

Biomarkers to uncover past environmental exposures

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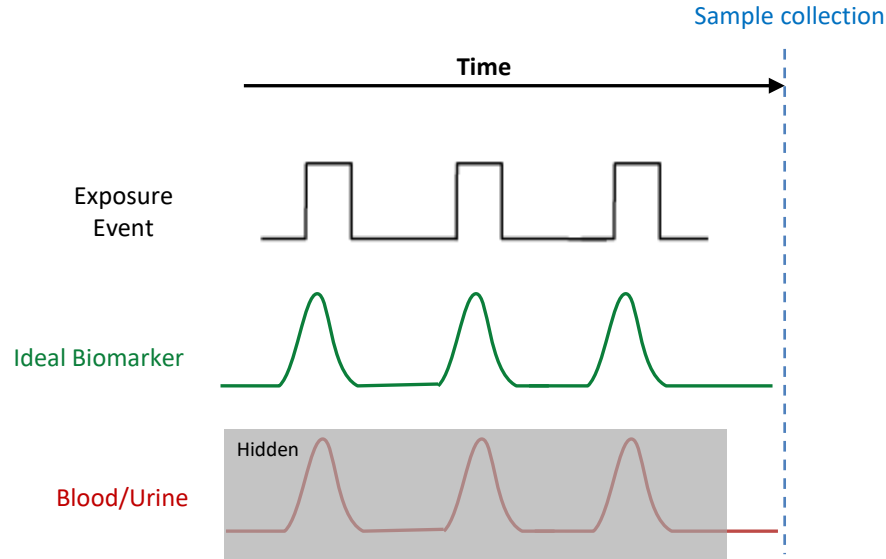
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Conflict of Interest

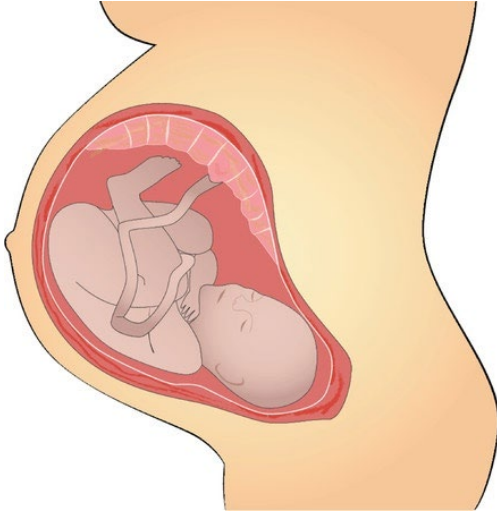
Manish Arora's conflict of interests are listed below and are managed by the Icahn School of Medicine at Mount Sinai in keeping with institutional guidelines.

- Mount Sinai holds patents for technology to be described in this presentation. Dr. Arora is listed as inventor
- Mount Sinai undertakes technology transfers for the technology discussed in this presentation. Dr. Arora is listed as PI on these technology transfers
- Mount Sinai partners with private, academic and not-for-profit groups to undertake commercial/for-profit endeavors (e.g. private labs, start-ups, etc). Dr. Arora is listed as inventor/co-founder of Linus Biotechnology Inc.

