Effect of frying-meat emission particulate on 17beta-estradiol 2-and 4-hydroxylation in human lung adenocarcinoma CL5 cells

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摘要

Abstract

The effect of airborne frying-meat emission particulate (FMEP) on metabolism of 17beta-estradiol (E(2)) to potentially toxic catechol estrogens 2- and 4-hydroxyestradiol (2- and 4-OH-E(2)) was determined using human lung adenocarcinoma CL5 cells treated with organic extracts of beef FMEP. E(2) was incubated with microsomes prepared from untreated CL5 cells or cells treated with 200 microg/ml FMEP extract for 6 h. E(2) metabolites formed were analyzed by high-performance liquid chromatography (HPLC). The results revealed that treatment with FMEP produced three-and twofold increases of 2- and 4-hydroxylation of E(2), respectively. Monooxygenase activity and immunoblot analyses showed that FMEP markedly induced microsomal 7-ethoxyresorufin O-deethylase (EROD) activity and cytochrome P-450 (CYP) IAI and CYPIBI protein levels. Similar increases in E(2) hydroxylation, EROD activity, and CYP protein levels were observed with HepG2 human hepatoma and MCF-7 human breast cancer cells treated with FMEP or 1 microM dibenz[a,h]anthracene. Cotreatment of CL5 cells with FMEP extract and 2 microM alpha-naphthoflavone, an arylhydrocarbon receptor antagonist, blocked the inductive effects of FMEP on E(2) hydroxylation and EROD activity. Additions of 0.01, 0.1, or 1 microM alpha-naphthoflavone, a CYP inhibitor, to microsomes produced concentration-dependent decreases in E(2) 2-hydroxylation and EROD activity of CL5 cells induced by dibenz[a,h]anthracene. The present finding demonstrates that FMEP can increase formation of 2-OH-E(2) and 4-OH-E(2) by human lung cells, and induction of CYP1A1 and CYP1B1 is a potential mechanism underlying increased E(2) metabolism. The toxicological significance of FMEP and estrogen interaction warrants further investigation.