

# *An unexplained case of elevated blood lead in a Hispanic child*

Larry K. Lowry, Ph.D.

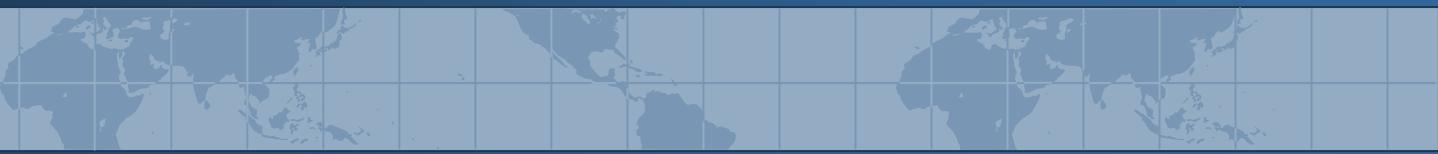
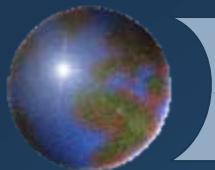
The University of Texas Health Center at Tyler  
Co-director, Southwest Center for Pediatric  
Environmental Health



# *Initial contact*

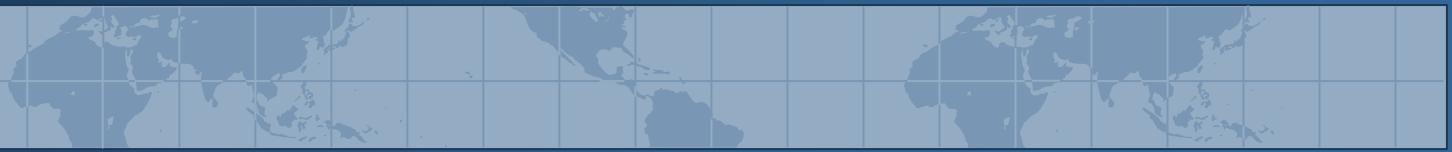
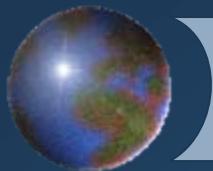


- TDH regional office asked SWCPEH to assist a pediatrician from an east Texas town
  - 11 month old child with a history of elevated blood leads, 36-41 µg/dl over a 4 month period
- Referred to Dr. Cherry for follow-up
  - Discussed case of Hispanic family and sources of lead in the home



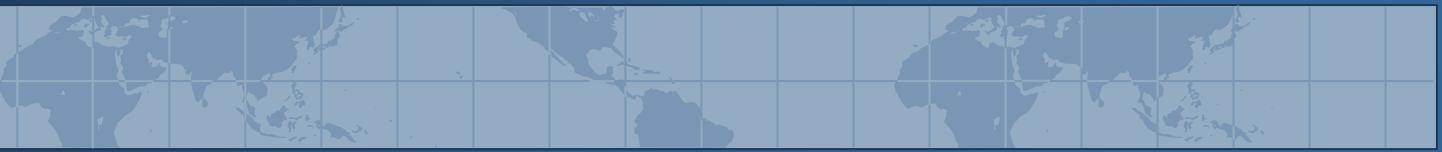
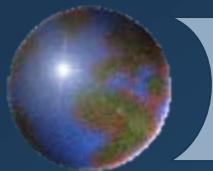
## *Health issues as reported by child's pediatrician*

- Breast-fed child exclusively for 6 months
- Initial blood lead elevated at 6 months
- Solid foods began at 6 months
- Mild anemia, otherwise normal growth and development
- No apparent source of lead based on discussion with mom



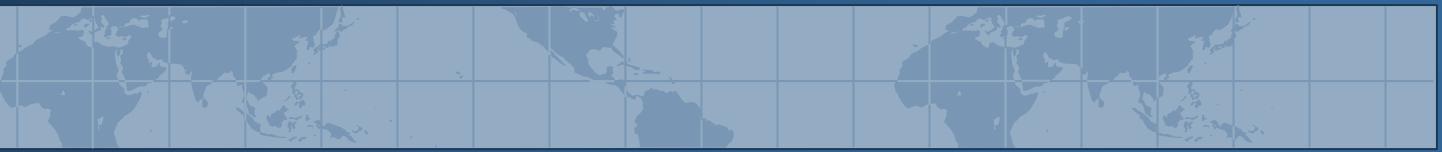
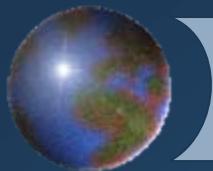
## *Family demographics*

