(with and without cells) showed a slight interaction with the aB assay. UV-Vis spectra determined for aB with the three $C_{60}(OH)_x$ showed no effect. Cytokine analysis for all $C_{60}(OH)_x$ showed a slight increase in IL-8 but was not statistically significant. These results suggest that hydroxylation of C_{60} causes minimal cytotoxicity at high hydroxylation levels and no inflammatory response in HEK. (Supported by NIH RO1 ES016138)

PS 1177 THE TRANSCRIPTIONAL PROFILING IN RESPONSE TO C(60) FULLERENES OF RAT LUNGS FOR IDENTIFICATION POTENTIAL BIOMARKERS.

K. Fujita[1], Y. Morimoto[2], S. Endoh[1], K. Uchida[1], H. Fukui[1], A. Ogami[2], I. Tanaka[2], M. Horie[1], Y. Yoshida[1], H. Iwahashi[1] and J. Nakanishi[1]. *[1]National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan and [2]University of Occupational and Environmental Health, Kitakyushu, Japan.* Sponsor: M. Takahashi.

In various industrial fields, the use of C(60) fullerenes is expected to increase, however, little is known about the potential toxicological mechanism of action. In our previous study, the transcriptomic profiling data closely matched the pathological findings that C(60) fullerenes caused no serious adverse pulmonary effects after whole-body inhalation exposure. Taking advantage of this, we attempted to characterize time-dependent changes in the gene expression profiles after intratracheal instillation with C(60) fullerenes at different dosages and to identify the candidate expressed genes as potential biomarkers. The hierarchical cluster analysis revealed that the up- or downregulation of genes after intratracheal instillation with 1.0mg C(60) fullerene particles in rat lung tissue was significantly over-represented in the "response to stimulus" and "response to chemical stimulus" categories of biological processes and in the "extracellular space" category of the cellular component. These results were remarkable for 1 week after the instillation with C(60) fullerenes. In the lung tissues instilled with 1.0mg C(60) fullerene particles, many representative genes involved in "inflammatory response" and in "matrix metalloproteinase activity" were upregulated for over 6 months. The expression levels of 89 and 21 genes were positively correlated with the C(60) fullerene dose at 1 week and 6 months after the instillation, respectively. Most of them were involved in "inflammatory response", and the Ccl17, Ctsk, Cxcl2, Cxcl6, Lcn6, Orm1, Rnase9, Slc26a4, Spp1, Mmp7, and Mmp12 genes were overlapped. Microarray-based gene expression profiling revealed that the expression of some genes is correlated with the dose of intratracheally instilled C(60) fullerenes. We suggest that these genes are useful for identifying potential biomarkers in acute-phase or persistent responses to C(60) fullerenes in the lung tissue.

PS 1178 EFFECT OF SURFACE MODIFICATION ON THE BIOAVAILABILITY AND INFLAMMATORY POTENTIAL OF MULTI-WALLED CARBON NANOTUBES.

T. M. Sager[1, 2], M. Wolfarth[1], D. Porter[1], V. Castranova[1], N. Wu[3] and A. Holian[2]. *[1]Pathology/Physiology Reasearch Branch, Health Effects Laboratory Division, NIOSH, Morgantown, WV, [2]Center for Environmental Health Sciences, University of Montana School of Medicine, Missoula, MT and [3]Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV.*

Manufactured nanoparticles display physiochemical characteristics and impart unique electrical, thermal, mechanical, and imaging properties that are highly desirable for applications within the commercial, medical and environmental sectors. Carbon nanotubes exhibit excellent electrical, optical and chemical properties with a broad range of applications. In addition, surface modification of carbon nanotubes with organic functional molecules extends their already broad applications. The addition of organic coatings such as –COOH terminated coatings alter the charge, functionality, and reactivity of the nanotube. However, the development of these engineered carbon nanotubes has surpassed evaluation of the potential health impacts. Therefore, this study examines whether carbon nanotubes with different surface chemistry affects pulmonary toxicity. Mice (C57BL/6J, male,7 weeks old) were given 0-40 ug/mouse of either bare mulit-walled carbon nanotubes (MWCNT) or COOH-coated MWCNT via pharyngeal aspiration. Inflammatory and cytotoxic potential of each particle type was analyzed at 1 and 7 days post-exposure. The findings of this study show both the bare and the COOH-modified MWCNTs produced a dose dependent increase in PMNs harvested by whole lung lavage at both 1 and 7 days post-exposure. However, even though the COOH-modified MWCNT did produce a dose dependent increase in PMN number at all doses and at all post-exposure time points, the inflammatory response produced by the COOH-modified MWCNT was lower than the inflammatory response generated by the bare MWCNT. In conclusion, altering the surface functionality of the MWCNT, i.e. bare versus COOH-modified MWCNT lowered the inflammatory properties of the MWCNT. Supported in part by grant RC2 ES-018742 (A. Holian, PI) and NSF grant CBET-0834233 (N. Wu, PI).

