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CORRESPONDENCE

Standardized residual values for pulmonary gas transfer coefficient (*K*CO): working party recommendations

To the Editor:

We have studied the influence of heart transplantation on the lung physiology of the transplant recipient [1]. This study highlighted an ambiguity in the presentation of the recommendation of the European Lung Function Working Party [2]. We are concerned that standardized residual values for the pulmonary gas transfer coefficient (*K*CO) will be incorrectly computed and interpreted [2].

The use of percentage predicted values for the reporting of lung function parameters is widely practised. Because the normal ranges for lung function measurements are influenced by gender and age, it is recommended that, in large population studies incorporating wide age ranges, results should be expressed as standardized residual (SR) values [2, 3]. SR are calculated using the formula:

SR = (observed - predicted)/RSD where RSD = residual standard deviation

Results are expressed as a + or - value, with a minus value indicating movement of the measured value away from the mean. Standardized residuals have a statistical standard normal distribution (mean 0 and SD 1), from which an original observation can be converted to a percentile for the whole population. Consequently, SRs prevent false positive associations being derived (as might occur if percentages of predicted values are used) and reduce the risk of true positive associations being missed [4, 5].

The European Working Party for the application of lung function testing has provided estimates of RSD for directly measured lung function variables, both for males and females [3]. However, a problem arises with *K*CO, the absolute values of which are normally derived from the ratio of the carbon monoxide diffusing capacity of the lung (*D*L,CO) and total lung capacity (TLC). Estimates of RSD are supplied both for *D*L,CO and TLC, but not for *K*CO [2]. The recommendations imply that the RSD for *K*CO is obtained by taking the ratio of the RSDs for *D*L,CO and TLC [2]. This is incorrect. The RSD for *K*CO is directly affected by the correlation between *D*L,CO and TLC, therefore, it can only be estimated correctly from a sample of the individual population *K*CO values. We strongly urge that an estimate computed in this way be added to the recommendations as a matter of urgency and we invite other readers comments on this interpretation.

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REPLY

From the authors:

We agree with Dr Egan and colleagues that the residual standard deviation (RSD) for the carbon monoxide transfer coefficient (*K*CO) (transfer factor of the lung for carbon monoxide/alveolar volume (*T*L,CO/*V*A) ratio) cannot be calculated from those for *T*L,CO and total lung capacity. No RSD was quoted in the report of the working party, but to the extent that we may have misled some readers, we apologize unreservedly, and thank the writers for drawing attention to this pitfall. Alternative reference values with their residual standard deviations have been published previously [1, 2].

Our inability to quote an RSD arose from a previous difficulty with reference values for *K*CO [3], but failure to mention it could also have reflected a dissatisfaction with the index! *K*CO purports to standardize *T*L,CO for variations in *V*A, but in fact overcorrects, since the ratio *T*L,CO/*V*A is not independent of, but negatively correlated with *V*A [4, 5]. On this account, *K*CO can be misinterpreted unless notice is taken of other indices.

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