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/*****
/* Back transformation of data from log */
/* Compiled by A. Michelle Edwards - 20171005 */
/* Abbreviations: */
/*   btlsmean = backtransformed lsmean */
/*   btse_mean = backtransformed standard error of the lsmean */
/*   btdata = backtransformed dataset */
/*   third = dataset name where lsmeans, stderr are saved from GLIMMIX */
*****/

/* Using Proc GLIMMIX - you need to save the lsmeans into a dataset */
/* This short snippet shows you how and where to do this */

Proc glimmix .....;
  ...;
  lsmeans trmt/pdiff adjust=tukey lines;
  ods output lsmeans=third;
Run;

/* Opening the dataset you saved with the lsmeans estimates and the standard errors */
/* First back transform the lsmean estimate */

Data btdata;
  set third;
  btlsmean = exp(estimate);

/* To back transform the standard error of the estimate */
/* you can use the Delta method for se estimates of log transformations */
  btse_mean = exp(estimate)*stderr;
Run;

/* Omega method for back transforming Log */
/*   btlsmeans - Back Transform Means */

data btdata;
  set third;
  omega=exp(stderr*stderr);
  btlsmean=exp(estimate)*sqrt(omega);
  btvar=exp(2*estimate)*omega*(omega-1);
  btse_mean=sqrt(btvar);
run;

```