**ToxT Package Documentation**

**1/11/2019**

**Other Required Macros:**

The following macros should be included in your code in order to run the ToxT code:

%table – creates summary tables by groups

%tablemrg – combines summary tables into one document

%stable – models time-to-event variables

%auc – calculates AUC value for longitudinal analysis

Information on the first three macros is available at: http://support.sas.com/resources/papers/proceedings12/345-2012.pdf

**Outcome Variables:**

The ToxT macro can handle two different types of outcome variables. The outcomes can be either adverse events or quality of life (QOL) scores. The adverse events should be coded as 0=no toxicity, 1=mild, 2=moderate, 3=severe, 4=very severe, 5=fatal. The QOL scores need to be scaled from 0 to 100, with 0=low QOL and 100=best QOL.

**SAS Macros:**

ToxT consists of 5 different macros:

%bytimept.sas – compares adverse events or QOL between groups

%ae\_over\_time.sas – performs repeated measures analyses and profile analyses

%time\_to\_ae.sas- performs time to event and competing risk analyses

%heatmap.sas – generates heat maps of individual patient data over time

%auc\_ae.sas – does AUC (area under the curve) analyses

**Required Data Sets and Variables for Adverse Event Data**

The following table shows which variables are required for each ToxT macro when analyzing adverse events.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Datasets/ Required Fields | SAS Macros (Output files) | | | | |
| bytimept  (bytimept\_ tbl\_ae.doc,  bytimept\_ figures\_ae.doc) | ae\_over\_time  (ae\_over\_time\_ tables\_ae.doc,  ae\_over\_time\_ figures\_ae.doc) | time\_to\_ae  (time\_to\_ae\_figures\_ae.doc, time\_to\_ae\_tbl\_x\_ae.doc,  time\_to\_ae\_tbl\_ov\_ae.doc) | heatmap (heatmap\_ae.doc) | auc\_ae  (auc\_ae\_tbl\_ae\_ UnadjustedAUC.doc OR  auc\_ae\_tbl\_ae\_  ProratedAUC.doc) |
| CRSE | √ | √ | √ | √ | √ |
| dcntr\_id | √ | √ | √ | √ | √ |
| evalae | √ | √ | √ | √ | √ |
| [comparison group] | √ | √ | √ | √ | √ |
| date\_on |  |  | √ |  |  |
| age |  |  | √ |  |  |
| fu\_date |  |  | √ |  |  |
| fu\_stat |  |  | √ |  |  |
| [factors]\* |  |  | √ |  |  |
|  |  |  |  |  |  |
| PROTDATA | √ | √ |  | √ | √ |
| dcntr\_id | √ | √ |  | √ | √ |
| [timepoint] | √ | √ |  | √ | √ |
|  |  |  |  |  |  |
| CYTOX | √ | √ | √ | √ | √ |
| dcntr\_id | √ | √ | √ | √ | √ |
| [timepoint] | √ | √ |  | √ | √ |
| eval\_dt |  |  | √ |  |  |
| endat\_dt |  |  | √ |  |  |
| toxicity | √ | √ | √ | √ | √ |
| grade | √ | √ | √ | √ | √ |
|  |  |  |  |  |  |
| FACTORS\* |  |  | √ |  |  |
| sasname |  |  | √ |  |  |

\*include all data fields of descriptive or stratification factors. Required only if user would like to perform the univariate and multivariate cox

proportional hazards models analysis on factors other than the [comparison group] and age [continuous data].

