Testing Blood for Lead

Presenter Information

Summary

Participants will:

- Conduct and analyze simulated blood tests to determine a child's blood lead level.
- Interpret readings and charts to learn that very low levels of lead in blood can be dangerous.

Core Concepts

This kit is designed to engage program participants in learning about the following core concepts:

- Blood testing is necessary to identify lead poisoning.
- Even very low levels of lead can affect young children's brain development.
- There is no safe level of lead in the body.

Presenters may need to provide further information that is appropriate for their program learning goals and for their participants.

Time Required

Approximately 20-30 minutes + discussion time

Each Kit Contains

- 2 **Testing Blood for Lead** kit instructions
- 2 **Lead Poisoning Information Sheets**
- Tube of Santiago's Blood* (simulated)
- Lead Test Paper (simulated)
- **Color Chart for Blood Lead Levels**

**No body fluids are used in Science Take-Out kits. Non-hazardous chemical mixtures are substituted as simulations of these substances.*

Presenter Provides

- One **Testing Blood for Lead** kit for each pair of participants
- Pencil or pen
- Paper towels for clean up

Warning: Choking Hazard

This Science Take-Out kit contains small parts. Do not allow children under the age of seven to have access to any kit components.

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Resources

Presenters may need to provide further information regarding testing blood for lead and lead poisoning that is appropriate for their program learning goals and for their participants. The following sites may be useful for program planning, updates, or background information:

- Centers for Disease Control and Prevention (CDC) – http://www.cdc.gov/nceh/lead/
- Environmental Protection Agency (EPA) – http://www2.epa.gov/lead
- National Institute of Environmental Health Sciences (NIEHS) – http://www.niehs.nih.gov/health/topics/agents/lead/
- Occupational Safety and Health Administration (OSHA) – https://www.osha.gov/SLTC/lead/
- Agency for Toxic Drug & Disease Registry (ASTDR):
    - **Lead Toxicity** – https://www.atsdr.cdc.gov/csem/csem.asp?csem=34&po=1
    - **Toxicological Profile for Lead** - https://www.atsdr.cdc.gov/toxprofiles/TP.asp?id=96&tid=22
    - **ToxFAQs for Lead** – https://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=93&tid=22

Suggested Procedure

1. For each **pair** of participants, you should provide a flat work area, one kit, and the materials described in the "Presenter Provides" section (on page i). Each kit is meant to be shared by a pair of participants and includes two copies of materials, as needed.
2. Most presenters use this kit as part of a larger program on lead poisoning that includes additional information appropriate to their audience. The resources section above provides ideas for follow-up components such as additional information and take-home handouts.
3. We strongly suggest use of the **Testing Blood for Lead** kit as an introductory activity. Ideally, this should be done with participants working in pairs to spark conversation and questions.
4. Explain to participants that they will be working in pairs to complete an introductory activity about testing blood for lead.

5. Explain that this activity will NOT provide all of the information that participants should know or might want to know about testing blood for lead and lead poisoning. The goals for the **Testing Blood for Lead** activity are simply to:
    - Provide an introduction to testing blood for lead and lead poisoning.
    - Give participants an opportunity to talk with each other about how testing blood for lead and lead poisoning relates to them.
    - Encourage participants to think about questions they have about testing blood for lead and lead poisoning.
6. Point out the disclaimer at the bottom of the Science Take-Out kit cover sheet. "The **Testing Blood for Lead** kit is not intended and should not be regarded as medical advice. Always seek the advice of a physician or other qualified health provider with any questions you may have regarding a health problem."
7. Explain that you understand participants may have questions about testing blood for lead and lead poisoning. At the end of the activity, there will be an opportunity to discuss their questions.
8. Hand out one kit for each pair of participants. NOTE: There are 2 copies of the kit instructions and the lead poisoning information sheet in each kit bag.
9. Read the information in the box on page 1. *You may want to inform participants that "Santiago's Blood" and the "Lead Test Paper" in the kit are not real. They are non-hazardous substances substituted as simulations of these substances.*
10. Encourage participants to jot down their questions about lead testing and lead poisoning in the box on page 2 of this this activity. Show them where this box is before they start to work on the activity.
11. Ask participants to work with their partners to read and follow the kit instructions, discuss, and write their answers to the questions in the kit instructions.
12. After all participants have completed their kits, facilitate a group discussion of their answers to questions in the activity. Review the kit's core concepts (see page i).
13. Cleanup: If kits are to be reused, see the *Reusing Testing Blood for Lead kits* information below. If kits will not be reused, then participants should put all kit materials into the kit bag. Discard kit bags in the trash. Participants should wash their hands after working with kit materials.
14. Provide additional information and answer participants' questions as appropriate for the audience and/or local community. Possible discussion questions might include:

- How can you learn more about the effects of lead on human health?
- How can you get your blood or the blood of family members tested?
- How can you protect yourself and members of your family from lead poisoning?

