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/*=====
| Covance Study Number   : 000000106343      |
| Program Name           : f_forest_bm.sas     |
| Purpose                 : to create Figure 15.1.1.1      |
| Input Data              : tflds.T_15_02_03_02_f tflds.T_15_02_03_04_f      |
| Output Data             : F_15_01_01_01      |
| Macros Called           :                    |
| Originally Performed by :Jyothsna Reddy      |
| Date                    : 28APR2015          |
|=====
| Modification History
|-----
| Modified by            :
| Modification Date      :
| Modification Description :
+=====*/

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options notes source source2 nofullstimer validvarname=upcase missing=' ';
ods _all_ close;
ods listing;

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*=====;
* START OF PROGRAM CODE                               ;
*=====;
%m_printto;

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%let tfldno=F_15_01_01_01;
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/* Standard - leave this */
%let TFL_Part=%scan(&_SASPROGRAMFILE,-3,%str());

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/* Standard - leave this */
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data _null_;
    tmp="&TFL_Part";
    if tmp not in ("dev" "qc") then call symput("TFL_Part", "prod");
    call symput('TFLpath', compress("&_SASPROGRAMFILE",""));
run;

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%put &tflpath;
```

```
ods _all_ close;
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options notes source source2 nofullstimer validvarname=upcase
nonumber nodate orientation=portrait missing=' ';
ods graphics on; /* As we are effectively using ODS graphics we need to ensure that it is turned on */
ods graphics / height=12cm width=16cm noborder; /* Removes border around the image */
ods path reset;
/* please include styles template */
%include "/cvn/projects/prj/development/000000106343/dev/figures/figtplt.sas";

ods rtf toc_data file="/cvn/projects/prj/data/000000106343/TFL/dev/Tables/&tfldno..rtf" style=t106343_g2 startpage=yes headery=1440 f
ootery=1440 ;

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ods exclude all;
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proc sort data=tflds.T_15_02_03_04_f out=forest;
    by paramn avisitn;
    where paramcd ne "CO";
run;

proc sort data=tflds.T_15_02_03_02_F out=forest_2;
    by paramn avisitn;
run;

data forest1;
length par 3;
    set forest(in=a) forest_2(in=b rename=difftype=difftyp);

    if DIFFTYP="THSm2.2vs.mCC" then do;
        if index(paramcd,"CRE") >0 then do;
            if avisitn=105 then par=1;
            else if avisitn=190 then par=2;
        end;
        if index(paramcd,"24U") >0 then do;
            if avisitn=105 then par=3;

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        else if avisitn=190 then par=4;
    end;
    if paramcd="CARBXHGB" then do;
        if avisitn=105 then par=1;
        else if avisitn=190 then par=2;
    end;
    end;

    else if DIFFTYP = "THSm2.2vs.SA" then do;
        if index(paramcd,"CRE") >0 then do;
            if avisitn=105 then par=5;
            else if avisitn=190 then par=6;
        end;
        if index(paramcd,"24U") >0 then do;
            if avisitn=105 then par=7;
            else if avisitn=190 then par=8;
        end;
    end;
    if paramcd="CARBXHGB" then do;
        if avisitn=105 then par=5;
        else if avisitn=190 then par=6;
    end;
    end;

if DIFFTYP="THSm2.2vs.mCC" then difftyp="THSm2.2/mCC (%)";
else difftyp="THSm2.2/SA (%)";
run;

proc sort data=forest1;
    by par paramn;
run;

PROC SQL;
CREATE TABLE forest1_xls AS
SELECT PARAM, DIFFTYP, AVISIT, DIFF, LCLM, UCLM
FROM forest1;
QUIT;

