

# A Plot & a Table per Page Times Hundreds in a Single PDF file



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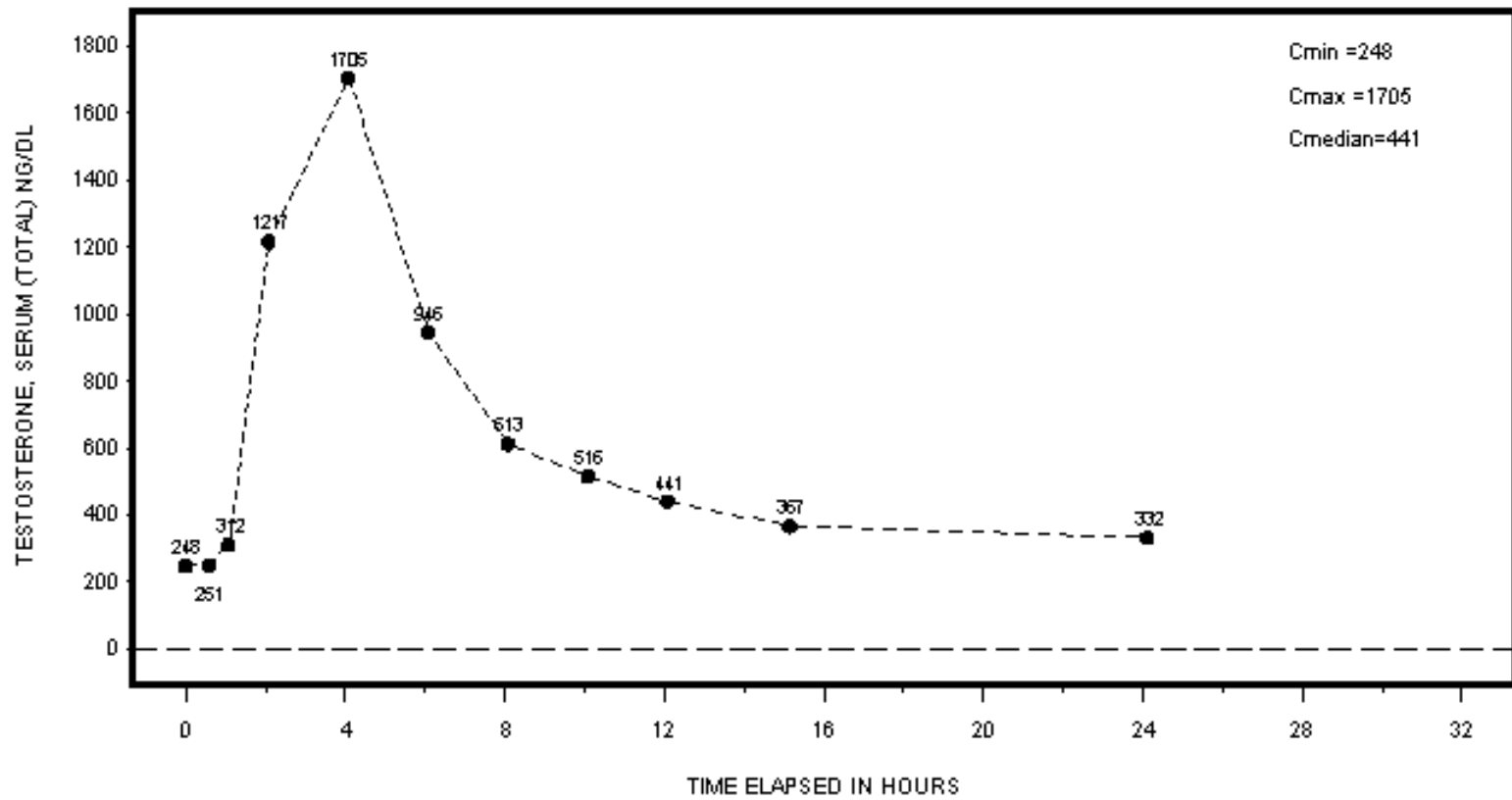
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## Overview

- Present the code to produce a postscript (.pdf) file containing multiple pages of a plot and a table per page.

# Introduction

- **Exploration:** In Windows environment, a figure and a table per spreadsheet page.
- **Production:** In SAS environment, a figure and a table per page times hundred pages in a file.



