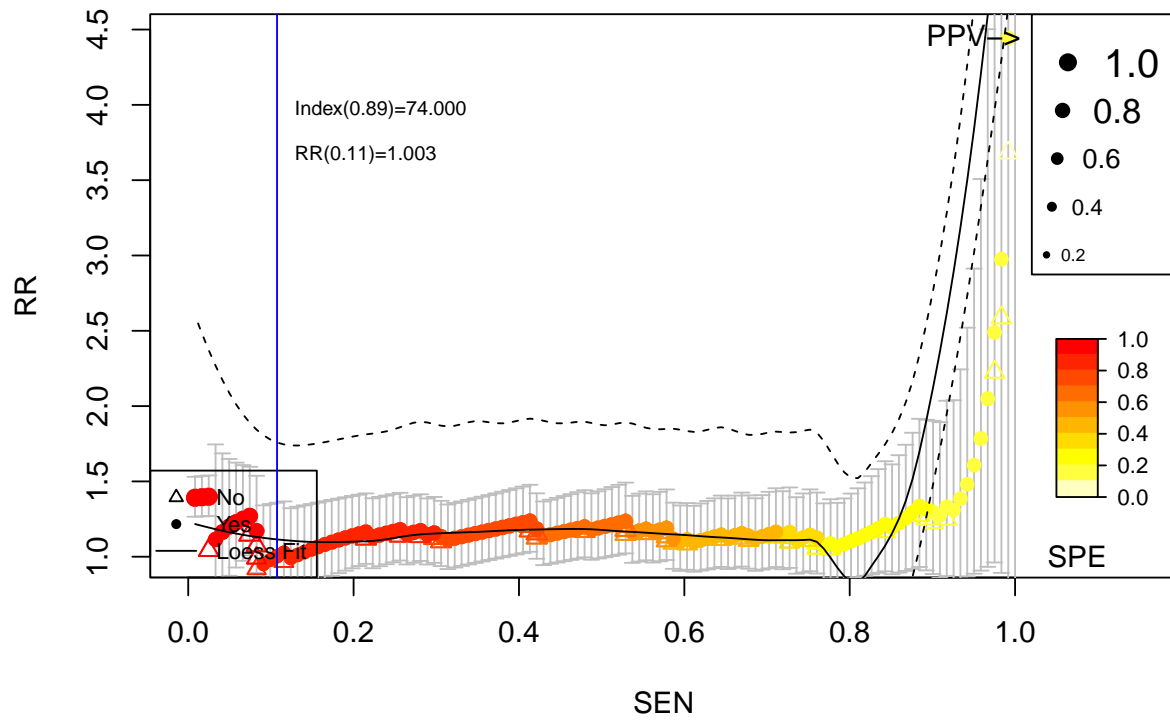
1.1 Exploring Raw Features with RRPlot

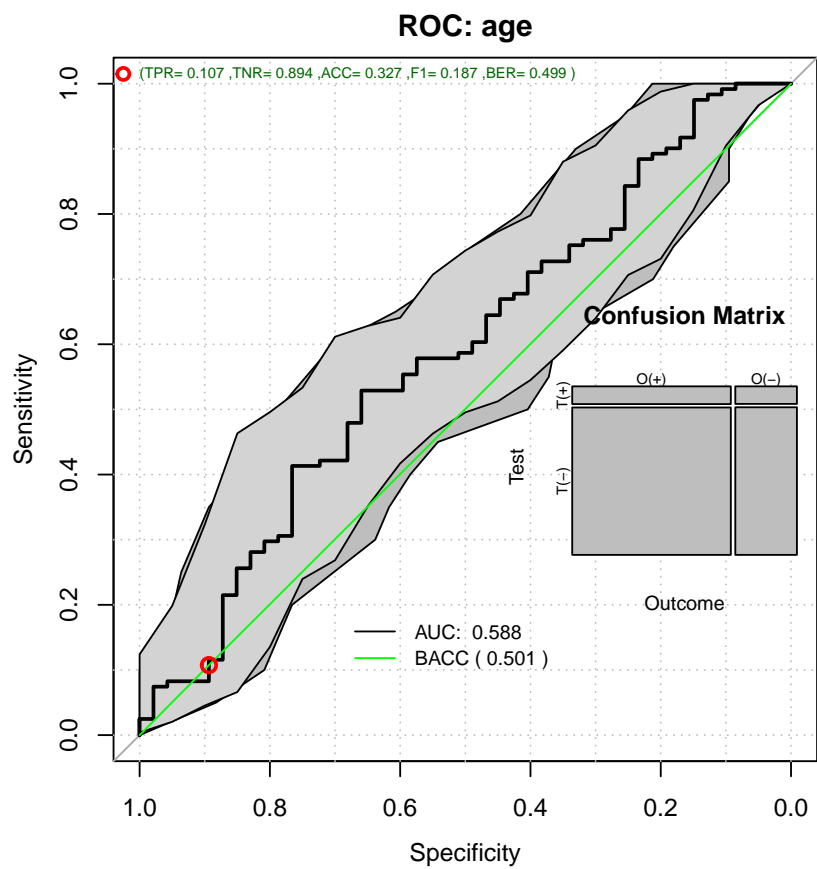
```
convar <- colnames(lung)[lapply(apply(lung,2,unique),length) > 10]
convar <- convar[convar != "time"]
topvar <- univariate_BinEnsemble(lung[,c("status",convar)],"status")
pander::pander(topvar)
```

age	wt.loss
0.106	0.106

```
topv <- min(5,length(topvar))
topFive <- names(topvar)[1:topv]
RRanalysis <- list();
idx <- 1
for (topf in topFive)
{
  RRanalysis[[idx]] <- RRPlot(cbind(lung$status,lung[,topf]),
                             atProb=c(0.90),
                             timetoEvent=lung$time,
                             title=topf,
                             plotRR=FALSE
                             )
  idx <- idx + 1
}
```

