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Braking news: Particles from car brakes harm lung cells

November 20 2009

Real-life particles released by car brake pads can harm lung cells in vitro. Researchers writing in BioMed Central's open access journal *Particle and Fibre Toxicology* found that heavy braking, as in an emergency stop, caused the most damage, but normal breaking and even close proximity to a disengaged brake resulted in potentially dangerous cellular stress.

Barbara Rothen-Rutishauser and Peter Gehr from the University of Bern, Switzerland, and Michael Riediker from the Institute for Work and Health, Lausanne, Switzerland, worked with a team of researchers to study the effects of brake particles on cultured lung cells placed in a chamber close to the axle of a car. They said, "Brake wear contributes up to 20% of total traffic emissions, but the health effects of brake particles remain largely unstudied. We've found that the metals in brake wear particles can damage junctions between cells by a mechanism involving oxidative stress".

The teams' analysis revealed that brake wear particles contain considerable amounts of iron, copper and organic carbon. Exposure to these pollutants caused increased signs of oxidative stress and inflammation in the cells, and hard braking caused most exposure. Interestingly, some exposure still occurred even when the brakes were not being applied, presumably due to residual brake particles coming off the turning axle and the braking system.

A direct comparison to other (model) particles known to cause these

stress effects in vitro was not done, so comparative statements cannot yet be made. The researchers hope that future studies will be able to determine exactly which components are involved in each cell-stress pathway. According to Rothen-Rutishauser and Riediker, "Just as for exhaust particles, efforts to diminish brake particle emissions will lead to an improved ambient air quality and so could provide better protection of human health".

More information: Toxic effects of brake wear particles on epithelial lung cells in vitro, Michael Gasser, Michael Riediker, Loretta Mueller, Alain Perrenoud, Fabian Blank, Peter Gehr and Barbara Rothen-Rutishauser, *Particle and Fibre Toxicology* (in press), www.particleandfibretoxicology.com/

Source: BioMed Central (news : web)