Helpful Hints

- We suggest using this activity as an introduction to the topic. Some participants may be uncomfortable with not having background or "the right answers" before they start. If you are doing the kit as part of a larger program, remind participants that you will provide more information and discuss their questions later; the kit is designed to get people thinking, interacting, and asking questions.
- Encourage participants to ask questions if they have difficulty understanding the activity instructions.
- Listening to the conversations as participants work will give you an opportunity to learn about participants' interests and concerns about lead poisoning.
- You may find some participants are working more slowly and need questions answered or encouragement to move to the next step. If your program time is limited, you might suggest to participants how long to spend on each part of the activity.
- Let them go! For many groups, simply handing out the kits and encouraging the participants to work on their own will stimulate independent work and interactive discussion. For audiences with limited English reading skills, presenters may wish to read each kit step to the group.

Consider using additional Science Take-Out kits related to lead poisoning:

- **Preventing Lead Poisoning** – Test simulated samples of dust, water, soil, and pottery from a child's home to determine the source of lead. Discuss other sources of lead exposure. Discuss ways to prevent lead exposure.
- **Safe City Water?** – Test water from a home and a daycare center for lead. Identify health risks associated with lead in drinking water.
- **A Healthy Home?** – Analyze the results of simulated tests for carbon monoxide, radon, mold, and lead. Explore ways a family can reduce their exposure to hazardous substances.

Reusing *Testing Blood for Lead* kits

Kits may be refilled and reused. Presenters will need to instruct participants on how to handle clean-up and return of the re-usable kit materials. For example, presenters might provide the following information for participants:

Discard	Return to kit
Used Lead Test Paper	• Container for Lead Test Paper • Tube of "Santiago's Blood" • **Color Chart for Blood Lead Levels** • 2 **Lead Poisoning Information** sheets

Note: It is <u>not</u> necessary to rinse or wash the "Santiago's Blood" tubes after use. Simply ask participants to close the lids on the tubes and discard the used Lead Test Paper strips.

If you want participants to keep copies of any handouts from the kit, you will need to make additional copies of the handouts before you re-use the kits.

Refills for ***Testing Blood for Lead*** kits are available at www.sciencetakeout.com. The **10 Kit Refill Pack** includes the following materials:

- Instructions for refilling kits
- 15 mL of "Santiago's Blood" (simulated)
- Transfer pipet for refilling tubes
- 20 strips of "Lead Test Paper" (simulated)

Kit Contents Quick Guide

Color Chart for Blood Lead Levels (µg lead/dL blood)

Effects on Children's Health	0	5	10	15	20	30	40	50	60
Learning and behavior problems									
Weakened bones									
Digestive system problems									
Kidney damage									

There is no known level of lead that is safe in the body.

Lead Test Paper

Lead Poisoning Information Sheet

Lead is a highly toxic metal. There is no level of lead that is safe in the body.

- Even very low levels (tiny amounts) of lead in a person's body can cause health problems.
- Lead enters your body when you eat or drink things that contain lead or breathe in dust that contains lead.
- Once lead enters the body, it stays in the body for a long time.
- Lead poisoning may result from exposure to tiny amounts of lead over a long period of time or a higher amount of lead over a short time.
- Lead is most dangerous for babies and young children, but adults also may be harmed by lead.

Lead is very toxic to children because their brains and bones are still developing.

- Children under the age of 6 years old are most at risk for the harmful effects of lead.
- Even very low levels of lead in blood can decrease a child's ability to learn, their ability to pay attention, and their success in school.
- Young children can eat, drink or breathe dust that is contaminated with lead because they crawl and play on the ground, and they often put their hands or toys in their mouths.
- It is very important to protect children from exposure to lead so they will be healthy as they get older.

Blood testing for lead is very important because most people do not show noticeable symptoms of lead poisoning.

- The CDC (Centers for Disease Control and Prevention) has determined that people with 5µg/dL (micrograms per deciliter) or more of lead in their blood should take action to reduce their lead exposure.
- The level of lead in the body will very slowly decrease without treatment, but only if the source of lead exposure is removed.

Safety Information for Presenters

Parental or Adult Supervision Required

This kit should be used only under the supervision of an adult who is committed to ensuring that the safety precautions below, and in the specific laboratory activity, are followed.

Warning: Choking and Chemical Hazard

Science Take-Out kits contain small parts that could pose a choking hazard and chemicals that could be hazardous if ingested. Do not allow children under the age of seven to have access to any kit components. Safety Data Sheets (SDS) provide specific safety information regarding the chemical contents of the kits. SDS information for each kit is provided in the accompanying presenter instructions.

