

```

*****
* Project      : ZRHM-REXA-07-JP
*
* Program name  : t15020306_ZRHM-REXA-07_V1.sas
*
* Author       : M. SUN
*
* Date created  : 05/26/2015
*
* Purpose      : Table 15.2.3.6 Sensitivity Analysis of Additional Biomarkers of
*               Exposure versus mCC and SA using Mixed Model on Day 5/90 Visit ? PP Set
*
* Revision History :
*
* Date      Author   Ref   Revision (Date in YYYYMMDD format)
*
*****

```

```

%let prgname=T15020306_ZRHM_REXA_07_JP_V1;

options mprint;

ods escapechar='^';

options sasautos=("W:\pmp07\macros" sasautos) notes;

%init(delivery=9);

```

```
%titlecsv(prgname=&prgname.,version=3);
```

```
options missing="";
```

```
data adbx1;
```

```
set adam.adbx;
```

```
where anl02fl='Y' and ANL01FL="Y" and DTYPE ne "LOCF";
```

```
if PARAMCD in ("CO", "CARBXHGB") and ATPT="DAY 5 - 20:00 - 21:30" and PPROT1FL="Y" then output;
```

```
else if PARAMCD in ("UMHBMCRE", "U3HPMCRE", "USPMACRE", "UNNALCRE") and upcase(AVISIT) eq  
"DAY 5" and PPROT1FL="Y" then output;
```

```
else if PARAMCD in ("CO", "CARBXHGB", "UMHBMCRE", "U3HPMCRE", "USPMACRE", "UNNALCRE") and  
upcase(AVISIT) eq "DAY 90" and PPROT4FL="Y" then output;
```

```
else if (upcase(AVISIT) ="DAY 5" and PPROT1FL="Y") or (upcase(AVISIT)="DAY 90" and PPROT4FL="Y")  
then do;
```

```
if paramcd in (
```

```
"U1OHPCRE", "UNNNCRE", "U4ABPCRE", "U1NACRE", "U2NACRE", "UOTOLCRE", "UCEMACRE",  
"UHEMACRE", "UBAPCRE", "UHMPMCRE", "USBMACRE", "UNEQCRE",
```

```
"U3HPM24U", "UMHBM24U", "USPMA24U", "UNNAL24U", "U1OHP24U", "UNNN24U", "U4ABP24U",  
"U1NA24U", "U2NA24U", "UOTOL24U", "UCEMA24U", "UHEMA24U", "UBAP24U", "UHMPM24U",  
"USBMA24U", "UNEQ24U") then output;
```

```
end;
```

```
run;
```

```
data adbx1;
```

```
set adbx1;
```

```
if paramcd='UMHBMCRE' then ord=1;
```

else if paramcd='U3HPMCRE' then ord=2;
else if paramcd='USPMACRE' then ord=3;
else if paramcd='CARBXHGB' then ord=4;
else if paramcd='UNNALCRE' then ord=5;

else if paramcd='CO' then ord=6;
else if paramcd='U1OHPCRE' then ord=7;
else if paramcd='UNNNCRE' then ord=8;
else if paramcd='U4ABPCRE' then ord=9;
else if paramcd='U1NACRE' then ord=10;
else if paramcd='U2NACRE' then ord=11;
else if paramcd='UOTOLCRE' then ord=12;
else if paramcd='UCEMACRE' then ord=13;
else if paramcd='UHEMACRE' then ord=14;
else if paramcd='UBAPCRE' then ord=15;
else if paramcd='UHMPMCRE' then ord=16;
else if paramcd='USBMACRE' then ord=17;
else if paramcd='UNEQCRE' then ord=18;

