Diagnostic Conundrums

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Objectives

- To recognize signs and symptoms of environmental causes of disease
- To identify environmental factors that cause or exacerbate illness
- To identify resources to aid the health professional faced with environmental issues

Case study #1

- 4 year old boy
- Abdominal pain x 1 day
- 3 loose BM's
- Temp - 99.8 ºF
- Not as playful
- Anorexia
- HR – 120, RR – 26, BP 105/65
- Mildly diaphoretic, MMM
- Diffuse abdominal pain, no rebound, no HSM, stools guiac negative
- Normal cardiac, lung, neurologic exam

Question #1a What is the most likely diagnosis?

A. Gastroenteritis
B. Food poisoning
C. Lead poisoning
D. Organophosphate poisoning

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Case #1 continued ...

- Presented to the ER later that night
- Lethargy
- Increased respiratory secretions
- Mild wheezing
- Increased salivation and pinpoint pupils

Question #1b Now what is the most likely diagnosis?

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B. Food poisoning
C. Lead poisoning
D. Organophosphate poisoning

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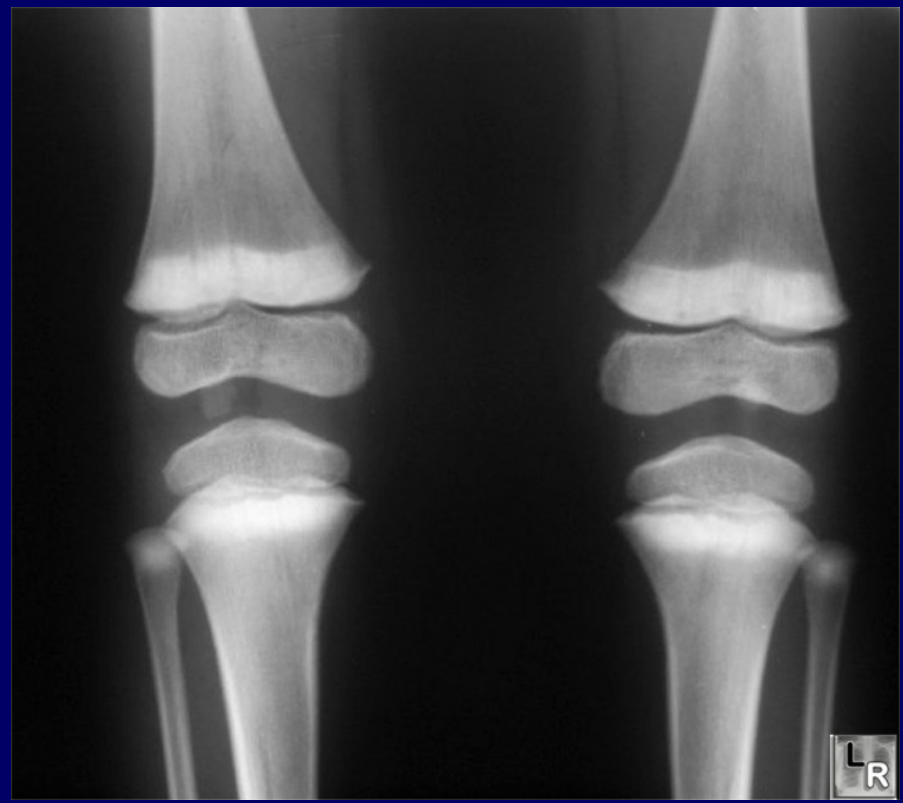
Environmentally influenced health problems are a challenge to diagnose since most present with non-specific symptoms that are commonly missed and very few have been adequately characterized.

Autonomic effects of Organophosphate poisoning

- D = diarrhea
- U = urination
- M = miosis
- B = bronchospasm
- E = emesis
- L = lacrimation
- S = sweating/salivation

Case #2 (Question #2a) You are evaluating a child with hyperactivity and have received the old records from his previous PCP. This x-ray was included. What was the most likely cause of this radiographic abnormality?

