



BC Cancer Agency

CARE + RESEARCH

An agency of the Provincial Health Services Authority

Cancer Surveillance & Outcomes

Customizing Survival Curves

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BC Cancer Agency

Outline

- Survival Curve Basics
- Using Proc Template
- Using Proc SGPlot



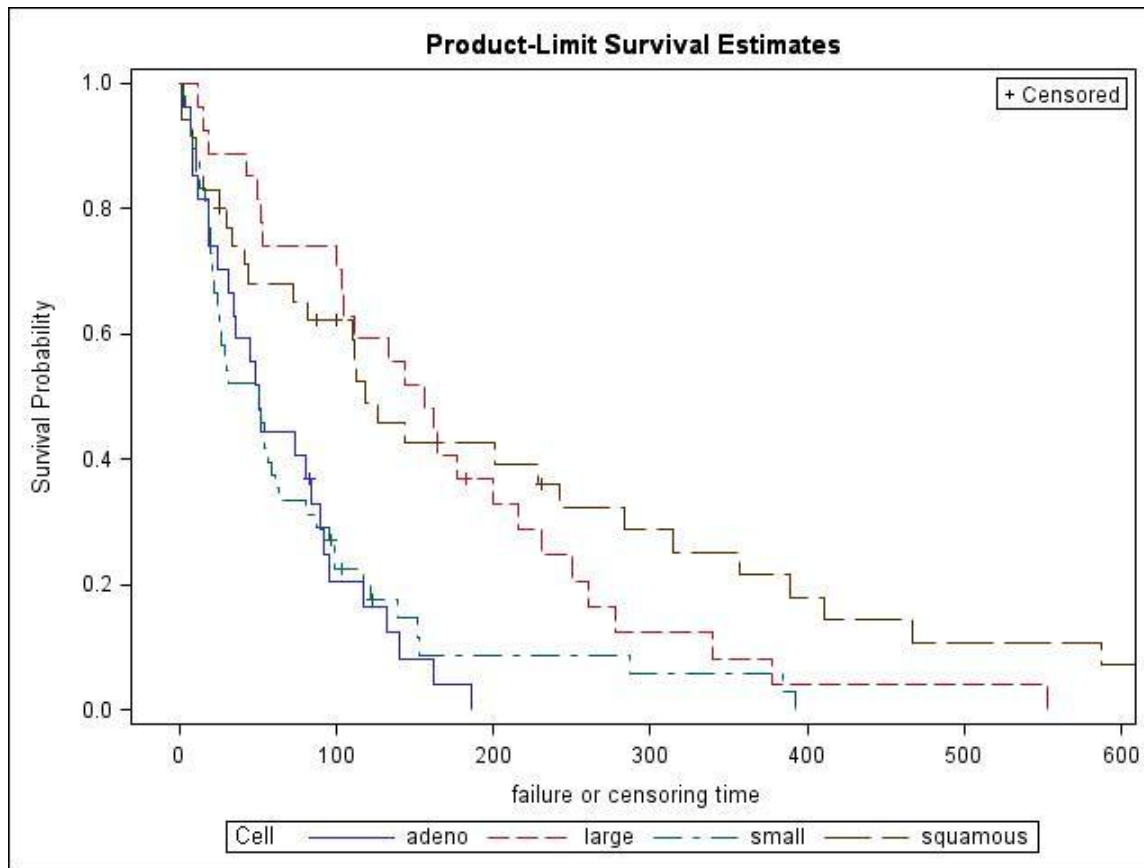
Analysis

- Using dataset Valung from proc lifetest help menu
- Run basic kaplan-meier

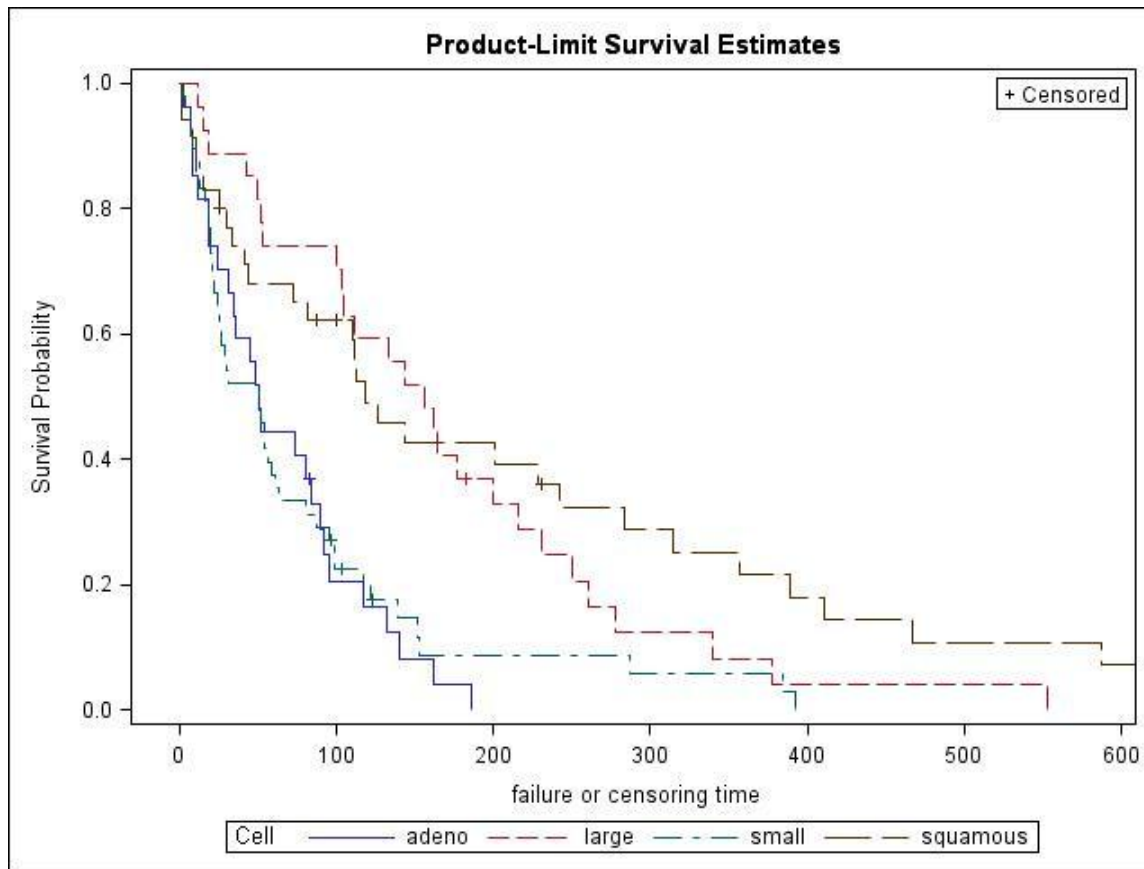
```
proc lifetest data=VALung plots=(s) ;  
    time SurvTime*Censor(1) ;  
    id Therapy ;  
    strata Cell ;  
run ;
```