PROC EXPORT DATA=forest1_xls DBMS=XLSX OUTFILE="/cvn/projects/prj/data/000000106343/TFL/dev/Tables/&tf1no..xlsx" REPLACE;
SHEET=Sheet1;

proc summary data=forest1;
    by par;
    var uclm;
    output out =axis1 max=max1;
run;
proc summary data=forest1;
    by par;
    var lclm;
    output out =axis2(drop=_type_ _freq_) min=min1;
run;
data maxaxis1;
merge axis1 axis2;
by par;
max2=(ceil(max1));
min2=(floor(min1));
if mod(max2,2)=0 then max3=max2;
else if mod(max2,2)=1 then max3=max2+1;
    if max3<100 then max3=150;
if min2>0 then do;
    if mod(min2,2)=0 then min3=min2;
else if mod(min2,2)=1 then min3=min2-1;
end;
else min3=0;
min=put(min3,best.);
max=put(max3,best.);

keep par max min;
run;

data forest_;
merge forest1 maxaxis1;
by par;
run;

data forest_;
set forest_ end=last;
page = 1;
par1=put(par,best.);

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    if last then call symput("maxpage", par1);
run;
%put &maxpage;

data dforest1_;
format lc13 Ucl3 LSMEAN comma6.2 ;
    set forest_;
    col1="Â "; col2="Â ";
    col3="Â "; col4="Â ";

lc13=lc1m;
uc13=uc1m;
lsmean=diff;
trt=diffotyp;

    if paramcd="CARBXHGB" then neword=4;
else if index(paramcd,"UMHBM")>0 then neword=1;
else if index(paramcd,"U3HPM")>0 then neword=2;
else if index(paramcd,"USPMA")>0 then neword=3;
else if index(paramcd,"UNNAL")>0 then neword=5;
else if index(paramcd,"U1OHP")>0 then neword=6;
else if index(paramcd,"UNNN")>0 then neword=7;
else if index(paramcd,"U4ABP")>0 then neword=8;
else if index(paramcd,"U1NA")>0 then neword=9;
else if index(paramcd,"U2NA")>0 then neword=10;
else if index(paramcd,"UOTOL")>0 then neword=11;
else if index(paramcd,"UCEMA")>0 then neword=12;
else if index(paramcd,"UHEMA")>0 then neword=13;
else if index(paramcd,"UBAP")>0 then neword=14;
else if index(paramcd,"UHMPM")>0 then neword=15;
else if index(paramcd,"USBMA")>0 then neword=16;
else if index(paramcd,"UNEQ")>0 then neword=17;

if diffotyp="THSm2.2/mCC (%)" and Ucl3 gt 150 then newpar="*"||strip(param);
else if diffotyp ne "THSm2.2/mCC (%)" and Ucl3 gt 200 then newpar="*"||strip(param);
else newpar=strip(param);

drop param;

rename newpar=param;

run;

proc sort data=dforest1_;
    by par PARAMN trt avisitn ;
    where avisitn ne . ;
run;

%macro graph( flag=);

proc sort data=dforest1_ out=dforest1;
    by neword par ;
    where par=&i;
run;

data dforest1;
length mrange $100;
    set dforest1;
    order=_n_;
    paramn=order;
    test=0;
    Param1=compbl(param);
    call symput("label1",diffotyp);
    call symput("label2",avisit);
    mrange=strip(put(lsmean,7.2)||' ('||compress(put(lc13,7.2)||','||put(uc13,7.2)||')'));
    order1=put(order,8.);
    tmp=" ";
    tmp1=" ";
run;

data _null_;
    set dforest1 end=last;
    if _n_=1 then call execute("proc format; value fmtcat");
    call execute(compress(put(order,8.))||'='||strip(param1)||'');
    if last then call execute("; run;");

    if last then call symput("ymax",order1);

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run;

proc template;
  define statgraph Forest11;
    begingraph;