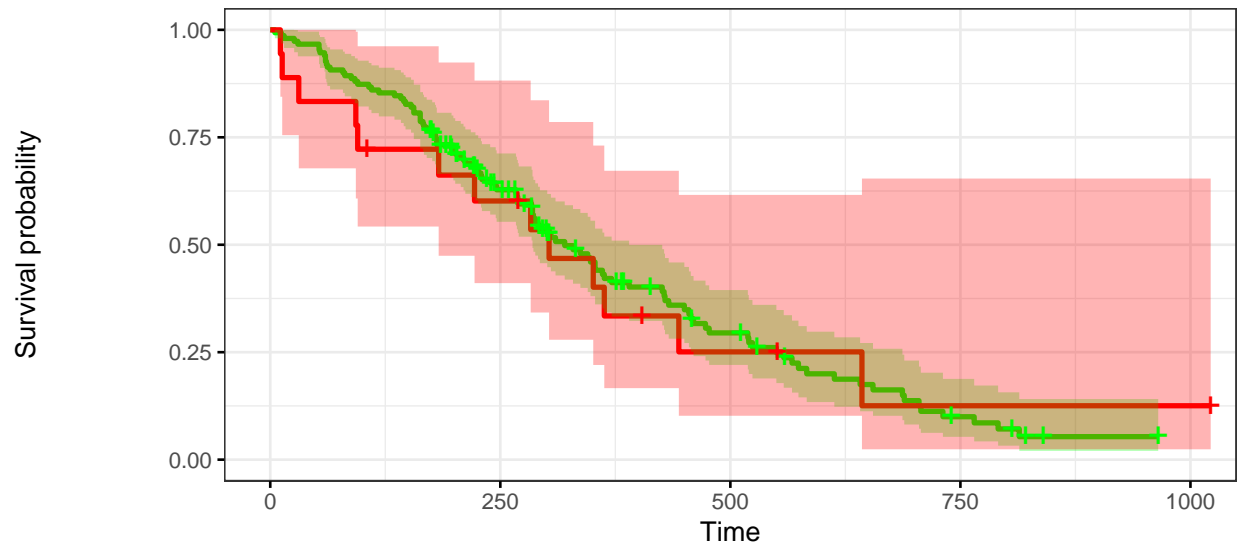
Relative Risk: age





Kaplan–Meier: age

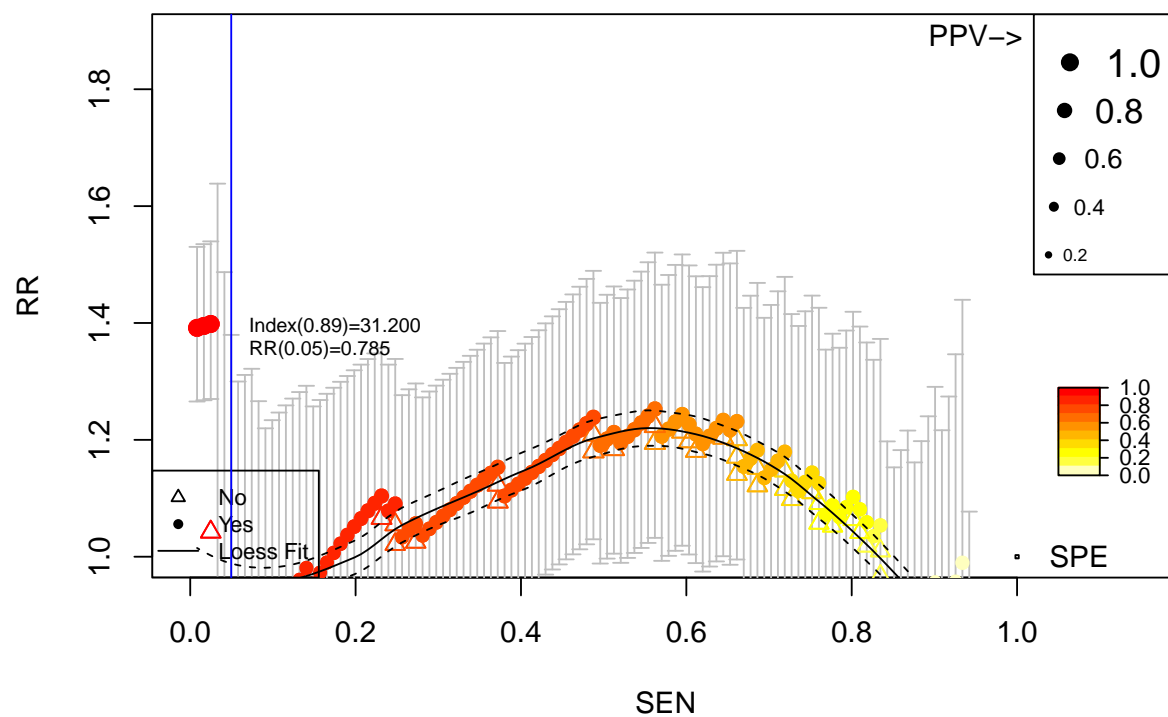
Strata + Low + At Risk > 74.000

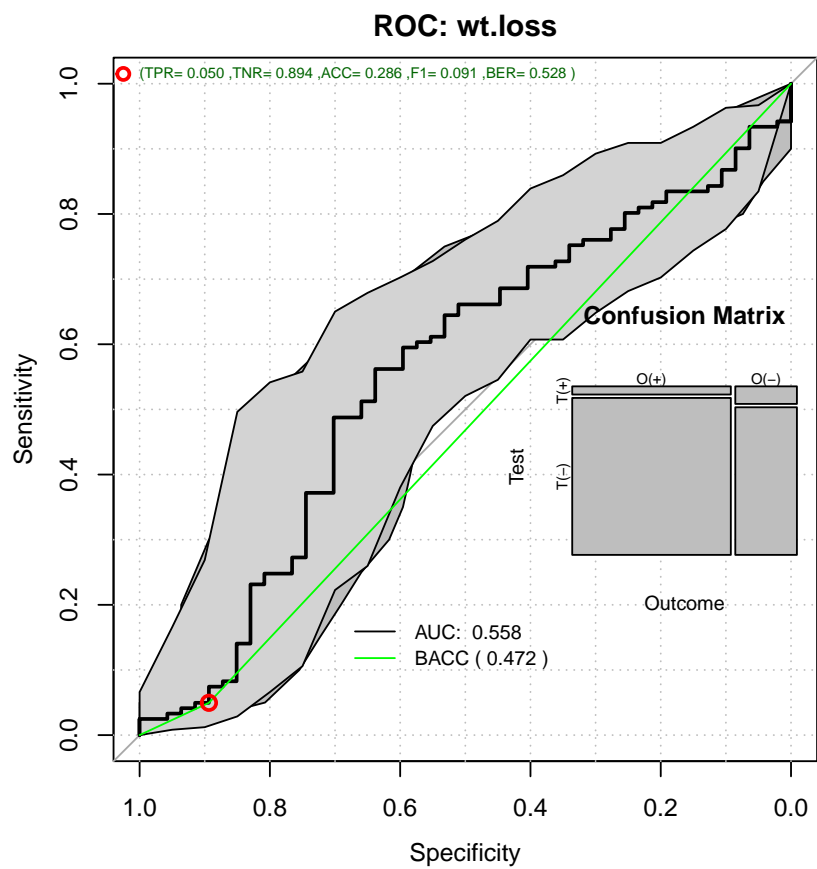


Number at risk

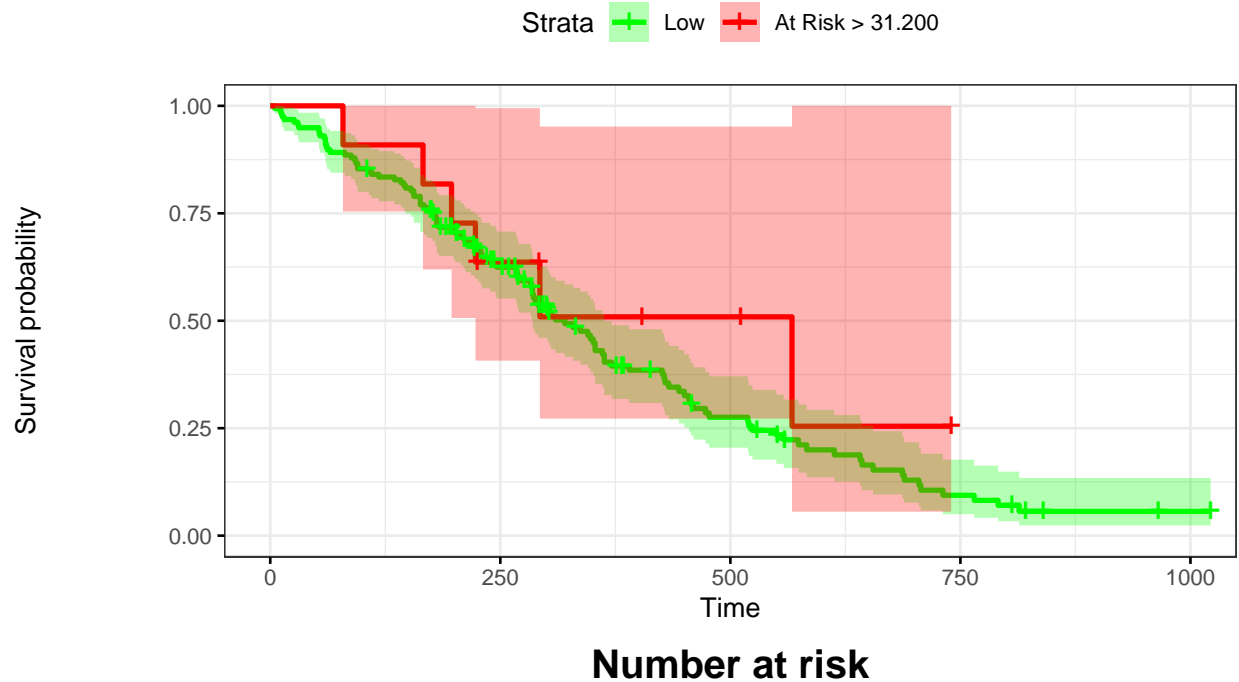
Low	150	79	27	7	0
At Risk > 74.000	18	10	3	1	1

Relative Risk: wt.loss





Kaplan–Meier: wt.loss



Low	157	83	27	8	1
At Risk > 31.200	11	6	3	0	0

```
names(RRanalysis) <- topFive
```

1.2 Reporting the Metrics

```
ROCAUC <- NULL
CstatCI <- NULL
RRratios <- NULL
LogRangp <- NULL
Sensitivity <- NULL
Specificity <- NULL

for (topf in topFive)
{
  CstatCI <- rbind(CstatCI, RRanalysis[[topf]]$c.index$cstatCI)
  RRratios <- rbind(RRratios, RRanalysis[[topf]]$RR_atP)
  LogRangp <- rbind(LogRangp, RRanalysis[[topf]]$surdif$pvalue)
  Sensitivity <- rbind(Sensitivity, RRanalysis[[topf]]$ROCAanalysis$sensitivity)
  Specificity <- rbind(Specificity, RRanalysis[[topf]]$ROCAanalysis$specificity)
  ROCAUC <- rbind(ROCAUC, RRanalysis[[topf]]$ROCAanalysis$aucs)
}

rownames(CstatCI) <- topFive
rownames(RRratios) <- topFive
rownames(LogRangp) <- topFive
rownames(Sensitivity) <- topFive
rownames(Specificity) <- topFive
```



```
rownames(ROCAUC) <- topFive
```

```
pander::pander(ROCAUC)
```

	est	lower	upper
age	0.588	0.490	0.686
wt.loss	0.558	0.459	0.656

```
pander::pander(CstatCI)
```

	mean.C Index	median	lower	upper
age	0.559	0.559	0.498	0.620
wt.loss	0.518	0.516	0.454	0.576

```
pander::pander(RRatios)
```

	est	lower	upper
age	1.003	0.741	1.36
wt.loss	0.785	0.462	1.33

```
pander::pander(LogRangp)
```

age	0.857
wt.loss	0.358

```
pander::pander(Sensitivity)
```

	est	lower	upper
age	0.1074	0.0585	0.177
wt.loss	0.0496	0.0184	0.105

```
pander::pander(Specificity)
```

	est	lower	upper
age	0.894	0.769	0.965
wt.loss	0.894	0.769	0.965

```
meanMatrix <- cbind(ROCAUC[,1],CstatCI[,1],Sensitivity[,1],Specificity[,1],RRatios[,1])
colnames(meanMatrix) <- c("ROCAUC","C-Stat","Sen","Spe","RR")
pander::pander(meanMatrix)
```

	ROCAUC	C-Stat	Sen	Spe	RR
age	0.588	0.559	0.1074	0.894	1.003

	ROCAUC	C-Stat	Sen	Spe	RR
wt.loss	0.558	0.518	0.0496	0.894	0.785

1.3 Modeling

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

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

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

Table 11: 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	-4.06e-07	1.000	1.000	1.000	0.577	0.720
age	9.13e-08	1.000	1.000	1.000	0.565	0.720

Table 12: 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	0.7
age	1.97	1.14	0.04871	0.2

1.4 Cox Model Performance

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

1.4.1 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(lung,status==1)$time)

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

Table 14: Initial Parameters

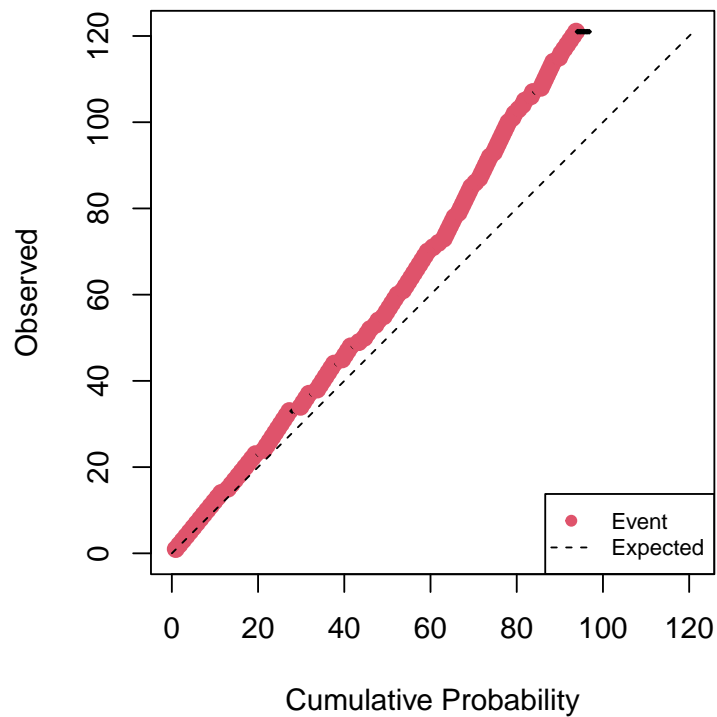
h0	timeinterval
0.85	578

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

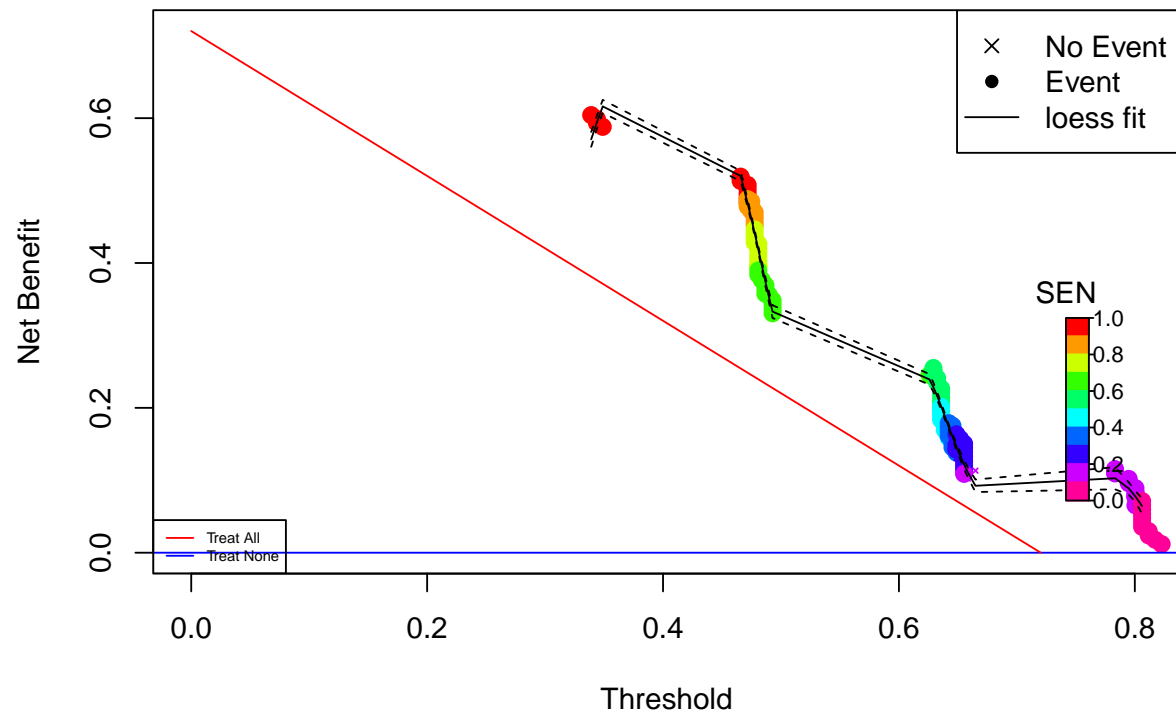
rdata <- cbind(lung$status,ppoisGzero(index,h0))