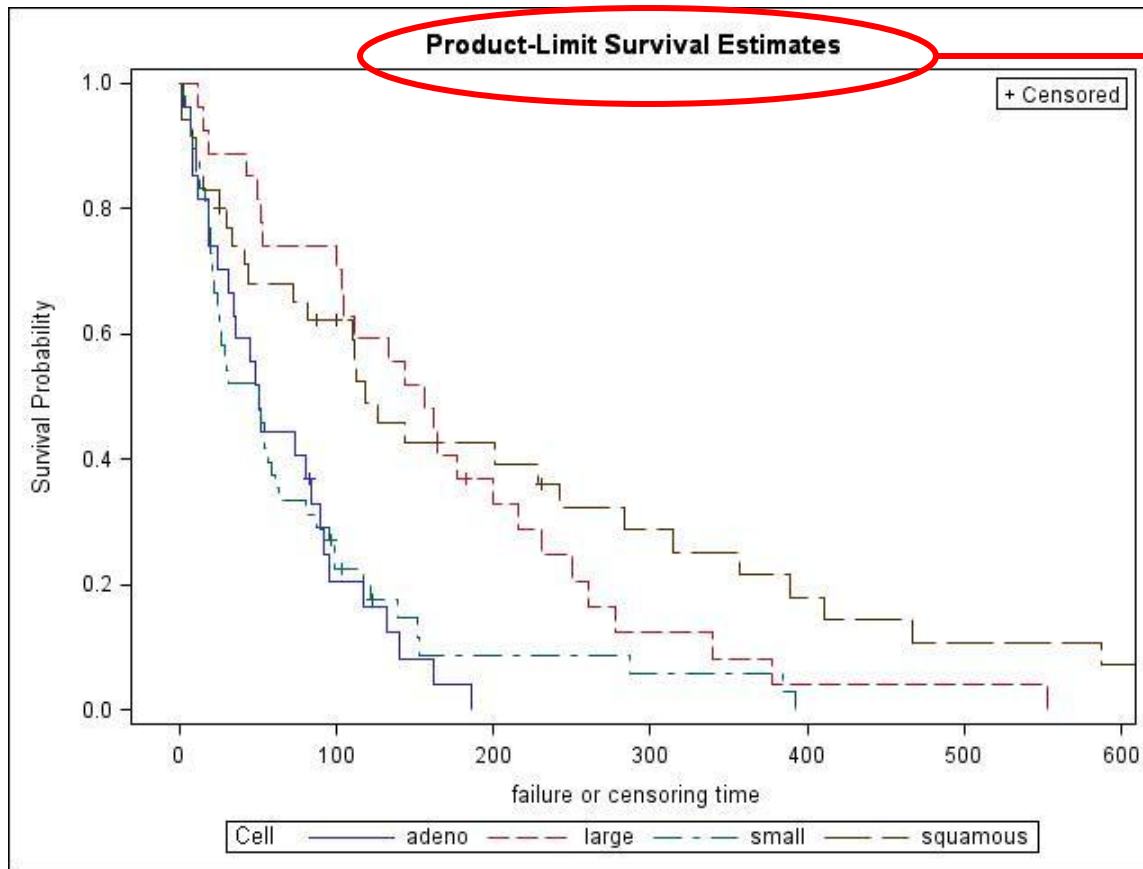
Default Kaplan-Meier Graph



Want to Modify Some Basics



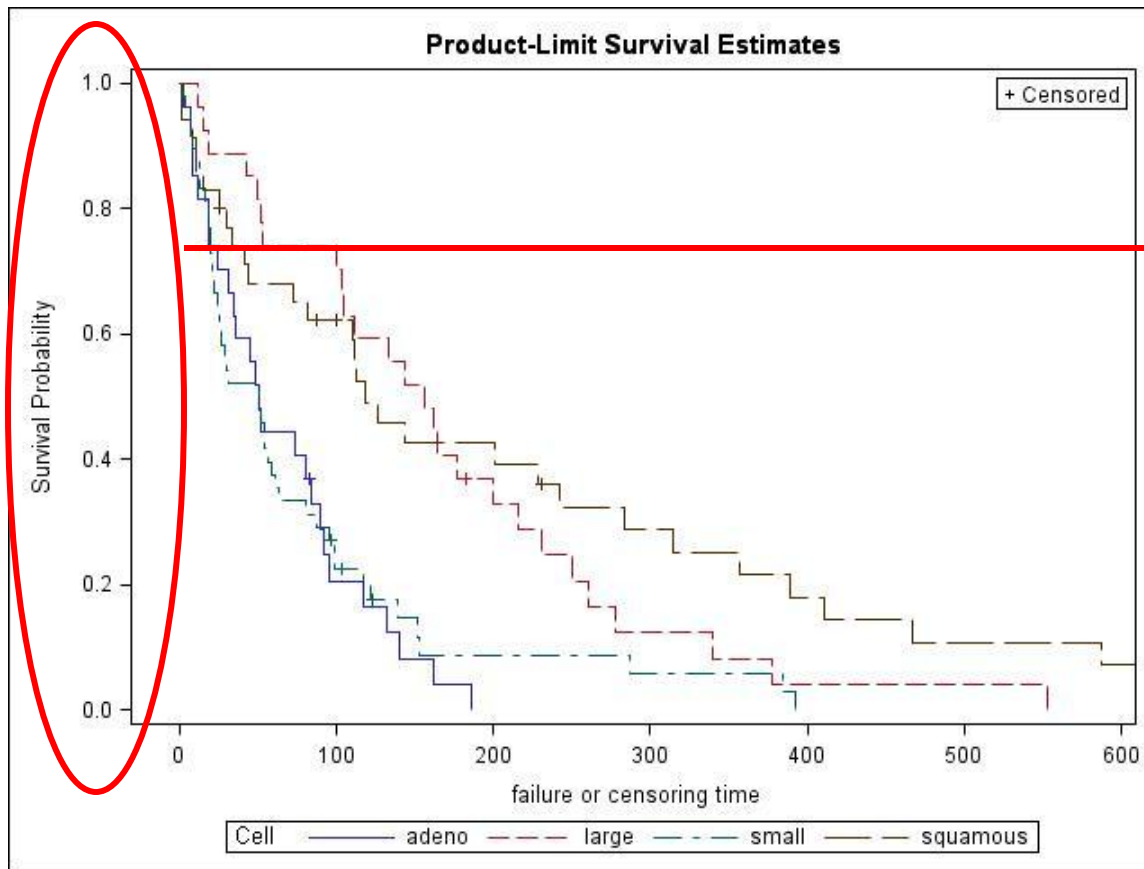
Want to Modify Some Basics



Title



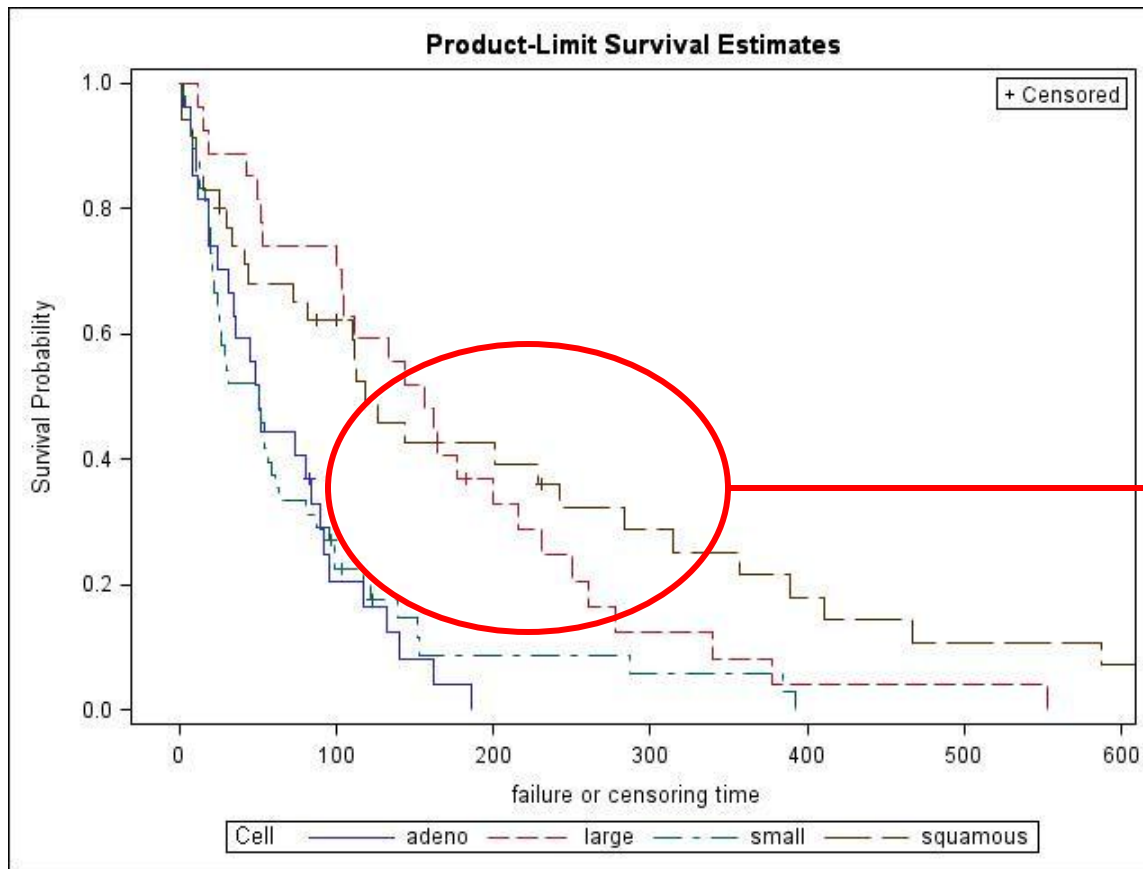
Want to Modify Some Basics



Change Axis to %



Want to Modify Some Basics



Change Line
Type and
Colour



SAS Graph Templates

- Graphs can be modified using templates.
 - Part of the graphing template language (GTL)
- How does one know which template to use?
- How does one go about changing the template?