**Required Data Sets and Variables for QOL Data**

The following table shows which variables are required for each ToxT macro when analyzing QOL data.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Datasets/ Required Fields | SAS Macros | | | | |
| bytimept  (bytimept\_ tbl\_qol.doc,  bytimept\_ figures\_qol.doc) | ae\_over\_time  (ae\_over\_time\_ tables\_qol.doc,  ae\_over\_time\_ figures\_qol.doc) | time\_to\_ae  (time\_to\_ae\_figures\_qol.doc, time\_to\_ae\_tbl\_x\_qol.doc) | heatmap (heatmap\_qol.doc) | auc\_ae  (auc\_ae\_tbl\_qol\_ UnadjustedAUC.doc OR  Auc\_ae\_tbl\_qol\_  ProratedAUC.doc) |
| CRSE | √ | √ | √ | √ | √ |
| dcntr\_id | √ | √ | √ | √ | √ |
| evalae | √ | √ | √ | √ | √ |
| [comparison group] | √ | √ | √ | √ | √ |
| date\_on |  |  | √ |  |  |
| age |  |  | √ |  |  |
| fu\_date |  |  | √ |  |  |
| fu\_stat |  |  | √ |  |  |
| [factors]\* |  |  | √ |  |  |
|  |  |  |  |  |  |
| FACTORS\* |  |  | √ |  |  |
| sasname |  |  | √ |  |  |
|  |  |  |  |  |  |
| QOL |  |  |  |  |  |
| dcntr\_id | √ | √ | √ | √ | √ |
| [timepoint] | √ | √ |  | √ | √ |
| comp\_dt |  |  | √ |  |  |
| qol | √ | √ | √ | √ | √ |
| \_label\_ | √ | √ | √ | √ | √ |
| scores | √ | √ | √ | √ | √ |

\*include all data fields of descriptive or stratification factors. Required only if user would like to perform the univariate and multivariate cox

proportional hazards models analysis on factors other than the [comparison group] and age [continuous data].

**Dataset and Variable Descriptions:**

The following table describes the datasets and variables used in ToxT.

|  |  |  |
| --- | --- | --- |
| Dataset | Data Field | Description |
| CRSE (one observation per patient) | dcntr\_id | patient identifier (character or numeric) |
| evalae | evaluable for toxicity (numeric)  (1= patient is evaluable and will be included in the analyses  0= patient is not evaluable and will not be included in the analyses) |
| [comparison group] | group to be used for data comparison which will be specified in BY macro parameter. (character or numeric)  (e.g. arm) |
| date\_on | date of initial randomization/registration (SAS date with mmddyy10. format) |
| age | age of patient at the time of study entry (numeric) |
| fu\_date | date patient last known to be alive or dead (SAS date with mmddyy10. format) |
| fu\_stat | patient status at last follow-up (numeric with fu\_stat. format)  (1= non-event  2= competing event)  (e.g. 1=alive, 2=death or 1=alive, 2=death/progression)  Notes: user need to format the variable accordingly prior to macro run in order to display the correct value of competing event on the title of the figure. |
| [factors]\* | include one variable for each descriptive/stratification factor of interest (e.g. data for gender, race, disease\_type). (character or formatted numeric) |
| PROTDATA  (one observation per time point per patient) | dcntr\_id | patient identifier (character or numeric) |
| [timepoint] | timepoint for treatment (numeric integer) which will be specified in TIMEPOINT macro parameter  (e.g. cycle or visit)  Notes: The dataset should include all treatment time points that are of interest for the analysis |
| CYTOX  (one observation per maximum grade per adverse event per timepoint per patient) | dcntr\_id | patient identifier (character or numeric) |
| [timepoint] | timepoint for adverse events reporting (numeric) which will be specified in TIMEPOINT macro parameter (i.e. cycle)  Notes: The dataset should include all adverse event reported up to the last time point indicated in the protdata dataset of user interest for the analysis |
| eval\_dt | date that the patient was seen for toxicity evaluation (SAS date with mmddyy10. Format) |
| endat\_dt | date decision was made to end active treatment/intervention or not to initiate protocol treatment/intervention (SAS date with mmddyy10. Format) |
| toxicity | Adverse event codes such as medra codes (numeric and should be formatted to provide the adverse event description)  (i.e. 900182, 10002272, 100033371, 10016256) |
| grade | Severity of the adverse event according to CTC guidelines. (numeric)  (i.e. 0, 1, 2, 3, 4, 5) |
| FACTORS  (one observation per factor) | sasname | Variable name of descriptive/stratification factors (character)  The dataset should include all descriptive/stratification factors (up to 8) of user interest which will be used as predictor in both Univariate and Multivariate Cox Proportional Hazard Model Analysis. The data field of the listed factors must be included in the CRSE dataset  (The variable specified in BY parameter should not be included)  (If Age group will be one of the factor, please do not name it as Age, as  it has been used in the CRSE dataset to represent the age as continuous variable)  These factors all need to be nominal variables, they cannot be continuous variables.  This dataset is required only if user would like to perform the univariate and multivariate cox proportional hazards models analysis on factors that are in addition to the[comparison group] and age [continuous factor] |
| QOL  (one observation per QOL item/symptom per timepoint per patient) | dcntr\_id | patient identifier (character or numeric) |
| (timepoint) | timepoint for QOL (numeric integer) which will be specified in TIMEPOINT macro parameter (i.e. cycle)  Notes: The dataset should include all symptoms/QOL items reported up to the last time point of user interest for the analysis |
| comp\_dt | date of completion for questionnaire (SAS date with mmddyy10. Format) |
| qol | Character variable indicating SAS variable names for each QOL item/symptom (i.e. p\_q10, poms04, lasa01) |
| \_label\_ | Character variable containing the description/label of the QOL item/symptom (i.e. Overall QOL, Sleep Interference, Nervousness) |
| scores | Symptoms/QOL items scores in a scale of 0 to 100 (numeric) with 0=Low quality of life and 100=Best quality of life (For symptoms with 0=no symptom and 100=worst symptom, the scores need to be reversed before using this program) |