- Mom 2<sup>nd</sup> generation immigrant from Mexico homemaker
  - Blood lead of 14 µg/dL in 3/14/02
- Dad employed as roofer
- Granddad, part-time roofer, caregiver
- 5-year old sister negative for blood lead



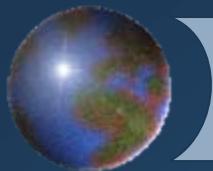
## *Timeline*

- Child born 8/01
- First tested at 6 mo for lead on 3/14/02 (41 µg/dL)
- Repeated testing 3/22/02 (36 µg/dL)
- Oral chelation with Succimer 4/02
- Lead test No. 3, 4/30/02 (40 µg/dL)
- Initial TDH inspection, 5/02
- Repeat testing on 6/12/02 (37 µg/dL)
- SWCPEH contacted, late 7/30/02



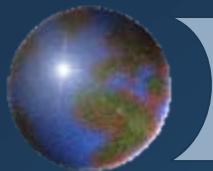
## *Initial visit by TDH*

- First visit by TDH hygienist in May
  - No sources of lead in the home or outside
  - All items on standard 6 page questionnaire tested, all negative
  - Paint, floors, surfaces, dirt outside, mini-blinds, all negative
- Family lived in a mobile home that was immaculately clean



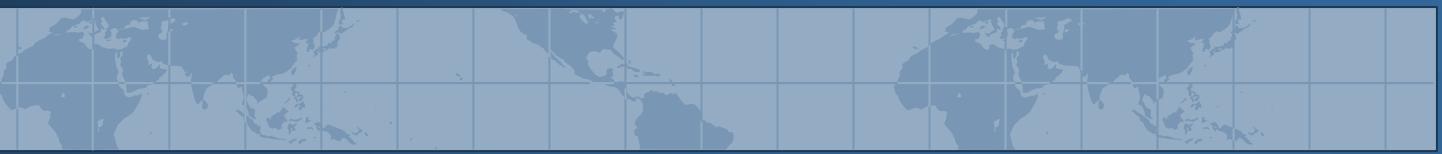
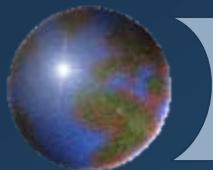
*Found in the back yard by  
garbage can – positive for Pb*





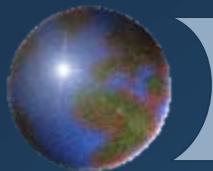
## *Next steps*

- Early 8/02 - Case discussed with Drs. Lowry, Levin, Brady, Huggins, Cherry
  - Talk by phone with family and pediatrician regarding sources of lead and preventive steps (hand washing, high calcium diet, etc)
  - Blood level 9/02/02 – 42 µg/dL
- 10/02/02 – Revisit to home by Drs. Cherry, Brady and Mr. Frambrough, TDH



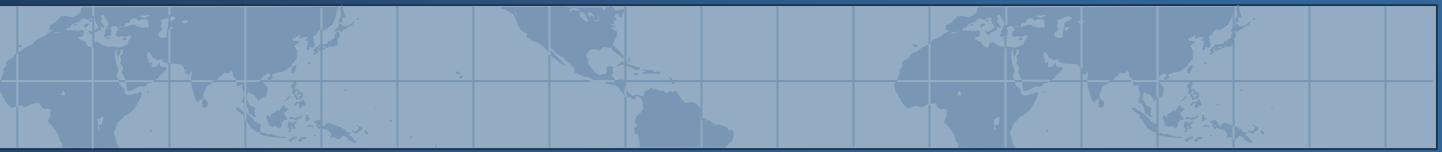
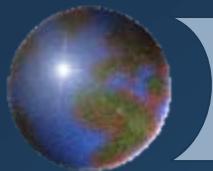
## *October visit by Drs Cherry & Brady*

