

# ESTIMATION OF OPTIMALLY-COMBINED-BIOMARKER ACCURACY IN THE ABSENCE OF A GOLD-STANDARD REFERENCE TEST.

**Objective** The reference diagnostic test used to establish the discriminative properties of a combination of biomarkers could be imperfect. Therefore, true disease status is missing which may lead to a biased estimate of the accuracy of the combination.

**Methods** A Bayesian latent-class mixture model is proposed to estimate the Area Under the ROC Curve (AUC) of a combination of biomarkers. The model allows selecting the combination that maximizes the AUC. Due to the latent structure of the model, missing true disease status can be estimated, while possible errors in the reference test are taken into account.

**Results** Model performance is investigated under several settings. Results indicate that the specification of non-informative priors may be challenging, since the interest lies in a complex function of fitted parameters. Especially in small datasets, careless specification of the prior information can lead to biased estimates of AUC.

**Conclusion** To ensure adequate performance of model-based estimates in a wide range of settings, a set of sensible non-informative prior distributions have to be proposed.

**Keywords:** Bayesian estimation; missing data; latent class mixture models; AUC