

RETROSPECTIVE EXPOSURE ASSESSMENT OF PERFLUOROOCCTANOIC ACID (PFOA) SERUM CONCENTRATIONS AT A FLUOROPOLYMER MANUFACTURING PLANT

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Background and Aims: A retrospective exposure assessment was conducted as part of an epidemiologic study of the morbidity and mortality of workers exposed to C8, the ammonium salt of perfluorooctanoic acid (PFOA).

Methods: A serum database of 2125 measurements of serum PFOA from workers in the plant was used to model retrospective exposures. Eight job category/job group combinations were modeled using linear mixed models to account for repeated measures along with several variable combinations including a 4 knot restricted cubic spline (RCS) function to reflect the influence of process changes over calendar time on exposure, cumulative years worked in potentially exposed jobs, and the amount of C8 used or emitted by the plant over time.

Results: The trends in serum PFOA levels over time reflect a complex plant history including changes in production levels and engineering controls instituted to decrease C8 exposures. Nevertheless, the models were successful in fitting the serum data, finding a consistent 2-3% increase in serum PFOA level per cumulative prior years worked in a potentially PFOA exposed job. With one exception, all the models included either the amount of C8 used in the plant or the amount of C8 emitted by the plant in the year the sample was collected as a predictor. Both of these were significant positive variables resulting in a 3% increase in serum PFOA level per increase in 1000 pounds of C8 emitted/year or an increase in serum PFOA level of 1% per 1000 pounds C8 used/year.

Conclusion: The approach described here represents an improvement in the specificity of exposure characterization for this cohort. The retrospective models for serum levels described here allow use of employee work histories to predict annual serum levels for the full unsampled cohort for use in the exposure response modeling.