libname p "C:\Classes\AppliedBiostat\Project3";

**data** lung;

set p.lung\_sas;

run;

**proc** **sort** data=lung;

by patid;

**run**;

/\*count participants\*/

**proc** **freq** data=lung nlevels;

table patid/ noprint;

**run**;

/\*525 patients\*/

/\*create dataset for each timepoint\*/

**data** t1;

set lung;

if funo eq **1**;

run;

**data** t2;

set lung;

if funo eq **2**;

run;

**data** t3;

set lung;

if funo eq **3**;

run;

**data** t4;

set lung;

if funo eq **4**;

run;

**proc** **means** data=t1 mean std max min n;

var fact\_t2 age\_tx cycles ecogps ctc\_hem ctc\_max ctc\_neu;

**run**;

**proc** **means** data=t4 mean std max min n;

var fact\_t2 age\_tx cycles ecogps ctc\_hem ctc\_max ctc\_neu ctc\_oth;

**run**;

**proc** **freq** data =lung;

table sex trtment exptx death crpr qol\_comp sx\_met sx\_cd sx\_pri;

**run**;

**proc** **transpose** data=lung out=lung\_w prefix=fact;

by patid;

id funo;

var fact\_t2;

**run**;

**proc** **transpose** data=lung out=lung\_wc prefix=qol\_co;

by patid;

id funo;

var qol\_comp;

**run**;

**proc** **transpose** data=lung out=lung\_wf prefix=func\_wb;

by patid;

id funo;

var func\_wb2;

**run**;

**proc** **transpose** data=lung out=lung\_wp prefix=phys\_wb;

by patid;

id funo;

var phys\_wb2;

**run**;

**proc** **transpose** data=lung out=lung\_ws prefix=socl\_wb;

by patid;

id funo;

var socl\_wb2;

**run**;

**proc** **transpose** data=lung out=lung\_wa prefix=add\_crn;

by patid;

id funo;

var add\_crn2;

**run**;

**proc** **transpose** data=lung out=lung\_we prefix=emot\_wb;

by patid;

id funo;

var emot\_wb2;

**run**;

**proc** **sort** data=lung\_w;

by patid;

**run**;

**proc** **sort** data=lung\_wc;

by patid;

**run**;

**proc** **sort** data=lung\_wf;

by patid;

**run**;

**proc** **sort** data=lung\_wp;

by patid;

**run**;

**proc** **sort** data=lung\_ws;

by patid;

**run**;

**proc** **sort** data=lung\_wa;

by patid;

**run**;

**proc** **sort** data=lung\_we;

by patid;

**run**;

**proc** **sort** data=t1;

by patid;

**run**;

/\*merge wide FACT\_T2 et al data with baseline data\*/

**data** p.lung\_wide;

merge lung\_w (drop= \_name\_ \_label\_ )

t1 (drop= funo qol\_comp fact\_t2)

lung\_wc (drop = \_name\_ \_label\_)

lung\_wf (drop = \_name\_ \_label\_)

lung\_wp (drop = \_name\_ \_label\_)

lung\_ws (drop = \_name\_ \_label\_)

lung\_wa (drop = \_name\_ \_label\_)

lung\_we (drop = \_name\_ \_label\_);

by patid;

run;

/\*save long dataset to permanent directory\*/

**data** p.lung;

set lung;

run;

/\*\*\*\*Analysis \*\*\*\*/

/\*means and SD at each time point (Question 1)\*/

**proc** **means** data=p.lung\_wide mean std min max n nmiss maxdec=**2**;

class exptx;

var fact:;

**run**;

/\*create output format for FUNO\*/

**proc** **format**;

value funo\_fmt

**1**= "Baseline"

**2**= "6 Weeks"

**3**= "12 Weeks"

**4**= "26 Weeks";

**run**;

**proc** **tabulate** data=p.lung;

label funo = "Time Point";

format funo funo\_fmt.;

class funo exptx;

var fact\_t2;

table exptx\*funo, fact\_t2\*(N mean std nmiss);

**run**;

/\*unadjusted mixed effects, random intercept, means model

contrast of treatment effect at each timepoint (Question 2)\*/

**proc** **sort** data= p.lung;

by descending exptx patid descending funo;

**run**;

/\*Estimates are coded to subtract the control from treatment\*/

**proc** **mixed** data=p.lung order=data;

class funo exptx/ ;

model fact\_t2 = funo exptx funo\*exptx/s;

random int/ sub= patid type=un;

estimate 'Difference at baseline' exptx **1** -**1** funo\*exptx **0** **0** **0** **0** **0** **0** **1** -**1**/ e cl;

estimate '6 weeks' exptx **1** -**1** funo\*exptx **0** **0** **0** **0** **1** -**1** **0** **0**/e cl;

estimate '12 weeks' exptx **1** -**1** funo\*exptx **0** **0** **1** -**1** **0** **0** **0** **0**/ e cl;

estimate '26 weeks' exptx **1** -**1** funo\*exptx **1** -**1** **0** **0** **0** **0** **0** **0**/e cl;

estimate 'treatment effect, post-baseline avg' exptx **3** -**3** funo\*exptx **1** -**1** **1** -**1** **1** -**1** **0** **0**/e cl divisor = **3**;

**run**;

\*Changes from baseline by arm;