**Sample Input Datasets:**

**CRSE data set contents and example:**

| **Alphabetic List of Variables and Attributes** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Type** | **Len** | **Format** | **Informat** | **Label** |
| AGE | Num | 8 | 3. | 3. | Age |
| AGE\_G | Num | 8 | AGE65F. | 3. | Age Group |
| DATE\_ON | Num | 8 | MMDDYY10. | DATE11. | Date#on |
| DZ\_G | Num | 8 | EVALBLF. | 2. | Disease#Status |
| EVALAE | Num | 8 | 8. | 8. | Evaluate#AE |
| PS\_G | Num | 8 | PERF\_SCR. | 2. | ECOG#PS |
| FU\_DATE | Num | 8 | MMDDYY10. | DATE11. | Follow-up Date |
| FU\_STAT | Num | 8 | FU\_STAT. | 2. | Follow-up Status |
| dcntr\_id | Char | 25 |  |  | Patient ID |
| rxarm | Char | 1 |  |  | Arm |

| **Patient ID** | **Arm** | **Evaluate#AE** | **Date#on** | **Age** | **Age Group** | **Disease#Status** | **ECOG#PS** | **Follow-up Date** | **Follow-up Status** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 768 | A | 1 | 03/04/2002 | 43 | <65 | EVALUABLE | 0-1 | 05/04/2005 | Alive |
| 58 | B | 1 | 11/23/1999 | 62 | <65 | MEASURABLE | 0-1 | 10/10/2002 | Death/Progression |

**CYTOX data set contents:**

| **Alphabetic List of Variables and Attributes** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Type** | **Len** | **Format** | **Informat** | **Label** |
| CYCLE | Num | 8 | 4. | 4. | Cycle |
| ENDAT\_DT | Num | 8 | MMDDYY10. | DATE11. | End#Active#Treatment |
| EVAL\_DT | Num | 8 | MMDDYY10. | DATE11. | Evaluation#Date |
| GRADE | Num | 8 | 2. | 2. | Grade |
| TOXICITY | Num | 8 | IMTLOCAL. | 8. | Toxicity |
| dcntr\_id | Char | 25 |  |  | Patient ID |