- Additional family history
- Extensive evaluation of non-traditional sources of lead
  - Toys, crib, tub, foods, pots, cosmetics, ceramics, imported foods & candies, key chains, herbal remedies, folk remedies, lead fishing sinkers, etc.
  - All negative for lead
- Broken pottery and discarded cupola + for Pb



# *Environmental history*

- Cooked beans in Pb-glazed pottery during pregnancy and until 6 mo old
  - Discontinued at 6 mo lead check
- Diet - breast milk only for 6 mo, both breast milk and baby foods until about 1 yr, then table foods, bottled water only
- Mobile home – no lead paint
  - PVC plumbing, city water, no pets, no pacifier, jewelry negative



## *The search for lead*

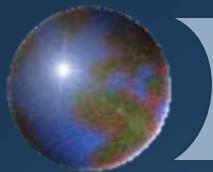
- Additional testing of carpet dust (negative)
- Dr. Brady conversed with granddad, dad and mom in Spanish
  - No specific cultural exposures identified
  - No use of Greta or Azarcon
- Food sources of lead not likely



# *Mexican pottery*



After touching their headボズウル to a set of dishes, Don and Frau Wallace collected other examples of lead-contaminated pottery.



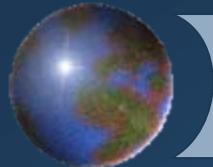
# *Lead-glazed Mexican pottery*

## ● General

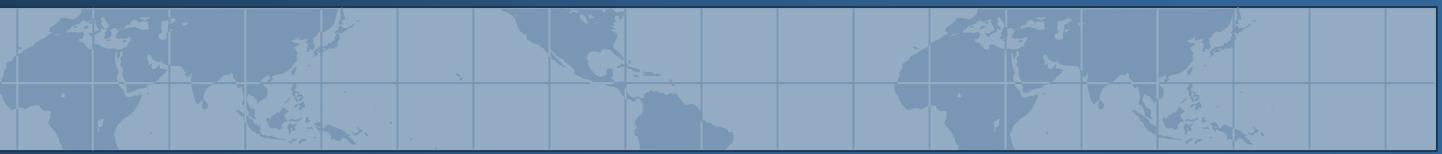
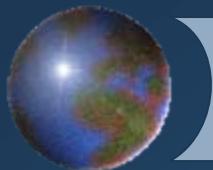
- Traditional use from the old country
- Contain high levels of lead
- Can be leached by acid foods (Salsa)
- Significant source of lead in diet

## ● Specifics

- Broken piece found outside by garbage can
- Not likely direct source of lead in child



