META-ANALYSIS OF DIAGNOSTIC TEST ROC CURVE DATA

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We consider the situation where for each study in the meta-analysis one pair of estimated sensitivity and specificity of the diagnostic test is available. The aim of the analysis is to estimate a summary ROC curve. In practice almost always the method of Littenberg&Moses (Stat Med, 1993) is used. This is an adhoc fixed effects method with several shortcomings. Rutter&Gatsonis (Stat Med, 2001) propose a method that adresses these shortcomings, but their method is relatively complicated and as yet hardly used in practice. In this paper we show that this type of diagnostic data fits nicely into the framework of bivariate meta-analysis introduced by van Houwelingen et al. (Stat Med, 1993). This assumes a standard random effect model for both sensitivities and specificities and allows that they are correlated. This brings the analysis of this type of data back into mainstream meta-analysis methods. The model can easily be fitted with General(ised) Linear Mixed Model modules of packages like SAS and S-Plus. The within study distribution of the estimated sensitivity/specificity can be modeled using an approximate normal or the exact binomial distribution. In this paper we also discuss the as yet unnoticed fact that there are at least 5 different reasonable choices for the summary ROC. The methods of Littenberg and Rutter implicitly make a (different) choice. Finally we point under which assumptions the summary ROC curve may be interpreted as a typical study specific curve.