| **Patient ID** | **Cycle** | **Evaluation#Date** | **End#Active#Treatment** | **Toxicity** | **Grade** |
| --- | --- | --- | --- | --- | --- |
| 768 | 1 | 03/26/2002 | 02/10/2003 | Nausea | 2 |
| 768 | 1 | 03/26/2002 | 02/10/2003 | Neutropenia | 2 |
| 768 | 1 | 03/26/2002 | 02/10/2003 | Vomiting | 2 |
| 768 | 1 | 03/26/2002 | 02/10/2003 | Diarrhea-No Colostom | 1 |
| 768 | 2 | 04/15/2002 | 02/10/2003 | Nausea | 1 |
| 768 | 2 | 04/15/2002 | 02/10/2003 | Neutropenia | 1 |
| 768 | 2 | 04/15/2002 | 02/10/2003 | Diarrhea-No Colostom | 2 |
| 768 | 2 | 04/15/2002 | 02/10/2003 | Paresthesias | 2 |
| 768 | 3 | 04/29/2002 | 02/10/2003 | Alopecia | 1 |
| 768 | 3 | 04/29/2002 | 02/10/2003 | Nausea | 1 |
| 768 | 3 | 04/29/2002 | 02/10/2003 | Neutropenia | 2 |
| 768 | 3 | 04/29/2002 | 02/10/2003 | Vomiting | 1 |
| 768 | 4 | 05/28/2002 | 02/10/2003 | Neutropenia | 1 |
| 768 | 4 | 05/28/2002 | 02/10/2003 | Paresthesias | 1 |
| 768 | 5 | 06/11/2002 | 02/10/2003 | Neutropenia | 3 |
| 768 | 5 | 06/11/2002 | 02/10/2003 | Leukopenia | 2 |
| 768 | 6 | 07/09/2002 | 02/10/2003 | Neutropenia | 3 |
| 768 | 6 | 07/09/2002 | 02/10/2003 | Leukopenia | 2 |
| 768 | 7 | 08/07/2002 | 02/10/2003 | Neutropenia | 1 |
| 768 | 7 | 08/07/2002 | 02/10/2003 | Diarrhea-No Colostom | 1 |
| 768 | 7 | 08/07/2002 | 02/10/2003 | Paresthesias | 1 |
| 768 | 8 | 08/20/2002 | 02/10/2003 | Neutropenia | 2 |
| 768 | 8 | 08/20/2002 | 02/10/2003 | Leukopenia | 2 |
| 768 | 8 | 08/20/2002 | 02/10/2003 | Vomiting | 1 |
| 768 | 8 | 08/20/2002 | 02/10/2003 | Diarrhea-No Colostom | 1 |
| 768 | 8 | 08/20/2002 | 02/10/2003 | Paresthesias | 1 |

**PROTDATA data set contents:**

| **Alphabetic List of Variables and Attributes** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Type** | **Len** | **Format** | **Informat** | **Label** |
| CYCLE | Num | 8 | 4. | 4. | Cycle |
| dcntr\_id | Char | 25 |  |  | Patient ID |

| **Patient ID** | **Cycle** |
| --- | --- |
| 768 | 1 |
| 768 | 2 |
| 768 | 3 |
| 768 | 4 |
| 768 | 5 |
| 768 | 6 |
| 768 | 7 |
| 768 | 8 |

**FACTORS data set contents:**

| **Alphabetic List of Variables and Attributes** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Type** | **Len** | **Format** | **Informat** | **Label** |
| sasname | Char | 8 | $CHAR8. | $CHAR. | SASName |

| **SASName** |
| --- |
| age\_g |
| dz\_g |
| ps\_g |

**QOL data set contents:**

| **Alphabetic List of Variables and Attributes** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Type** | **Len** | **Format** | **Informat** | **Label** |
| CYCLE | Num | 8 | 4. | 4. | Cycle |
| COMP\_DT | Num | 8 | MMDDYY10. | DATE11. | Completion#Date |
| QOL | Char | 40 |  |  | QOL Scale |
| \_LABEL\_ | Char | 40 |  |  | QOL Scale Description |
| SCORES | Num | 8 |  | 8. | QOL Score |
| dcntr\_id | Char | 25 |  |  | Patient ID |