## *Additional blood lead data, µg/dL*

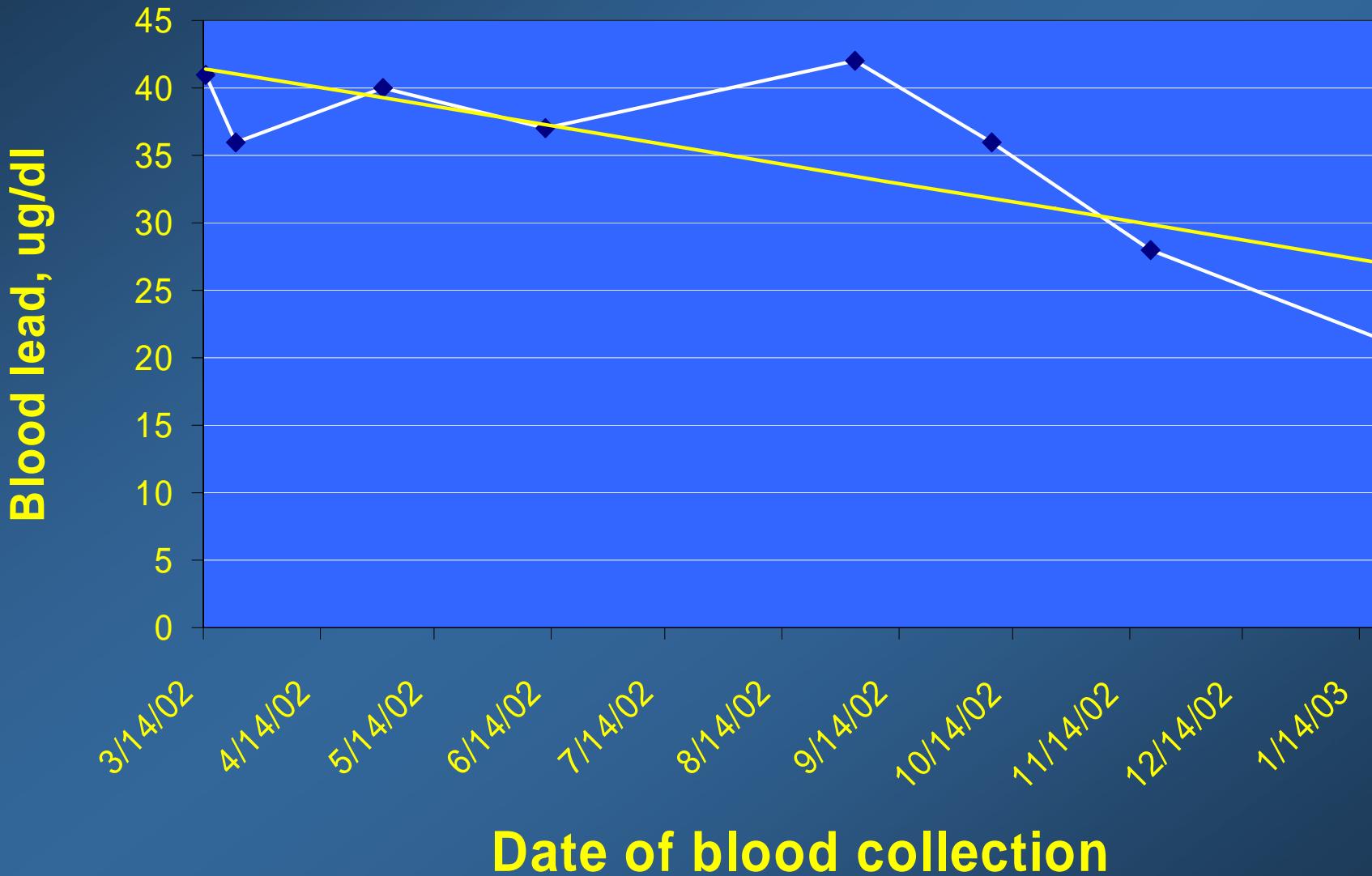


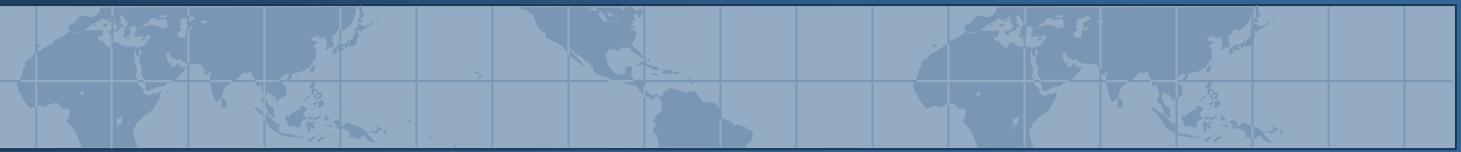
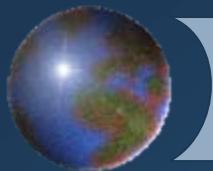
## *Follow up information*

- Mother admits to using Mexican pottery during pregnancy
  - If Pb high, then 5 yo should have elevated PbB also
- Pb in breast milk about 30% of maternal value
  - Not expected to be a significant source of lead
- Reported cases of pica in adults among Hispanics along the border
- Could this be the case here?
- Can we reconstruct estimated blood lead levels in mom and child at birth



