Using PROC GLIMMIX

PROC GLIMMIX fits statistical models to data with correlations or nonconstant variability and where the response is not necessarily normally distributed. These models are known as generalized linear models. Here is the basic syntax for PROC GLIMMIX to develop a generalized linear model.

The PROC GLIMMIX statement invokes the GLIMMIX procedure and enables you to specify a data set and various options. The CLASS statement enables you to specify the classification variables to be used in the analysis. It must appear before the MODEL statement and can appear only once. The MODEL statement is required and names the dependent variable and the fixed effects. This statement can appear only once. The RANDOM statement with the _RESIDUAL_ keyword defines R, the residual variance-covariance matrix.

You can specify multiple RANDOM statements. The GROUP= option in the RANDOM statement estimates the covariance parameters by groups. The COVTEST statement provides a mechanism to obtain statistical inferences for the covariance parameters. You can specify multiple COVTEST statements.

Let's go back to the scenario that involves the effects of different drugs on blood pressure. The RANDOM _RESIDUAL_ statement with the GROUP=drug option enables the residual variance to vary by levels of **Drug** to account for the possibility of nonconstant variance. The COVTEST statement with the HOMOGENEITY keyword tests whether the variances are constant across levels of **Drug**. The null hypothesis for this test is that the variances are constant. The alternative hypothesis is that they are not constant across the levels of **Drug**.

The previous analysis in PROC GLM assumed a constant variance across the levels of **Drug**. It was estimated by mean squared error to be 25.41. This model does not assume a constant variance, but estimates a separate variance for each level of **Drug**, as shown in the Covariance Parameter Estimates table. For drugs 1 through 4, the variances are estimated to be 60.79, 16.18, 22.49, and 2.42, respectively. The results of the COVTEST statement reject the null hypothesis of constant variance across the levels of **Drug** with a *p*-value less than 0.0001. When you properly account for the non-constant variances, the effect of **Drug** is now significant. Previously, when you assumed constant variance, it was not significant, with a *p*-value of 0.0974.