| **Patient ID** | **Cycle** | **Completion#Date** | **QOL Scale** | **QOL Scale Description** | **QOL Score** |
| --- | --- | --- | --- | --- | --- |
| 768 | 1 | 03/26/2002 | p\_lasa01 | Fatigue Level | 90 |
| 768 | 1 | 03/26/2002 | p\_lasa02 | Trouble Sleeping | 85 |
| 768 | 1 | 03/26/2002 | p\_lasa03 | Pain | 80 |
| 768 | 1 | 03/26/2002 | p\_q01 | Nausea | 70 |
| 768 | 2 | 04/15/2002 | p\_lasa01 | Fatigue Level | 67 |
| 768 | 2 | 04/15/2002 | p\_lasa02 | Trouble Sleeping | 78 |
| 768 | 2 | 04/15/2002 | p\_lasa03 | Pain | 55 |
| 768 | 2 | 04/15/2002 | p\_q01 | Nausea | 40 |
| 768 | 3 | 04/29/2002 | p\_lasa01 | Fatigue Level | 82 |
| 768 | 3 | 04/29/2002 | p\_lasa02 | Trouble Sleeping | 71 |
| 768 | 3 | 04/29/2002 | p\_lasa03 | Pain | 90 |
| 768 | 3 | 04/29/2002 | p\_q01 | Nausea | 30 |
| 768 | 4 | 05/28/2002 | p\_lasa01 | Fatigue Level | 60 |
| 768 | 4 | 05/28/2002 | p\_lasa02 | Trouble Sleeping | 46 |
| 768 | 5 | 06/11/2002 | p\_lasa01 | Fatigue Level | 33 |
| 768 | 5 | 06/11/2002 | p\_lasa02 | Trouble Sleeping | 78 |
| 768 | 6 | 07/09/2002 | p\_lasa02 | Trouble Sleeping | 89 |
| 768 | 6 | 07/09/2002 | p\_lasa03 | Pain | 80 |
| 768 | 7 | 08/07/2002 | p\_lasa03 | Pain | 23 |
| 768 | 7 | 08/07/2002 | p\_q01 | Nausea | 67 |
| 768 | 7 | 08/07/2002 | p\_lasa01 | Fatigue Level | 92 |
| 768 | 8 | 08/20/2002 | p\_lasa01 | Fatigue Level | 87 |
| 768 | 8 | 08/20/2002 | p\_lasa02 | Trouble Sleeping | 44 |
| 768 | 8 | 08/20/2002 | p\_lasa03 | Pain | 69 |
| 768 | 8 | 08/20/2002 | p\_q01 | Nausea | 48 |

**Macro Call Parameters:**

The following parameters are used in all of the macro calls unless specified otherwise.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Parameter Status | Parameter Description | Parameter Options | Parameter Examples |
| datasource | Optional | Source of Data | 1= Internal Mayo CCS database  2=User provided datasets (DEFAULT) | datasource=1  datasource=2 |
| datatype | Optional | Type of Outcome (Adverse Event or QOL) | 1=Adverse Event (DEFAULT)  2=QOL | datatype=1  datatype=2 |
| by | Required | Group Variable | Numeric or Character | by=arm  by=group |
| timepoint | Required (Not used by time\_to\_ae macro) | Timepoint Variable | Numeric | timepoint=cycle  timepoint=visit |
| toxicity\_list | Required | List of adverse events or QOL endpoints to include in the analysis (Up to 8) | Numeric or Character | toxicity\_list=10002272   100033371  10016256  toxicity\_list=lasa1 poms20 |
| studynum | Optional (Used by Mayo Only) | Mayo protocol reference number |  | Studynum=MC9284 |
| incmiss | Optional  (Not used by time\_to\_ae macro) | How to handle missing values (applicable to Adverse Event data analysis only) | y=assume a grade is 0 if the variable isn’t reported (DEFAULT)  n=assume the grade is missing if a value is not entered | incmiss=y  incmiss=n |
| rescale | Optional (Used only by the auc\_ae macro) | Define whether unadjusted AUC or average AUC or Prorated AUC is calculated | 0 = Unadjusted AUC (DEFAULT)  1=average AUC  (2 or 3 or 4..) = maximum number of time intervals to calculate the prorated AUC score to account for missing data | rescale=0  rescale=1  rescale=3  rescale=10 |
| grade | Optional  (Used only by the time\_to\_ae macro and is required for this macro) | Grade or QOL to use for time to event analyses | e.g. for adverse event outcomes, a value of 3 would calculate time to a grade 3 or higher adverse event  for QOL outcomes, a value of 50 would calculate time to a QOL items scores of 50 or lower | grade=3  grade=50 |
| covrstr | Optional  (Used only by the ae\_over\_time macro) | Specify the covariance structure for the random effect | un = unstructured  (DEFAULT)  cs = compound symmetry  ar(1) = autoagressive (1) | covrstr=un  covrstr=cs  covrstr=ar(1) |

**Sample Macro Calls:**

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* Example of Running ToxT macro for AEs \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* You can change these format definitions, but \*/

/\* these formats are required!! \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

proc format;

value fcycle 0='0'

