New Methods for Interpretation of Exposure Data Subject to Limit of Detection

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Measurements of environmental levels of chemicals used for exposure assessments are often limited by levels of detection. Surrogate measures or computational approaches are used often to complete exposure assessments. Advancements in the interpretation of measured exposure data will significantly improve our ability to quantify actual exposures.

We developed state-of-the-art methods to evaluate the impact of mixtures on human health effects. Upon completion of the work, we prepared peer-reviewed scientific manuscripts. These papers document the epidemiological and statistical issues, offer statistical approaches for obtaining valid parameter estimates along with confidence intervals, and empirically demonstrate the utility of the proposed methodology.

The methodologies developed through this effort will offer DESPR investigators and external consultants an opportunity to develop statistical methods to perfect measurement issues pertaining to the quantification of chemicals or biomarkers. In addition, this work will help design more cost effective studies and, ultimately, facilitate discussion of laboratory methods for standardizing the reporting of exposure data when estimating human health risks.

Implications: The methodologies produced as a result of this collaborative effort will enable researchers to reduce or eliminate bias due to limit(s) of detection. Employing these innovative analysis techniques for such data will enable improved decision making by researchers and policy-makers.

Key words: Limit of detection, censoring, measurement error, missing data

Project start and end dates: December 2006 – December 2008

Peer-reviewed publication(s):


This abstract was prepared by the principal investigator for the project. Please see www.americanchemistry.com/lri for more information about the LRI.


Aiyi Liu et al. (2010). Interval estimation and hypothesis testing in disease-association studies with data subject to limits of detection. *Epidemiology*. (Accepted).

Brian W Whitcomb et al. (2010). Detection, calibration, and quantification of immunoassays in large scale epidemiological studies; the effect of calibration approach on risk estimation. *Epidemiology* (Accepted).

Albert Vexler et al. (2010). Combined efficient design based on data subject to detection limit. *Epidemiology* (Accepted).

**Other publication(s):**

Ofer Harel et al. Multiple imputation for longitudinal data. (In preparation).

**Abstract creation date:** March 2010