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*****;
* Project          : ZRHM-REXA-07-JP
*
* Program name     : T1502044501_ZRHM-REXA-07_V1.sas
*
* Author          : L. Yan
*
* Date created     : 05/20/2015
*
* Purpose          : Table T1502044501
*
* Revision History :
*
* Date            Author      Ref      Revision (Date in YYYYMMDD format)
*
*****;

%let prgname=T1502044501_ZRHM_REXA_07_JP_V1;
options mprint;

options sasautos=("W:\pmp07\macros" sasautos) notes;
%init(delivery=9);

%titlecsv(prgname=&prgname., version=5);

%put &title1;
%put &title2;
%put &APPENDIX;
%put &endpoint;
%put &outname.;
%put &repversion.;

options missing="";

%macro cal_summary_pvalue(wher=, outnum=, method=, used=, var=, in=, pflg=, paramcd=, avisit=);
title2 h=10pt j=1 "&used";

proc sort data=&in. out=anadt_&outnum.;
by usubjid;
where &wher. ;
run;

proc sort data=anadt_&outnum.;
by trtcd;
run;

%if &method = 1 %then %do;
title3 h=10pt j=1 "Paramcd: &paramcd, &avisit. Model: Mixed, Method: Log";

proc means data = anadt_&outnum. noprint;
by trtcd;
var &var.;
output out=xlab_&outnum. n=n mean=mean median=med std=sd min=min max=max q1=q1 q3=q3 lclm=lclm uclm=uclm;
run;
%end;

%if &method = 2 %then %do;
title3 h=10pt j=1 "Paramcd: &paramcd, &avisit. Model: Mixed, Method: Normal";

proc means data = anadt_&outnum. noprint;
by trtcd;
var aval;
output out=xlab_&outnum. n=n mean=mean median=med std=sd min=min max=max q1=q1 q3=q3 lclm=lclm uclm=uclm;
run;
%end;

data xlab_&outnum.;
set xlab_&outnum.;
n1 = trim(left(compress(put(n, 8.))));
if sd > . then mean1 = (trim(left(compress(put(mean, 8.1))))||' ( '|trim(left(compress(put(ceil(sd*100)/100, 8.2))))
)||')';
else mean1 = (trim(left(compress(put(mean, 8.1))))||' (NA)';
ci1=trim(left(compress(put(floor(lclm*100)/100, 8.2))))||', '|trim(left(compress(put(ceil(uclm*100)/100, 8.2)))));
median1 = trim(left(compress(put(med, 8.1)))));
q1q3 = trim(left(compress(put(q1, 8.2))))||', '|trim(left(compress(put(q3, 8.2)))));
min1 = trim(left(compress(put(min, 8.))))||', '|trim(left(compress(put(max, 8.0)))));

run;

/*
proc mixed data=anadt_&outnum.;

Class trtcd sex UCPDGR1;

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Model logaval = logbase sex UCPDGR1 trtcd / outp=pred;

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

ods output lsmeans=lsmeans_&outnum. (keep=trtcd lower upper estimate); *each arm;

ods output diffs=LSMeanDiffCL&outnum. (keep=trtcd lower upper probt estimate); * lsmean and C.I. for ratios;

ods output covparms=ROOTMSE&outnum.(rename=(estimate=mse)); *MSE;

run;
*/

proc mixed data=anadt_&outnum.;
class trtp sex UCPDGR1;

%if &method = 1 %then %do;
model logaval = logbase sex UCPDGR1 trtp/ outp=pred;
%end;
%if &method = 2 %then %do;
model aval = base 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_&outnum. (keep=trtp lower upper estimate); *each arm;
ods output diffs=LSMeanDiffCL&outnum. (keep=_trtp trtp lower upper probt estimate where=(TRTP="THSm2.2")); * lsmean and
C.I. for ratios;
ods output covparms=estimate&outnum.(rename=(estimate=rootmse)); *MSE;
run;
ods output close;