else if paramcd='UMHBM24U' then ord=19;
else if paramcd='U3HPM24U' then ord=20;
else if paramcd='USPMA24U' then ord=21;
else if paramcd='UNNAL24U' then ord=22;

```
else if paramcd='U1OHP24U' then ord=23;
else if paramcd='UNNN24U' then ord=24;
else if paramcd='U4ABP24U' then ord=25;
else if paramcd='U1NA24U' then ord=26;
else if paramcd='U2NA24U' then ord=27;
else if paramcd='UOTOL24U' then ord=28;
else if paramcd='UCEMA24U' then ord=29;
else if paramcd='UHEMA24U' then ord=30;
else if paramcd='UBAP24U' then ord=31;
else if paramcd='UHMPM24U' then ord=32;
else if paramcd='USBMA24U' then ord=33;
else if paramcd='UNEQ24U' then ord=34;
```

```
if ord>0;
```

```
run;
```

```
data adbx2;
```

```
set adbx1;
```

```
if paramcd ne 'CO' then do;
```

```
logaval=log(AVAL);
```

```
logbase=log(BASE);
```

```
end;
```

```
if upcase(AVISIT) eq "DAY 5" then dord=1;
```

```
if upcase(AVISIT) eq "DAY 90" then dord=2;
```

```
if paramcd='CO' then cotest=1; else cotest=2;
```

```
run;
```

```
proc sort data=adbx2;
```

```
by ord paramcd;
```

```
run;
```

```
data adbx2;
```

```
set adbx2 end=eof;
```

```
by ord paramcd;
```

```
if eof then call symputx('tottest',ord);
```

```
run;
```

```
%macro doit;
```

```
%trtrtfg(pgmname=&loutname., pgmid=1, new=0, style=, bookmark=%lowcase(&outname.));
```

```
%do i=1 %to &tottest;
```

```
%let getp&i=0;
```

```
%do j=1 %to 2;
```

```
%if &j=2 %then %let getppfl=4; %else %let getppfl=1;;;
```

```
proc sort data=adbx2 out=adbx2&i&j nodupkey;

by ord dord;

where ord=&i and dord=&j;

run;
```

```
data adbx2&i&j;

set adbx2&i&j;

call symputx("param&i",param);

call symputx("day&i",avisit);

keep paramcd param avisit ord dord;

run;
```

```
title1 bold j=l "&lt;title1 &title2";
```

```
title2 "The where clause used on the dataset adam.adbx: pprot&getppfl.fl='Y' and anl02fl='Y' and  
anl01fl='Y' and dtype ne 'LOCF'";
```

```
title3 "param: &&param&i, avisit: &&day&i" ;
```

```
proc mixed data=adbx2;

where ord=&i and dord=&j;

class trtp sex UCPDGR1;

%if &i=6 %then %do;

model aval = base sex UCPDGR1 trtp/ outp=pred;

%end;

%else %do;

model logaval = logbase sex UCPDGR1 trtp/ outp=pred;
```

```

%end;

lsmeans trtp / pdiff =control('mCC') alpha=0.05 cl;

lsmeans trtp / pdiff =control('SA') alpha=0.05 cl;

ods output lsmeans=lsmeans&i&j (keep=trtp lower upper estimate); *each arm;

ods output diffs=diffs&i&j (keep=_trtp trtp lower upper probt estimate where=(TRTP="THSm2.2")); *
lsmean and C.I. for ratios;

ods output covparms=estimate&i&j(rename=(estimate=mse)); *MSE;

run;

```

```

proc freq data=adbx2 noprint;

where ord=&i and dord=&j;

tables trtp/out=countn&i&j;

run;

```

```

data countn&i&j.1(keep=ord dord row col1) countn&i&j.2(keep=ord dord row col2)
countn&i&j.3(keep=ord dord row col3);

set countn&i&j;

length col1 col2 col3 $20; ord=&i; dord=&j;

if trtp='THSm2.2' then do;

row=2; col1=put(count,3.); output countn&i&j.1;

end;

if trtp='mCC' then do;

row=2; col2=put(count,3.); output countn&i&j.2;

end;

```

```

if trtp='SA' then do;

    row=2; col3=put(count,3.); output countn&i&j.3;

end;

run;

data LSMeanCL&i&j.1(keep=ord dord row col1) LSMeanCL&i&j.2(keep=ord dord row col2)
LSMeanCL&i&j.3(keep=ord dord row col3);

set lsmeans&i&j(obs=3);

%if &i=6 %then %do;

    lsmean = estimate; /* Ratio of geometric mean */

    LowerCL = lower; /* 95% CI lower bound */

    UpperCL = upper; /* 95% CI upper bound */

%end;

%else %do;

    lsmean = exp(estimate); /* Ratio of geometric mean */

    LowerCL = exp(lower); /* 95% CI lower bound */

    UpperCL = exp(upper); /* 95% CI upper bound */

%end;

length col1 col2 col3 $20; ord=&i; dord=&j;

if trtp='THSm2.2' then do;

    row=3; col1=put(round(lsmean,0.01),7.2); output LSMeanCL&i&j.1;

    row=4; col1=put(round(floor(lowercl*100)/100,0.01),7.2)||',
'| | strip(put(round(ceil(uppercl*100)/100,0.01),7.2)); output LSMeanCL&i&j.1;

end;