Challenges in reconstructing exposures from acute events

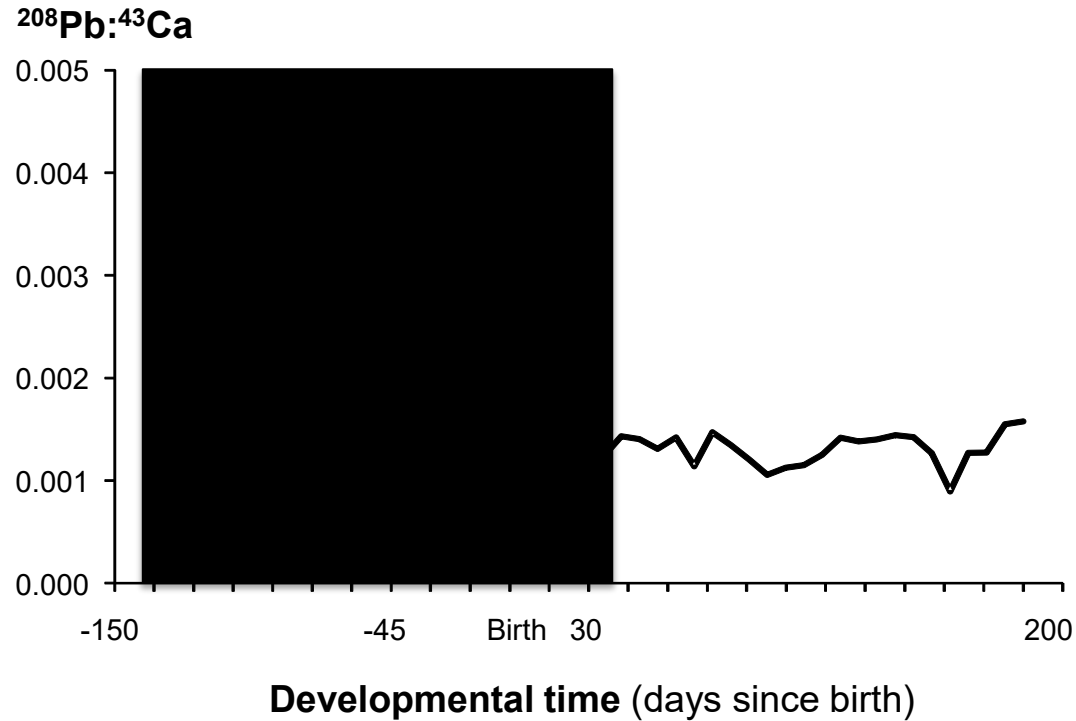


Challenges to estimating prenatal exposure



- Variable partitioning across placenta
- Maternal biomarkers may not reflect fetal exposure
- Not feasible to obtain fetal tissue during pregnancy

Uncovering past lead (Pb) exposure



Tooth biomarkers

Growth rings in a tree



Growth rings in teeth

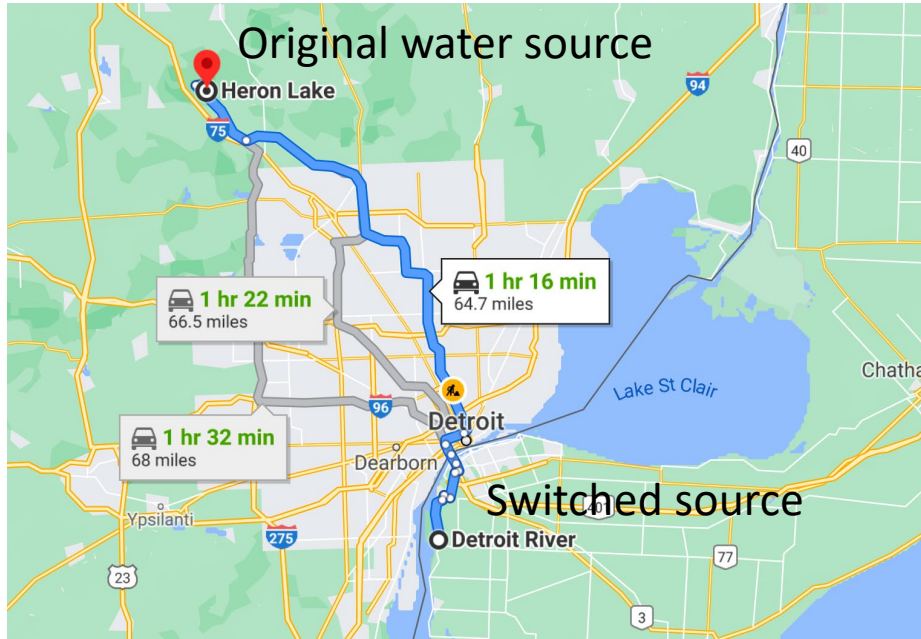


Images:

-Dr. Grissino-Mayer

-wikipedia.org

Case Study: Flint Water Crisis



Dr. Mona Hanna-Attisha

Timeline of Flint Water Crisis



Flint Water Crisis “Ground Zero”