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

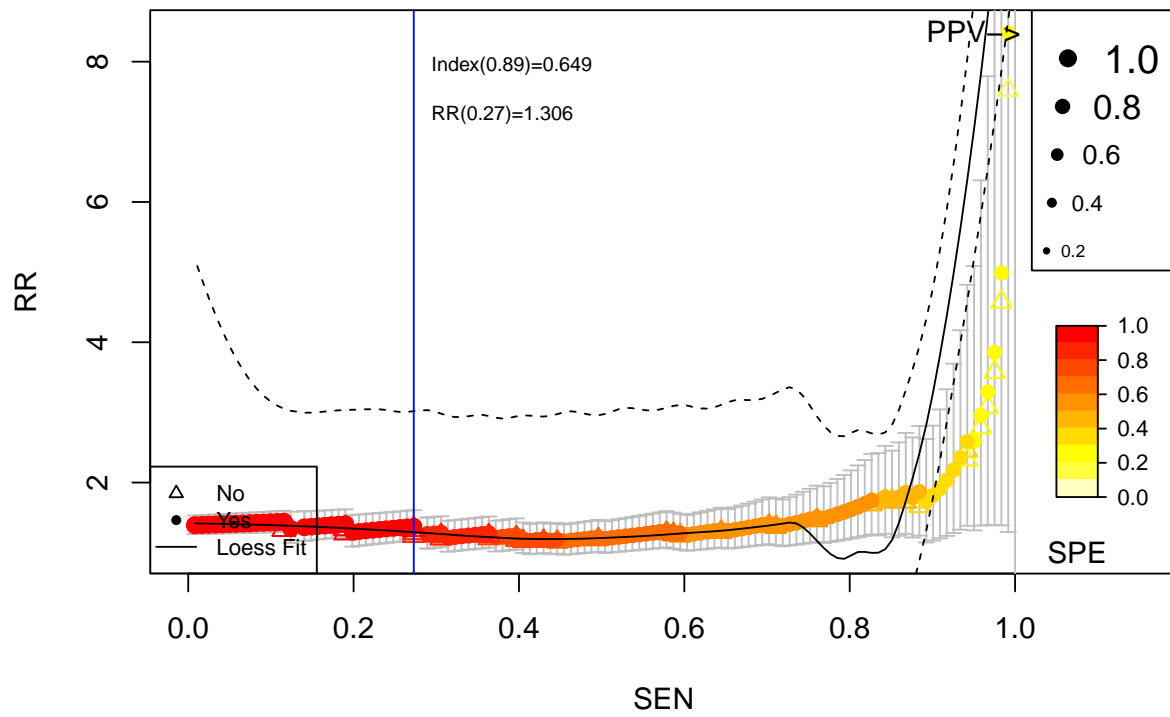
Cumulative vs. Observed: Raw Train: Lung Cancer

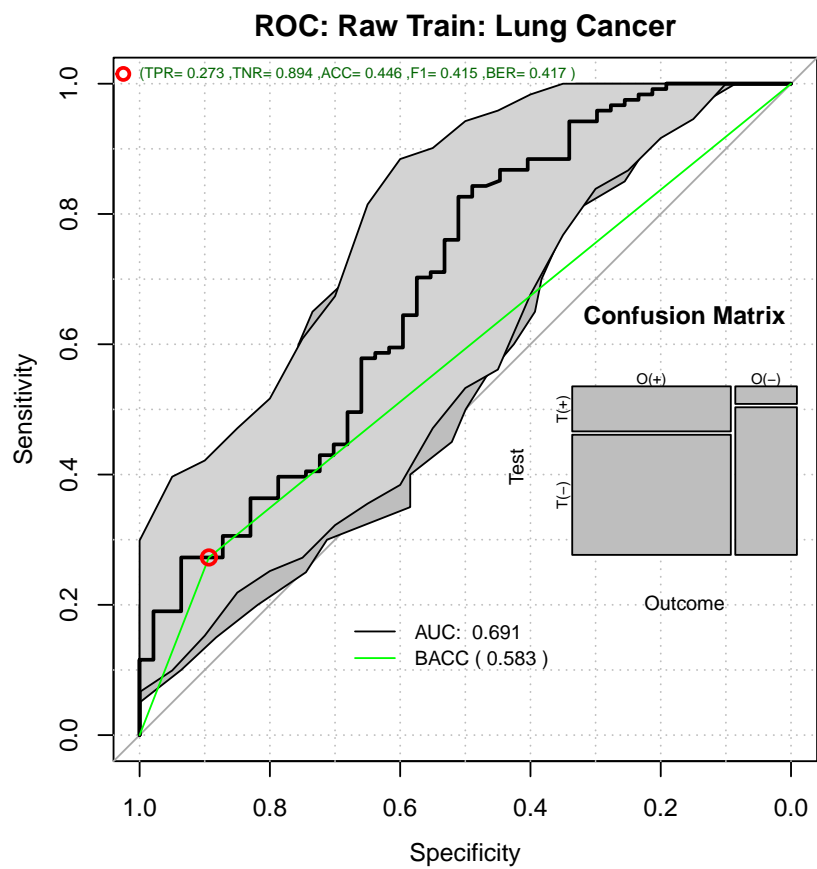


Decision Curve Analysis: Raw Train: Lung Cancer

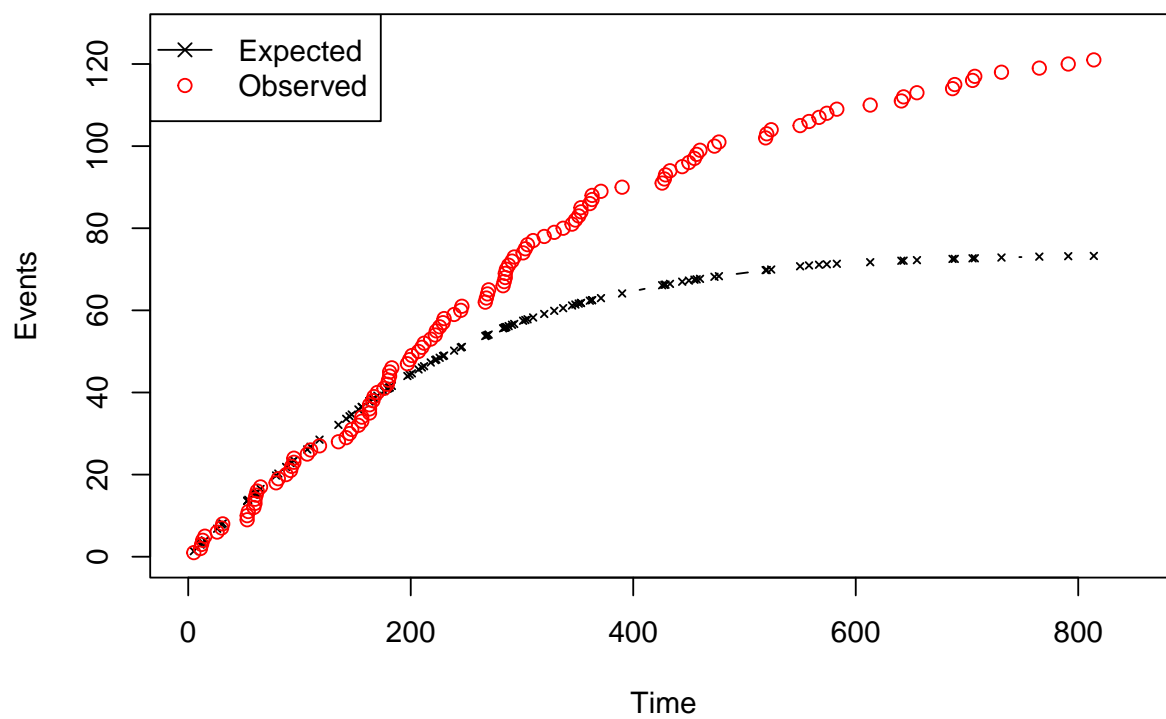


Relative Risk: Raw Train: Lung Cancer

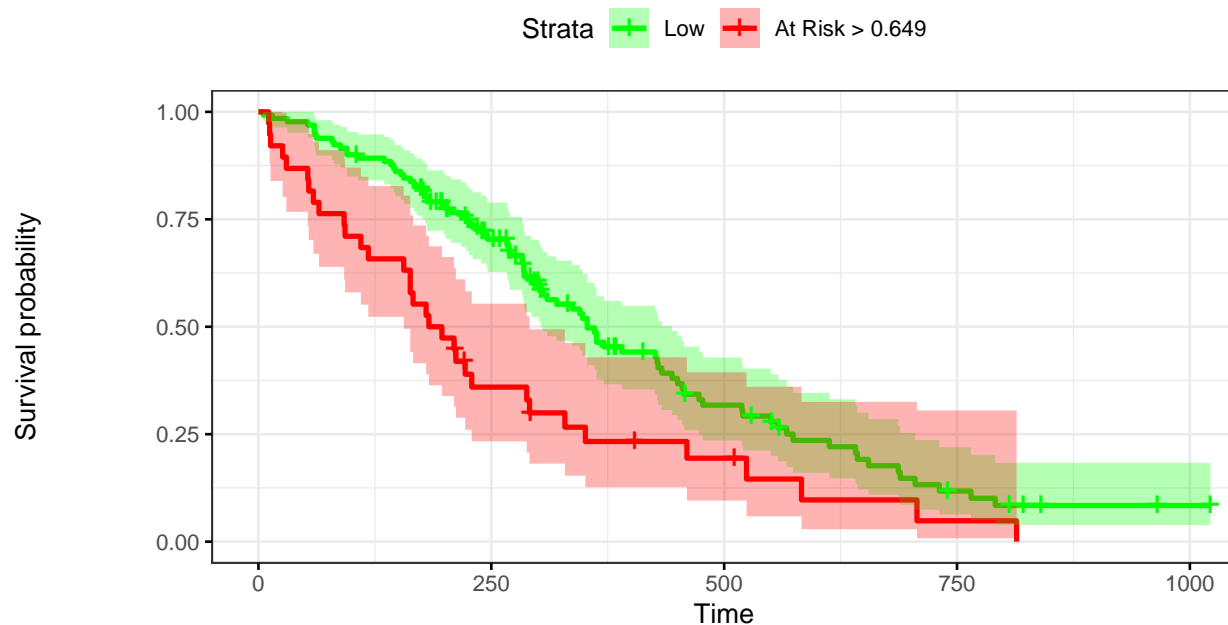




Time vs. Events: Raw Train: Lung Cancer



Kaplan–Meier: Raw Train: Lung Cancer



Number at risk

Low	130	77	25	7	1
At Risk > 0.649	38	12	5	1	0

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

1.4.2 Uncalibrated Performance Report

```
pander::pander(t(rrAnalysisTrain$keyPoints),caption="Threshold values")
```

Table 15: Threshold values

	@:0.9	@MAX_BACC	@MAX_RR	@SPE100	p(0.5)
Thr	0.649	0.478	0.339	0.339	0.493
RR	1.240	1.742	68.491	68.491	1.270
SEN	0.273	0.826	1.000	1.000	0.612
SPE	0.872	0.511	0.191	0.191	0.596
BACC	0.573	0.669	0.596	0.596	0.604