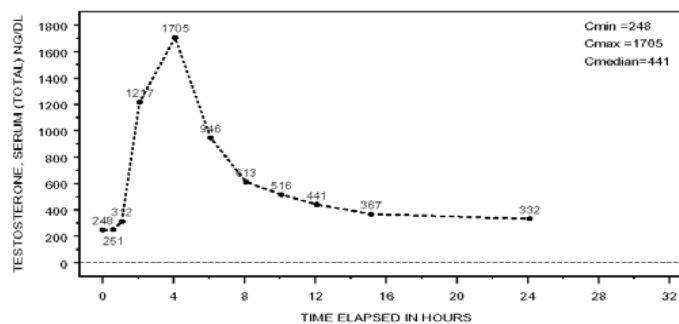
OTHER HORMONES MONITORED BESIDES SERUM TOTAL TESTOSTERONE (T)

Subject: 1, Period: DAY 32

S (HH)	Time (1)	DTime (2) (HH:%%)	BT (3)	DHT (4)	DHTT (5)	E2 (6)	E2T (7)	FSH (8)	LH (9)	SHBG (10)
0		0.00	150	51	0.2056	2.3	0.0093	0.44	0.16	20
2		2.08	950	120	0.0986	3.1	0.0025			22
4		4.08	1376	244	0.1431	6.9	0.0040			21
6		6.08	723	144	0.1522	4.8	0.0051			20
24		24.12	217	98	0.2952	2.8	0.0084			21

- (1) STime=> Scheduled time
- (2) DTime=> Postdose Draw Time
- (3) BT => Bioavailable T (ng/dL)
- (4) DHT => Dihydrotestosterone (DHT), Serum (ng/dL)
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- (7) E2T => E2/T
- (8) FSH => Follicle Stimulating Hormone (FSH-ICMA) (miu/mL)
- (9) LH => Luteinizing Hormone (LH-ICMA) (miu/mL)
- (10) SHBG => Sex Hormone Binding Globulin (nmol/L)

Serum Total Testosterone Levels in Males  
Study A 99-99-99 Subject 1, Period=DAY 32, Final Dose: 80 unit



OTHER HORMONES MONITORED BESIDES SERUM TOTAL TESTOSTERONE (T)  
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# Topics

- **A Plot with Annotated Numbers and Statistics (gplot)**
- **A Table Reprinted as a Plot (gprint)**
- **Titles & Footnotes (gslide)**
- **A Page at a Time (greplay)**
- **Cleaning-Up (greplay)**
- **Creating the pdf file (Acrobat Distiller)**
- **Hardware Versus Software Fonts**

# Creating Do loop;

```
proc sort data=pk out=doloop(keep=subjid period f_dose) nodupkey;  
  by subjid period;  
run;
```

```
data _null_;  
  set doloop end=last;  
  comb=trim(left(period))||subjid||trim(left(f_dose));  
  call symput('combo'||left(_n_),trim(comb));  
  if last then call symput('ncombo',left(_n_));  
run;
```

```
%macro doit;  
  %do i=1 %to &ncombo;  
  
    %if &i=1 %then %do; %let mode=replace; %end;  
    %else          %do; %let mode=append; %end;
```

**\*\*\* Extract Patient Identification Number \*\*\*;**

```
%let subjid=%substr(&&combo&i,2,7);
```



## Creating the plot

*Plotting the 24 hours PK figure. In order to prevent the vertically compressed appearance, there is a need to define the vertical spread of the figure to 5 inches.*

```
goptions vsize=5.0 in;
```

```
proc gplot data=pk;  
  where subjid("&subjid" & period=&period);  
  plot valuen*act_tim / vaxis=axis1  
    haxis=axis2  
    vref=(0) lvref=3  
  frame;  
  
  format valuen 5.;  
run; quit;
```

# X axis and Symbol

## X AXIS

```
axis2 label=(justify=center f='Helvetica' h=2.5pct  
"TIME ELAPSED IN HOURS")
```

```
width=12
```

```
order=(0 to 32 by 4)
```

```
major=(width=12 height=1.5)
```

```
minor=(number=1 width=12)
```