data pval&outnum.;
set LSMeanDiffCL&outnum.;
ProbtDiff=probt;
keep trtp ProbtDiff;
run;

data lsmeans_&outnum.;
set lsmeans_&outnum.;
lowercl=lower;
uppercl=upper;
lsmean=estimate;
keep trtp lowercl uppercl lsmean;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
lowercl=lower;
uppercl=upper;
difference=estimate;
keep trtp _trtp lowercl uppercl difference;
run;

data lsmeans_&outnum.;
set lsmeans_&outnum.;
if TRTP="THSm2.2" then trtcd=1;
else if TRTP="mCC" then trtcd=2;
else if TRTP="SA" then trtcd=3;

%if &method = 1 %then %do;
Estimate1 = exp(lsmean); /* Ratio of geometric mean */
LowerCL = exp(lowercl); /* 95% CI lower bound */
UpperCL = exp(uppercl); /* 95% CI upper bound */
%end;
%if &method = 2 %then %do;
Estimate1 = lsmean; /* Ratio of geometric mean */
LowerCL = lowercl; /* 95% CI lower bound */
UpperCL = uppercl; /* 95% CI upper bound */
%end;

run;

data ROOTMSE&outnum.;
set estimate&outnum.;
*CVperc=100*sqrt(exp(rootmse**2)-1);
cvperc=100*sqrt(exp(rootmse)-1);
run;

proc sort data=lsmeans_&outnum. nodupkey;
by trtcd;
run;

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data lsmeans_&outnum.;
length geomean geoci $100;
set lsmeans_&outnum.;
geomean=strip(put(ESTIMATE1, 8.2));
geoci=strip(put(floor(LowerCL*100)/100, 8.2)||", "||strip(put(ceil(UpperCL*100)/100, 8.2)));

keep trtcd geomean geoci;
run;

proc sort data=LSMeanDiffCL&outnum. nodup;
by TRTP _TRTP;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
myord=1;
run;

data ROOTMSE&outnum.;
set ROOTMSE&outnum.;
myord=1;
run;

data LSMeanDiffCL&outnum.;
merge LSMeanDiffCL&outnum. ROOTMSE&outnum.;
by myord;
run;

data LSMeanDiffCL&outnum.;
length geomean geoci $100;
set LSMeanDiffCL&outnum.;
if _TRTP eq "mCC" then trtcd=4;
if _TRTP eq "SA" then trtcd=5;

%if &method = 1 %then %do;

    difference = 100*exp(difference); /* Ratio of geometric mean */
    lowercl = 100*exp(lowercl); /* 95% CI lower bound */
    uppercl = 100*exp(uppercl); /* 95% CI upper bound */
%end;

%if &method = 2 %then %do;

    difference =difference; /* Ratio of geometric mean */
    lowercl = lowercl; /* 95% CI lower bound */
    uppercl = uppercl; /* 95% CI upper bound */
%end;

%if &method = 1 %then %do;
geomean=strip(put(round(difference, 0.01), 8.2))||" ("||strip(put(ceil(CVperc*100)/100, 8.2)) ||")";
%end;
%if &method = 2 %then %do;
geomean=strip(put(round(difference, 0.01), 8.2))/" ("||strip(put(CVperc, 8.1)) ||")"/;
%end;

geoci=strip(put(floor(lowercl*100)/100, 8.2))||", "||strip(put(ceil(uppercl*100)/100, 8.2)));
keep trtcd geomean geoci difference;
run;

data pval&outnum.;
set pval&outnum.;
if _n_=1;
trtcd=4;
keep trtcd ProbtDiff;
format ProbtDiff PVALUE6.3;
run;

proc sort data=LSMeanDiffCL&outnum.;
by trtcd;
run;

data LSMeanDiffCL&outnum.;
merge LSMeanDiffCL&outnum. pval&outnum.;
by trtcd;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
%if &method = 1 %then %do;
    if (difference < 100) then ProbtDiff=ProbtDiff/2;
    else ProbtDiff=1-ProbtDiff/2;
%end;
%if &method = 2 %then %do;
    if (difference < 0) then ProbtDiff=ProbtDiff/2;
    else ProbtDiff=1-ProbtDiff/2;
%end;

