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Method development for the analysis of pooled biomarker data

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For many health outcomes, it has become increasingly common to aggregate data from multiple studies to obtain increased sample sizes. The enhanced sample size of the pooled data allows investigators to perform subgroup analyses, evaluate the dose-response relationship over a broad range of exposures, and provide robust estimates of the biomarker-disease association. However, study-specific calibration processes must be incorporated in the statistical analyses to address between-study variability in the biomarker measurements. We introduce methods for evaluating the biomarker-disease relationship that validly account for the calibration process. We consider both internal and external calibration studies in the context of nested case-control studies. We then illustrate the utility of these estimators using simulations and an application to a pooling project of 25(OH)D and colorectal cancer.

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