    %if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
      layout lattice / columns=5 columnweights=(0.20 0.01 0.42 0.01 0.36);
    %end;
    %else %do;
      layout lattice / columns=3 ;
    %end;

    drawline x1=0 y1=9.8 y2=9.8 x2=120/lineattrs=(thickness=1) x1space=layoutpercent y1space=layoutpercent
    x2space=layoutpercent y2space=layoutpercent ;

    drawline x1=0 y1=90 y2=90 x2=120 /lineattrs=(thickness=1) x1space=layoutpercent y1space=layoutpercent
    x2space=layoutpercent y2space=layoutpercent;

    /*--Column headers--*/
    sidebar / align=top;
    %if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
      layout lattice / rows=1 columns=5 opaque=true columnweights=(0.20 0.01 0.42 0.01 0.36);
    %end;
    %else %do;
      layout lattice / columns=3 opaque=true;
    %end;
    entry textattrs=(size=9 weight=bold) halign=center "Parameter";
    %if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
      entry textattrs=(size=9 weight=bold) halign=center "";
    %end;
    layout gridded;
    entry textattrs=(size=9 weight=bold) halign=center "Geometric LS Mean";
    entry textattrs=(size=9 weight=bold) halign=center "Ratio (95% CI)";
    endlayout;
    %if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
      entry textattrs=(size=9 weight=bold) halign=center " ";
    %end;
    %let label2=&label2;
    entry textattrs=(size=9 weight=bold) halign=center "&label2.";
    endlayout;
    endsidebar;

    /*--Second & third column showing Count and percent--*/
    layout overlay / walldisplay=none
      xaxisopts=(display=none offsetmin=0 offsetmax=0 )
      y2axisopts=(reverse=true display=(tickvalues) type=linear offsetmin=0.06 offsetmax=0.06
        linearopts=(tickvalueformat=fmtcat. tickvaluesequence=(start=1 end=&ymax increment=1)) tickvalueattrs=(size=9))
    ;
    scatterplot y=order x=col1 / yaxis=y2 markerattrs=(size=0) ;
    ;
    endlayout;

    %if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
      layout overlay / walldisplay=none
        xaxisopts=(display=(tickvalues) tickvalueattrs=(size=9) )
        y2axisopts=(reverse=true display=none type=linear offsetmin=0.01 offsetmax=0.08) ;
      scatterplot y=order x=col1 / markercharacter=tmp yaxis=y2 datalabelattrs=(size=9)
        markercharacterattrs=graphvaluetext(size=9);
    endlayout;
    %end;

    /*--Second & third column showing Count and percent--*/
    layout overlay / walldisplay=none
      xaxisopts=(display=(tickvalues) tickvalueattrs=(size=9) )
    %if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
      y2axisopts=(reverse=true display=none type=linear offsetmin=0.01 offsetmax=0.08) ;
    %end;
    %else %do;
      y2axisopts=(reverse=true display=none type=linear offsetmin=0.02 offsetmax=0.06) ;
    %end;

    scatterplot y=order x=col1 / markercharacter=mrangle yaxis=y2 datalabelattrs=(size=9)
      markercharacterattrs=graphvaluetext(size=9);
    endlayout;
  enddefine;
run;

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%if &i=3 or &i=4 or &i=7 or &i=8 %then %do;
layout overlay / walldisplay=none
    xaxisopts=(display=(tickvalues) tickvalueattrs=(size=9) )
    y2axisopts=(reverse=true display=none type=linear offsetmin=0.01 offsetmax=0.08) ;
scatterplot y=order x=col1 / markercharacter=tmp1 yaxis=y2 datalabelattrs=(size=9)
    markercharacterattrs=graphvaluetext(size=9);
endlayout;
%end;