**proc** **mixed** data=p.lung order=data ;

class funo exptx/ ;

model fact\_t2 = funo exptx funo\*exptx/s;

random int/ sub= patid type=un;

estimate '6 weeks, control' funo **0** **0** **1** -**1** exptx **0** **0** funo\*exptx **0** **0** **0** **0** **0** **1** **0** -**1**/ e cl;

estimate '12 weeks, control' funo **0** **1** **0** -**1** exptx **0** **0** funo\*exptx **0** **0** **0** **1** **0** **0** **0** -**1**/ e cl;

estimate '26 weeks, control' funo **1** **0** **0** -**1** exptx **0** **0** funo\*exptx **0** **1** **0** **0** **0** **0** **0** -**1**/ e cl;

estimate '6 weeks, treatment' funo **0** **0** **1** -**1** exptx **0** **0** funo\*exptx **0** **0** **0** **0** **1** **0** -**1** **0**/ e cl;

estimate '12 weeks, treatment' funo **0** **1** **0** -**1** exptx **0** **0** funo\*exptx **0** **0** **1** **0** **0** **0** -**1** **0**/ e cl;

estimate '26 weeks, treatment' funo **1** **0** **0** -**1** exptx **0** **0** funo\*exptx **1** **0** **0** **0** **0** **0** -**1** **0**/ e cl;

**run**;

/\*Find variables for use in MI by correlating with missingness or outcome\*/

**data** lw;

set p.lung\_wide;

miss1 = **0**;

miss2 = **0**;

miss3 = **0**;

miss4 = **0**;

if fact1 = **.** then miss1 = **1**;

if fact2 = **.** then miss2 = **1**;

if fact3 = **.** then miss3 = **1**;

if fact4 = **.** then miss4 = **1**;

miss = sum(of miss:);

run;

\* check correlation with outcome;

**proc** **corr** data = lw;

var fact1 sex ecogps sx: p\_rt ctc: cycles crpr pd\_lt6 surv\_dur age\_tx trtment exptx weeks months t\_death func: phys: add: emot: socl:;

**run**;

/\*Perform MI with vars correlated >.15 and with treatment indicator\*/

**proc** **MI** data = p.lung\_wide out = lung\_mi

nimpute = **2000** seed= **37**;

MCMC nbiter=**200000** initial=em (bootstrap= **400**) plots = trace(mean);

var fact: ecogps exptx sx\_sys cycles pd\_lt6 surv\_dur func: phys: add: emot: socl:;

**run**;

\*Save MI data for future use;

**data** p.lung\_mi;

set lung\_mi;

run;

\* perform analysis by imputation for each time period;

**proc** **glm** data = p.lung\_mi;

class exptx;

model fact1 = Exptx;

estimate "Control" intercept **1** exptx **1** **0**/e ;

estimate "Treatment" intercept **1** exptx **0** **1**/e ;

estimate "Difference" exptx -**1** **1**/e ;

by \_imputation\_;

ods output Estimates=ests;

**run**;

**proc** **glm** data = p.lung\_mi;

class exptx;

model fact2 = Exptx;

estimate "Control" intercept **1** exptx **1** **0**/e ;

estimate "Treatment" intercept **1** exptx **0** **1**/e ;

estimate "Difference" exptx -**1** **1**/e ;

by \_imputation\_;

ods output Estimates=ests2;

**run**;

**proc** **glm** data = p.lung\_mi;

class exptx;

model fact3 = Exptx;

estimate "Control" intercept **1** exptx **1** **0**/e ;

estimate "Treatment" intercept **1** exptx **0** **1**/e ;

estimate "Difference" exptx -**1** **1**/e ;

by \_imputation\_;

ods output Estimates=ests3;

**run**;

**proc** **glm** data = p.lung\_mi;

class exptx;

model fact4 = Exptx;

estimate "Control" intercept **1** exptx **1** **0**/e ;

estimate "Treatment" intercept **1** exptx **0** **1**/e ;

estimate "Difference" exptx -**1** **1**/e ;

by \_imputation\_;

ods output Estimates=ests4;

**run**;

\*estimates at time 1;

**proc** **mianalyze** parms = ests;

modeleffects control treatment difference;

**run**;

\*estimates at time 2;

**proc** **mianalyze** parms = ests2;

modeleffects control treatment difference;

**run**;

\*estimates at time 3;

**proc** **mianalyze** parms = ests3;

modeleffects control treatment difference;

**run**;

\*estimates at time 4;

**proc** **mianalyze** parms = ests4;

modeleffects control treatment difference;

**run**;

\*Create sas tables to summarize missingness;

**data** lg;

set p.lung;

if qol\_comp = **9** then qol\_simp = "Missing from Death";

if qol\_comp = **0** then qol\_simp= "Not Missing";

if qol\_comp = **1** or qol\_comp = **2** or qol\_comp = **4** then qol\_simp = "Missing from Other";

if qol\_comp = **7** or qol\_comp = **8** then qol\_simp = "Missing from Illness";

if qol\_comp = **3** or qol\_comp = **5** then qol\_simp="Missing from Staff";

if qol\_comp = **.** then qol\_simp= "Unknown";

qol\_death = "Missing from Death";

if qol\_simp ne "Missing from Death" then qol\_death = "Missing from Other";

run;

\*Complex summary of missingness;

**proc** **tabulate** data=lg;

label funo = "Time Point";

format funo funo\_fmt.;

class funo qol\_simp exptx;

table exptx\*funo, qol\_simp\*(N);

**run**;

\*Just death vs other cause for missingness;

**proc** **tabulate** data=lg;

label funo = "Time Point";

format funo funo\_fmt.;

class funo qol\_death exptx;

table exptx\*funo, qol\_death\*(N);

**run**;

\*Means at each time by arm;

**proc** **mixed** data=p.lung order=data ;

class funo exptx ;

model fact\_t2 = funo exptx funo\*exptx/s;

random int/ sub= patid type=un;

lsmeans exptx\*funo /cl;

**run**;