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Breakthroughs in Andrology

Reduced Seminal Parameters Associated With Environmental DDT Exposure and p, p' -DDE Concentrations in Men in Chiapas, Mexico: A Cross-Sectional Study

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Abstract

In response to mounting concerns about the endocrine-disrupting influence of environmental chemicals on human health, this epidemiological study was initiated to test the hypothesis that nonoccupational exposure to the estrogenic pesticide 1,1,1-trichloro-2,2-bis(chlorodiphenyl)ethane (DDT) affects male reproductive parameters. One hundred and sixteen men aged 27 years (SD = 8.2) living in malaria endemic-areas in Chiapas (Mexico), where DDT was sprayed until 2000, participated in a cross-sectional study. Semen analyses were conducted according to

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World Health Organization methods and a quality control program was followed. DDT exposure was defined as the level of blood plasma *p,p'*-dichlorodiphenyl dichloroethylene (DDE), the major metabolite of DDT. The *p,p'*-DDE concentration adjusted for total lipids was 100 times higher than that reported for nonexposed populations at 45 plus or minus 32 $\mu\text{g/g}$ (mean \pm SD). Crude regression analysis showed that several sperm motion parameters, including the percentage of motile sperm, decreased with higher *p,p'*-DDE concentrations ($\beta = -8.38$; $P = .05$ for squared motility), and the percentage of sperm with morphological tail defects increased with higher plasma *p,p'*-DDE concentration ($\beta = 0.003$; $P = .017$). Insufficient sperm chromatin condensation was observed in 46.6% of participants, and the most severe category of incomplete DNA condensation was also positively correlated with *p,p'*-DDE concentration ($r = .223$; $P = .044$). Therefore, nonoccupational exposure to DDT, as assessed by plasma *p,p'*-DDE concentrations, is associated with poorer semen parameters in men, indicating adverse effects on testicular function and/or the regulation of reproductive hormones. Previously, a causal role of environmental toxicants in human male infertility has been lacking because observed effects have been the result of unusually high exposures, either occupationally or as a result of industrial accidents, resulting in unprecedented controversy (reviewed by Cheek & McLachlan, Environmental hormones and the male reproductive system. *J Androl.* 1998;19:5). This is the first epidemiological study demonstrating effects after nonoccupational exposures to DDT. Based on these findings, the effect of DDT on male reproductive health should not be ignored.

Key words: Pesticide, organochlorine, spermatozoa, sperm motility, sperm morphology, chromatin

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