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Fine and ultrafine particles from indoor sources – Effects in a controlled human exposure study and lung epithelial cells *in vitro*.

Abstract *

In recent years increasing concern has been expressed about the potential adverse health effects of particles from indoor sources. The aims of the EPIA project were to: (1) to characterize potentially relevant indoor sources of (ultra)fine particles with respect to their emission levels and composition and (2) to study their adverse health effects. We investigated the effects of emissions from candle burning (CB), toasting of bread (TB) and sausage frying (FS) in a randomized, cross-over sham-controlled exposure study in healthy adults as well as *in vitro* in A549 human lung epithelial cells. Participants were exposed for 2 h to each of these sources at two different exposure levels, and examined before, during and after the exposures at defined time-intervals. We found transient associations between exposures and several respiratory and cardiovascular effects as well as inflammatory changes (e.g. lung function, blood pressure, arterial stiffness, interleukin-8 in nasal lavage/blood). Specific effects were found to depend strongly on the emission source and the selected exposure metric (e.g. size-specific particle mass concentration, size-specific particle number concentration, lung deposited surface area concentration. Evaluation of collected PM_{2.5} samples in the A549 cells, revealed an increased release of interleukin-8 and induction of DNA strand breaks for toasting, whereas the particles from candle burning only resulted in DNA damage. The results from our project demonstrate that elevated concentrations from certain indoor emission sources may lead to changes in the lung and cardiovascular systems as well as possibly to induce inflammation. The study was supported by the German Federal Environment Agency (UBA, FKZ3711-62-205).

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