

SPIROMICS Physiology Working Group

Recommendations for Longitudinal Analysis

Background

As we define the SPIROMICS Core 5 variables, there is need for a uniform approach to the analysis of longitudinal data. In the case of certain variables, e.g. FEV₁, change over time will be used to draw inferences on disease progression. We recognize that there are several approaches that can be used to determine longitudinal change. Simply taking the difference between first and last measures, e.g. Visit 4 minus Visit 1, is not recommended because of the variable time intervals among subjects between SPIROMICS visits. We also recognize that there is significant within-subjects variability in many of the measurements of interest and that the apparent direction of change of the variable will not always be predictable, e.g. FEV₁ might actually improve over time in some subjects.

Recommendations

There is agreement that the gold standard for longitudinal analysis is a mixed model regression analysis containing both fixed effects and random effects. This takes account of every measurement for a given subject and allows for varying time periods between measurements. SPIROMICS investigators need to decide with help from the GIC as to what specific fixed and random effects are best included in the model. Admittedly, this might vary from one analysis to another depending on the primary variable of interest.

There might be circumstances where investigators choose to report longitudinal change in terms of annualized change or “raw slope”. This would take account of first and last measurements divided by the intervening time period. Whilst this method is also acceptable, investigators need to understand its limitations.

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April 2018

Adopted by the GIC 20181108