EVALUATING THE PREDICTIVENESS OF A MARKER

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Various measures that quantify the predictiveness of a continuous marker for a binary outcome have been proposed. These include the area under the ROC curve, the proportion of variation explained, the correlation of outcome with risk, the Brier score, the concordance index, and the misclassification rate, amongst others. In this talk we argue that the predictive capacity of a marker has to do with the population distribution of risk given the marker and suggest a graphical tool, the predictiveness curve, that displays this distribution. The display provides a common meaningful scale for comparing markers that may not be comparable on their original scales. Some existing measures of predictiveness are shown to be summary indices derived from the predictiveness curve. Other measures are concerned with the performance of decision rules based on the marker, which we argue is different from its predictiveness. Applications to risk prediction markers in cancer and cystic fibrosis will be discussed. This is joint work with Ying Huang.