PS 1179 OXIDATIVE LIPIDOMICS REVEALS SELECTIVE, BUT NOT RANDOM, PULMONARY PHOSPHILIPID PEROXIDATION AFTER INHALATION OF CARBON NANOTUBES.

Y. Tyurina[1], V. Tyurin[1], L. Sparvero[1], A. Amoscato[1], V. Kapralova[1], E. Kisin[2], A. Murray[2], J. Shi[3], B. Fadeel[3], A. Shvedova[2] and V. Kagan[1]. *[1]Center for Free Radical and Antioxidant Health, Department of EOH, University of Pittsburgh, Pittsburgh, PA, [2]Pathology and Physiology Research Branch, Health Effects Laboratory Division, NIOSH, Morgantown, WV and [3]Division of Biochemical Toxicology, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden.*

It is commonly accepted that lipid peroxidation is a mechanism of cell/tissue damage and death by nanoparticles, including single walled carbon nanotubes (SWCNT). We performed global ipidomics/oxidative lipidomics analysis of all molecular species in major classes of phospholipids and established that random free radical peroxidation does not happen in the lung of mice at 3 different time-points after SWCNT inhalation. C57BL/6 mice were exposed to SWCNT via inhalation (5mg/m3, whole body inhalation for 4 consecutive days, 5 h/day) and scarified 1, 7 and 28 days thereafter. We found that two most abundant and susceptible phospholipids - phosphatidylcholine and phosphatidylethanolamine - that constitute more than 75% of total phospholipids, do not undergo peroxidation at all. In addition, we demonstrated that three relatively minor anionic phospholipids - cardiolipin, phosphatidylinositol, and phosphatidylserine get oxidized in a very selective way: only few molecular species out of many in each class (10 out of 25 for CL, 3 out of 5 for PI, 1 out of 7 for PS) were converted into oxygenated species. Moreover, the selectivity was also detected towards fatty acids of the respective oxidized anionic phospholipids (not most polyunsaturated fatty acids but most abundant). We speculate that SWCNT-induced phospholipid peroxidation in lung is involved in the production of selective precursors of pro-resolving mediators of inflammation rather than in non-specific oxidative damage. Supported by NIOSH OH008282; NIH NIAID U19 AI068021, HL70755, HL094488, EC-FP7-NANOMMUNE-214281.

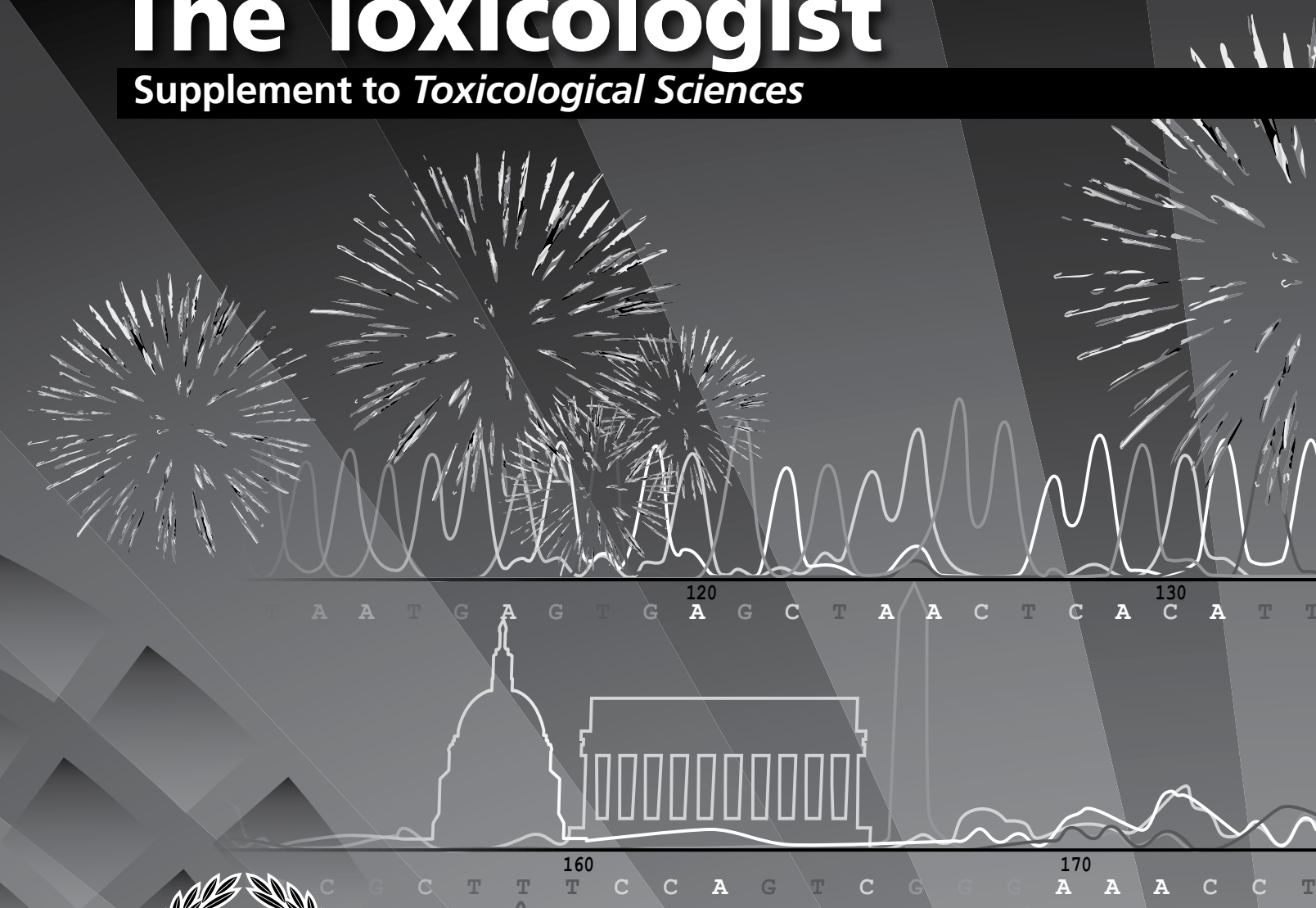
PS 1180 COMPARATIVE GENOTOXICITY OF FIBROUS PARTICLES: CARBON NANOFIBERS, SINGLE-WALLED CARBON NANOTUBES, AND ASBESTOS.