A. Lead poisoning
B. Arsenic poisoning
C. Mercury poisoning
D. Carbon monoxide poisoning



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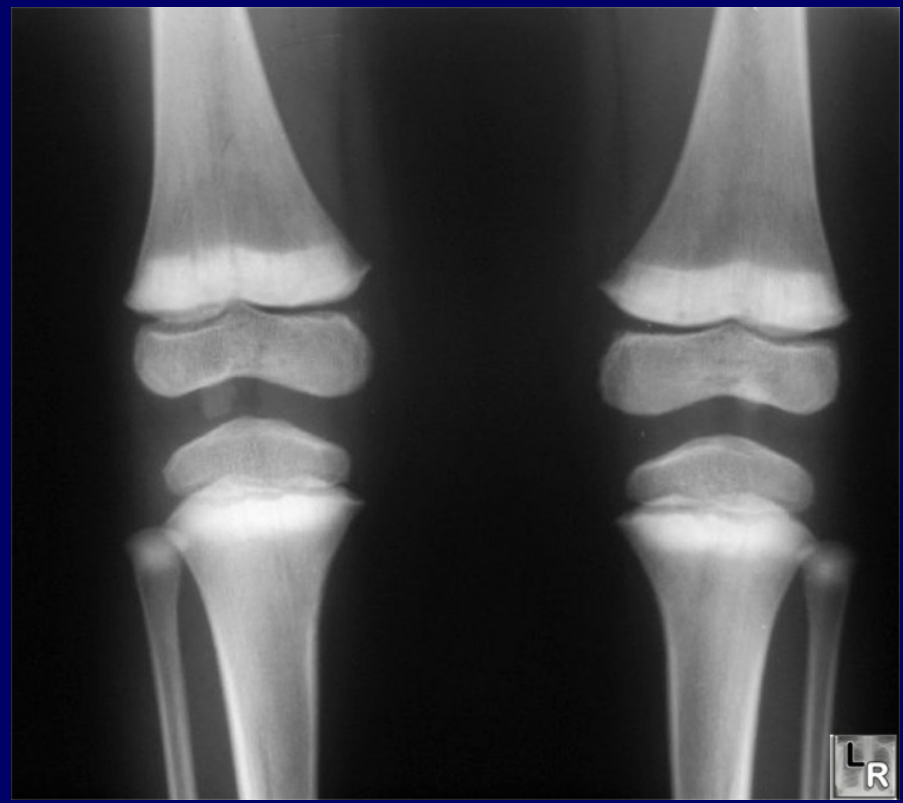
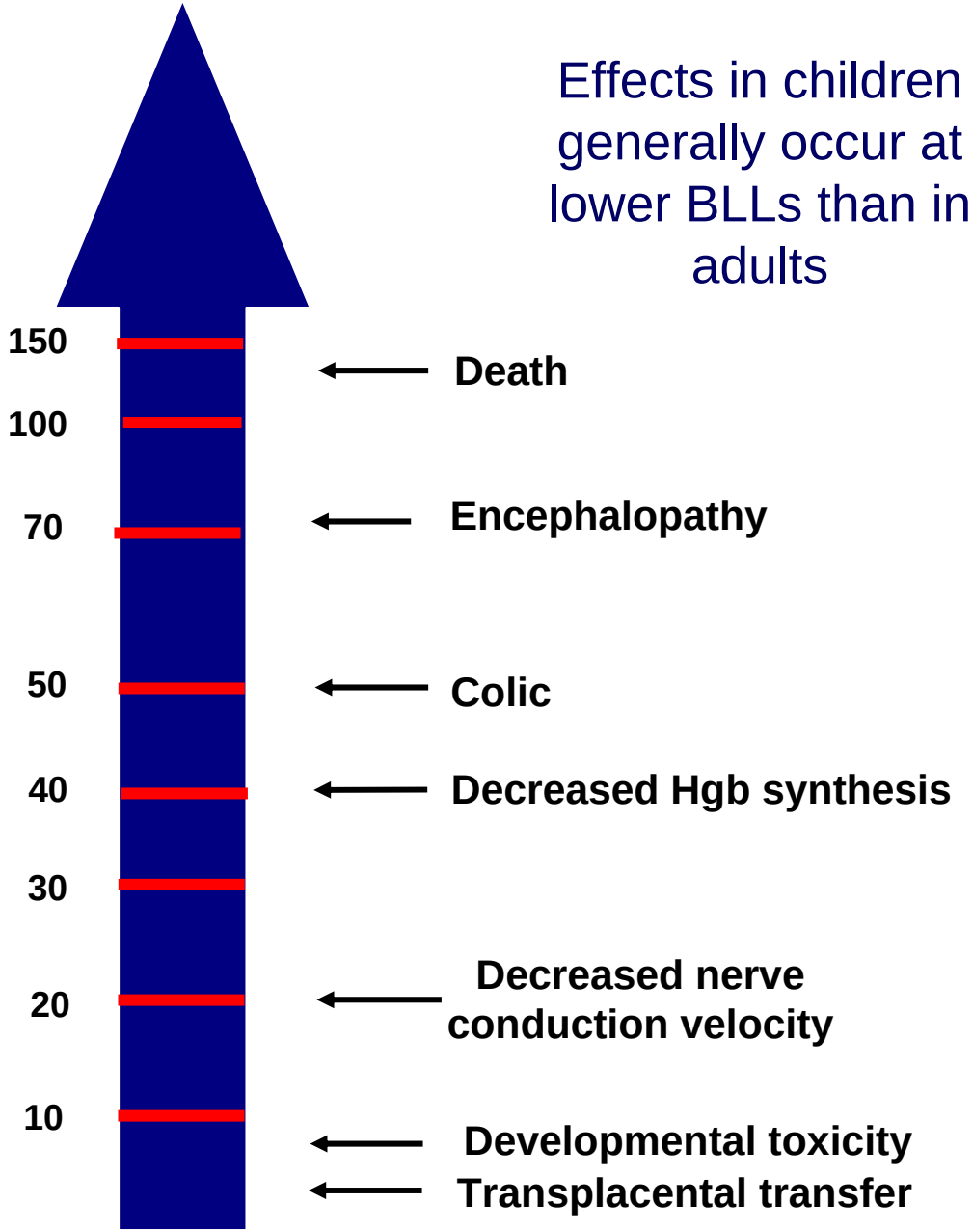


