Abstract:
The interior of motor vehicles is made of a wide variety of synthetic materials, which emit volatile organic compounds (VOC). We tested the health effects of emissions from vehicles exposed to “parked in sunshine” conditions. A new and a 3 year old vehicle with identical interior were exposed to 14 000 W of light. Indoor air was analyzed by GC-MS. Toxicity of extracts of indoor air was assayed in human primary keratinocytes, human lung epithelial A549 cell line, and Chinese hamster V79 lung fibroblasts. In addition, toxicity after metabolic activation by CYP1A1, CYP1A2, CYP1B1, CYP2A6, CYP2B6, and CYP2E1 was assayed. The effect on type I allergic reaction (IgE-mediated immune response), type IV allergic reaction (T-cell mediated immune response), and irritative potential was evaluated also. A total of 10.9 and 1.2 mg/m(3) VOC were found in new and used motor vehicle indoor air, respectively. The major compounds in the new vehicle were o,m,p-xylenes, C3 and C4-alkylbenzenes, dodecane, tridecane, and methylpyrrolidinone. In the used vehicle they were acetone, methylpyrrolidinone, methylcyclohexane, acetaldehyde, o,m,p-xylenes, ethylhexanol, and toluene. No toxicity was observed in any cell line with or without metabolic activation. Neither did we find an effect on type IV sensitization or an irritative potential. A slight but statistically significant aggravating
effect on IgE-mediated immune response of only the new vehicle indoor air was determined (p < 0.05). The IgE-response modulating effect of indoor air might be relevant for atopic individuals. Else no direct toxicity, no toxicity after metabolic activation by cytochrome P450, and no irritative or type IV sensitizing potential of motor vehicle indoor air were found, neither from the new nor used vehicle. Our investigations indicated no apparent health hazard of parked motor vehicle indoor air.