

Scientific Studies

Vehicle Emissions Damage DNA

“Worse, the damage may not be easily remedied.”

We've all heard news reports questioning the safety of vehicular traffic. We've all heard implications that runners and those with respiratory problems are at high risk from exposure to vehicle exhaust fumes. However, the affects be worse than fumes and emission induced asthma. Particles from vehicle emissions may actually cause oxidative stress-induced DNA damage. Worse, the damage may not be easily remedied.

Bräune et al (2007) investigated oxidative damage to DNA and related repair capacity. Researchers examined twenty-nine healthy nonsmoking adults with controlled exposure to urban air particles in a two-factored design, testing subjects with biking exercise and without, in either filtered air or air with exposure to particles from vehicle exhaust.

Exposure to exhaust fume particles significantly increased DNA strand breaks, with a further increase in DNA strand breaks with exercise, presumably due to increased air ventilation. In addition,

the dose-response relationship was significant, however simultaneous exposure to ozone, nitrogen oxides, and carbon monoxide had no influence. DNA damage was noted as an important initial event in carcinogenesis.

The researchers concluded that particles from vehicle exhaust cause “systemic oxidative stress with damage to DNA” and further they found “no apparent compensatory up-regulation of DNA repair within 24 hours”, indicating the damage was not easily remedied.

The data of the researchers also shows that most of the particulate emissions that caused systemic oxidative stress were from diesel vehicles at exposure levels commonly encountered in streets and dwellings near roads. Not addressed in this study is whether or not antioxidants could help to protect individuals from the oxidative stress that caused damage to the subjects DNA strands.

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Reference:

Bräune EV, Forchhammer L, Møller P, Simonsen J, Glasius M, Wåhlin P, Raaschou-Nielsen O, & Loft S. Exposure to Ultrafine Particles from Ambient Air and Oxidative Stress-Induced DNA Damage. *Environmental Health Perspectives* Volume 115, Number 8, August 2007

<http://www.ehponline.org/members/2007/9984/9984.pdf>