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run;

data mrep_&outnum.;
set lsmeans_&outnum. LSMeanDiffCL&outnum.;
run;

proc sort data=mrep_&outnum.;
by trtcd;
run;

proc sort data=xlab_&outnum.;
by trtcd;
run;

data xlab_&outnum.;
merge xlab_&outnum.(in=a) mrep_&outnum.;
by trtcd;
run;

data xlab_&outnum.;
set xlab_&outnum.;
if geoci ne "";
run;

proc transpose data = xlab_&outnum. out=xlab_1_&outnum.;
id trtcd;
var n1 geomean geoci ProbtDiff;
run;

data rep_&outnum.;
length _name_ _1 _2 _3 ord1 $100;
set xlab_1_&outnum.;
ord1="&outnum";
ordnum=input(ord1, best.);
if upcase(_name_)="N1" then do; _name_="n"; sord=0; end;
%if &method = 1 %then %do;
if upcase(_name_)="GEOMEAN" then do; _name_="Geometric LS Mean (CV%)"; sord=1; end;
if upcase(_name_)="GEOCI" then do; _name_="95% CI of Geometric Mean"; sord=2; end;
if upcase(_name_)="CI1" then do; _name_="95% CI of Mean"; sord=4; end;
%end;
%if &method = 2 %then %do;
if upcase(_name_)="GEOMEAN" then do; _name_="LS Mean"; sord=1; end;
if upcase(_name_)="GEOCI" then do; _name_="95% CI"; sord=2; end;
if upcase(_name_)="CI1" then do; _name_="95% CI"; sord=4; end;
%end;

if upcase(_name_)="MEAN1" then do; _name_="Mean (SD)"; sord=3; end;
if upcase(_name_)="MEDIAN1" then do; _name_="Median"; sord=5; end;
if upcase(_name_)="Q1Q3" then do; _name_="Q25, Q75"; sord=6; end;
if upcase(_name_)="MIN1" then do; _name_="Min, Max"; sord=7; end;
if upcase(_name_)="PROBTDIFF" then do; _name_="p-value (one-sided)"; sord=9; end;
run;

data rep;
set rep rep_&outnum.;
run;

%mend;

%macro mainloop(where1=, outn=, where=);

proc sort data=adam.adsl out=trt;
by usubjid;
where PPROT1FL="Y";
run;

data trt;
set trt;
if TRT01A="THSm2.2" then trtcd=1;
else if TRT01A="mCC" then trtcd=2;
else if TRT01A="SA" then trtcd=3;
run;

/*
"Use PPROTxFL with xx in 1 and 4 for data at APUPER=1 and 4 respectively.
ADBX.PARAMCD="CYP2A6" at AVISITN in (105, 190) " ANL02FL="Y" and DTYPE ne "LOCF" log Mixed
*/

data indata1;
length group $4;
set adam.ADBX;
group="A";
paramn=paramn+100;
if avisitn=106 then used="The where clause used on the dataset adam.ADBX: PPROT1FL=Y and ANL02FL=Y";
else if avisitn=190 then used="The where clause used on the dataset adam.ADBX: PPROT4FL=Y and ANL02FL=Y";

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if PARAMCD in ("CYP2A6") and avisitn in (106, 190) and ANL02FL="Y" and (&where.);
drop DTYPE ATPT;
run;

data anldata1;
set indata1;
if paramcd in ("CYP2A6") then method=1;
if aval>0 then logaval=log(aval);
if base>0 then logbase=log(base);
run;

proc sort data=anldata1 out=fmt(keep=paramn param) nodupkey;
by paramn param;
run;

proc sort data=anldata1 out=check(keep=method paramcd) nodupkey;
by method paramcd;
run;

data anldata1;
set anldata1;
if &where.;
run;

proc sort data=anldata1 out=check(keep=paramn avisitn avisit method used param paramcd) nodupkey;
by paramn avisitn avisit method;
where &where1.;
run;

data trt_1;
set trt;
run;

data anldata1;
set anldata1;
if TRTP="THSm2.2" then trtcd=1;
else if TRTP="mCC" then trtcd=2;
else if TRTP="SA" then trtcd=3;
run;

data check;
set check;
ord=_n_;
run;