Lowest Reported Effect Levels of Lead in Children (BLLs reported as µg/dL)

Effects in children generally occur at lower BLLs than in adults



Lead poisoning is primarily a sub-clinical disease but with ongoing exposure, severity of symptoms will increase

Source: Preventing Lead Poisoning in Young Children, Centers for Disease Control and Prevention; 1991.

There is currently no known safe threshold for lead exposure in children. The first signs are often subtle neurobehavioral problems.

Case #3

- 16 year old female
- Hx of mild intermittent asthma
- Woke up at 6 am with SOB, cough & chest tightness
- Last attack the previous summer
- Vitals - normal
- No acute distress
- Audible wheezing, no focal findings
- Normal cardiovascular & HEENT exam

Question #3a All of the following are potential triggers for this patient's asthma symptoms EXCEPT:

A. Passive smoke exposure (mother smokes)
B. Poor air quality (Air Quality Index=120)
C. Cat dander (babysitting friend's cat)
D. Exposure to a house built before 1950

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Question #3b Which of the following air pollutants have been linked to pediatric asthma?

A. Ozone
B. Particulate matter
C. Nitrogen dioxide
D. All of the above
E. None of the above

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Air Quality Index

Air Quality Index	*Air Quality Conditions*	*Color Alert*
0-50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy for Sensitive Groups	Orange
151-200	Unhealthy	Red
201-300	Very Unhealthy	Purple
301-500	Hazardous	Maroon

“People who wouldn’t dream of abusing a child think nothing of giving their children and grandchildren an environment that has been abused.”

Richard J. Jackson, MD, MPH, Director, National Center for Environmental Health, Centers for Disease Control and Prevention, USA

Case #4 (Question #4) A 16 year old girl was admitted to the hospital for weakness, weight loss, and foot drop of several months duration. On each of her nails there was a white non-palpable transverse line. What is the diagnosis?

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Symptoms of Arsenic poisoning

- Acute
  - Hematemesis
  - Diarrhea
  - Nausea, vomiting
  - Hypotension
  - QT prolongation
  - Seizures
  - ATN, ARF
  - Garlic odor
- Chronic
  - Diarrhea
  - Peripheral neuropathy
  - Chronic renal insufficiency
  - Hyperkeratosis of the skin
  - Mee’s lines
  - Patchy alopecia

Case #5 (Question #5) You are seeing a 10 year old girl for a camp physical. All of the following have been reported to be toxic effects of DEET in humans EXCEPT:

A. Seizures
B. Mental status changes
C. Urticaria
D. Acute renal failure

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DEET recommendations

- Do not use in children < 2 months
- Use only if needed in children < 5 years
- Use 10% DEET if outside for 1 hour
- Use 23% - 30% DEET if outside for more than 4 hours
- Only apply once a day and wash ASAP
- Avoid products that contain DEET and a sunscreen
- Do not apply to face or hands

Case #6 (Question #6) A 3 year old boy presents with a 4 week history of irritability and fatigue, loss of appetite, a 5 kg weight loss, and diaphoresis. There is no history of fever. He has had severe pain in his wrists and legs. His palms and soles were pruritic, erythematous, and edematous with some desquamation proximally on his hands. His lips are erythematous. He is noted to be hypertensive at 162/100