Helpful SAS code

- Using a combination of ODS trace and ODS graphics, one can figure out the template of the graph being produced

```
ods trace on;  
ods graphics on;  
...SAS Program...  
ods graphics off;  
ods trace off;
```



Log File

- The log file displays:

- Data used to generate graph

- Template used

Output Added:

Name: SurvivalPlot

Label: Survival Curves

Template: Stat.Lifetest.Graphics.ProductLimitSurvival

Path: Lifetest.SurvivalPlot



Survivalplotdata

- Output data requested through ODS

	failure or censoring time	Survival Probability	AtRisk	Event	Censored	Cell	StratumNum
1	0	1	27	0	.	adeno	1
2	3	0.962962963	27	1	.	adeno	1
3	7	0.9259259259	26	1	.	adeno	1
4	8	0.8518518519	25	2	.	adeno	1
5	12	0.8148148148	23	1	.	adeno	1
6	18	0.7777777778	22	1	.	adeno	1
7	19	0.7407407407	21	1	.	adeno	1
8	24	0.7037037037	20	1	.	adeno	1
9	31	0.6666666667	19	1	.	adeno	1
10	35	0.6296296296	18	1	.	adeno	1
11	36	0.5925925926	17	1	.	adeno	1
12	45	0.5555555556	16	1	.	adeno	1
13	48	0.5185185185	15	1	.	adeno	1
14	51	0.4814814815	14	1	.	adeno	1



Template Code

- Obtaining the Template code:
 - Code will show up in the log

```
proc template;  
  source Stat.Lifetest.Graphics.ProductLimitSurvival;  
run;
```

- Can modify and run the code which will then change the template being used
 - Code is too long to display



De-coding Template Code

- Familiarize yourself with plot options
 - Template lists all plot options
 - Many if statements based on confidence intervals requested, at risk patients, number of strata
- Need to figure out which pieces are relevant to what needs modification



Example of Ignorable Code

- Within the Proc Template code structure, will see the following:

```
/*4*/ if (PLOTBW=1 AND PLOTBP=0)
    bandplot LimitUpper=HW_UCL LimitLower=HW_LCL x=TIME /
    modelname="Survival" fillattrs=GRAPHCONFIDENCE name="HW"
    legendlabel=LABELHW;
/*4*/ endif;
```

- Where PlotBW and PlotBP refer to types of confidence bands



Example of Important Code

```
proc template;
  define statgraph new_graph_template;
    begingraph;
  entrytitle "Plotted with SGrender";
    layout overlay /
      xaxisopts=(label="Time" shortlabel="Time" offsetmin=.05 linearopts=(viewmax=600))
      yaxisopts=(label="Survival Probability" shortlabel="Survival"
        linearopts=(viewmin=0 viewmax=1 tickvaluelist=(0 .2 .4 .6 .8 1.0)));

  stepplot y=SURVIVAL x=TIME / group=STRATUM index=STRATUMNUM
  name="Survival" rolename=( _tip1=ATRISK _tip2=EVENT) tip=(y x Time _tip1 _tip2) ;
  DiscreteLegend "Survival" / title="Cell" location=outside;

  scatterplot y=CENSORED x=TIME / group=STRATUM index=STRATUMNUM markerattrs=(symbol=plus);

  layout gridded / rows=1 autoalign=(TOPRIGHT BOTTOMLEFT TOP BOTTOM) border=true
    BackgroundColor=GraphWalls:Color Opaque=true;

  entry "+ Censored";
  endlayout;

  endlayout;
  endgraph;
end;
run;
```