%*cal_summary_pvalue(where=1, outnum=1, var=aval, in=anldata1, pflg=1);

data rep;
run;

data _null_;
set check;
call execute ('%cal_summary_pvalue(where=%str(avisitn='||avisitn||' and paramn='||paramn||' ), outnum='||ord||', met
hod='||method||', used='||used||', var=logaval, in=anldata1, paramcd='||paramcd||', avisit='||avisit||');');
run;

data frep;
set rep;
ord=ORDNUM;
run;

data frep;
merge frep(in=a) check;
by ord;
if a;
if avisitn>.;
run;

proc sort data=trt_1 nodupkey;
by trtcd usubjid;
run;

proc freq data = trt_1 noprint;
tables trtcd/ out= denom;
run;

data _null_;
set denom end=eof;

retain total 0;

total = total+count;

if trtcd= 1 then do;
call symput('trt1', trim(left(put(count,8)))));

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end;
if trtcd= 2 then do;
  call symput('trt2', trim(left(put(count,8)))));
end;
if trtcd= 3 then do;
  call symput('trt3', trim(left(put(count,8)))));
end;
run;

%put trt1=&trt1 trt2=&trt2 trt3=&trt3;

%macro cal_part_main();

data frep;
set frep;

avisit=propcase(avisit);
if AVISIT="Day 0" then avisit="Baseline";

  %do i = 1 %to 100;
    if (&i-1)*3<ordnum<=&i*3 then pagen=&i;
  %end;

run;

%mend;

%cal_part_main();
data frep&outn.;
set frep;
space=" ";
if avisit="Day 6/Discharge Confinement" then avisit="Day 5";

*if _name_="p-value (one-sided)" then delete;
run;

%mend;

%trtrtfg(pgmname=&loutname., pgmid=1, new=0, style=, bookmark=%lowcase(&outname.));
title1 bold j=1 "&title1 &title2";

%mainloop(where1=%str(method=1), outn=2, where=%str((avisitn=106 and PPROT1FL="Y") or (avisitn in (190, 191) /*and APUPE
R=4*/ and PPROT4FL="Y") ));

ods listing;
ods rtf close;

data pvalueday5;
set frep2;
if avisit="Day 5" and _name_="p-value (one-sided)";
keep paramcd _4;
run;

data pvalueday5;
set pvalueday5;
pvlueday5 =input(compress(_4), best.);
drop _4;
run;

data frep2;
merge frep2(in=a) pvalueday5;
by paramcd;
if a;
run;

data frep2;
set frep2;
if avisit ne "Day 5" and pvlueday5>0.05 and _name_="p-value (one-sided)" then delete;
run;

%*mainloop(flg=PPROT2FL, outn=2, where=%str(avisitn=130 and APUPER=2));
%*mainloop(flg=PPROT3FL, outn=3, where=%str(avisitn=160 and APUPER=3));
%*mainloop(flg=PPROT4FL, outn=4, where=%str(avisitn in (190, 191) and APUPER=4));

data odata.&prgname.;
set /*frep1 (in=a)*/ frep2 (in=b) /*frep3 (in=c) frep4 (in=d)*/;
*if a then group="PPROT1FL";
*if b then group="PPROT2FL";
*if c then group="PPROT3FL";
*if d then group="PPROT4FL";

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run;

/*
proc sort data=anldata1 out=fmt(keep=paramn param) nodupkey;
by paramn param;
run;
*/

data fmt;
set fmt;
fmtname="grp";
start=paramn;
label="Parameter: "||strip(param);
run;

proc format cntlin=fmt;
run;

%global totalpage2;
data _null_;
set frep2 end=eof;

if eof then do;
call symput('totalpage2', trim(left(put(pagen,8)))));
end;

run;

