

Toxics Use Reduction Institute Science Advisory Board Meeting Minutes
January 12, 2022
Virtual Zoom Meeting
2:00 PM

Members Present: Dave Williams (Chair), Robin Dodson (Vice Chair), Christy Foran, Heather Lynch, Helen Poynton, Lisa Cashins, Denise Kmetzo, Christine Rioux

Members not present: Amy Cannon, Wendy Heiger-Bernays, Rich Gurney

Program staff present: Liz Harriman (TURI), Heather Tenney (TURI), Hayley Hudson (TURI), Michael Ellenbecker (TURI), Tiffany Skogstrom (OTA), John Raschko (OTA), Caredwen Foley (OTA), Sandy Baird (MassDEP), Kari Sasportas (OTA)

Others present: Carol Holahan (Foley Hoag ACC), Christina Bramante (Nano-C), Jerome Lang (Nano-C), Raza Ali (ACC), John Monica (Offit Kurman), Laura Spark (Clean Water Action), Katherine Robertson (MCTA), Clint Richmond (Sierra Club)

Welcome & Introductions

The chair noted that this meeting is being conducted remotely, consistent with [An Act Extending Certain COVID-19 Measures Adopted during the State of Emergency](#). This Act includes an extension, until April 1, 2022, of the remote meeting provisions of Governor Baker's March 12, 2020, Executive Order resulting from the outbreak of the 2019 novel coronavirus, known as "COVID-19."

Board members introduced themselves, program staff were announced and attendees were asked to put their name and affiliation in the chat.

Approve November Meeting Minutes

A motion was made to approve the November meeting minutes as written, and there was a second.

A grammatical error was identified in the second bullet from the bottom of the pulmonary toxicity section it should say '**potentially occur from** all MWCNT'.

After a roll call vote the minutes were approved by the eight members present, with seven approvals and one abstention.

Program Updates

- The Spring Continuing Education Conference is still planned to be in person in Marlborough-we hope for waning COVID numbers.
- The PFAS category is now officially on the TURA list and program staff are working on developing guidance. TURI/OTA are currently working through the TSCA active PFAS to determine which chemicals are within the TURA definition in order to support industry with guidance. Many have indeterminate structures, or are confidential business information, so companies will need to contact their suppliers to find out whether a PFAS within the category is in a product they are using.
 - If you know of companies that are trying to figure out whether they have reportable chemicals, please have them contact Tiffany Skogstrom at OTA, and she will bring the

question anonymously to the rest of us to assist. Other general questions about filing can go to MassDEP or OTA.

- This is a planning year under TURA, so facilities are notifying their employees about the process and setting up meetings to look for opportunities and options.
- TURI will be offering the Resource Conservation (RC) training for TUR Planners who want to be RC certified, scheduled this winter, the date will be posted on TURI's calendar. This will be a virtual one day training, the asset specific training will be offered in the spring so that planners can be RC certified in time to sign plans in June. Companies can do any other non-reportable chemical or material as RC without RC certification.
- TURI is working on an update to their Pollution Prevention Options Analysis System (P2OASys) hazard assessment tool, and the site is temporarily down.
- Sign up for TURI and OTA newsletters and TURI's Greenlist Bulletin that goes out monthly for the latest news.
- TURI grantees are working on alternatives to halogenated solvent cleaning, PFAS in turnout gear and surfactants, and hazards in personal care products marketed to Black women.

Carbon Nanotubes and Fibers Petition: Continued work focused on Multi-walled Carbon Nanotubes

Heather gave an update of where the board is at with the nanomaterials discussion and the information that has been collected and received from board members so far. We ran a literature search on each endpoint for MWCNT and reviewed that information at the last meeting. It was then decided that all members would focus on pulmonary toxicity and members identified studies they thought were particularly helpful and that information was highlighted on the LibGuide. Today the plan is to go through that information specifically.

Pulmonary Toxicity

Board members discussed the information and large number of studies on pulmonary toxicity effects of MWCNT exposure. There was further discussion on the difficulty and the different approaches in trying to compare so many multifaceted studies for just one endpoint.

The board called out papers that they thought were very helpful: Dong and Ma (2015 and 2019), which highlighted links between inflammation, fibrosis, and possible cancer. Others: Labib (2016) and Vietti (2016) both were very helpful in understanding AOP and overall effects of MWCNT with very helpful figures as well.

- In Mercer (2013) the endpoints for inflammation and fibrosis were not consistent with other articles.–and some were not focused on just MWCNT. Difficult to compare studies with different methodologies, e.g., how animals were exposed for inhalation studies.
- Vietti (2016) was helpful in understanding the cellular responses and why other authors chose different pathways.
- The amount of evidence of pulmonary toxicity in animal studies was very strong: inflammation, fibrosis, and cellular degeneration. Does the animal model of inhalation leading to inflammation, fibrosis and oxidative stress and causing damage (e.g., tumorigenesis) – is that supported by the occupational studies?