Example of Important Code

```
proc template;  
  define statgraph new_graph_template;  
    begingraph;  
    entrytitle "Plotted with SGrapher";  
    layout overlay /  
      xaxisopts=(label="Time" shortlabel="Time" offsetmin=.05 linearopts=(viewmax=600))  
      yaxisopts=(label="Survival Probability" shortlabel="Survival"  
        linearopts=(viewmin=0 viewmax=1 tickvaluelist=(0 .2 .4 .6 .8 1.0)));  
  
    stepplot y=SURVIVAL x=TIME / group=STRATUM index=STRATUMNUM  
      name="Survival" rolename=( _tip1=ATRISK _tip2=EVENT) tip=(y x Time _tip1 _tip2) ;  
    DiscreteLegend "Survival" / title="Cell" location=outside;  
  
    scatterplot y=CENSORED x=TIME / group=STRATUM index=STRATUMNUM markerattrs=(symbol=plus);  
  
    layout gridded / rows=1 autoalign=(TOPRIGHT BOTTOMLEFT TOP BOTTOM) border=true  
      BackgroundColor=GraphWalls:Color Opaque=true;  
  
    entry "+ Censored";  
    endlayout;  
  
  endlayout;  
  endgraph;  
end;  
run;
```

Title



Example of Important Code

```
proc template;
  define statgraph new_graph_template;
    begingraph;
      entrytitle "Plotted with SGrnder";
      layout overlay /
        xaxisopts=(label="Time" shortlabel="Time" offsetmin= 05 linearopts=(viewmax=600))
        yaxisopts=(label="Survival Probability" shortlabel="Survival"
          linearopts=(viewmin=0 viewmax=1 tickvaluelist=(0 .2 .4 .6 .8 1.0)));
      stepplot y=SURVIVAL x=TIME / group=STRATUM index=STRATUMNUM
        name="Survival" rolename=( _tip1=ATRISK _tip2=EVENT) tip=(y x Time _tip1 _tip2) ;
      DiscreteLegend "Survival" / title="Cell" location=outside;

      scatterplot y=CENSORED x=TIME / group=STRATUM index=STRATUMNUM markerattrs=(symbol=plus);

      layout gridded / rows=1 autoalign=(TOPRIGHT BOTTOMLEFT TOP BOTTOM) border=true
        BackgroundColor=GraphWalls:Color Opaque=true;

      entry "+ Censored";
      endlayout;

    endlayout;
  endgraph;
end;
run;
```

Axis Options



Example of Important Code

```
proc template;
  define statgraph new_graph_template;
    begingraph;
    entrytitle "Plotted with SGrender";
    layout overlay /
      xaxisopts=(label="Time" shortlabel="Time" offsetmin=.05 linearopts=(viewmax=600))
      yaxisopts=(label="Survival Probability" shortlabel="Survival"
        linearopts=(viewmin=0 viewmax=1 tickvaluelist=(0 .2 .4 .6 .8 1.0)));

    stepplot y=SURVIVAL x=TIME / group=STRATUM index=STRATUMNUM
      name="Survival" rolename=( _tip1=ATRISK _tip2=EVENT) tip=(y x Time _tip1 _tip2) ;
    DiscreteLegend "Survival" / title="Cell" location=outside;

    scatterplot y=CENSORED x=TIME / group=STRATUM index=STRATUMNUM markerattrs=(symbol=plus);

    layout gridded / rows=1 autoalign=(TOPRIGHT BOTTOMLEFT TOP BOTTOM) border=true
      BackgroundColor=GraphWalls:Color Opaque=true;

    entry "+ Censored";
    endlayout;

    endlayout;
    endgraph;
  end;
run;
```

