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**ADVERSE EFFECTS OF INDUSTRIAL MULTI-WALLED CARBON NANOTUBES  
ON HUMAN PULMONARY CELLS.**

Lyes Tabet<sup>1</sup>, Cyrill Bussy<sup>1</sup>, Nadia Amara<sup>1</sup>, Ari Setyan<sup>2</sup>, Alain Grodet<sup>3</sup>, Michel J. Rossi<sup>4</sup>, Jean-Claude Pairon<sup>5</sup>, Jorge Boczkowski<sup>1,6</sup>, Sophie Lanone<sup>1</sup>, (1) Inserm U841, Equipe 04 Faculté de Médecine, 8 rue du Général Sarrail, 94000 Créteil, France (2) Institut universitaire romand de Santé au Travail (Institute for Work and Health), Université de Lausanne et Université de Genève, Rue du Bugnon 21, CH-1005 Lausanne, Switzerland, (3) INSERM, Unité 773, CRB3, Paris, France; Université Paris 7, Faculté de Médecine, site X. Bichat, Paris, France, (4) EPFL (Ecole Polytechnique Fédérale de Lausanne), LPAS (Laboratoire de Pollution Atmosphérique et Sol), Station 6, CH-1015 Lausanne, Switzerland, (5) INSERM, Unité 841, Créteil, F-94010, France; Université Paris 12, Faculté de Médecine, Créteil, F-94010, France; CHI Créteil, Service pneumologie et pathologie professionnelle, Créteil, F-94010, France, (6) Assistance Publique-Hôpitaux de Paris, Hôpital Bichat, CIC 007, Paris, France.

The aim of this study was to evaluate adverse effects of multi-wall carbon nanotubes (MWCNT) produced for industrial purposes, on the human epithelial cell line A549. MWCNT were dispersed in dipalmitoyl lecithin (DPL), a component of pulmonary surfactant, and the effects of dispersion in DPL were compared to those in 2 other media: ethanol (EtOH) and phosphate buffer saline (PBS). Effects of MWCNT were also compared to those of 2 asbestos fibers (chrysotile and crocidolite) and carbon black (CB) nanoparticles, not only in A549 cells, but also on mesothelial cells (MeT5A human cell line), used as an asbestos-sensitive cell type. MWCNT formed agglomerates on top of both cell lines (surface area 15-35  $\mu\text{m}^2$ ), that were significantly larger and of a higher number in PBS than in EtOH and DPL. Whatever the dispersion media, incubation with 100  $\mu\text{g}/\text{ml}$  MWCNT induced a similar decrease in metabolic activity without changing cell membrane permeability or apoptosis. Neither MWCNT cellular internalization nor oxidative stress was observed. In contrast, asbestos fibers penetrated into the cells, decreased metabolic activity but not cell membrane permeability and increased apoptosis, without decreasing cell number. CB was internalized without any adverse effects. In conclusion, this study demonstrates that MWCNT produced for industrial purposes exert adverse effects on without being internalized by human epithelial and mesothelial pulmonary cell lines.