- Beard (2018), has a helpful table showing the different biomarkers and ICAM-1 (cardiovascular) was consistent across studies Liu, Vladderen (2017), Fatkhutdinova (2016). This biomarker is consistent with other similar exposures: silica exposure, coal miners, and lung disease.
- The figures showing fibers puncturing the alveoli are striking.
- Penetration of the blood brain barrier in mice Samiei (2020) is unsettling.
- Inhalation is the most important exposure route-there is low solubility of these materials.
- Translocation within the body is a concern. Is this just a lung problem or could they move to other organs (especially shorter ones)?
- A member questioned the clinical significance in humans and how relevant the biomarker evidence is. How severe or reversible is it?
- Potential for cancer, and classification from IARC, are only based on MWCNT-7. Reactive oxygen species (ROS) and inflammation can lead to cancer but happen all the time at low levels. There is not a lot of human data. Would we see effects in workers already?
- Aschberger (2019) is a genotoxicity study but focused on grouping – they looked at 19 different analogs, collected physiochemical information and then coupled that with what is known about toxicology. The highest concern are long, thin, straight and rigid, related to inflammation and mesothelioma. This is similar to asbestos.
- Occupational studies are limited to only very few studies. Tromp (2017) – one small facility with only 12 workers, showed a lot of variability and diversity in the particles. Occupational studies are sampling in various ways and different methods and it is hard to compare in an effective way. There are many confounders and every facility is going to be different.
- The question was raised about whether workers were likely using PPE, in terms of whether we would likely be seeing disease at this point in time. Uncertain, as no regulations often means no requirements for workers or researchers. MWCNTs are similar to asbestos in being able to penetrate cell walls; mouse lung studies show that penetration.
- Animal studies are measuring effects, are there parallels to ‘High toxicity dust’ where we can compare MWCNTs to other substances and their effects?
- How should we approach listing a category of chemical? Are modifications or characteristics in the literature that researchers point out as potentially less or more hazardous – particular metals or catalysts?
- In order to connect animal studies and characteristics of what is hazardous, further characterization would be helpful. This is challenging, and most studies didn’t do a detailed characterization.
- A member questioned whether we know what is in use. This is always hard without reporting information. Additionally, there is a large variation, differences in purity and contaminants (e.g. cobalt, unburned carbon, soot).
- Is asbestos regulated by length and aspect ratio? 5 micrometers and longer was based on being able to measure them, not on their toxicity and 3:1 aspect ratio.
- Seeing strong animal evidence for pulmonary effects; additional concerns for translocation and other organ effects, particularly with shorter fibers
- Vietti (2016) review paper - would it be helpful to plot fiber characteristics and fibrosis for the inhalation and pharyngeal aspiration studies? (Tables 1 and 3)

There was general interest in knowing more about what is used in Massachusetts. While that information doesn't factor into a recommendation, it helps provide some context. TURI will review the very limited survey information available and report back.

TURI will populate the excel spreadsheet for all pulmonary toxicity studies, with information on characteristics such as length, type of fiber, and aspect ratio.

Visitor Comments

At this time any visitors or guests had an opportunity to ask any questions or offer any comments; there were none.

Path Forward

We could take another pass at pulling out the characteristics in the spreadsheet to elucidate trends.

TURI will further research other bodies trying to define or characterize these –ECHA, REACH, and other states, and check the EPA SNUR.

Next Meeting

A motion was made to adjourn. Heather will send a When2Meet this afternoon for a February meeting.

Visitor Comments (inserted verbatim from zoom chat)

From John Raschko to Everyone 02:02 PM

John Raschko, Mass

From Liz Harriman to Everyone 02:02 PM

could you please identify yourself in the chat with your organization

From iPhone to Everyone 02:03 PM

John Monica, Offit Kurman, Tysons Corner, Virginia.

From Kari Sasportas, Mass OTA to Everyone 02:03 PM

Kari Sasportas, Mass OTA

From Caredwen Foley, MA OTA to Everyone 02:03 PM

Caredwen Foley, Mass OTA

From Christina Bramante to Everyone 02:03 PM

Christina Bramante, representing Nano-C

From Christine Rioux to Everyone 02:03 PM

Christine Rioux Environmental Health Scientist

From Laura Spark to Everyone 02:03 PM

Laura Spark, Clean Water Fund/Clean Water Action

From Katherine to Everyone 02:03 PM

Katherine Robertson, MCTA

From Raza Ali | ACC to Everyone 02:03 PM

Raza Ali, American Chemistry Council - Northeast Region.

From Jerome Lang to Everyone 02:04 PM

Jerome Lang, Nano-C

From Tiffany Skogstrom to Everyone 02:05 PM

Tiffany Skogstrom, OTA Director and TURA Administrative Council Executive Director

From Carol Holahan to Everyone 02:08 PM

Carol Holahan-Foley Hoag

From Christine Rioux to Everyone 03:42 PM

To ensure the safety of workers and the public, Clean Water Action and PEER ask the Toxic Use Reduction Institute's Science Advisory Board to:

- List CNTs (single-walled and multi-walled) and CNFs as higher hazard substances in the List of TURA Chemicals, with a reporting threshold of 100g;
- Categorize these substances as a group, rather than individually.

From Heather Lynch to Everyone 03:52 PM

<https://www.sciencedirect.com/science/article/pii/S1748013220301109>

The European REACH Regulation [2] has introduced the concept of 'nanoform' [3]. Annex VI to REACH states that "a nanoform is a form of a natural or manufactured substance containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution, one or more external dimensions is in the size range 1 nm – 100 nm, including also by derogation fullerenes, graphene flakes and single wall carbon nanotubes with one or more external dimensions below 1 nm".

A substance may have one or more NFs, based e.g. on differences in their number based particle size distribution, shape, aspect ratio, crystallinity, assembly structure, specific surface area and surface functionalisation or treatment (REACH Annex VI, points 2.4.2. – 2.4.5).

<https://www.cdc.gov/niosh/docs/2013-145/pdfs/2013-145.pdf>