Stuff that isn't
changing



Producing the New Graph

- Good idea to rename the new templates and use Proc SGrnder to run

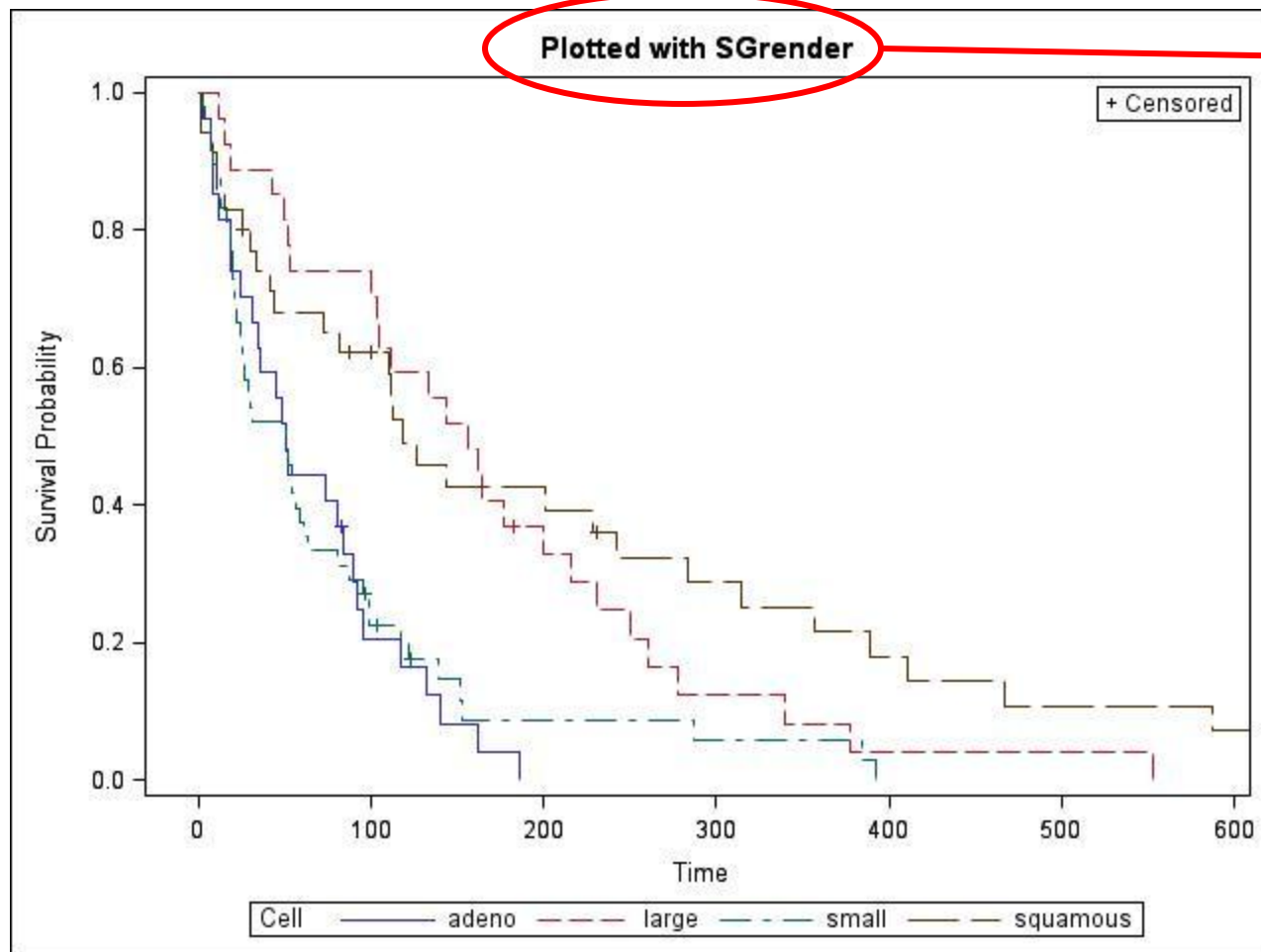
```
proc sgrnder data=survivalplotdata  
  template=new_graph_template;  
run;
```

Recall this dataset is found in the log (add 'data' suffix)

- This prevents default templates from being permanently changed by mistake
 - Difficult to return to original settings
 - for me, anyways



Result



Title Change



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Proc SGplot

- For those that do not feel comfortable with templates
 - Templates can be confusing and can wreck SAS if you don't know how to get the default back (yikes!)
 - Difficult to use your own line colours
- Can output data and graph with SGplot
 - Commands more similar to basic SAS graphing



