Endocrine activity and developmental toxicity of cosmetic UV filters--an update.


Abstract

UV filters represent a new class of endocrine active chemicals. In vitro, 8/9 chemicals showed estrogenic (MCF-7 cells), and 2/9 antiandrogenic activity (MDA-kb2 cells). Six/nine filters (benzophenone (Bp)-1, Bp-2, Bp-3, 3-benzylidene camphor (3-BC), 4-methylbenzylidene camphor (4-MBC), octyl-methoxycinnamate (OMC)) increased uterine weight in immature rats. 3-Benzylidene camphor and 4-MBC displaced 16alpha125I-estradiol from human estrogen receptor (ER)beta, not ERalpha. Developmental toxicity of 4-MBC (0.7-47 mg/kg body weight/day) and 3-BC (0.24-7 mg/kg), administered in chow was investigated in Long Evans (LE) rats. Weight gain of pregnant rats was reduced only by 3-BC, early postnatal survival rate and thymus weight by both compounds at higher doses. 4-Methylbenzylidene camphor and 3-BC delayed male puberty, and dose-dependently affected reproductive organ weights of adult male and female F1 offspring, with partly different effect patterns. Thyroid weight was increased by higher 4-MBC doses. Tissue-specific changes in mRNA levels of estrogen-regulated genes in prostate, uterus and brain regions, determined by real-time PCR, and in their response to acute estradiol challenge in adult gonadectomized offspring were observed. Lowest effective doses were 0.24 mg/kg/day for 3-BC and 7 mg/kg/day for 4-MBC. Fat tissue levels at 7 mg/kg 4-MBC (GC-MS) approached the range of UV filters in fish (Nagtegaal et al., 1997; Balmer et al., 2004).

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