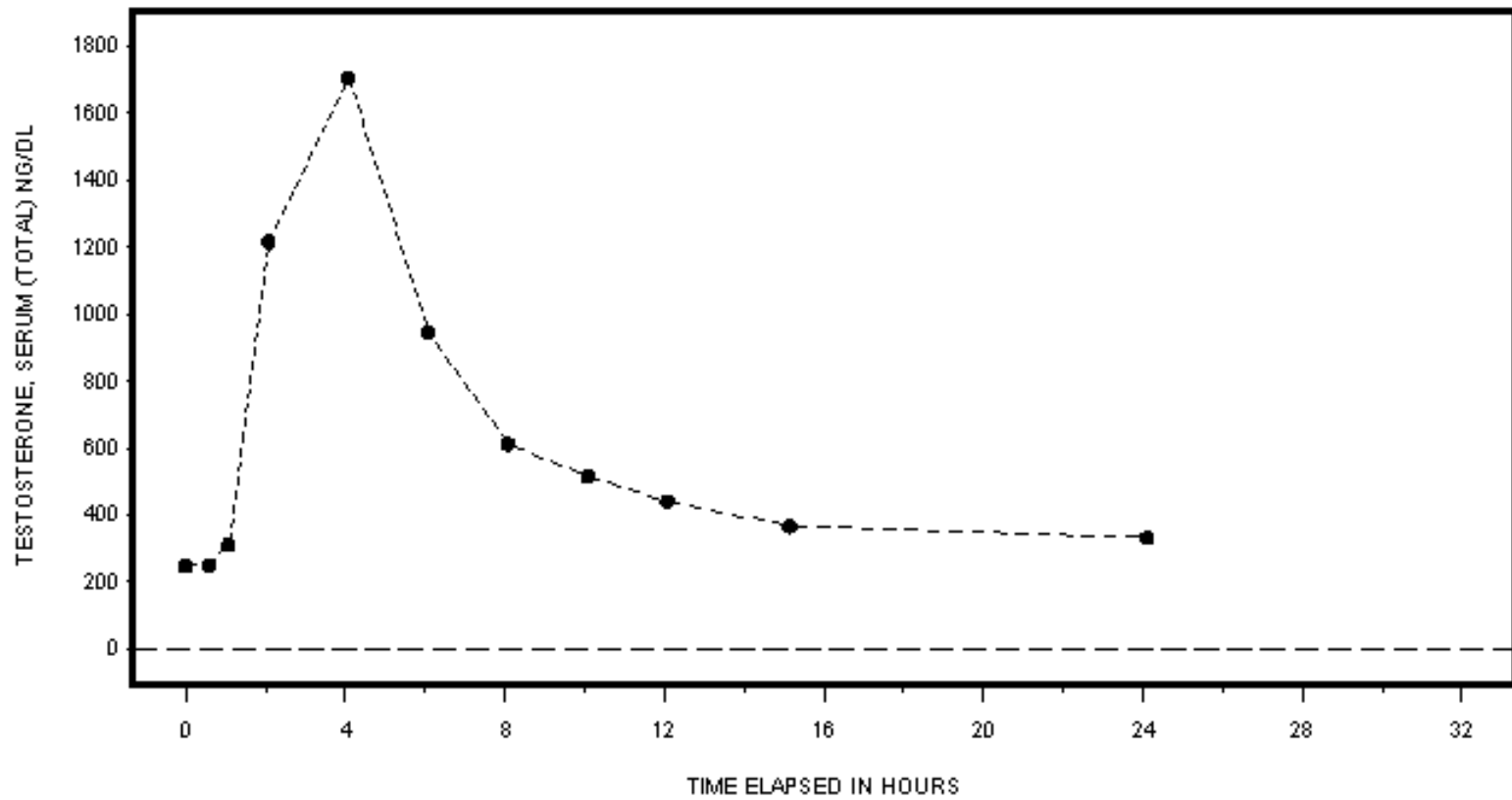
```
value=(height=2.5pct)
```

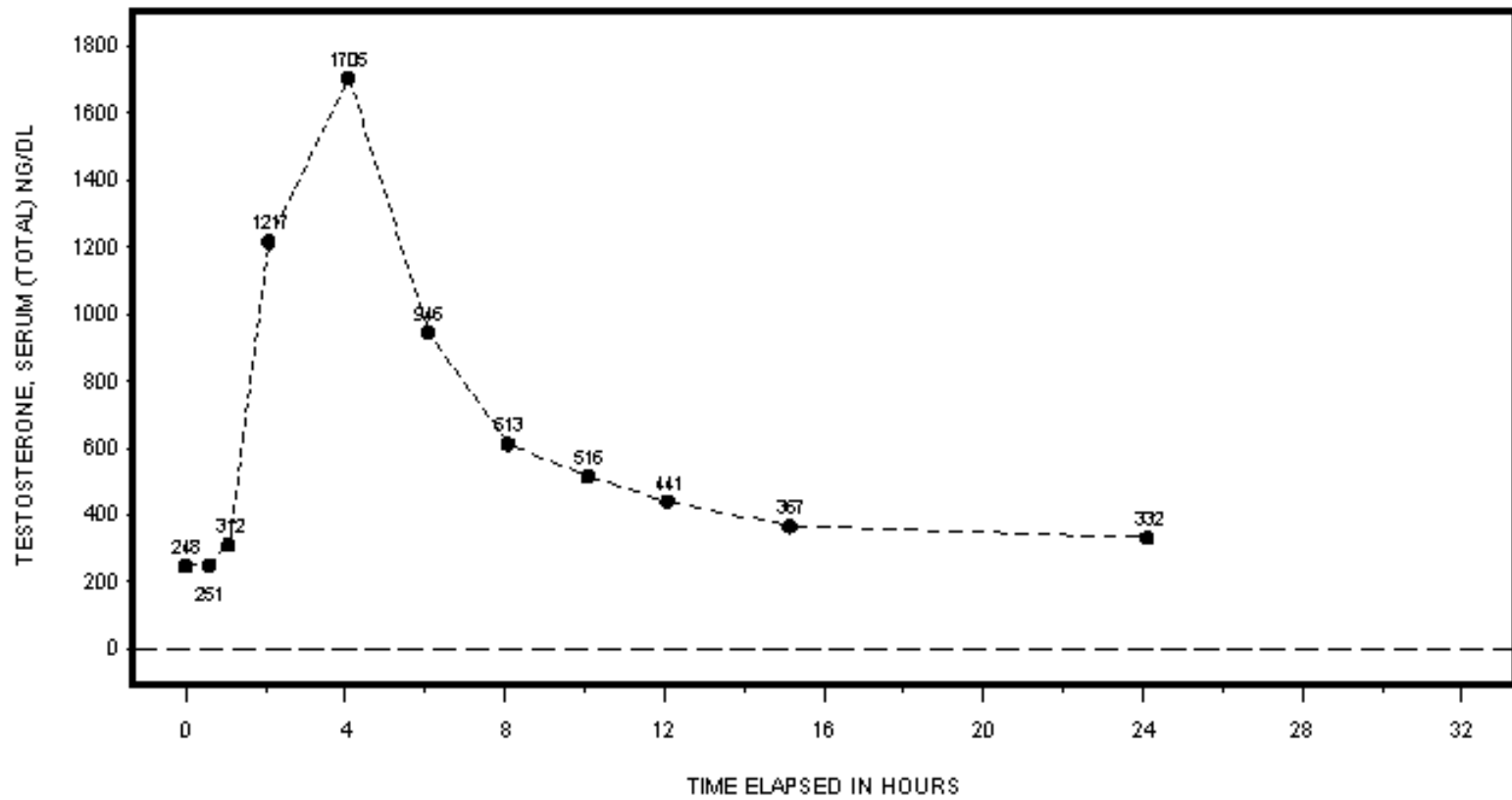
```
offset=(3pct)
```

```
length=80pct;
```

*Use a dot symbol and connect the points with a dotted line.*

```
symbol1 color=black interpol=join value=dot  
height=2 pct line=2 width=16;
```