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

Table 16: O/E Ratio

O/E	Low	Upper	p.value
1.65	1.37	1.97	3.16e-07


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

Table 17: O/E Mean

mean	50%	2.5%	97.5%
1.23	1.23	1.19	1.27

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

Table 18: O/Acum Mean

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	0.65	0.584	0.707

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

Table 20: ROC AUC

est	lower	upper
0.691	0.598	0.784

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

Table 21: Sensitivity

est	lower	upper
0.273	0.196	0.361

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

Table 22: Specificity

est	lower	upper
0.894	0.769	0.965

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

Table 23: Probability Thresholds

90%
0.649

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

Table 24: Risk Ratio

est	lower	upper
1.31	1.11	1.54

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

Table 25: 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

1.4.3 Cox Calibration

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

calprob <- CoxRiskCalibration(ml,lung,"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	749

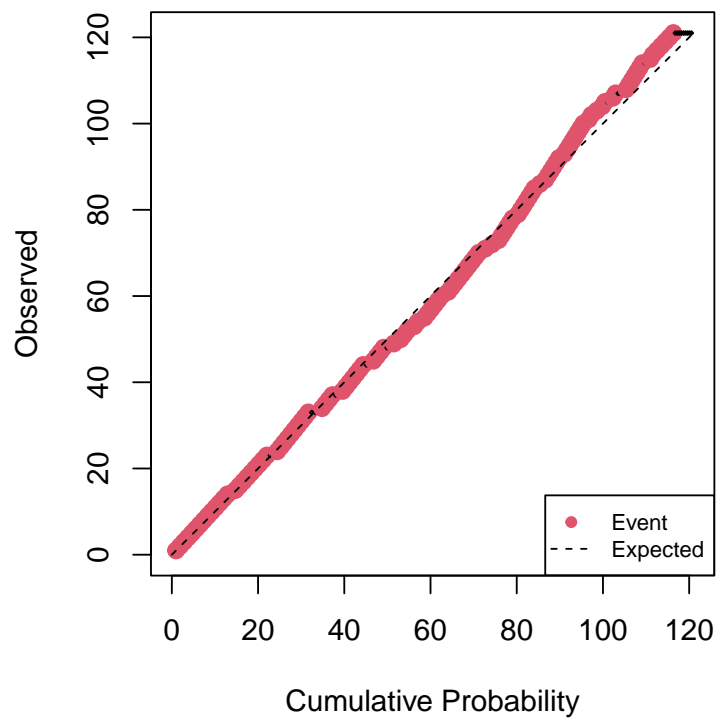
1.4.4 The RRplot() of the calibrated model

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

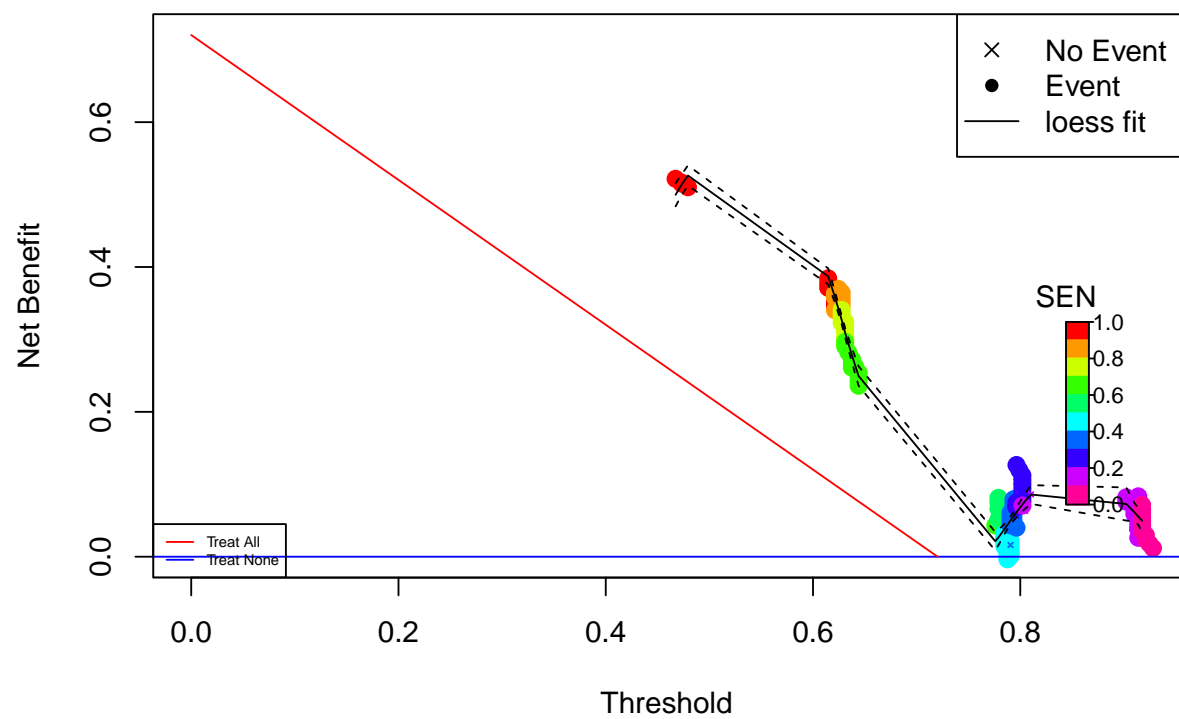
rdata <- cbind(lung$status,calprob$prob)

