Toxics Use Reduction Institute Science Advisory Board Meeting Minutes
June 30, 2021
Virtual Zoom Meeting
2:00 PM

Members Present: Dave Williams (Chair), Robin Dodson (Vice Chair), Christy Foran, Christine Rioux, Heather Lynch, Helen Poynton, Wendy Heiger-Bernays

Members not present: Amy Cannon, Rich Gurney, Lisa Cashins, Denise Kmetzo

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

Others present: Katherine Robertson (MCTA), Carol Holahan (Foley Hoag ACC), Trisha McCarthy (Coyne PC for ACC), Harry Hechehouche (ACC), Terry Connel (Teknor Apex), Christina Bramante (Nano-C), Elizabeth Saunders (Clean Water Action), Tom Lada (Nano-C), Jerome Lang (Nano-C), Tom Rueckes (Nantero), Erin DeSantis (ACC), Laura Spark (Clean Water Action)

Welcome & Introductions

Please note 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."

Attendees were asked to put their name and affiliation in the chat before it is turned off to visitors.

Approve May Meeting Minutes

A motion was made to approve the May minutes as written, and there was a second. A roll call vote was performed, and the minutes were unanimously approved by the seven members present.

Program Updates

- TURI/UML experienced a cyber-security incident and a resulting IT outage the past two weeks.
    - Uml.edu email is currently reliable but turi.org email is not.
    - The main turi.org website and calendar are functional, but not our supplemental sites like the SAB LibGuide.
- The TURA program was shortlisted for the World Future Council's "Future Policy" Award
    - The only US policy to qualify. The award celebrates the most effective policy solutions that minimize the adverse health effects of exposure to chemicals on human health and the environment.
- The Adhoc Committee meeting is scheduled July 22nd from 9-11 AM and the topic is fees

Carbon Nanotubes and Fibers Petition

- We reviewed the petition at the last meeting and had uploaded most of the related materials to the LibGude prior to the UML outage. Some SAB members have provided us materials as well.

- The goal of today's meeting is to begin to dig in with the limited key studies that were sent out during outage and go through them by endpoint.
- TURI has commissioned GreenScreens for SWCNT, MWCNT, and carbon nanofibers. These should be completed very soon and should be helpful moving forward.
- This summer TURI will also work on a current literature review to get the latest studies on these substances.
- Although we did not receive information from stakeholders for this meeting, we did receive inquiries from a consultant representing a company who manufactures SWCNT. They have asked us the best way for them to provide information moving forward.

Pulmonary Toxicity

- NIOSH's Current Intelligence Bulletin from 2013 included 54 nanomaterial studies that they based their recommendation on – evidence is strong.
- A Board member summarized the NIOSH Bulletin and the explained how NIOSH determined the REL.

Mass, volume, number, and surface area – those different factors could make certain nanomaterials more or less toxic. They are attached together/agglomerated can affect toxicity and their ability to penetrate the lung. That whole aspect of these substances is challenging and unique.

Carcinogenicity

- A Board member summarized the IARC monograph that had sufficient evidence for MWCNT-7 but inadequate evidence for SWCNT.
- At the time there were no human studies to use for the evaluation.
- Important to note a lack of studies rather than negative findings.
- One study investigated initiation vs proliferation
- Chronic inflammation and fibrosis can result in cancer (Dong and Ma 2019)

Genotoxicity

- A board member summarized findings surrounding genotoxicty (Kisin, 2011), a cell culture study that compared asbestos to carbon nanofibers and SWCNTs. They found DNA damage represented by broken chromosome strands. CNT may be antigenic as opposed to clastogenic – in certain cancers multiploidy is seen with the same mechanism.
- Study of potentially exposed workers to MWCNT showed higher ratios of non-coding rNA, associated with increased risk of cancer. It is worth looking into what happens in the air –do they agglomerate? Some of these responses are greater than asbestos.

Environmental

A board member summarized information found on the environmental and aquatic hazards.

- Coatings make a difference and can impact the hazard of the substance and fate/behavior in environment. Treating these substances is necessary because they are very insoluble.
- Depending on how they have been treated they can act very differently in the water. Members expressed interest in learning more about the fate of these substances in the natural environment.

