

ALKYLPHENOLS BULLETIN

An Update from the Alkylphenols & Ethoxylates Research Council

September 13, 2010

Fourth CDC Human Biomonitoring Report Detects Trace Levels of 4-t-Octylphenol in Human Urine

The Center for Disease Control (CDC) recently posted revised human biomonitoring results for 4-t-Octylphenol (4-t-OP) in revised data tables for the *Fourth National Report on Human Exposure to Environmental Chemicals*.^{1 2} The *Fourth Report* includes results for concentrations of 212 chemicals in human urine or blood samples from national samples taken between 1999 and 2004. The updated results published in *July 2010* provides additional data from the 2005-2006 for 51 of the chemicals, including 4-t-OP. It is not surprising that trace amounts of commonly used chemicals can be detected in humans, especially as limits of analytical detection are improving. Concentrations of 4-t-OP measured in human urine in these most recent results were very low - less than 1 part per billion. The CDC report notes “orally administered 4-tert-octylphenol was well absorbed, did not bioaccumulate, and was quickly eliminated from the blood” in rat studies.

The CDC report also emphasizes “the measurement of an environmental chemical in a person’s blood or urine is an indication of exposure; it does not by itself mean that the chemical causes disease or an adverse effect” and “research studies, separate from these data, are required to determine which blood or urine levels are safe.”

Other such studies on the effects of 4-t-OP are available. A study by Tyl et al (1999), which evaluated the toxicity and reproductive effects of 4-t-OP in two generations of rats with exposures ranging from low to high (0.2–2000 parts per million in the diet), is considered to be the most critical evaluation of the potential impact of estrogen-like

¹ US Department of Health and Human Services Centers for Disease Control and Prevention. (2009) [The Fourth National Report on Human Exposure to Environmental Chemicals](http://www.cdc.gov/exposurereport/pdf/FourthReport.pdf).
<http://www.cdc.gov/exposurereport/pdf/FourthReport.pdf>.

² US Department of Health and Human Services Centers for Disease Control and Prevention. (2010, July) [Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables](http://www.cdc.gov/exposurereport/pdf/Update_Tables.pdf).
http://www.cdc.gov/exposurereport/pdf/Update_Tables.pdf.

activity and overall hazard for 4-t-OP in mammals.³ This study was accepted by the Low-Dose Peer Review Panel sponsored by the US Environmental Protection Agency (EPA) and the National Institute of Environmental Health Science (NIEHS) in 2001 as being definitive for showing the lack of reproductive effects. The report also concluded “there is no evidence that octylphenol induces hormonal activity at low dose.”⁴

Another study by Moffat et al. (2001) showed that 4-t-OP is metabolized in rats to another compound, a glucuronide conjugate, which does not have any estrogenic activity in an accepted screening assay.⁵

While it is not clear what levels of exposure to 4-t-OP resulted in the trace concentrations of 4-t-OP found by the CDC in human urine, “worst case” human exposure to 4-t-OP has been calculated to be less than 0.2 µg/kg-body weight/day.⁶ This exposure is approximately 7,500 times less than the lowest dose at which no adverse effects were observed in rat (15 mg/kg-body weight/day) by Tyl et al (1999) for this compound.

Link to: [CDC Fourth National Report on Human Exposure to Environmental Chemicals](#)

Link to: [Updated Tables, Fourth National Report on Human Exposure to Environmental Chemicals](#)

³ Tyl, R.W., Myers, C.B., Marr, M.C., Brine, D.R., Fail, P.A., Seely, J.C., & Van Miller, J.P. (1999). Two-generation reproduction study with para-tert-octylphenol (OP) in rats. *Regulatory Toxicology and Pharmacology*, *30* (2), 81-95.

⁴ National Institute of Environmental Health and Sciences, National Toxicology Program (NIEHS, NTP) and US Environmental Protection Agency (US EPA). (2001, August). Final Report of the Endocrine Disruptor Low-Dose Peer Review. <http://ntp.niehs.nih.gov/ntp/htdocs/liason/LowDosePeerFinalRpt.pdf>.

⁵ Moffat, G.J., Burns, A., Van Miller, J., Joiner, R., & Ashby, J. (2001). Glucuronidation of nonylphenol and octylphenol eliminates their ability to activate transcription via the estrogen receptor. *Regulatory Toxicology and Pharmacology*, *34* (2), 182-187.

⁶ Van Miller, J.P., & Staples, C.A. (2005). Review of the potential environmental and human health-related hazards and risks from long-term exposure to p-tert-octylphenol. *Human and Ecological Risk Assessment*, *11* (2), 319–351.