Proc SGplot example

```
proc sgplot data=survivalplotdata_sgplot;
title f="blackadder ITC/Italic/Bold" h=24pt "Much Better Looking Graph" ;

step x=Time y=SURVIVAL1/lineattrs=(pattern=1 color=Blue thickness=3)
Legendlabel="Adeno";

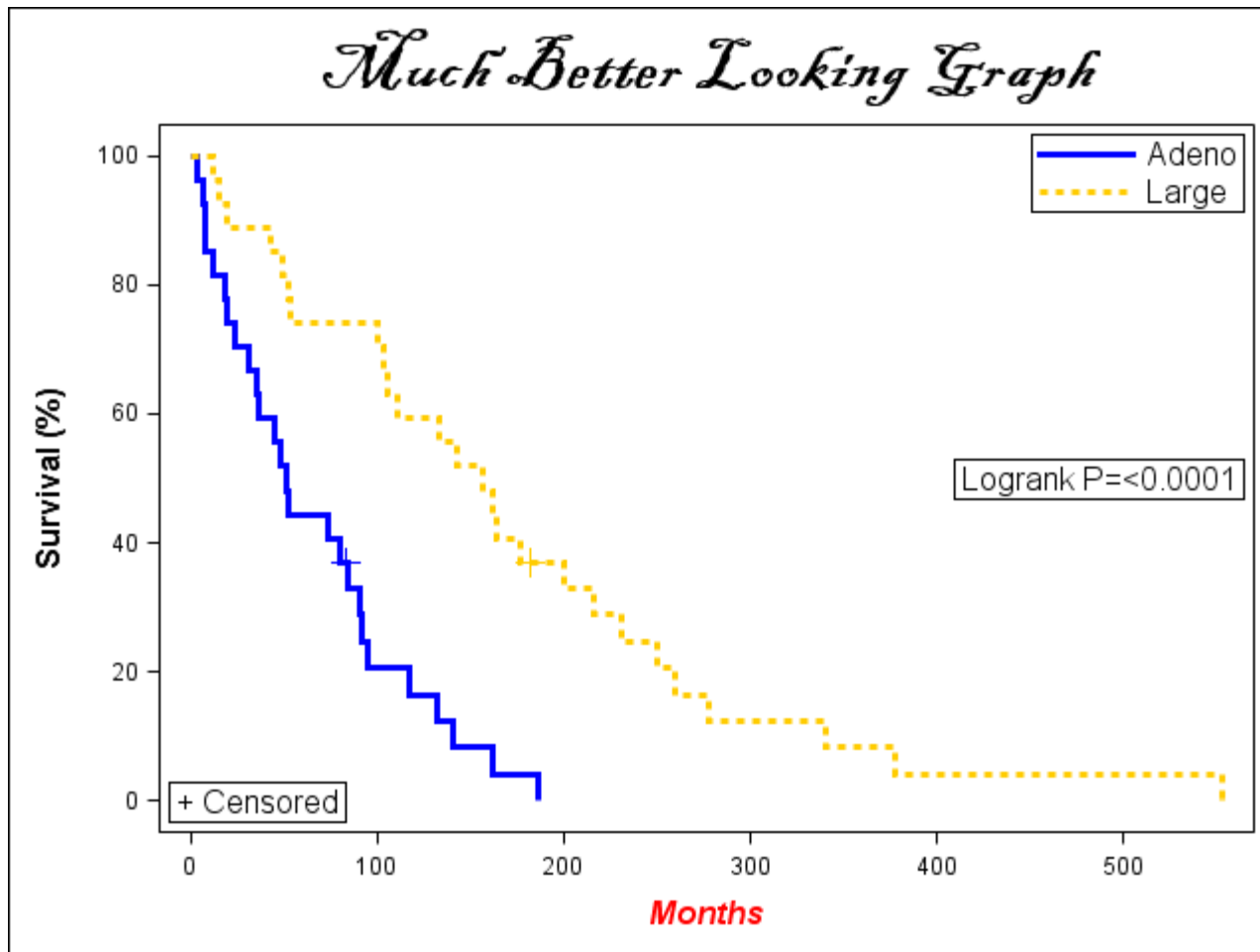
step x=Time y=SURVIVAL2/lineattrs=(pattern=2 color=CXFFCC00 thickness=3)
Legendlabel="Large";
keylegend/across=1 down=2 location=inside position=topright valueattrs=(
size=12pt);

axis label= 'Years' LABELattrs=( size=12pt weight=bold color=red
style=italic);
yaxis label="Survival (%)" min=0 max=100 LABELattrs=( size=12pt
weight=bold);

inset "Logrank P=<0.0001"/border position=right TEXTattrs=( size=12pt);
run;quit;
```



Result



Pros and Cons

- Proc Template is easy to adjust the default template to make small changes
 - Difficult to change line colours when using the group option
- Proc SGplot can be used on the output dataset and can be graphed however you wish
 - Difficult to include list of at risk patients



Conclusion

- Proc Template and Proc SGrnder can both modify graphs
- Proc SGplot can be used without having to deal with templates





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Questions?