/*--Forth column showing hazard ratio graph--*/
layout overlay / walldisplay=none
%if &flag="crea" %then %do;
    xaxisopts=( display=(ticks tickvalues)
    linearopts=(tickvaluesequence=(start=0 end=150 increment=50) tickdisplaylist=("0" "50" "100" "150" ) viewmin=0)
    tickstyle=inside tickvalueattrs=(size=9) )
    yaxisopts=(reverse=true display=none offsetmin=0.02 offsetmax=0.06) ;

referenceline x=0 / lineattrs=(pattern=solid);
referenceline x=50 / lineattrs=(pattern=shortdash);
referenceline x=100 / lineattrs=(pattern=solid);
%end;
%else %if &flag="sa" %then %do;
    xaxisopts=( display=(ticks tickvalues)
    linearopts=(tickvaluelist=(50 100 200) tickdisplaylist=("50" "100" "200" ) viewmin=0 viewmax=200)
    tickstyle=inside tickvalueattrs=(size=8) )
    yaxisopts=(reverse=true display=none offsetmin=0.02 offsetmax=0.06) ;

referenceline x=100 / lineattrs=(pattern=solid);
%end;

%if &i=1 or &i=2 or &i=3 or &i=4 %then %do;
highlowplot y=order low=lcl3 high=Ucl3/name="hlp" lineattrs=(color=red);

entry halign=left " "
    halign=center textattrs=(size=8 weight=bold) "&label1." / location=outside valign=bottom ;
entry halign=left " "
    halign=center " " / location=outside valign=top ;
scatterplot y=order x=LSMEAN / name="pred" markerattrs=(size=9 symbol=squarefilled color=red);
%end;
%else %do;
highlowplot y=order low=lcl3 high=Ucl3/name="hlp" lineattrs=(color=green);

entry halign=left " "
    halign=center textattrs=(size=8 weight=bold) "&label1." / location=outside valign=bottom ;
entry halign=left " "
    halign=center " " / location=outside valign=top ;
scatterplot y=order x=LSMEAN / name="pred" markerattrs=(size=9 symbol=trianglefilled color=green);
%end;
endlayout;

endlayout;
endgraph;
end;
run;

ods select all;

ods escapechar='^';
ODS RTF PREPAGE="^S={outputwidth=100% just=1 font_size=12pt font_weight=bold background=white foreground=black font_face=arial}^R/RT
F'\QL' Figure 15.1.1.1 Forest Plot of Statistical Analysis of Biomarkers of Exposure on Day 5 and Day 90 - PP Set";

proc sort data=dforest1;
by avisitn ;
run;

** proc template for the appearance of the plot **;
proc sgrender data=dforest1 template=Forest11;
run;

ODS RTF TEXT="^S={outputwidth=100% just=1 font_size=9pt background=white foreground=black font_face=arial}^R/RTF'\QL' Note: mCC = Me
nthol conventional cigarettes; SA = Smoking abstinence; THSm2.2 = Tobacco Heating System 2.2 Menthol.";
ODS RTF TEXT="^S={outputwidth=100% just=1 font_size=9pt background=white foreground=black font_face=arial}^R/RTF'\QL' * The estimate
or CI is outside of the reporting scale.";

ODS RTF TEXT="^S={outputwidth=100% just=1 font_size=9pt background=white foreground=black font_face=arial}^R/RTF'\QL'";
%let tflprg=f_forest_bm;
ODS RTF TEXT="^S={outputwidth=100% just=1 font_size=9pt background=white foreground=black font_face=arial}^R/RTF'\QL' Appendix 15.2.

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3.2 and 15.2.3.4";
ODS RTF TEXT="^S={outputwidth=100% just=1 font_size=9pt background=white foreground=black font_face=arial}^R/RTF'\QL' Study ID:ZRHM-
REXA-08-US Program: &tflprg..sas &sysdate Status: &status. (Page &i of 8)";
```

```
ods markup close;
ods path reset;
```

```
%mend graph;
```

```
%macro forest;
%do i=1 %to 4;
    %graph(flag="crea");
%end;
%do i=5 %to 8;
    %graph(flag="sa");
%end;
%mend;
```

```
%forest;
%m_logchk;
```

```
ods exclude all;
ods _all_ close;
```