## Creating the annotated dataset:

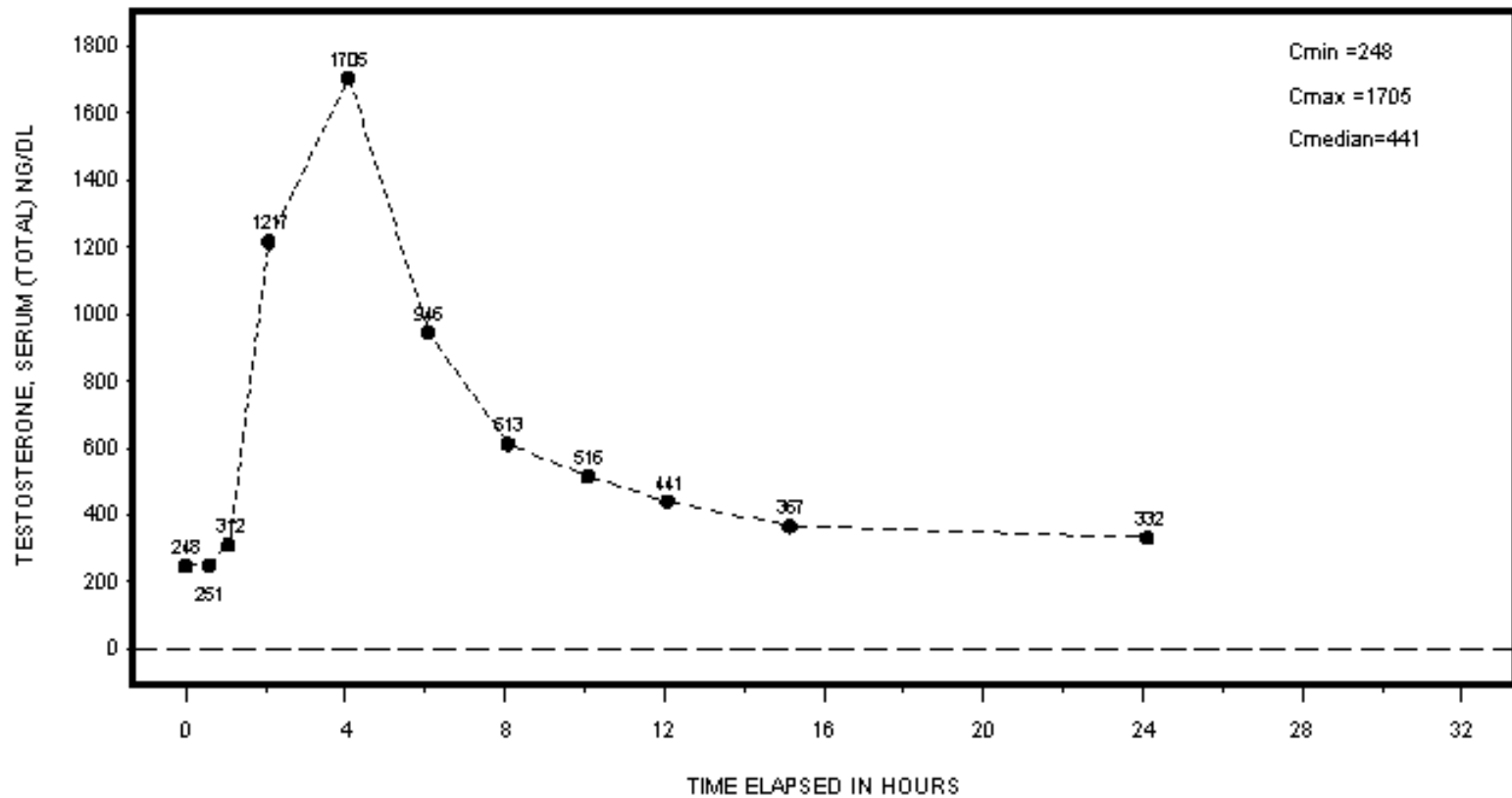
```
data anno;
  length text $5 style $12;
  retain function 'label' style "'Helvetica'" xsys ysys
    '2' hsys '1' size 3.9;
  set pk(keep=subjid period act_tim valuen smplhour);
  where subjid="'&subjid'" & period=&period;

  if smplhour~=0.5 then position='2';
  else                    position='8';

  x=act_tim;
  y=valuen;
  text=trim(left(put(valuen,5.)));
  output;
run;
```

## Creating the plot: Annotate in gplot

```
proc gplot data=pk;  
  where subjid="&subjid" & period=&period;  
  plot valuen*act_tim / vaxis=axis1 haxis=axis2  
    vref=(0)  
    vref=3  
    anno=anno  
    frame;  
  
  format valuen 5.;  
run; quit;
```



# Calculating Statistics

```
proc means data=pk noprint;  
  where subjid("&subjid" & period=&period;  
  var valuen;  
  output out=stats min=min max=max median=median;  
run;
```

```
data _null_;  
  set stats;  
  call symput('Cmin',trim(left(put(min,8.))));  
  call symput('Cmax',trim(left(put(max,8.))));  
  call symput('Median',trim(left(put(median,8.))));  
run;
```