1='1';

value ftox 1='Diarrhea'

2='Nausea'

3='Thrombosis';

value fgrade 0='No Toxicity'

1='Mild'

2='Moderate'

3='Severe'

4='Very Severe'

5='Fatal';

value frel 1='Not related'

2='Unlikely'

3='Possible'

4='Probable'

5='Definite';

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* creates a file of patient information with one record per patient \*/

/\* Note: dcntr\_id, arm, gender, and race must be character variables \*/

/\* and other variables should be numeric \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

data crse;

evalae=1;

length dcntr\_id $ 25

arm gender race $ 1;

input dcntr\_id $ arm $ date\_on mmddyy10. age gender $ race $ fu\_time fu\_stat;

cards;

1 A 10/18/2015 60 M W 10 1

2 A 11/5/2015 65 F W 15 2

3 B 11/6/2015 72 M W 20 1

4 B 12/8/2015 58 F B 22 2

;;;;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* creates a dataset that shows which variables on the crse file \*/

/\* will be used for adjusting the models \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

data factors;

length sasname $ 15;

sasname='gender'; output;

sasname='race'; output;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* creates the adverse event data \*/

/\* contains all adverse event data with one record per patient and cycle and AE \*/

/\* Note: all of the variables except dcntr\_id must be numeric \*/

/\* Toxicity, grade, rel\_smed, cycle, and eval\_dt endat\_dt must be formated \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

data cytox;

rel\_smed=3;

length dcntr\_id $ 25;

format toxicity ftox.

grade fgrade.

rel\_smed frel.

cycle fcycle.

eval\_dt endat\_dt mmddyy10.;

input @1 dcntr\_id $char1.

@3 cycle 1.

@5 eval\_dt mmddyy10.

@16 endat\_dt mmddyy10.

@27 toxicity 1.

@29 grade 1.;

cards;

1 1 10/18/2015 01/01/2016 1 3

1 1 10/18/2015 01/01/2016 2 2

1 1 10/18/2015 01/01/2016 3 0

1 2 11/18/2015 01/01/2016 1 2

1 2 11/18/2015 01/01/2016 2 0

1 2 11/18/2015 01/01/2016 3 0

2 1 11/05/2015 01/03/2016 1 0

2 1 11/05/2015 01/03/2016 2 1

2 1 11/05/2015 01/03/2016 3 0

2 2 12/05/2015 01/03/2016 1 1

2 2 12/05/2015 01/03/2016 2 1

2 2 12/05/2015 01/03/2016 3 1

3 1 11/06/2015 12/28/2015 1 0

3 1 11/06/2015 12/28/2015 2 0

3 1 11/06/2015 12/28/2015 3 0

3 2 12/06/2015 12/28/2015 1 0

3 2 12/06/2015 12/28/2015 2 0

3 2 12/06/2015 12/28/2015 3 2

4 1 12/08/2015 01/05/2016 1 2

4 1 12/08/2015 01/05/2016 2 1

4 1 12/08/2015 01/05/2016 3 0

4 2 12/28/2015 01/05/2016 1 1

4 2 12/28/2015 01/05/2016 2 1

4 2 12/28/2015 01/05/2016 3 1

;;;;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* creates a file that shows all possible cycles for each patient \*/

/\* if a patient/cycle combination is on this file but not on cytox \*/

/\* the AEs are all considered to be grade '0' for that cycle. \*/

/\* Note: dcntr\_id must be a character variable \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

data protdata;

length dcntr\_id $ 25;

input dcntr\_id $ cycle;

cards;

1 1

1 2

2 1

2 2

3 1

3 2

4 1

4 2

;;;;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* all of the ToxT macros should be in the directory where the code is being run \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* includes ancillary macros \*/

/\* See http://support.sas.com/resources/papers/proceedings12/345-2012.pdf \*/

/\* for more information on macros %table, %stable, and %tablemrg \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

%include 'table.macro'; /\* creates summary reports by arm \*/

%include 'tablemrg.macro'; /\* merges summary reports together \*/

%include 'stable.macro'; /\* creates Cox model summaries \*/

%include 'profile\_ed.macro'; /\* does profile analyses \*/

%include 'auc.macro'; /\* calculates AUC \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* Creates a summary table of demographics by arm. \*/