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

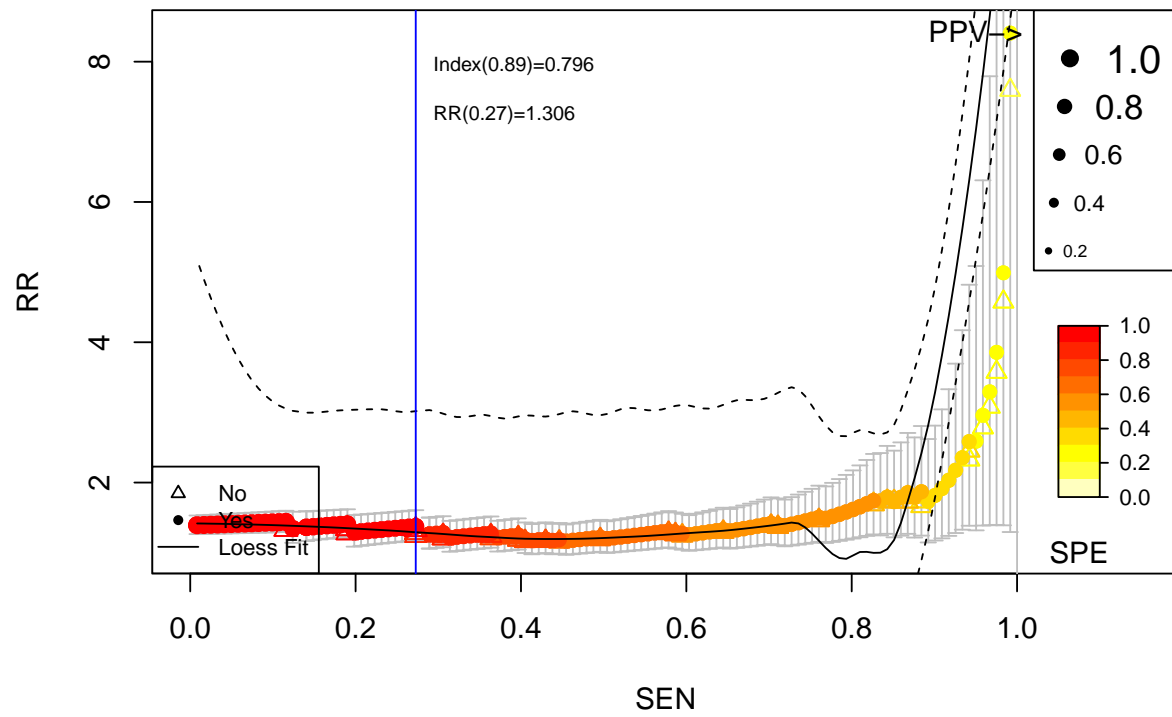
Cumulative vs. Observed: Train: Lung

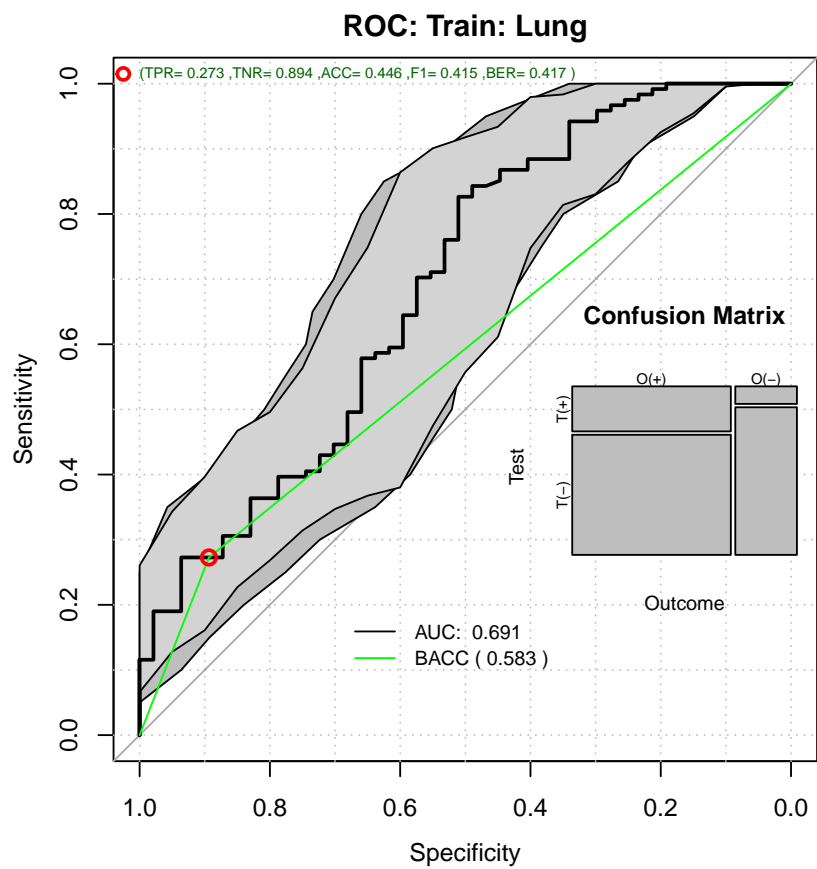


Decision Curve Analysis: Train: Lung

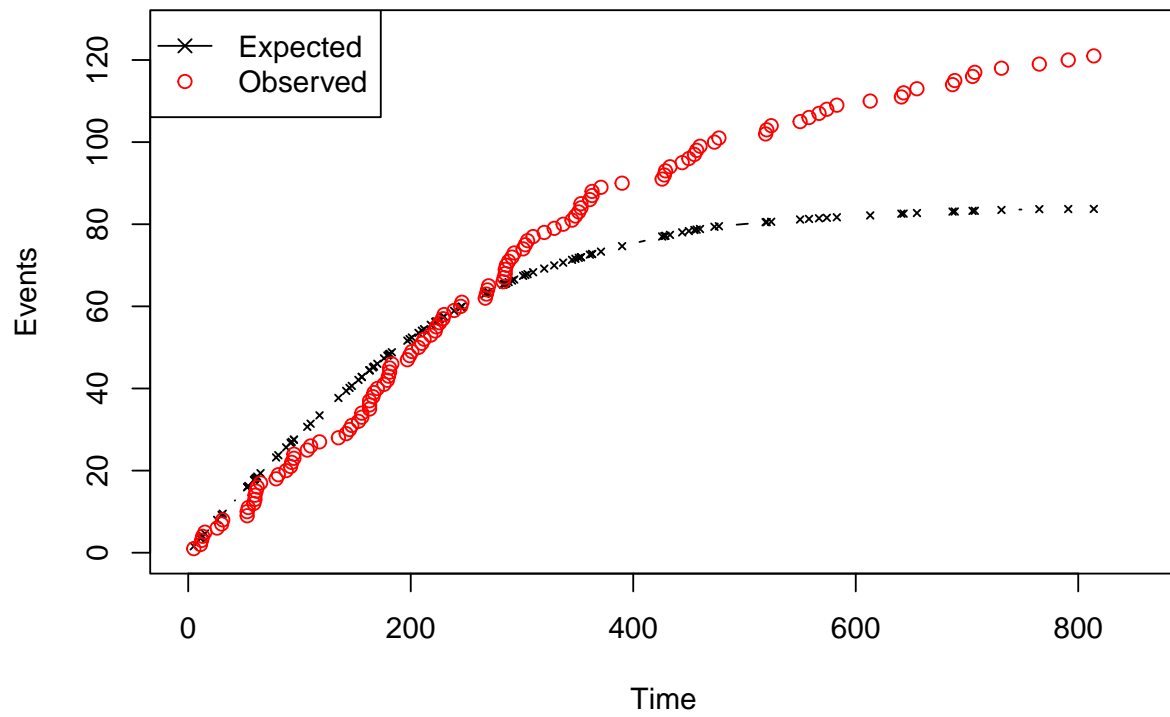


Relative Risk: Train: Lung

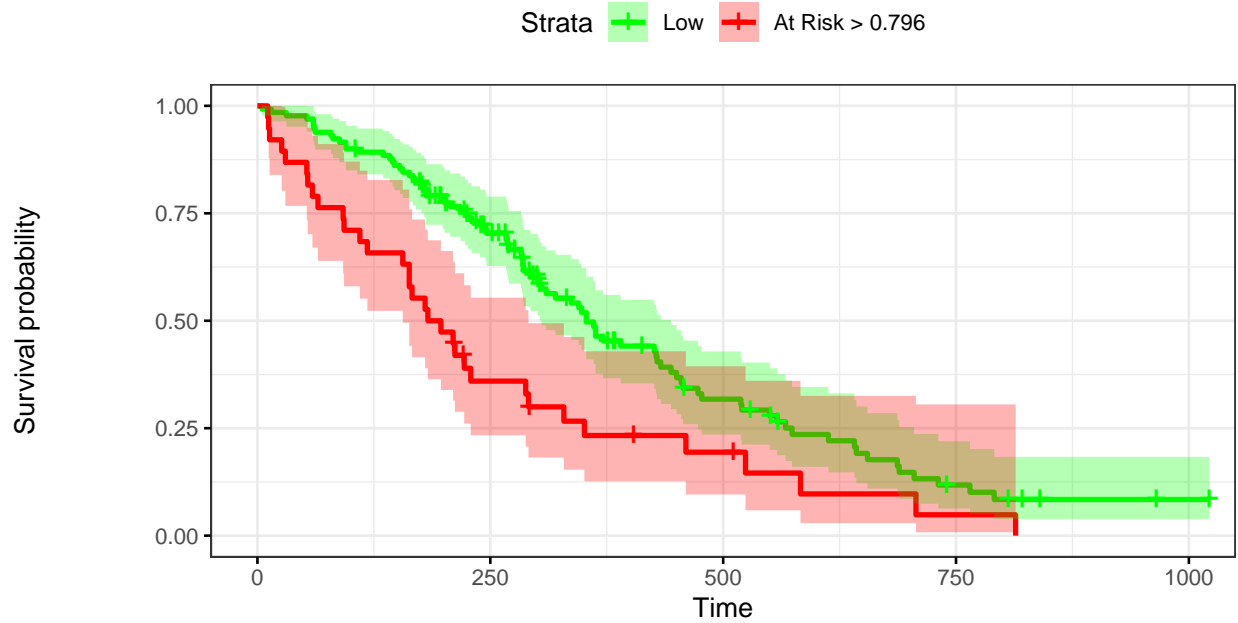




Time vs. Events: Train: Lung



Kaplan–Meier: Train: Lung



Number at risk

Low	130	77	25	7	1
At Risk > 0.796	38	12	5	1	0

1.4.5 Calibrated Train Performance

```
pander::pander(t(rrAnalysisTrain$keyPoints),caption="Threshold values")
```

Table 27: Threshold values

	@:0.9	@MAX_BACC	@MAX_RR	@SPE100	p(0.5)
Thr	0.796	0.628	0.467	0.467	0.479
RR	1.240	1.742	68.491	68.491	2.784
SEN	0.273	0.826	1.000	1.000	0.959
SPE	0.872	0.511	0.191	0.191	0.277
BACC	0.573	0.669	0.596	0.596	0.618

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

Table 28: O/E Ratio

O/E	Low	Upper	p.value
1.45	1.2	1.73	0.000124

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


Table 29: O/E Mean

mean	50%	2.5%	97.5%
1.06	1.06	1.02	1.09

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

Table 30: O/Acum Mean

mean	50%	2.5%	97.5%
1	1	0.996	1.01

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

mean.C Index	median	lower	upper
0.651	0.651	0.589	0.712

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

Table 32: ROC AUC

est	lower	upper
0.691	0.598	0.784

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

Table 33: Sensitivity

est	lower	upper
0.273	0.196	0.361

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

Table 34: Specificity

est	lower	upper
0.894	0.769	0.965

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

Table 35: Probability Thresholds

90%
0.796

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

Table 36: Risk Ratio

est	lower	upper
1.31	1.11	1.54

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

Table 37: 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

1.5 Cross-Validation

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

```
.[++++].[++].[++++].[++].[++].[++].[++].[++++].[++++].[++++]10 Tested: 72 Avg. Selected: 3.6
Min Tests: 1 Max Tests: 5 Mean Tests: 1.388889 . MAD: 0.4886257 .[++].[++++].[++++].[++++].[+
].[++].[++++].[++++].[++++].[+]20 Tested: 121 Avg. Selected: 3.5 Min Tests: 1 Max Tests: 5 Mean
Tests: 1.652893 . MAD: 0.4744729 .[++++].[++].[++].[++].[++].[++++].[++++].[++++].[++++]30
Tested: 140 Avg. Selected: 3.533333 Min Tests: 1 Max Tests: 5 Mean Tests: 2.142857 . MAD:
0.4767379 .[++].[++++].[++++].[++].[++++].[++++].[++++].[++++].[++++].[++++]40 Tested: 155
Avg. Selected: 3.6 Min Tests: 1 Max Tests: 7 Mean Tests: 2.580645 . MAD: 0.4774606
.[++].[++++].[++++].[++].[++].[++].[++++].[++].[++++].[++++]50 Tested: 158 Avg. Selected: 3.58 Min Tests:
1 Max Tests: 8 Mean Tests: 3.164557 . MAD: 0.4783504 .[++++].[++++].[++++].[++].[++].[++++].[++++].[++++].[++++].[++++]60
Tested: 166 Avg. Selected: 3.616667 Min Tests: 1 Max Tests: 10 Mean Tests: 3.614458 . MAD:
0.477686 .[++++].[++++].[++++].[++++].[++].[++].[++++].[+].[++++].[++++]70 Tested: 166 Avg. Selected:
3.614286 Min Tests: 1 Max Tests: 10 Mean Tests: 4.216867 . MAD: 0.4765466 .[++++].[++++].[++++
].[++++].[++++].[+].[++++].[++++].[++++].[++++]80 Tested: 167 Avg. Selected: 3.65 Min Tests: 1 Max Tests: 14
Mean Tests: 4.790419 . MAD: 0.4769744 .[++++].[++++].[++++].[++].[++].[++++].[++++].[++].[++++].[+]90
Tested: 167 Avg. Selected: 3.644444 Min Tests: 1 Max Tests: 14 Mean Tests: 5.389222 . MAD:
0.477648 .[++++].[++++].[++++].[++].[++++].[+].[++].[++++].[++++].[+].[++++]100 Tested: 168
Avg. Selected: 3.65 Min Tests: 1 Max Tests: 16 Mean Tests: 5.952381 . MAD: 0.4784858
.[++].[+].[+].[+].[++++].[++++].[++++].[++].[++++].[+]110 Tested: 168 Avg. Selected: 3.6 Min
Tests: 1 Max Tests: 16 Mean Tests: 6.547619 . MAD: 0.4778259 .[++++].[++++].[++].[+
].[++++].[++++].[++].[++++].[++].[++++]120 Tested: 168 Avg. Selected: 3.616667 Min Tests: 2 Max Tests:
```

16 Mean Tests: 7.142857 . MAD: 0.4772032 .[+++].[+++].[+++].[+++].[+].[+++].[++++].[+++].[+++].[+++]130
Tested: 168 Avg. Selected: 3.646154 Min Tests: 2 Max Tests: 16 Mean Tests: 7.738095 .
MAD: 0.4775695 .[+++].[+++].[+].[+++].[+++].[+++].[+].[+++].[+++].[+]140 Tested: 168
Avg. Selected: 3.642857 Min Tests: 2 Max Tests: 16 Mean Tests: 8.333333 . MAD: 0.4774368
.[+++].[+++].[+].[+].[+++].[+].[+++].[+].[+].[+++]150 Tested: 168 Avg. Selected:
3.633333 Min Tests: 2 Max Tests: 16 Mean Tests: 8.928571 . MAD: 0.4772352 .[+++].[+++].[+-
].[+++].[+++].[+].[+++].[+++].[+].[+++]160 Tested: 168 Avg. Selected: 3.6375 Min Tests: 2 Max Tests:
17 Mean Tests: 9.52381 . MAD: 0.4769764 .[+].[+].[+++].[+++].[+++].[+].[+].[+++].[+++].[+++]170
Tested: 168 Avg. Selected: 3.629412 Min Tests: 3 Max Tests: 20 Mean Tests: 10.11905 .
MAD: 0.4772372 .[+++].[+++].[+++].[+].[+].[+-].[+++].[+++].[+].[+++]180 Tested: 168
Avg. Selected: 3.627778 Min Tests: 3 Max Tests: 21 Mean Tests: 10.71429 . MAD: 0.477139
.[+].[+++].[+++].[+++].[+++].[+].[+++].[+].[+++].[+++]190 Tested: 168 Avg. Selected: 3.631579
Min Tests: 3 Max Tests: 22 Mean Tests: 11.30952 . MAD: 0.4770433 .[+].[+++].[+].[+].[+++].[+++].[+].[+++].[+].[+]
Tested: 168 Avg. Selected: 3.625 Min Tests: 3 Max Tests: 23 Mean Tests: 11.90476 . MAD: 0.4768734

