

ELIMINATION HALF-LIVES OF SELECTED POLYCHLORINATED DIBENZODIOXINS AND DIBENZOFURANS IN BREAST-FED HUMAN INFANTS

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Elimination half-life estimates for several polychlorinated dibenzodioxins/furans (PCDD/F) were calculated by modeling the blood and breast milk concentrations in two breast-fed human infants as reported by Abraham et al. (1996, 1998). Our analysis differs from that of other investigators in that we analyzed individual dioxin and furan congeners while the other studies considered TCDD only and we determined the half-lives in infants, rather than simply predicting body burdens in infants and older children. The average half-life values for each consistently measurable congener were determined to be less than about 6 mo and did not vary substantially between the two infants studied. The average elimination half-life values for 2,3,7,8-tetraCDD, 1,2,3,7,8-pentaCDD, 1,2,3,6,7,8-hexaCDD, 1,2,3,4,6,7,8-heptaCDD, and octaCDD were 0.40, 0.32, 0.39, 0.32, and 0.46 yr, respectively, and 0.27 yr for 2,3,4,7,8-pentaCDF. These values are in stark contrast with the 7 to 15+ yr values reported for these congeners in human adults (Michalek et al., 1996). These much shorter half-life values, likely attributable to rapid growth of the adipose tissue volume and enhanced fecal excretion of dioxins for breast-fed infants, explain why the much higher daily dioxin intake during breastfeeding does not translate to proportionately higher tissue concentrations. Thus, the shorter half-life of dioxins during breastfeeding needs to be considered when evaluating the dioxin hazard to children.