

## 3M Research -- Human Studies

### General Population Exposure

3M has conducted several studies on levels in the general population exposure, including studies characterizing levels found in the blood serum of adults, children and the elderly:

- Olsen, G.W., Church, T.R., Miller, J.P., Burris, J.M., Hansen, K.J., Lundberg, J.K., Armitage, J.B., Herron, R.M., Medhdizadekhashi, Z., Nobiletti, J.B., O'Neill, E.M., Mandel, J.H., and Zobel, L.R. "Perfluorooctanesulfonate and other fluorochemicals in the serum of American Red Cross adult blood donors," *Environmental Health Perspectives* 111:1892-1901, 2003;
- Olsen, G.W., Church, T.R., Hansen, K.J., Burris, J.M., Butenhoff, J.L., Mandel, J.H., and Zobel, L.R. "Quantitative evaluation of perfluorooctanesulfonate (PFOS) and other fluorochemicals in the serum of children," *Journal of Children's Health* 2:53-76, 2004; and
- Olsen, G.W., Church, T.R., Larson, E.B., van Belle, G., Lundberg, J.K., Hansen, K.J., Burris, J.M., Mandel, J.H., and Zobel, L.R. "Serum concentrations of perfluorooctanesulfonate and other fluorochemicals in an elderly population from Seattle, Washington," *Chemosphere* 54:1599-1611, 2004.

3M has also evaluated historical trends in serum levels, and the distribution between liver and serum in the body:

- Olsen, G.W., Huang, H., Helzlsouer, K.J., Hansen, K.J., Butenhoff, J.L., and Mandel, J.H. "Historical Comparison of Perfluorooctanesulfonate, Perfluorooctanoate, and Other Fluorochemicals In Human Blood," *Environmental Health Perspectives* 113(5):539-45, 2005; and
- Olsen, G.W., Hansen, K.J., Stevenson, L.A., Burris, J.M., and Mandel, J.H. "Human donor liver and serum concentrations of perfluorooctanesulfonate and other perfluorochemicals," *Environmental Science and Technology* 37:888-891, 2003.

Most recently, in a pilot study, 3M has documented evidence of a decline in general population serum levels in samples collected in 2005:

- Olsen, G.W., Mair, D.C., Reagen, W.K., Ellefson, M.E., Ehresman, D.J., Butenhoff, J.L., Zobel, L.R. Preliminary Evidence of a Decline in Perfluorooctanesulfonate (PFOS) and Perfluorooctanoate (PFOA) concentrations in American Red Cross Blood Donors." *Chemosphere* 68(1):105-11, 2007.