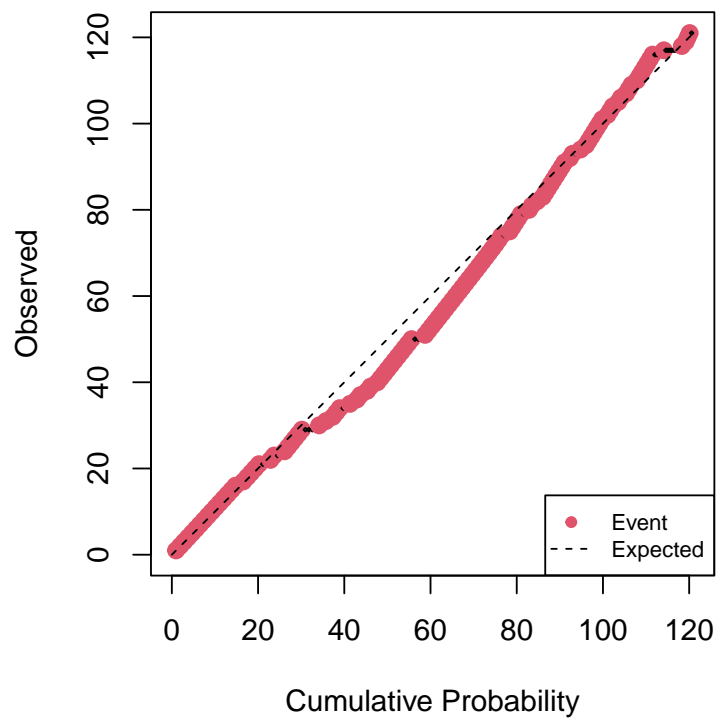
```
stp <- rcv$survTestPredictions
stp <- stp[!is.na(stp[,4]),]

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)

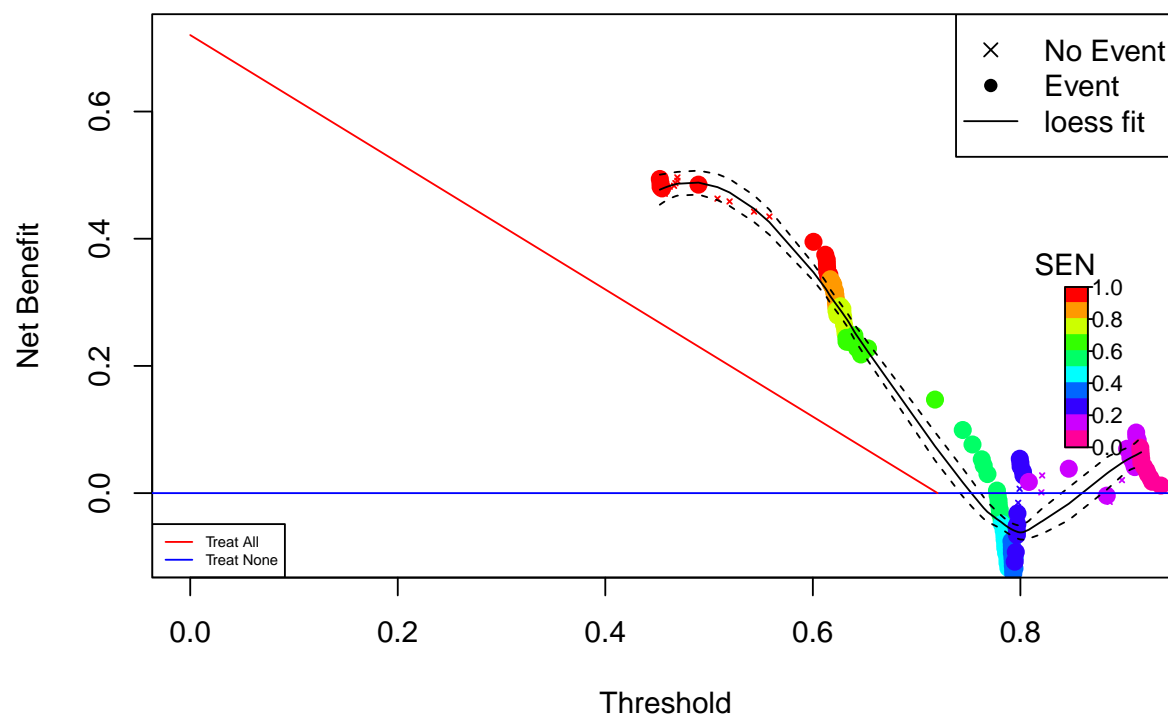
rdatacv <- cbind(status,prob)
rownames(rdatacv) <- bbx$names
names(times) <- bbx$names

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

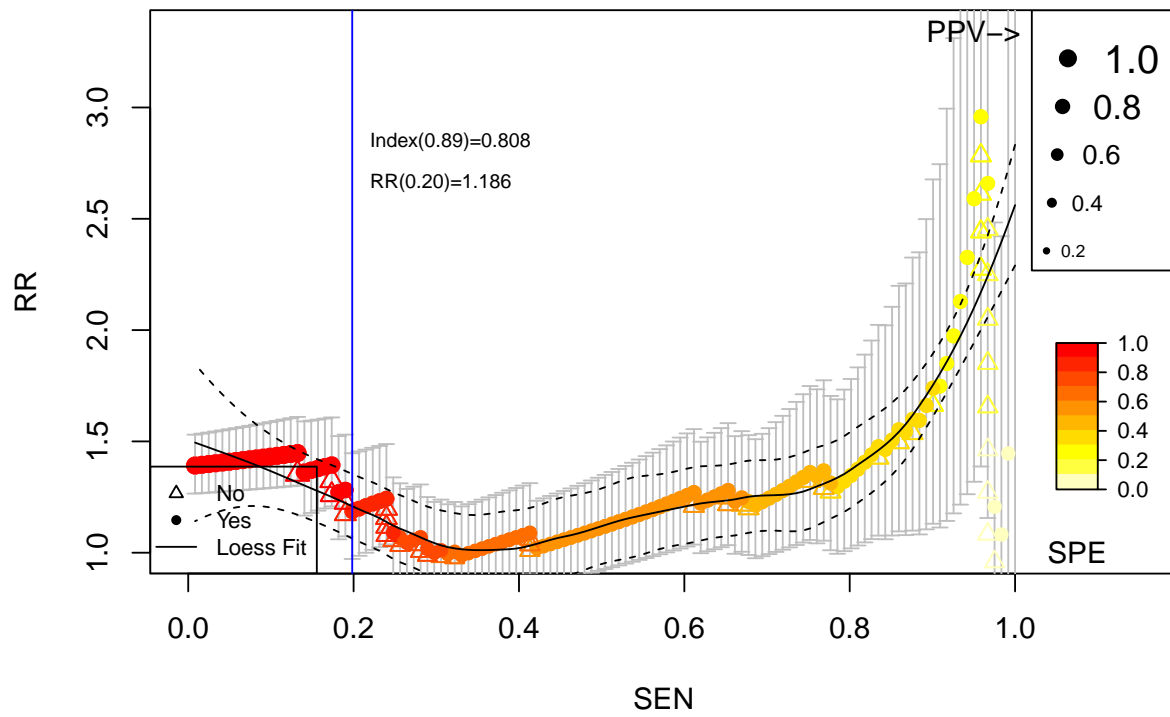
Cumulative vs. Observed: Test: Lung Cancer

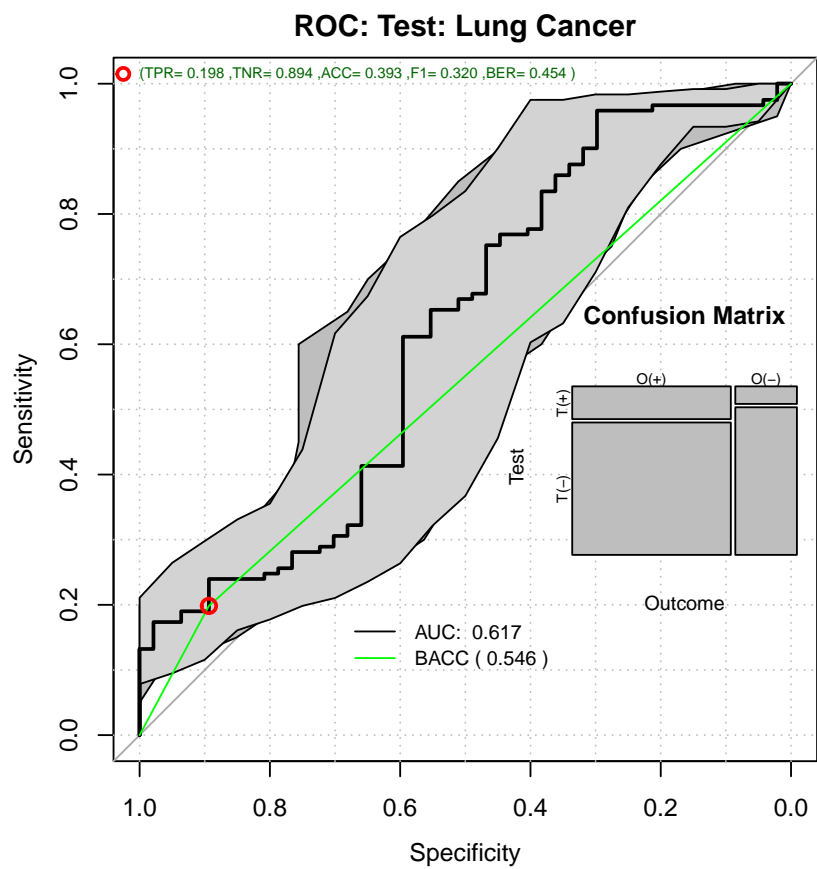


Decision Curve Analysis: Test: Lung Cancer

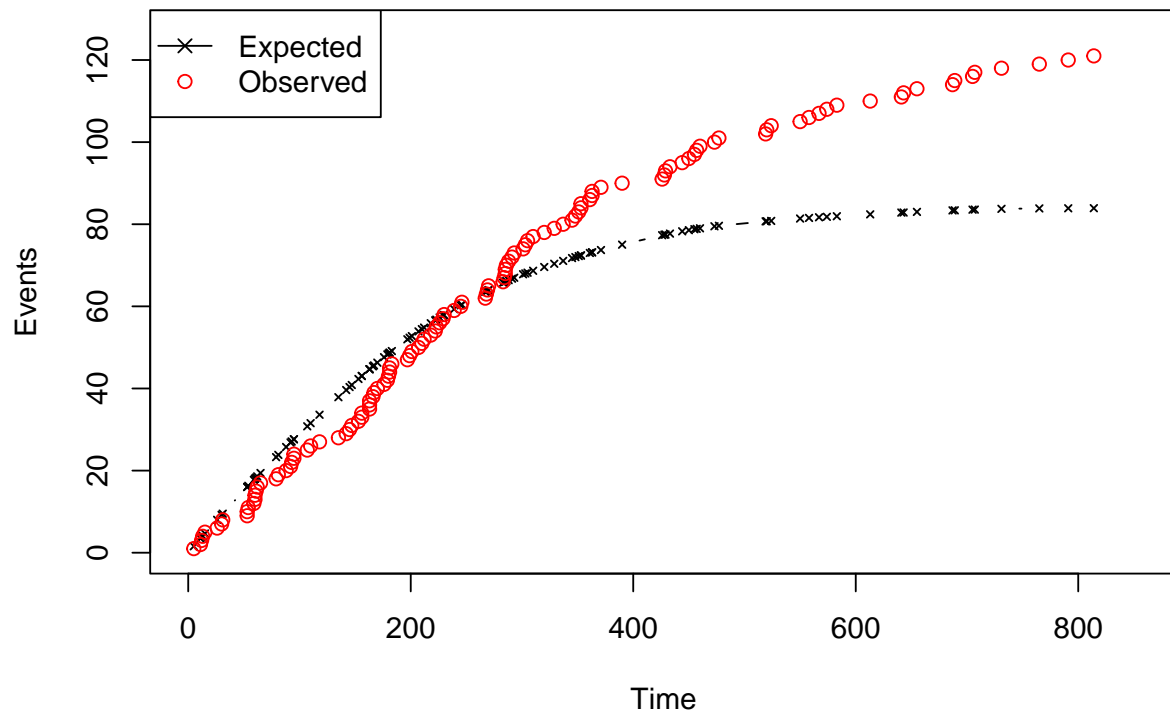


Relative Risk: Test: Lung Cancer

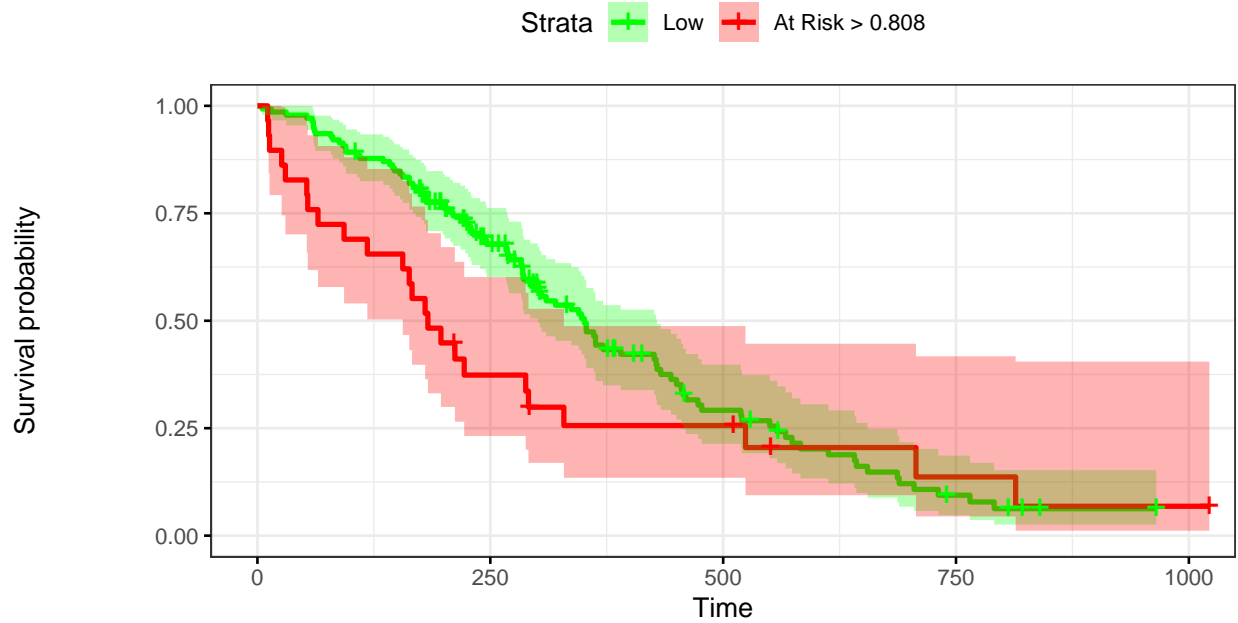




Time vs. Events: Test: Lung Cancer



Kaplan–Meier: Test: Lung Cancer



Number at risk

Low	139	79	24	6	0
At Risk > 0.808	29	10	6	2	1

1.5.1 Cross-Validation Test Performance