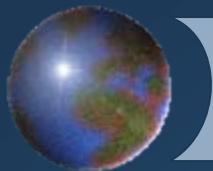
# Blood lead over time





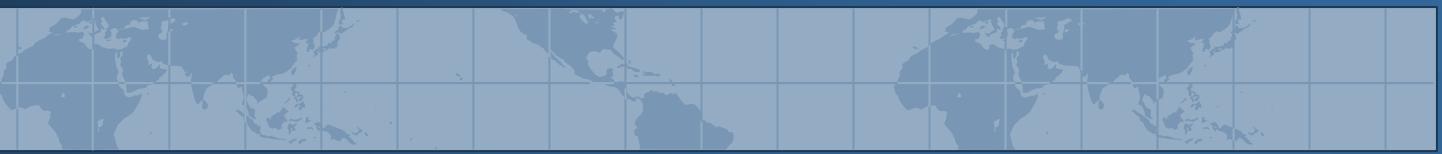
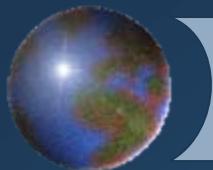
# *Hypothesis*

- Lead exposure occurred in utero from pica activity of mom, and not from cooking in Mexican pottery



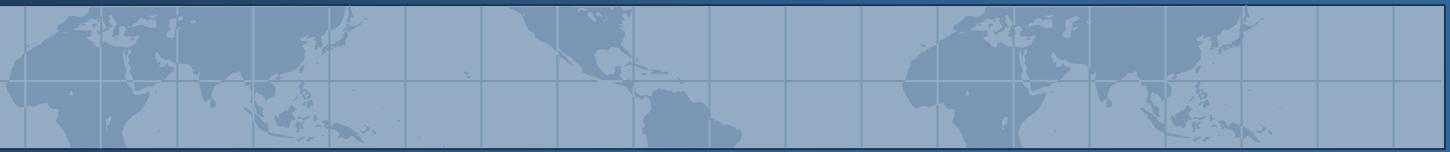
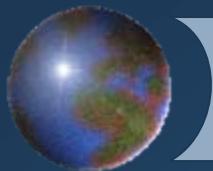
## *Evidence*

- Presence of lead in mom and child links the two to a common source
  - Not likely to be cooking in Mexican pottery
- Lead levels in child slowly dropping for 8 months, from initial age of 6 mo to current age of 14 mo
  - Elimination half-life from blood, 27 days
  - Elimination half-life from bone,  $10^5$  days
- Chelation (compliance not verified) did not lower blood lead in child
  - Expected to lower blood level if major depot in body



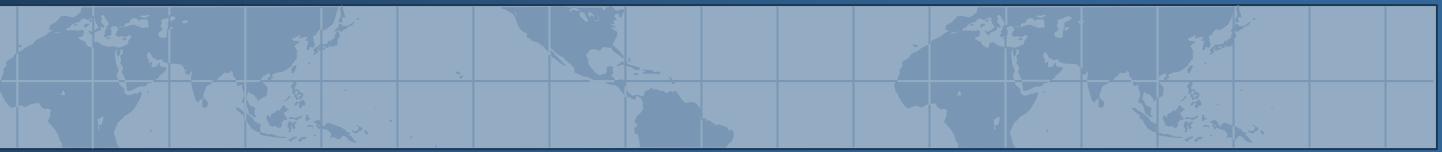
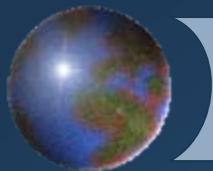
## *Discussion and speculation*

- Mom possibly ingested some chips of pottery (pica) while pregnant, giving her and child high initial dose of lead
  - Rapid elimination of first (blood) compartment during first 6 months
  - Slow elimination from bone over years
- Most likely, 2- compartment elimination, rapid from the blood and slow from the bone
- Lead levels in child and in mom reflect washout of lead from bone stores



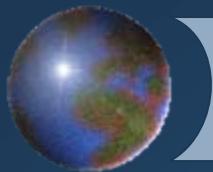
# *Elimination kinetics evidence*

- Elimination kinetics for mom and child similar linking the possible exposure
  - $k_{el}$  for child is 0.07 µg/dL/day
    - Slope of curve with n=7
  - $k_{el}$  for mom is 0.05 µg/dL/day
    - Slope of curve with n=2
- Elimination kinetics imply slow release from bone
- Cannot calculate elimination half-life as it is likely a 2-compartment model and there is no data for the early rapid elimination phase from blood