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Forms of mercury

- Elemental
  - liquid
- Inorganic
  - Mercuric chloride
- Organic
  - Methyl, ethyl, diethyl
  - Phenyl organic groups

Elemental Mercury Poisoning

- “Mad Hatter syndrome”
  - Erethism (red palms, emotional lability, and memory impairment)
  - Tremor
  - Gingivitis
- Renal impairment
- Decreased appetite, restlessness, sweating, hypertension & tachycardia

Symptoms of Acrodynia

- Pink palms and soles
- Red cheeks and nose
- Loss of hair, teeth, and nails
- Tachycardia and hypertension
- Painful extremities
- Insomnia & irritability
- Salivation & sweating

Case #7

- 15 year old
- Late November
- Headaches x 6 weeks
- Dizziness, nausea, difficulty concentrating, & fatigue
- Afebrile
- No previous hx of headaches
- HEADSS exam – no risk factors
- Maternal hx of migraines
- Vital signs normal
- Normal physical exam

Question #7a Which of the following diagnoses is the LEAST LIKELY cause of this patient's symptoms?

A. Depression
B. Chronic fatigue syndrome
C. Migraine or other headache syndrome
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Case #7 continued ...

- History reveals remodeling and move to basement
- House is heated by gas-burning furnace
- Family often also uses wood-burning fireplace
- Venous blood carboxyhemoglobin is 5%
- Gas company finds the concentration of carbon monoxide in the home is normal

Question #7b The most likely diagnosis for this patient now that you have the normal carbon monoxide concentration measured in the home would be:

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Carbon Monoxide poisoning is considered a disease with a thousand faces. Its classic mask – cherry-red lips, cyanosis and retinal hemorrhages – occurs only rarely.

The signs and symptoms of nonlethal carbon monoxide poisoning, especially from intermittent, low-level exposures, are easily mistaken for other illnesses commonly seen in primary care, such as viral illness, depression, chronic fatigue syndrome, migraine or other headaches.

Question #7c All of the following are potential causes of carbon monoxide poisoning EXCEPT:

A. Generators
B. Power boats
C. Fireplaces
D. Espiritismo

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Case #8 (Question #8) A child presenting with acrodynia would display all of the following symptoms EXCEPT:

A. An erthymatous rash
B. Peripheral neuropathy
C. Hypotension
D. Swollen, painful, and red fingers and toes

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Case #9 (Question #9) A mother in your practice has just found out that she is pregnant and has read an article about the dangers of fish consumption and mercury to her unborn child. You recommend all the following EXCEPT:

A. No shark, swordfish, king mackerel or tilefish
B. Up to 12 oz/week of a variety of fish and shellfish low in mercury
C. Up to 12 oz/week of fish caught in local waters if unknown
D. Smaller serving sizes for children

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Case #10 (Question #10) You are seeing a 15 month old child with a lead level of 25 µg/dl. As you begin to take the history, you consider that the most likely source of environmental lead exposure for this child is

A. Folk remedies
B. House dust
C. Lead containing batteries
D. Lead glazed pottery
E. Lead plumbing

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Sources of lead

- Home and day care setting
- Occupational risk factors
- Cultural practices
  - Imported cosmetics
  - Medicinals
- Dietary and other food related factors

Prevention

- Wet mop and wet wipe down windowsills
- Wash toys regularly
- Do not let children play in dirt
- Remove contaminated clothes at work
- Do not use pottery or ceramic ware for food storage
- Use cold tap water and run for 1-2 min

Case #11

- 4 year old boy
- 2-3 days – vomiting
- Decreased energy & oral intake
- Fever
- Hx of developmental delay, microcephaly, slow weight gain
- Afebrile, VSS
- MMM, + tears
- Abdomen soft, NTND, no HSM
- Remainder of exam normal

Case #11 continued . . .

- Returned 2 days later to ER
- Continued vomiting (non-bilious)
- Increased sleepiness
- Temp 38 C, HR 132, RR 28, BP 107/56
- Wt down 0.7 kg
- MM dry
- Decreased bowel sounds
- Decreased subcutaneous tissue
- Normal electrolytes
- BUN/Cr 35 and 0.7
- Received 2 boluses NS

Question #11 What is the most likely diagnosis?

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B. Thallium poisoning
C. Arsenic poisoning
D. Mercury poisoning

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Summary

- Most environmentally influenced health problems present with non-specific symptoms
- Good history taking is the key
- Anticipatory guidance can keep your patients healthy

“We must not, in trying to think about how we can make a big difference, ignore the small daily differences we can make which, over time, add up to big differences that we often cannot foresee.”

Marian Wright Edelman (1939 -)