INCREASED MITOCHONDRIAL DNA-CONTENT ATTRIBUTABLE TO CADMIUM EXPOSURE AMONG ELDERLY

Nicky Pieters, *Hasselt University, Belgium*
Elke Munters, *Hasselt University, Belgium*
Karen Smeets, *Hasselt University, Belgium*
Valerie Pennemans, *Hasselt University, Belgium*
Harry Dewitte, General practice, Genk, Beligum
Joris Penders, *Hasselt University, Belgium*
Emmy Van Kerkhove, Hasselt University, Belgium
Jaco Vangronsveld, *Hasselt University, Belgium*
Ann Cuypers, *Hasselt University, Belgium*
Tim Nawrot, *Hasselt University, Belgium*

Background and Aims: Many lines of evidence suggest that mitochondria and oxidative DNA damage have a central role in ageing-related diseases and carcinogenesis. Cadmium is linked to increase cancer incidence but cadmium is not mutagenic by itself. Here we show, in a cross-sectional study of 143 elderly, a link between mitochondrial DNA (mtDNA) content, oxidative DNA damage (8-deoxyhydroxyguanosine) and urinary cadmium which is a biomarker of lifetime exposure.
Methods: In a case-crossover analysis, we estimated the risk of dying from non-traumatic causes before the age of one year in relation with outdoor PM10 concentrations on the day of death. We matched control days on temperature in order to exclude confounding by variations in daily temperature.
Results: We found that each doubling in urinary cadmium concentration was independently associated with a +0.10 (95% CI: 0.03 to 0.19;) increase in the ratio of mtDNA/nDNA content (COX-1, 3212/3319) and 8-deoxy-hydroxyguanosine increased substantially [+11.2% (0.85 to 22.2%; p=0.03)].
Conclusions: The observed association of an increased mtDNA/nDNA ratio in relation to urinary cadmium provides mechanistic plausibility to the hypothesis that carcinogenic metals like cadmium induce ageing related pathways.