Source: American Chemical Society

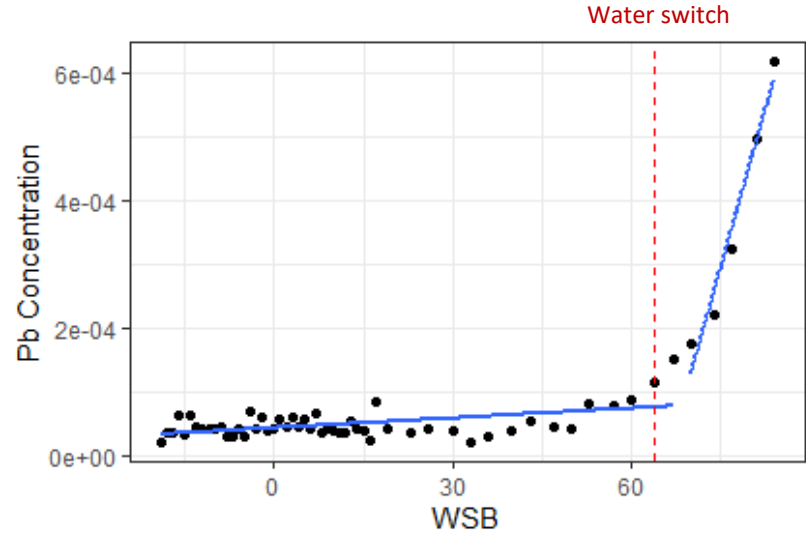
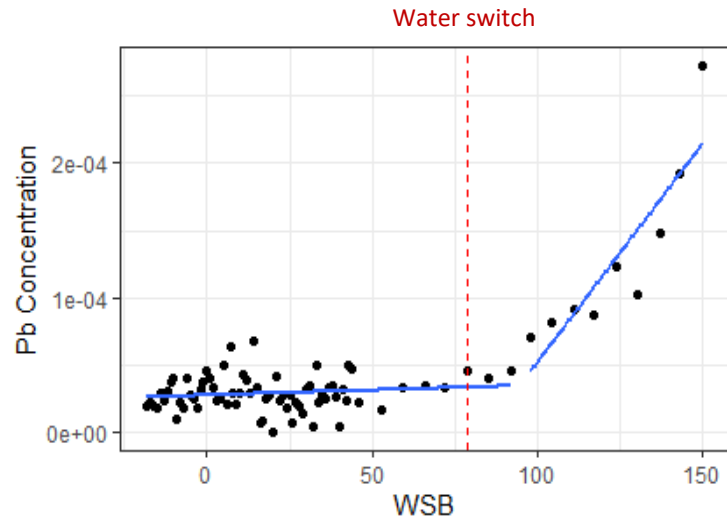
April 25, 2014 – After construction delays, the water source switch to the Flint River is completed. This date is considered the start of the water crisis.

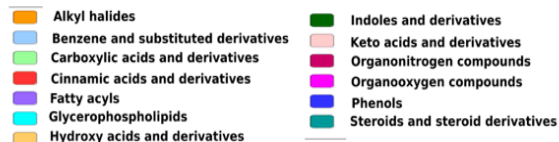
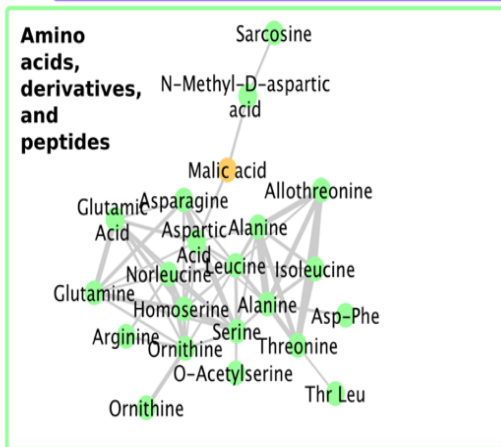
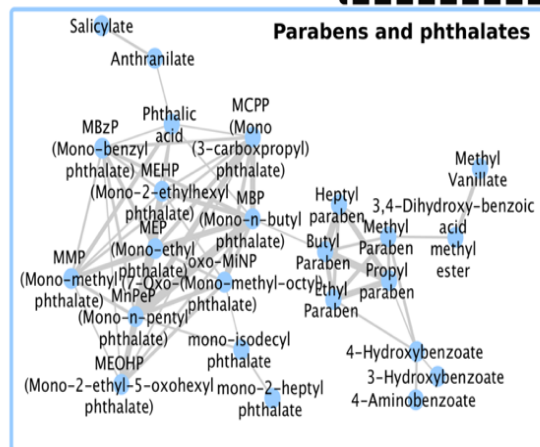
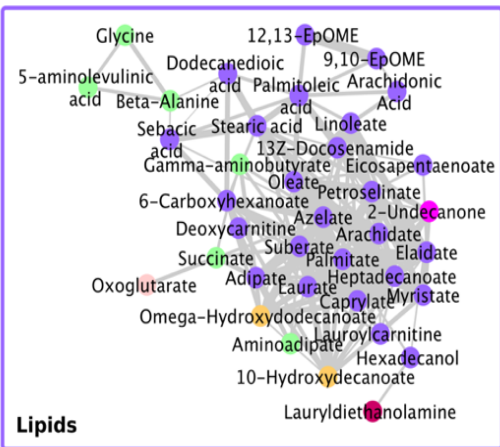
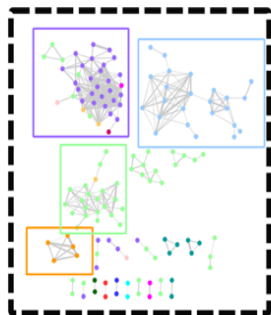
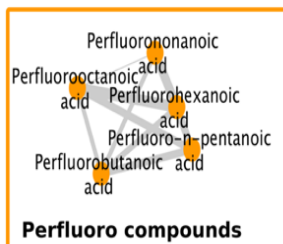
October, 2014 – Flint's General Motors Truck Assembly plant discontinues using Flint tap water because high levels of chlorine are corroding engine parts. Their water supply is reverted to DWSD water source