E. Kisin[1], A. R. Murray[1], L. Sargent[2], D. Lowry[2], K. Siegrist[2], M. Chirila[3], D. Schwegler-Berry[1], S. Leonard[1], V. Castranova[1], B. Fadeel[4], V. E. Kagan[5] and A. A. Shvedova[1]. *[1]PPRB, NIOSH, Morgantown, WV, [2]TMBB, NIOSH, Morgantown, WV, [3]AEB, NIOSH, Morgantown, WV, [4]Institute of Environmental Medicine, Karolinska Instituet, Stockholm, Sweden and [5]University of Pittsburgh, Pittsburgh, OR.*

Carbon nanofibers (CNF) are generating great interest in industrial sectors such as energy production and electronics, where alternative materials may have limited performance or are produced at a much higher cost. However, despite the increasing industrial use of carbon nanofibers, information on their potential adverse health effects is limited. In the current study, we examine the cytotoxic and genotoxic potential of CNF (Pyrograf®-III) and compare it with the effects of asbestos fibers (crocidolite) or single-walled carbon nanotubes (SWCNT). The genotoxic effects in hamster lung fibroblast (V79) cell line were examined using two complementary assays: comet and micronucleus (MN). In addition, we utilized fluorescence *in situ* hybridization to detect the chromatin pan-centromeric signals within the MN. The use of this probe allows the classification of MN as being centromere positive or centromere negative indicating their origin by anaugenic (chromosomal malsegregation) or clastogenic (chromosome breakage) mechanisms, respectively. Results from cytotoxicity tests revealed a concentration- and time-dependent loss of cell viability after exposure to all tested materials in the following sequence: asbestos>CNF>SWCNT. Additionally, cellular uptake and generation of oxygen radicals was seen in the murine RAW264.7 macrophage cell line following exposure to CNF or asbestos but not after administration of SWCNT. Comet and MN assays demonstrated the induction of DNA damage and MN after exposure to all tested materials with the strongest effect seen for CNF. Moreover, the chromatin pan-centromeric signals within the MN were positive after cell exposure to CNF suggesting that the mitotic spindle and the segregation of the chromosomes were affected. Supported by NIOSH OH008282, NORA 0HELD015, and EC-FP-7-NANOMMUNE-214281.

The Toxicologist

Supplement to *Toxicological Sciences*



SOCIETY OF TOXICOLOGY
50th Anniversary
1961–2011

Celebrating 50 Years of Service in Science

50th Anniversary Annual Meeting and ToxExpo™ Washington, D.C.

An Official Journal of the Society of Toxicology

OXFORD UNIVERSITY PRESS

ISSN 1096-6080
Volume 120, Supplement 2
March 2011

www.toxsci.oxfordjournals.org

SOT | Society of Toxicology

Creating a Safer and Healthier World by Advancing the Science of Toxicology

www.toxicology.org

Preface

This issue of *The Toxicologist* is devoted to the abstracts of the presentations for the Continuing Education courses and scientific sessions of the 50th Annual Meeting of the Society of Toxicology, held at the Walter E. Washington Convention Center, March 6–10, 2011.

An alphabetical Author Index, cross referencing the corresponding abstract number(s), begins on page 578.

The issue also contains a Key Word Index (by subject or chemical) of all the presentations, beginning on page 606.

The abstracts are reproduced as accepted by the Scientific Program Committee of the Society of Toxicology and appear in numerical sequence.

Copies of *The Toxicologist* are available at $45 each plus $5 postage and handling (U.S. funds) from:

Society of Toxicology
1821 Michael Faraday Drive, Suite 300
Reston, VA 20190

www.toxicology.org