- A review article was noted (Jackson et al, 2013). The table in Jackson shows various CNTs and vertebrate/invertebrate combinations aquatic tox from <0.1 to >100 mg/L.
- Evidence for developmental effects and studies on zebrafish show embryonic effects on development at sub mg/L concentrations, so that endpoint should be added.
- Trying to measure them in the environment is challenging; there are no good analytical methods yet, the best studies are the modeling studies.

Overall Discussion

- Program staff reported that GreenScreens that were requested for CNT should be received soon and will be made available.
- A board member asked about categorization and whether that is something we should consider now rather than later.
- There is no consensus on how to group or categorize, but it is agreed to start thinking about strategy now and how we might organize all the information.
    - Single walled/multi walled, functionalized, chemical composition, size, length, impurities, residual metal catalyst, coatings, zeta potential, surface charge, and any overlap in endpoints.
- It was decided that a table might be the most efficient option to organize all the information and be able to easily sort through it.
- TURI will work with Mike to get review papers and draft a few table layouts to send to board members for input.
- The board discussed how they would prefer stakeholder information to be received and organized. The board was in agreement that they would prefer the information sooner in the process rather than later.
- A visitor noted that it seems to be the physical characteristics that cause the hazard, not the chemical, and asked whether a different regulatory vehicle would be more appropriate.

Next Meeting

Heather will send out a doodle poll for a meeting in September

A motion was made to adjourn.

Visitor Comments (inserted verbatim from zoom chat)

From Terry to Everyone: 02:04 PM
Terry Connel - Teknor Apex
From Christina Bramante to Everyone: 02:04 PM
Christina Bramante representing Nano-C
From Carol Holahan to Everyone: 02:05 PM
Carol Holahan, Foley Hoag
From Elizabeth Saunders - Clean Water Action to Everyone: 02:05 PM
Elizabeth Saunders - MA Director - Clean Water Action
From christine rioux to Everyone: 02:05 PM
christine rioux environmental health scientist/consultant
From Tom Lada to Everyone: 02:05 PM
Tom Lada - Nano-C

From Jerome Lang to Everyone: 02:05 PM
Jerome Lang, Nano-C
From Tom Rueckes to Everyone: 02:05 PM
Tom Rueckes - Nantero
From Katherine Robertson to Everyone: 02:06 PM
Katherine Robertson, Massachusetts Chemistry & Technology Alliance
From Sandy Baird to Everyone: 02:08 PM
Sandra Baird, MassDEP, Office of Research and Standards
From Tricia McCarthy's iPad to Everyone: 02:08 PM
Tricia McCarthy, Coyne PC for American Chemistry Council
From Carol Holahan to Everyone: 02:10 PM
who seconded the motion
thank you.
From Caredwen Foley, MA OTA to Everyone: 02:14 PM
caredwen.foley@mass.gov
From Harry Hechehouche to Everyone: 02:18 PM
harry hechehouche, acc
From Heather Tenney to Everyone: 02:27 PM
Articles of Note focus on MOA:

- Dong and Ma, 2019. "Integration of inflammation, fibrosis and cancer induced by CNTs".
- Shvedova et al., 2016. "Integrated Analysis of Dysregulated ncRNA and mRNA expression in humans exposed to CNTs".
- Fukshima et al., 2018. "Carcinogenicity of MWCNTs".
- Kisin et al., 2011 Genotoxicity of carbon nanofibers".
- Vlaanderen et al., 2017 Cross=sectional study of changes in immunological markers and lung health".
- Yanamala, Kagen and Shvedove, 2013. "Molecular modeling in structural nano-toxicolgy – Interaction of nanoparticles with nano-machinery of cells".
- NIOSH Current Intelligence Bulletin, 2013

Articles above from Dave
From Helen Poynton (she/her) to Everyone: 02:41 PM
Coll, C., Notter, D., Gottschalk, F., Sun, T., Som, C. and Nowack, B., 2016. Probabilistic environmental risk assessment of five nanomaterials (nano-TiO2, nano-Ag, nano-ZnO, CNT, and fullerenes). Nanotoxicology, 10(4), pp.436-444.