```



```

else if trtp='mCC' then do;

    row=3; col2=put(round(lsmear,0.01),7.2); output LSMeanCL&i&j.2;

    row=4; col2=put(round(floor(lowercl*100)/100,0.01),7.2)||',
'| |strip(put(round(ceil(uppercl*100)/100,0.01),7.2)); output LSMeanCL&i&j.2;

end;

else if trtp='SA' then do;

    row=3; col3=put(round(lsmear,0.01),7.2); output LSMeanCL&i&j.3;

    row=4; col3=put(round(floor(lowercl*100)/100,0.01),7.2)||',
'| |strip(put(round(ceil(uppercl*100)/100,0.01),7.2)); output LSMeanCL&i&j.3;

end;

run;

data LSMeanDiffCL&i&j.1(keep=ord dord row col4) LSMeanDiffCL&i&j.2(keep=ord dord row col5);

set diffs&i&j;

%if &i=6 %then %do;

    difference = estimate; /* Ratio of geometric mean */

    LowerCL = lower; /* 95% CI lower bound */

    UpperCL = upper; /* 95% CI upper bound */

%end;

%else %do;

    difference = 100*exp(estimate); /* Ratio of geometric mean */

    LowerCL = 100*exp(lower); /* 95% CI lower bound */

    UpperCL = 100*exp(upper); /* 95% CI upper bound */

%end;

length col4 col5 $20; ord=&i; dord=&j;

```

```

if _trtp='mCC' then do;

row=3; col4=put(round(difference,0.01),7.2); output LSMeanDiffCL&i&j.1;

row=4; col4=put(round(floor(lowercl*100)/100,0.01),7.2)||',
'| | strip(put(round(ceil(uppercl*100)/100,0.01),7.2)); output LSMeanDiffCL&i&j.1;

row=5;

%if &i=6 %then %do;

if (difference < 0) then Probt1=Probt/2;

else Probt1=1-Probt/2;

%end;

%else %do;

if (difference < 100) then Probt1=Probt/2;

else Probt1=1-Probt/2;

%end;

col4=put(Probt1,pvalue6.3);

%if &j=1 %then %do; call symputx("getp&i",Probt1); %end;

%else %do; if &&getp&i>0.05 then col4=""; %end;;

output LSMeanDiffCL&i&j.1;

end;

if _trtp='SA' then do;

row=3; col5=put(round(difference,0.01),7.2); output LSMeanDiffCL&i&j.2;

row=4; col5=put(round(floor(lowercl*100)/100,0.01),7.2)||',
'| | strip(put(round(ceil(uppercl*100)/100,0.01),7.2)); output LSMeanDiffCL&i&j.2;

end;

run;

data ROOTMSE&i&j;