On December 15, 2015 - Mayor Weaver declared the water issue as a citywide public health state of emergency to prompt help from state and federal officials

Tooth Pb at week-by-week resolution

Preliminary results (not peer reviewed)

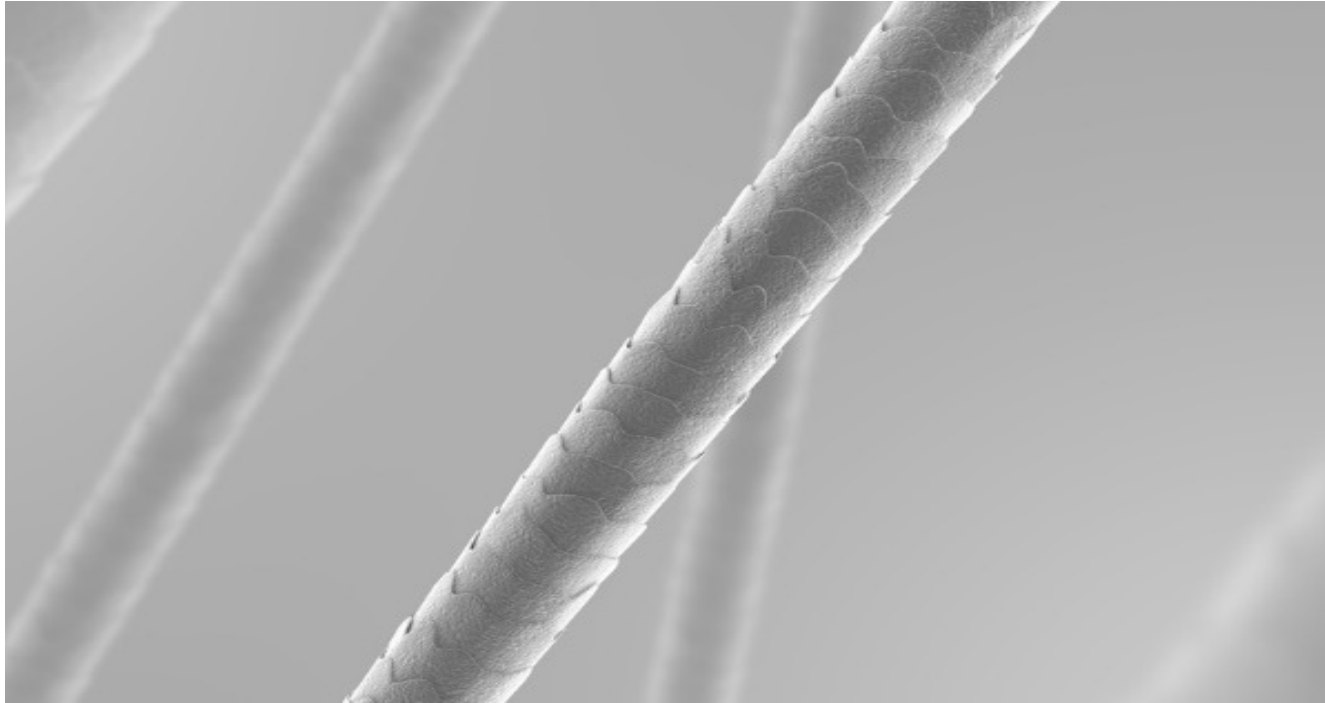




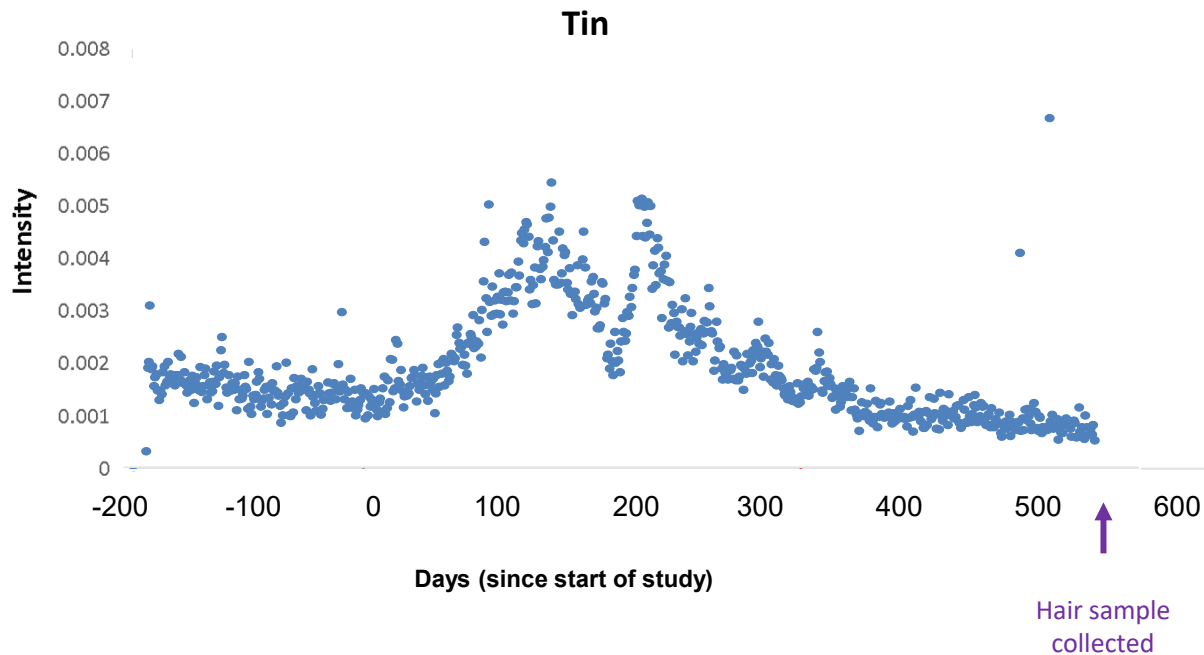
Metals

- Lead
 - Manganese
 - Zinc
 - Magnesium
 - Arsenic
 - Calcium
 - Copper
 - Lithium
 - Cadmium
 - Sulphur
 - Phosphorus
- (=22 metals in total)

Hair biomarkers

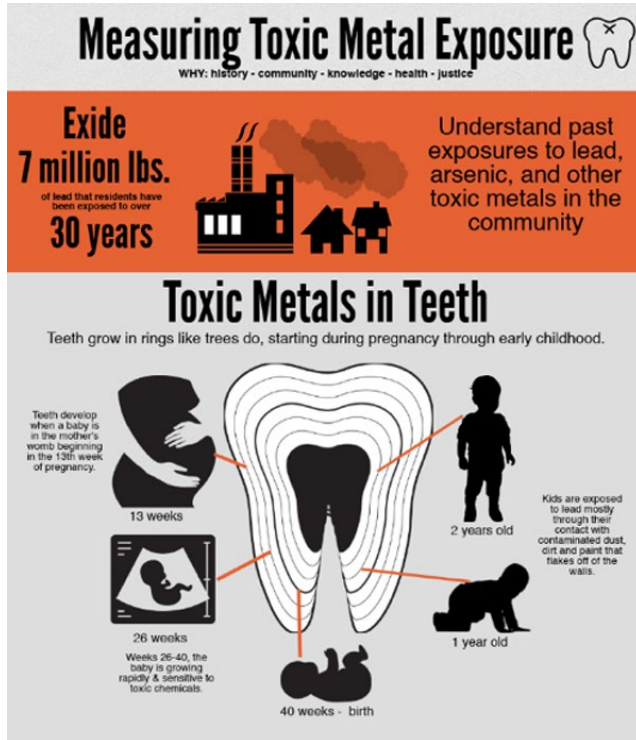


Hair biomarkers from California Fires



Acknowledgements: Drs. D. Bennett, R. Schmidt, UC Davis. Unpublished data

Reporting results to the community



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◀ Contact for more info ▶

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(Supported by National Institute of Environmental Health Sciences (Grants #P30ES007048 and #P01ES023845))

Acknowledgements: Drs. Maida Galvez and Sarah Evans, Mount Sinai

Summary

- Blood and urine biomarkers are very valuable but other biomatrices should also be collected
- Teeth, hair, fingernails/toenails can be collected and stored with no special requirements. Sewage monitoring.
- Measuring exposure using multiple matrices is likely to provide a more complete picture



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