/\* The result is stored in table1.doc. \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

%table(dsn=crse,outdoc=table1.doc,ttitle1=Demographics,var=age gender race,type=c d d,by=arm);

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* includes the main ToxT macros \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

%include 'ae\_over\_time\_v2.sas'; /\* does repeated measures analyses \*/

%include 'heatmap\_v2.sas'; /\* creates heatmaps by arm \*/

%include 'auc\_ae\_v2.sas'; /\* does AUC analyses by arm \*/

%include 'bytimept\_v2.sas'; /\* summary measures over time \*/

%include 'time\_to\_ae\_v2.sas'; /\* does time to event analyses \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* runs ToxT analyses \*/

/\* for three AEs with codes 1, 2, and 3 \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

%ae\_over\_time (by=arm, timepoint=cycle, toxicity\_list=1 2 3);

/\* creates ae\_over\_time\_tables\_ae.doc and ae\_over\_time\_figures\_ae.doc \*/

%heatmap (by=arm, timepoint=cycle, toxicity\_list=1 2 3);

/\* creates heatmap\_ae.doc \*/

%auc\_ae (by=arm, timepoint=cycle, toxicity\_list=1 2 3);

/\* creates auc\_ae\_tbl\_ae\_UnadjustedAUC.doc and auc\_ae\_figures\_ae\_UnadjustedAUC.doc \*/

%bytimept (by=arm, timepoint=cycle, toxicity\_list=1 2 3);

/\* creates bytimept\_tbl\_ae.doc and bytimept\_figures\_ae.doc \*/

%time\_to\_ae (by=arm, toxicity\_list=1 2 3, grade=2);

/\* creates time\_to\_ae\_tbl\_1\_ae.doc time\_to\_ae\_tbl\_2\_ae.doc time\_to\_ae\_tbl\_3\_ae.doc \*/

/\* time\_to\_ae\_tbl\_ov\_ae\_doc and time\_to\_ae\_figures\_ae.doc \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* The .png files used to create the figures are also created at each step \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\* Example of Running ToxT macro for PROs \*/

/\* Note: PROS must be scaled from 0 to 100 \*/

/\* with 100 being better scores \*/

/\* The QOL dataset is needed in addition \*/

/\* to the CRSE, PROTDATA, and FACTORS \*/

/\* datasets that are already created \*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

data qol;

length dcntr\_id qol \_label\_ $ 25;

input dcntr\_id $ cycle comp\_dt mmddyy10. qol $ \_label\_ $ scores;

cards;

1 1 10/18/2015 lasa1 LASA 65

1 2 11/18/2015 lasa1 LASA 77

2 1 11/05/2015 lasa1 LASA 45

2 2 12/05/2015 lasa1 LASA 52

3 1 11/06/2015 lasa1 LASA 77

3 2 12/06/2015 lasa1 LASA 65

4 1 12/08/2015 lasa1 LASA 70

4 2 12/28/2015 lasa1 LASA 42

;;;;

/\*\*\*\* Summarize the data for lasa1 (Overall QOL) \*\*\*\*/

%ae\_over\_time (datasource=2, datatype=2, by=arm, timepoint=cycle, toxicity\_list=lasa1);

/\* creates ae\_over\_time\_tables\_qol.doc and ae\_over\_time\_figures\_qol.doc \*/

%heatmap (datasource=2, datatype=2, by=arm, timepoint=cycle, toxicity\_list=lasa1);

/\* creates heatmap\_qol.doc \*/

%auc\_ae (datasource=2, datatype=2, by=arm, timepoint=cycle, toxicity\_list=lasa1, rescale=1);

/\* creates auc\_ae\_tbl\_qol\_ProratedAUC.doc and auc\_ae\_figures\_qol\_ProratedAUC.doc \*/

%bytimept (datasource=2, datatype=2, by=arm, timepoint=cycle, toxicity\_list=lasa1);

/\* creates bytimept\_tbl\_qol.doc and bytimept\_figures\_qol.doc \*/

%time\_to\_ae (datasource=2, datatype=2, by=arm, toxicity\_list= lasa1, grade=50);

/\* creates time\_to\_ae\_tbl\_1\_qol.doc and time\_to\_ae\_figures\_qol.doc \*/