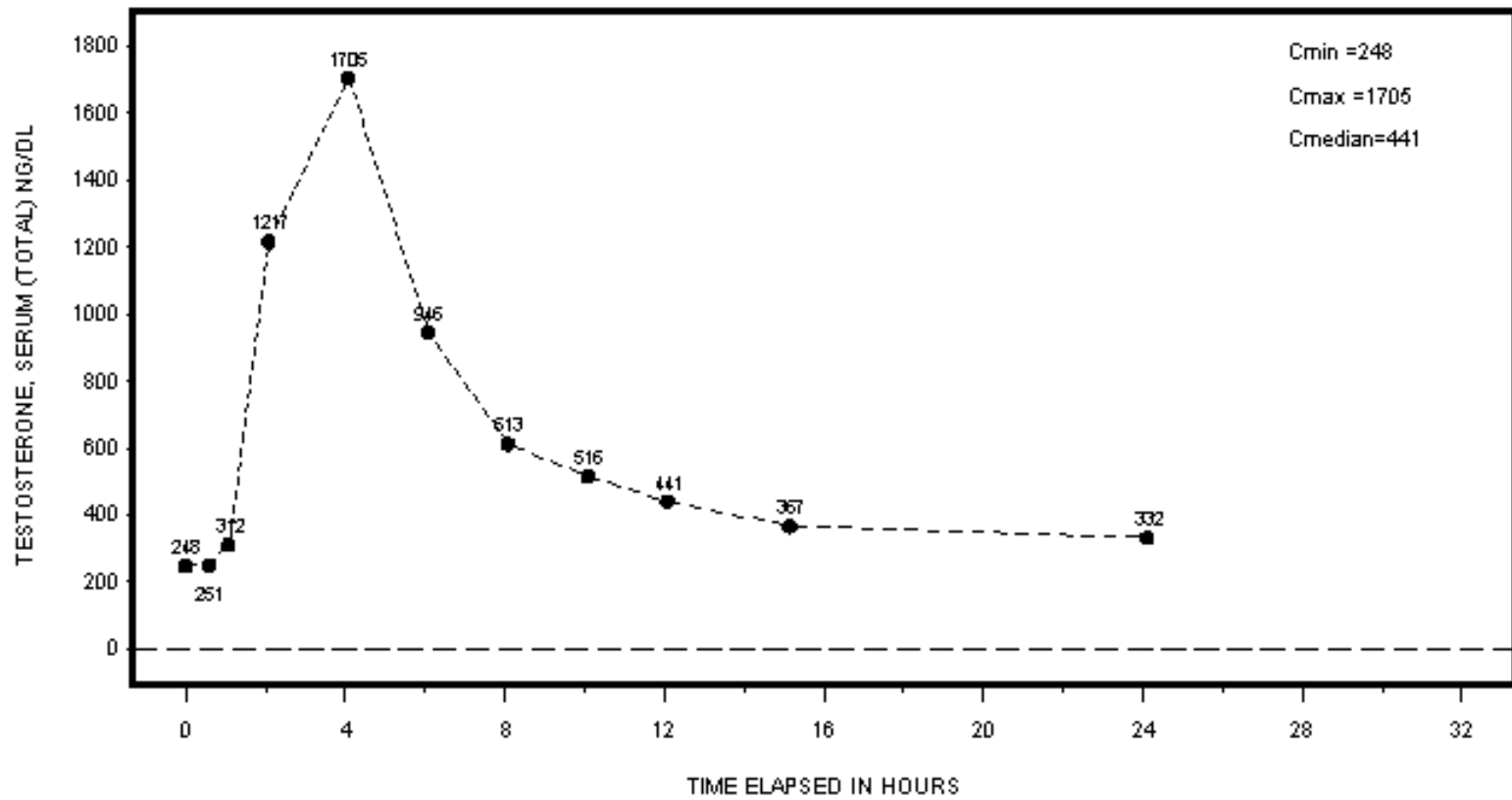


## Creating the plot: Adding Notes

```
proc gplot data=pk;
  where subjid="&subjid" & period=&period;
  plot valuen*act_tim / vaxis=axis1
        haxis=axis2
        vref=(0)
        lvref=3
        anno=anno
        frame;

  note move=(80.5,81) h=2.5pct "Cmin =&cmin";
  note move=(80.5,77) h=2.5pct "Cmax=&cmax";
  note move=(80.5,73) h=2.5pct "Cmedian=&median";

  format valuen 5.;
run; quit;
```



# Adding a Table

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# GPRINT: Saving a Table as a Plot

```
filename tabletmp "&rtfdir.temphorm.lst";  
proc printto new file=tabletmp; run;  
  Title1 "ABC"; Footnote1 "XYZ";  
  Proc report ...; run;  
proc printto; run;
```