```
pander::pander(t(rrAnalysisTest$keyPoints),caption="Threshold values")
```

Table 38: Threshold values

	@:0.9	@MAX_BACC	@MAX_RR	@SPE100	p(0.5)
Thr	0.808	0.601	0.601	0.4525	0.508
RR	1.186	2.958	2.958	7.2455	2.275
SEN	0.198	0.959	0.959	1.0000	0.959
SPE	0.894	0.298	0.298	0.0213	0.213
BACC	0.546	0.628	0.628	0.5106	0.586

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

Table 39: O/E Ratio

O/E	Low	Upper	p.value
1.44	1.2	1.72	0.000128

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

Table 40: O/E Mean

mean	50%	2.5%	97.5%
1.05	1.05	1.01	1.09

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

Table 41: O/Acum Mean

mean	50%	2.5%	97.5%
0.955	0.955	0.945	0.965

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

mean.C Index	median	lower	upper
0.606	0.607	0.543	0.667

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

Table 43: ROC AUC

est	lower	upper
0.617	0.517	0.717

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

Table 44: Sensitivity

est	lower	upper
0.198	0.131	0.281

```
pander::pander((rrAnalysisTest$ROCAAnalysis$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%
0.808

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

Table 47: Risk Ratio

est	lower	upper
1.19	0.972	1.45

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

Table 48: Logrank test Chisq = 2.869716 on 1 degrees of freedom,
p = 0.090261

	N	Observed	Expected	(O-E)^2/E	(O-E)^2/V
class=0	139	97	103.5	0.409	2.87
class=1	29	24	17.5	2.417	2.87

1.5.2 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")
```

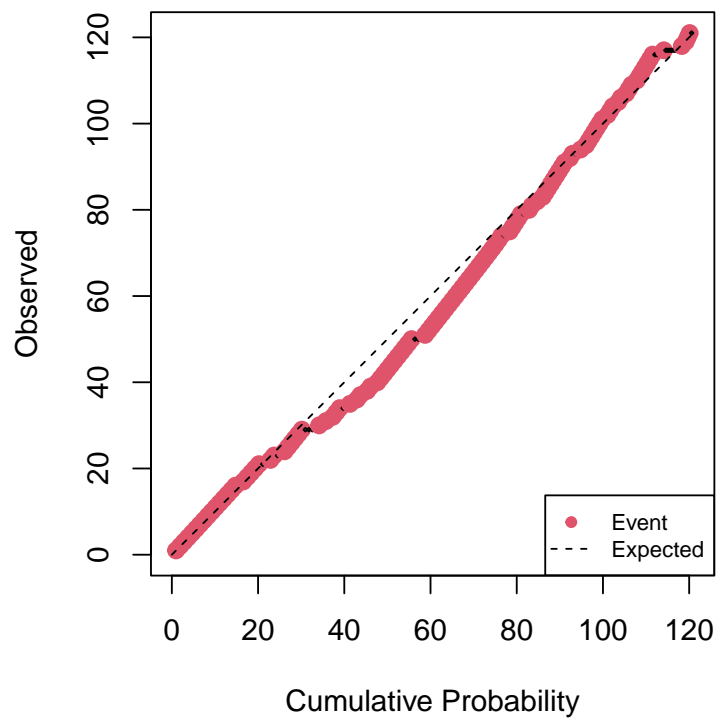
h0	Gain	DeltaTime
0.85	1	754

```
timeinterval <- calprob$timeInterval;

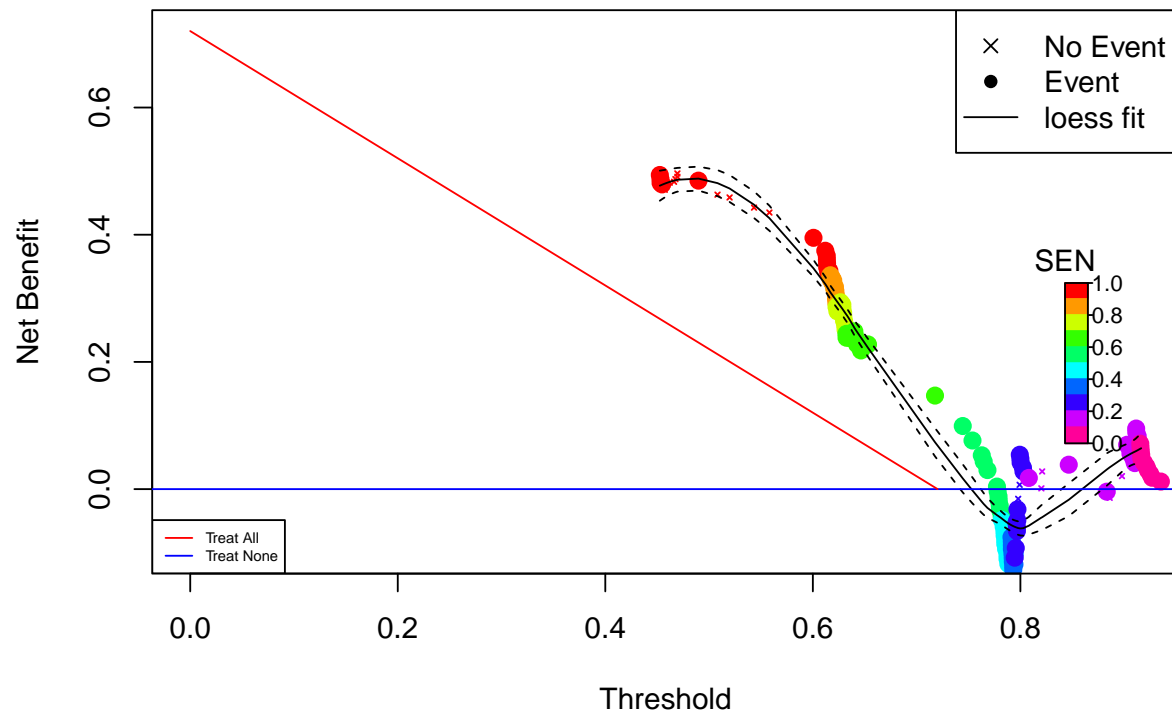
rdata <- cbind(status,calprob$prob)