%put totalpage2=&totalpage2;

%*title(prgname1=&prgname.);

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

/*****
title1 j=1 h=9pt "Study ID: ZRHM-REXA-07-JP" j=r "Page ^{thispage} of ^{lastpage}";
title2 " ";
title3 bold j=1 "&title1 &title2";

title5 "^R/RTF'\brdrb\brdrs ' ";

footnote1 "^R/RTF'\brdrb\brdrs ' ";
footnote2 j=1 h=9pt "Note: mCC = Menthol conventional cigarettes; SA = Smoking abstinence; THSm2.2 = Tobacco Heating Sys
tem 2.2 Menthol .";
footnote3 j=1 h=9pt "Note: Adjusted geometric least squares (LS) means and confidence intervals (CIs) from an ANCOVA mod
el conducted with baseline value, study arm, ";
footnote4 j=1 h=9pt "sex and mCC consumption reported at screening as fixed effect factors. ";
footnote5 j=1 h=9pt " ";
footnote6 j=1 h=9pt "Program: &fprgname." j=c "Status: Draft/&fdate." j=r "&APPENDIX.";
/*****/

%macro reppart;

%do i = 1 %to &totalpage2;

proc report data=frep2 headskip headline spacing=4 nowd split='~' style=[outputwidth=100%] style(header column)=[protec
tspecialchars=off];
where pagen=&i;
column pagen paramn avisitn avisit sord _name_ _1 space _2 space _3 space _4 space _5;
define pagen /order order=internal noprint;
define paramn /order order=internal noprint;
define avisitn /order order=internal noprint;
define avisit /order "Time point" flow style(column)=[cellwidth=7% just=l];
define sord /order order=internal noprint;

define _name_ /display "Statistic" flow style(column)=[cellwidth=15% just=l];
define _1 /display "THSm2.2" flow style(column)=[cellwidth=10% just=c];
define space /display " " flow style(column)=[cellwidth=0.5% just=c];

define _2 /display "mCC" flow style(column)=[cellwidth=10% just=c];
define space /display " " flow style(column)=[cellwidth=0.5% just=c];

define _3 /display "SA" flow style(column)=[cellwidth=10% just=c];

define space /display " " flow style(column)=[cellwidth=0.2% just=c];

define _4 /display "THSm2.2 : mCC Ratio (%)" flow style(column)=[cellwidth=10% just=c];
define space /display " " flow style(column)=[cellwidth=0.2% just=c];

define _5 /display "THSm2.2 : SA Ratio (%)" flow style(column)=[cellwidth=10% just=c];

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COMPUTE before paramn ;
LINE @1 paramn grp.;
ENDCOMP;
*/
COMPUTE after avisitn ;
LINE @1 " ";
ENDCOMP;

break after pagen/page;
compute before pagen;
line @1 " ";
endcomp;

compute before _page_ /style=[fontweight=bold fontsize=3.75];
line @1 "&title1 &title2";
line @1 " ";
LINE @1 paramn grp.;

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

compute after _page_/style=[fontsize=1.75];
line @1 "Note: mCC = Menthol conventional cigarettes; SA = Smoking abstinence; THSm2.2 = Tobacco Heating System 2.2 Ment
hol.";
line @1 "Note: Adjusted geometric least squares (LS) means and confidence intervals (CIs) from an mixed model conducted
on log-transformed values with";
line @1 "log-transformed baseline value, study arm, sex and mCC consumption reported at screening as fixed effect factor
s. Geometrical CV% of the ratio";
line @1 "is estimated from the residual mean squares.";
line @1 "Note: p-value for one-sided test for comparison between products.";
line @1 "&APPENDIX.";
line @1 "Study ID:ZRHM-REXA-07-JP          Program: &fprgname..sas          Status: &repversion./&fdate.          Page: &i.
of &totalpage2";
endcomp;

run;
%end;

%mend;
%reppart;

ods listing;
ods rtf close;

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