*Define 60 columns and 30 rows for the  
output to be incorporated into gprint*

```
goptions hpos=60 vpos=30 ftext='Courier' htext=2.8;
```

*Prevent a repeat of titles & footnotes in the table.*

```
title; footnote;
```

*Incorporate the table into a figure.*

```
proc gprint fileref=tabletmp  
  ctext=black;  
run; quit;
```

## GSLIDE: Titles and Footnotes

```
goptions rotate=portrait ftext='Helvetica' htext=2.5 nodisplay  
device=ps1200 gunit=pct;
```

```
proc gslide;
```

```
title1 j=c h=1.60 f='Helvetica' 'Serum ...';
```

```
title2 j=c h=1.60 f='Helvetica' "Study &protocol. Subject  
&subject, Period=&tperiod, Final Dose: &f_dose unit";
```

*Define program, location, running date and  
page X of Y values.*

```
footnote j=l h=1.0 f='Courier' "%str(&pgmid..sas Date: &sysdate)"  
j=r "Page &i of &ncombo";  
run; quit;
```

## OUTPUT: Postscript file

*Create a single postscript file.*

*Use a high resolution postscript device (ps1200).*

```
filename gsasfile "&rtfdir.&pgmid..ps";
```

```
goptions reset=all htext=3 rotate=portrait  
device=ps1200 ftext='Helvetica'  
colors=(black) cback=white gunit=pct  
gsfmode=&mode gsfname=gsasfile  
vsize=9.25 in hsize=7.0 in  
horigin=.95 in vorigin=.78 in  
display;
```

## GREPLAY: Replaying Titles, Figure & Table

*The greplay code define the size and location of each unit and their order of appearance in each page.*

```
proc greplay igout=gseg nofs tc=cat1x2;  
  tdef lab1x2  
    1/ ulx=0 uly=100      urx=100 ury=100  
      llx=0 lly= 0  lrx=100 lry= 0  
    2/ ulx=0 uly=92      urx=100 ury=92  
      llx=0 lly=46  lrx=100 lry=46  
    3/ ulx=5 uly=44      urx=100 ury=44  
      llx=5 lly= 0  lrx=100 lry= 0;  
  template lab1x2;  
  treplay 1:gslide 2:gplot 3:gprint;  
run;  
quit;
```

## GREPLAY: Cleaning Up

*If this program is run in interactive mode and hundreds of plots are created, it is recommended to clean up the catalog containing the figures after each iteration.*

```
proc greplay igout=gseg nofs;  
  delete _all_;  
run; quit;
```

*End the “do loop”.*

```
%end;
```

```
%mend doit;  
%doit;
```



# Translating Postscript (PS) to PDF file

**“Distill” PS file to pdf file Adobe Acrobat Distiller.  
Set “Settings/Job Options/General/Default Page Size/  
Width=> 612.0 and Height to 792 points.**

**Drop PS file on Adobe Acrobat Distiller Icon or  
Double click on your postscript file.  
A new file with pdf extension will be created.**

**PDF files are less than ~40% size of postscript file.**

# Hardware fonts

## **SAVE SPACE and RUNNING TIME:**

**For a 700 pages output: PS => PDF**  
**18X (94%) reduction in file size (92MB => 4.5MB)**

## **ALLOW SEARCH FUNCTION**

**Allow Use of Search Function in Acrobat Reader**

**To List Available Hardware Fonts for a Given SAS  
Provided Device:**

```
Proc gdevice c=sashelp.devices nofs;  
list DeviceDriverName; * ex. list ps1200;  
run; quit;
```

## General Considerations

- **Extensive Data Validation** Graphic displays are data driven and unforgiving for outliers, missing values, and data entry errors.
- **Add %Put statement** to identify values of macro variables for debugging and identification of problem data. (Even if mprint mlogic symbolgen turned off, LOG still > 3MB!)
- **Programming Standard:** The SAS program contains one single standard to produce all outputs. (Important for validation purposes).

## Conclusion

- **SAS Graph possess all the procedures to produce a “A Plot and a Table per Page Times Hundreds in a Single File .**
- **Adobe Acrobat Distiller allows to “distill” a postscript (ps) file into a pdf file.**
- **Hardware fonts save storage space, running time and allow the use of search functions in pdf format.**

# Acknowledgements

- SAS Institute Technical Support

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