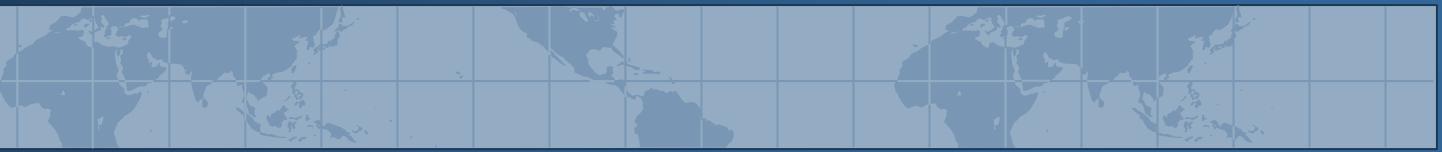
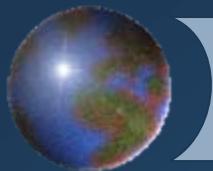
## *Follow-up health surveillance*

- Based on elimination rate, predict drop of PbB of 2-3 µg/dL per month
  - Monitor blood lead quarterly
- Further chelation not indicated
- Abdominal x-rays to rule out GI source, not indicated
- Enroll in early childhood intervention program
  - Monitors neuro-developmental progress to 6<sup>th</sup> grade



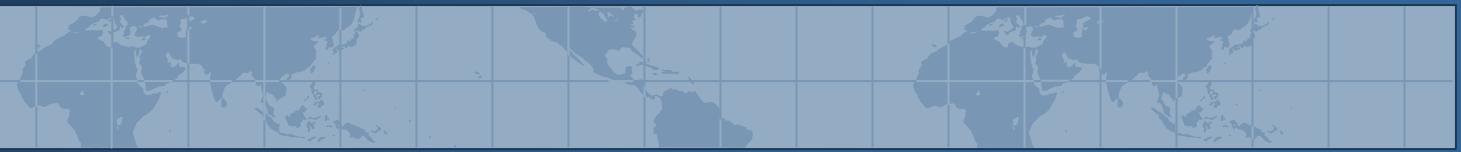
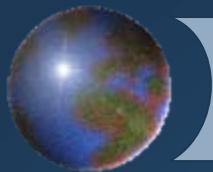
## *CDC recommendations*

- Re-check PbB monthly if PbB > 20 µg/dL
- Surveillance for neurobehavioral effects if PbB remains above 20 µg/dL
- Maintain diet high in Ca, Fe, Vitamin C
- Use dairy products regularly as source of Ca



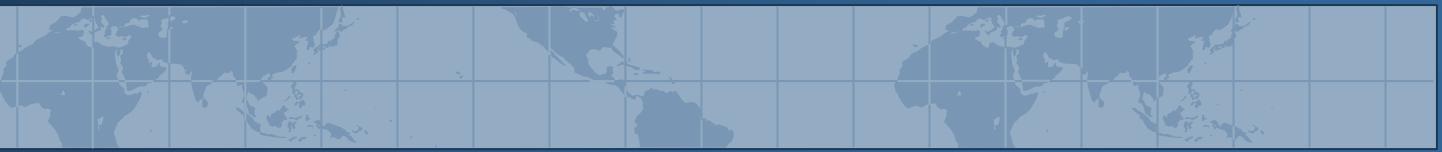
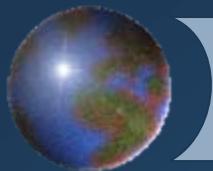
## *What are long term consequences?*

- Children exposed to very high Pb in Idaho in 1970s (PbB 50-150 µg/dL) evaluated in mid 1990s
- Normal PbB, elevated bone lead (XRF), mild neurobehavioral decrement compared to controls



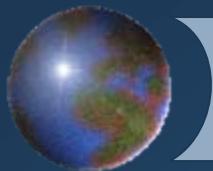
# *Summary*

- Environmental questionnaire essential
- Possible sources of lead must be investigated and tested
- Do not neglect cultural issues
- Keep an open mind
- Its not only paint



# *Epilog*

- Mother admitted to pica behavior with Mexican pottery



## *Thanks to my co-investigators*

- Debra Cherry, MD
- Tim Brady, DO
- Cecil Fambrough, IH