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

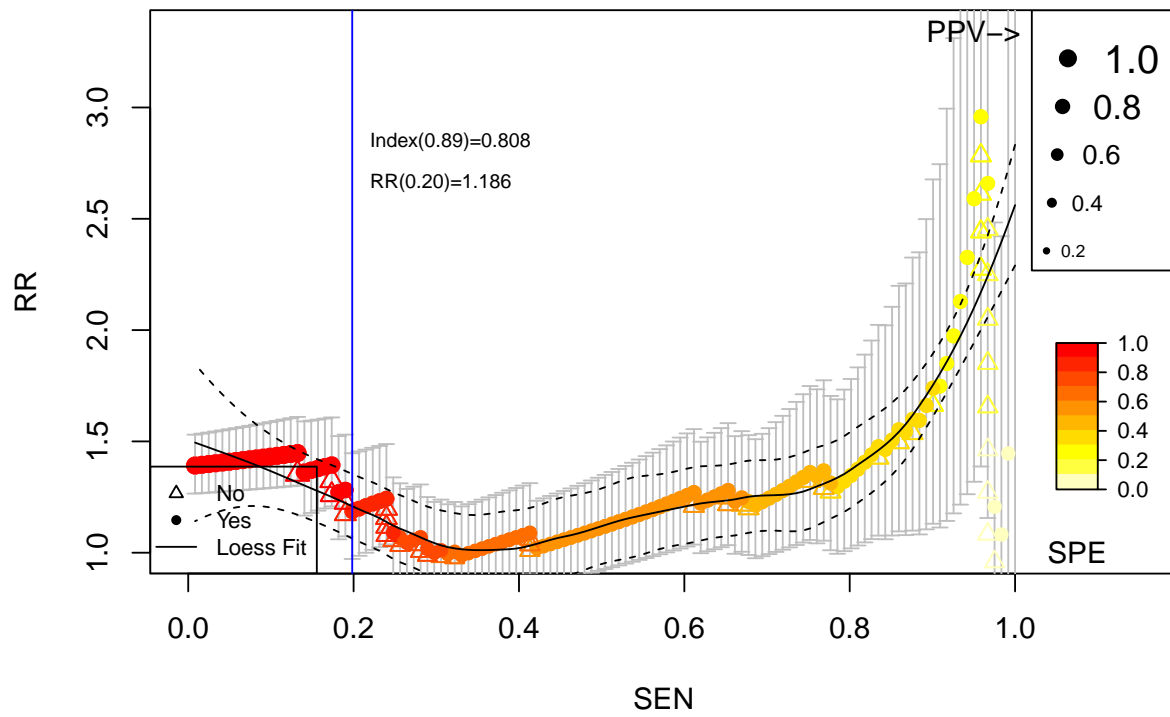
Cumulative vs. Observed: Calibrated Test: Lung

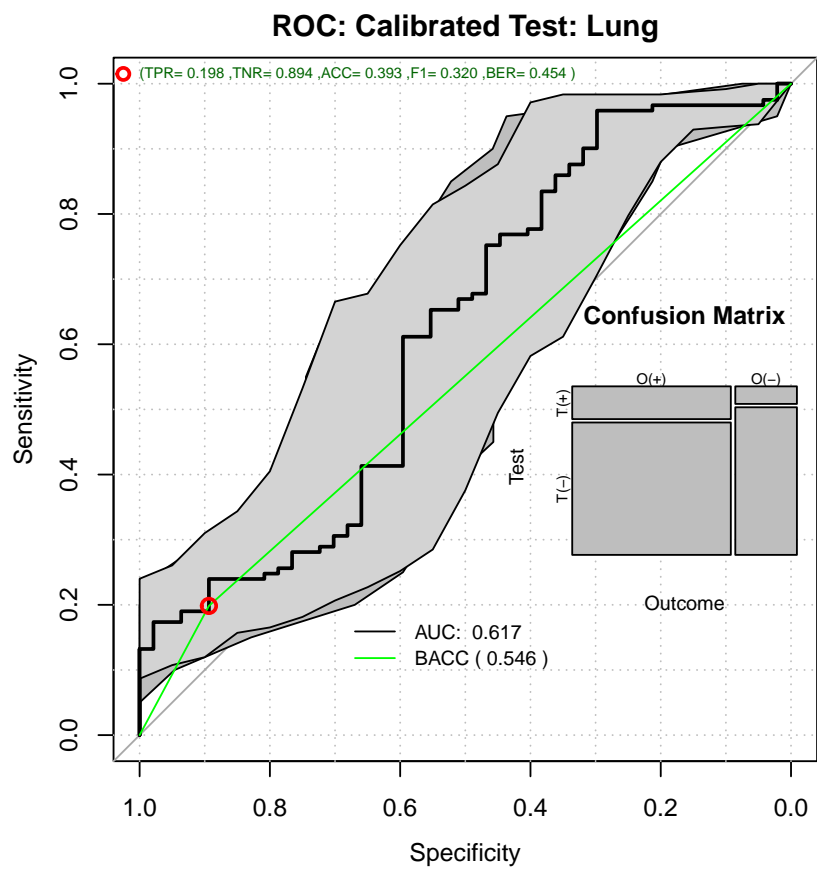


Decision Curve Analysis: Calibrated Test: Lung

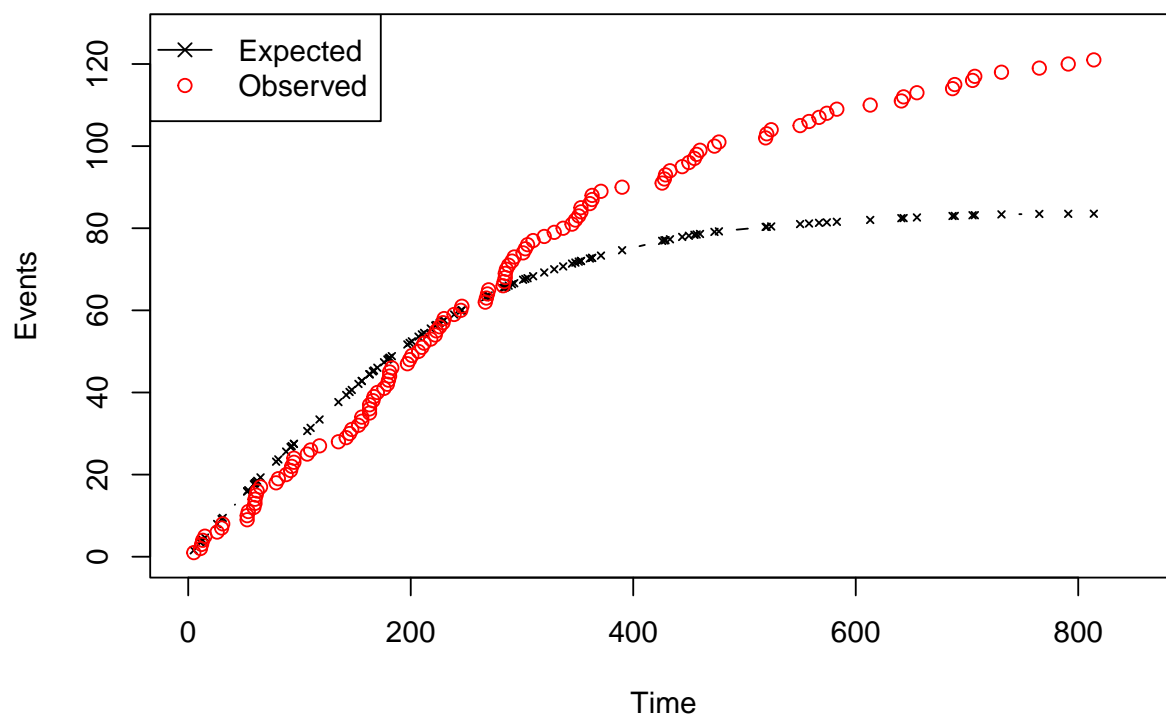


Relative Risk: Calibrated Test: Lung

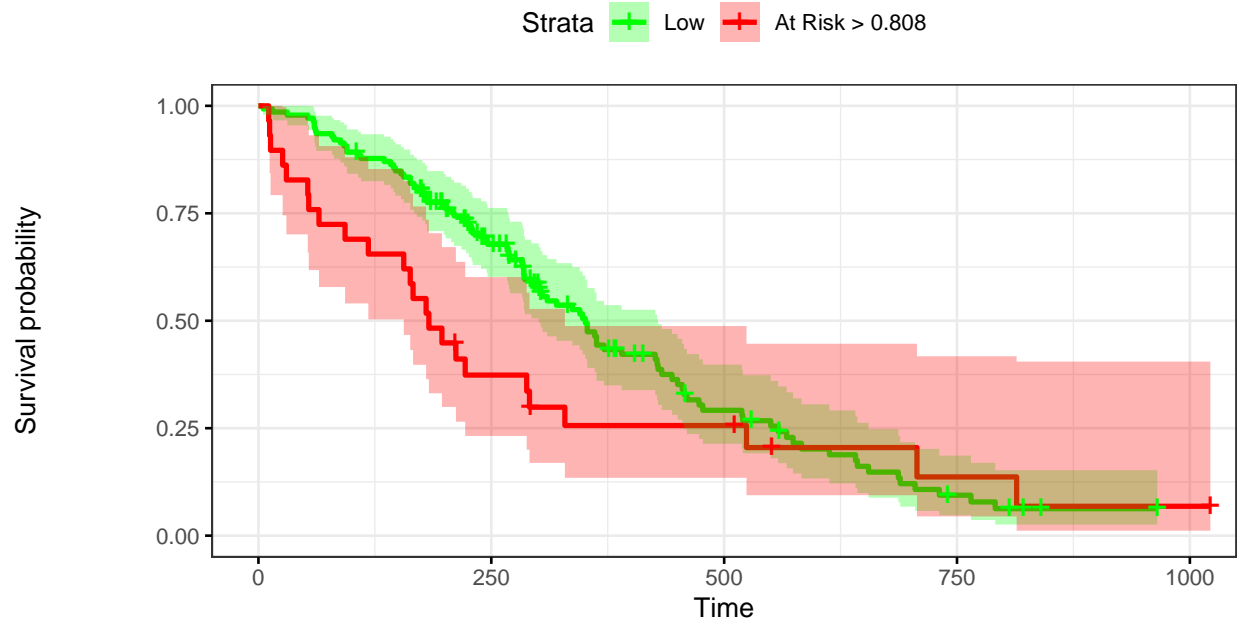




Time vs. Events: Calibrated Test: Lung



Kaplan–Meier: Calibrated Test: Lung



Number at risk

Low	139	79	24	6	0
At Risk > 0.808	29	10	6	2	1

1.5.3 Calibrated Test Performance

```
pander::pander(t(rrAnalysisTest$keyPoints),caption="Threshold values")
```

Table 50: Threshold values

	@:0.9	@MAX_BACC	@MAX_RR	@SPE100	p(0.5)
Thr	0.808	0.601	0.601	0.4525	0.508
RR	1.186	2.958	2.958	7.2455	2.275
SEN	0.198	0.959	0.959	1.0000	0.959
SPE	0.894	0.298	0.298	0.0213	0.213
BACC	0.546	0.628	0.628	0.5106	0.586

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

Table 51: O/E Ratio

O/E	Low	Upper	p.value
1.45	1.2	1.73	0.000122

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

Table 52: O/E Mean

mean	50%	2.5%	97.5%
1.06	1.06	1.02	1.1

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

Table 53: O/Acum Mean

mean	50%	2.5%	97.5%
0.955	0.955	0.945	0.964

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

mean.C Index	median	lower	upper
0.606	0.606	0.54	0.673

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

Table 55: ROC AUC

est	lower	upper
0.617	0.517	0.717

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

Table 56: Sensitivity

est	lower	upper
0.198	0.131	0.281

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

Table 57: Specificity

est	lower	upper
0.894	0.769	0.965

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

Table 58: Probability Thresholds

90%
0.808

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

Table 59: Risk Ratio

est	lower	upper
1.19	0.972	1.45

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

Table 60: Logrank test Chisq = 2.869716 on 1 degrees of freedom,
p = 0.090261

	N	Observed	Expected	(O-E)^2/E	(O-E)^2/V
class=0	139	97	103.5	0.409	2.87
class=1	29	24	17.5	2.417	2.87