```

```
set estimate&i&j;  
  
length col4cv $7; ord=&i; dord=&j;  
  
CVperc=100*sqrt(exp(mse)-1);  
  
row=3; col4cv=put(round(ceil(CVperc*100)/100,0.01),7.2);  
  
keep ord dord row col4cv;  
  
run;
```

```
data struct&i&j;  
  
set adbx2&i&j;  
  
length hd $80 stat $40;  
  
row=1; hd=param; output;  
  
row=2; hd=propcase(avisit); stat='n'; output;  
  
row=3; hd='';  
  
%if &i=6 %then %do;  
  
    stat='LS Mean';  
  
%end;  
  
%else %do;  
  
    stat='Geometric LS Mean (CV%)';  
  
%end;
```

```
output;  
  
row=4; hd=''; stat='95% CI';output;  
  
row=5; hd=''; stat='p-value (one-sided)';output;  
  
keep ord dord row hd stat;
```

```
run;
```

```
data res&i&j;
```

```
merge struct&i&j countn&i&j.1 countn&i&j.2 countn&i&j.3 LSMeanCL&i&j.1 LSMeanCL&i&j.2  
LSMeanCL&i&j.3 LSMeanDiffCL&i&j.1 LSMeanDiffCL&i&j.2 ROOTMSE&i&j;
```

```
by ord dord row;
```

```
run;
```

```
data res&i&j;
```

```
set res&i&j;
```

```
%if &i=6 %then %do;
```

```
%end;
```

```
%else %do;
```

```
if row=3 then col4=trim(col4)||'('||strip(col4cv)||')';
```

```
if row=3 then col5=trim(col5)||'('||strip(col4cv)||')';
```

```
%end;
```

```
run;
```

```
%end;
```

```
%end;
```

```
ods rtf close;
```

```
data final;
```

```
set %do i=1 %to &totttest; res&i.1 res&i.2 %end;;;
```

```
by ord dord;
```

```
run;
```

```
data final;
```

```
set final;
```

```
by ord;
```

```
if first.ord then pagen+1;
```

```
run;
```

```
data final;
```

```
set final;
```

```
by ord dord;
```

```
if first.dord and dord=2 then delete;
```

```
if stat='p-value' and col4="" then delete;
```

```
run;
```

```
data final;
```

```
set final end=eof;
```

```
by pagen;
```

```
if eof then call symputx("totalpage",pagen);
```

```
run;
```

```
data odata.&prgname.;
```

```
set final;
```

```
run;
```

```
%trtrtf(pgmname=&outname., pgmid=1, new=0, style=, bookmark=%lowcase(&outname.));
```

```
%do i=1 %to &totalpage;
```

```
title; footnote;
```

```
/*
```

```
title1 bold j=l "&title1 &title2";
```

```
title2 " ";
```

```
footnote1 bold h=12pt
```

```
"
```

```
_____";
```

```
footnote2 j=l h=9pt 'Note: Adjusted geometric least squares (LS) means and confidence intervals (CIs)  
from an ANCOVA model conducted with baseline value, '
```

```
'study arm, sex and mCC consumption reported at screening as fixed effect factors.';
```

```
footnote3 j=l h=9pt "Note: mCC = Menthol conventional cigarettes; THSm2.2 = Tobacco Heating System  
2.2 Menthol.";
```

```
footnote4 j=l h=9pt "Note: p-value for one-sided test for comparison between THSm2.2 and mCC.";
```

```
footnote5 j=l h=9pt " ";
```

```
footnote6 h=9pt j=l "&APPENDIX.";
```

```
footnote7 h=9pt j=l "Study ID:ZRHM-REXA-07-JP      Program: &prgname..sas      Status:  
&repversion./&fdate.      Page: &i. of &totalpage";
```

```
*/
```

```
proc report data=final headskip headline nowd split='~' style=[outputwidth=100%] style(header  
column)=[protectspecialchars=off];
```

```
where pagen=&i;
```

```
column pagen ord dord hd stat col1 col2 col3 col4 col5;
```

```

define pagen /order order=internal noprint;

define ord /order order=internal noprint;

define dord /order order=internal noprint;

define hd /display "Variable" style(column)=[cellwidth=12% just=l] style(header)=[just=l];

define stat /display "Statistic" style(column)=[cellwidth=15% just=l] style(header)=[just=l];

define col1 /display "THSm2.2" style(column)=[cellwidth=9% just=c];

define col2 /display "mCC" style(column)=[cellwidth=9% just=c];

define col3 /display "SA" style(column)=[cellwidth=9% just=c];

%if &i=6 %then %do;

define col4 /display "THSm2.2 - mCC~Difference" style(column)=[cellwidth=10% just=c];

define col5 /display "THSm2.2 - SA~Difference" style(column)=[cellwidth=10% just=c];

%end;

%else %do;

define col4 /display "THSm2.2 : mCC~Ratio (%)" style(column)=[cellwidth=10% just=c];

define col5 /display "THSm2.2 : SA~Ratio (%)" style(column)=[cellwidth=10% just=c];

%end;

```

COMPUTE before pagen;

LINE @1 " ";

ENDCOMP;

COMPUTE after dord;

LINE @1 "";

ENDCOMP;

```
compute before _page_ /style=[fontweight=bold fontsize=3.75];
```

```
line @1 "&title1 &title2";
```

```
line @1 "^R/RTF\brdrb\brdrs\brdrw30\brsp20\b ' ";
```

```
endcomp;
```

```
compute after _page_ /style=[fontsize=1.75];
```

```
line @1 "Note: Adjusted geometric least squares (LS) means and confidence intervals (CIs) from an  
mixed model conducted with baseline value, "
```

```
"study arm, sex and mCC consumption reported at screening as fixed effect factors.";
```

```
line @1 "Note: mCC = Menthol conventional cigarettes; THSm2.2 = Tobacco Heating System 2.2  
Menthol.";
```

```
line @1 "Note: p-value is for the one-sided test for comparison between THSm2.2 and mCC. P-value at  
Day 90 is evaluated only if P-value at "
```

```
"Day 5 is significant, in all biomarkers except for Total NNAL.";
```

```
line @1 " ";
```

```
line @1 "&APPENDIX.";
```

```
line @1 "Study ID:ZRHM-REXA-07-JP      Program: &fprgname..sas      Status: &repversion./&fdate.  
Page: &i. of &totalpage";
```

```
endcomp;
```

```
run;
```

```
%end;
```

```
ods listing;
```

```
ods rtf close;
```


%mend;

%doit;