

# LEAD CONTAMINATION

- WHAT IS LEAD**
- bluish-white lustrous metal
  - very soft, highly malleable, ductile
  - poor conductor of electricity
  - very resistant to corrosion but tarnishes upon exposure to air
  - its isotopes are the end products of each of the three series of naturally occurring radioactive elements



## HOW LEAD POISONS

### LEAD INSIDE THE BODY

#### leaves in the waste

**Child 32%** **vs** **Adult 99%**

Inorganic lead is not metabolized by the body, but is instead absorbed or excreted. Lead that is not absorbed in the bones is usually eliminated.

#### the half-life of lead in bones 25-30 years

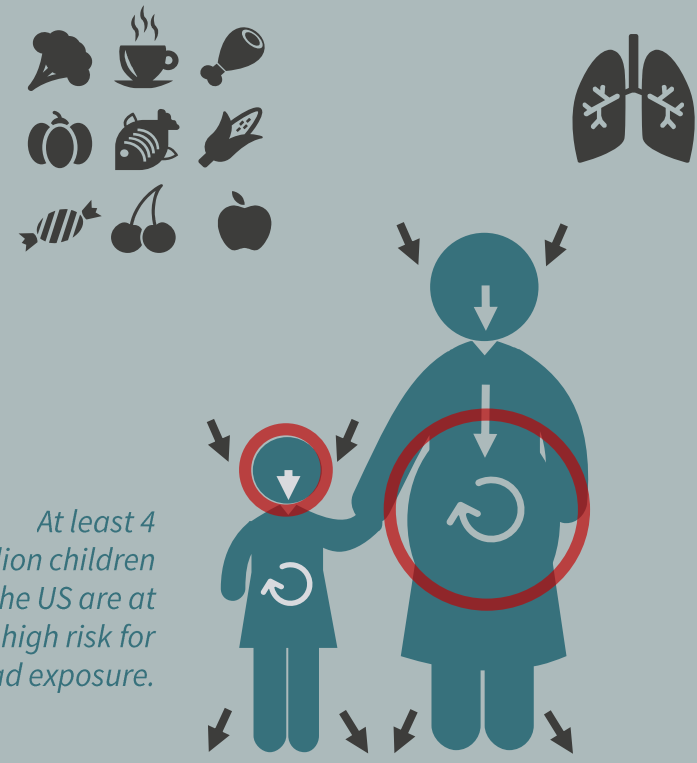
Some lead in bones can re-enter the blood and organs when a bone is broken or with advancing age.

#### human health impacts

- Causing anemia
- Kidney damage & failure
- Damage to the brain & nervous system
- Inhibits the liver's ability to produce proteins
- Decreases sexual drive, increases impotence

### ROUTE OF BODY ENTRY

#### ingestion    inhalation



#### exposure to lead in the womb & lead poisoning in children can have serious mental side effects:

- Impaired attention/Concentration
- Communication & hearing problems
- Slowed growth & development

## LEAD IS CLOSER THAN YOU THINK



- **CASE:** FLINT WATER CRISIS
- **LOCATION:** FLINT, MICHIGAN, USA
- **YEAR:** 2014



Facing budget shortfalls, the city had to switch its water source in 2014 to a nearby river. The river was contaminated with several toxic substances, and was very corrosive. Without treatment, the river water corroded the piping system, which caused the lead in the piping to leach into the city water supply.



The result was elevated lead concentration levels in blood of many city residents. This was of great concern especially for affected children and pregnant women. The problem of drinking water lead contamination is not contained within Flint, however, since an estimated 535,000 children in the US under the age of 5 have elevated blood levels.

## ZA's CURE



- **CASE:** TREATMENT OF IFA USING ZA-TECH
- **LOCATION:** SINGAPORE, CHINA
- **YEAR:** 2015-2017



- Incineration fly ash (IFA) is a type of incineration residue that remains after the combustion of municipal solid waste
- Lead is one of the heavy metals that often fail IFA disposal requirements



- In commercial cases, ZA-T can reduce Pb concentration in fly ash from > 50 ppm to 100 – 1000 times below the applicable disposal limit by TCLP
- ZA-T can also treat Pb in industrial wastewater

Sources

[1] "How to Finally End Lead Poisoning in America". <http://time.com/4286726/lead-poisoning-in-america/>  
 [2] "Health Effects of Lead Poisoning". <http://harvardpublichealthreview.org/lead-poisoning/>  
 [3] "Blood Lead Levels in Children Aged 1-5 Years - United States, 1999-2010". <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm>  
 [4] "How big data and algorithms are slashing the cost of fixing Flint's water crisis". <http://theconversation.com/how-big-data-and-algorithms-are-slashing-the-cost-of-fixing-flints-water-crisis-62525>