Chemicals Used in Science Take-Out Kits

Every effort has been made to reduce the use of hazardous chemicals in Science Take-Out kits. Most kits contain common household chemicals or chemicals that pose little or no risk.

Safety Goggles Recommended

We encourage participants to adopt safe lab practices, and wear safety goggles when performing laboratory activities involving chemicals. Safety goggles are not provided in Science Take-Out kits. They may be purchased online or from a hardware store.

General Safety Precautions

1. Work in a clean, uncluttered area. Cover the work area to protect the work surface.
2. Read and follow all instructions carefully.
3. Pay particular attention to following the specific safety precautions included in the kit instructions.
4. Do not use the contents of this kit for any other purpose beyond those described in the kit instructions.
5. Do not leave kits or kit parts where they could be used inappropriately by others.
6. Never taste or ingest any chemicals provided in the kit.
7. Do not eat, drink, or apply make-up or contact lenses while performing kit activities that use chemicals.
8. Wash your hands after performing kit activities that use chemicals.
9. Chemicals used in Science Take-Out experiments may stain or damage skin, clothing or work surfaces. If spills occur, wash the area immediately and thoroughly.
10. Kits may be refilled and reused. Kit components that are not reused may be discarded in regular trash.

No body fluids from humans or animals are used in Science Take-Out kits. Non-hazardous chemical mixtures are substituted as simulations of these substances.

Testing Blood for Lead

Patient: Santiago Cruz **Age: 7 years**

Santiago's mother brought him to the neighborhood health clinic. She is worried because he has become irritable and is not eating well. He is also having problems with learning and behavior in school. Santiago's teacher reports that he is overly active and he does not pay attention to his work in class.

The doctor at the clinic knows that a number of children in the neighborhood have elevated blood lead levels. He suspects that Santiago might be suffering from lead poisoning. The doctor wants you to test a sample of Santiago's blood to determine the lead level in his blood.

1. Dip one end of the Lead Test Paper into the sample of Santiago's blood for 2 seconds.

2. Immediately match the color of the Lead Test Paper with one of the colored squares on the **Color Chart for Blood Lead Levels**.

3. What is the level of lead in Santiago's blood?

   _____ µg lead/dL (micrograms of lead per deciliter of blood)

4. Look at the **Effects on Children's Health** part of the chart. What kinds of problems may result from Santiago's blood lead level?

Read the **Lead Poisoning Information Sheet** in your kit and then answer questions 5-7 below.

5. Why is it difficult to diagnose lead poisoning without testing blood lead levels?

6. Why is it dangerous for children to be exposed to lead?

7. Where might the lead that poisoned Santiago have come from?

What questions do <u>you</u> have about testing blood for lead and lead poisoning?

Section 1 Chemical Product and Company Information

Science Take-Out
80 Office Park Way
Pittsford, NY 14534
(585)764-5400

CHEMTREC 24 Hour Emergency
Phone Number (800) 424-9300
For laboratory use only. Not for drug, food or household use

Product	Buffer Solution pH8
Synonyms	"Santiago's Blood" (simulated)

Section 2 Hazards Identification

This substance or mixture has not been classified at this time according to the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals.

Signal word: WARNING
Pictograms: None required
Target organs: None known

GHS Classification:
Skin Irritation (Category 3)
Eye irritation (Category 2B)

GHS Label information: **Hazard statement(s):**
H316: Causes minor skin irritation.
H320: Causes eye irritation.

Precautionary statement(s):

P264: Wash hands thoroughly after handling.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P332+P313: If skin irritation occurs: Get medical attention.

P337+P313: If eye irritation persists: Get medical attention.

Ca Prop 65 - This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	EINECS
Water	7732-18-5	99.09%	231-791-2
Potassium phosphate, monobasic	7778-77-0	0.72%	231-913-4
Sodium hydroxide	1310-73-2	0.19%	215-185-5

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN ABSORPTION: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

Suitable Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Protective Actions for Fire-fighters: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool.

Specific Hazards: During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Section 6 Accidental Release Measures

Personal Precautions: Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation.

Environmental Precautions: Avoid runoff into storm sewers and ditches which lead to waterways.

Containment and Cleanup: Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling and Storage

Precautions for Safe Handling: Read label on container before using. Do not wear contact lenses when working with chemicals. Keep out of reach of children. Avoid contact with eyes, skin and clothing. Do not inhale vapors, spray or mist. Use with adequate ventilation. Avoid ingestion. Wash thoroughly after handling. Remove and wash clothing before reuse.

Conditions for Safe Storage: Store in a cool, well-ventilated area away from incompatible substances.

Section 8 Exposure controls / Personal Protection

Exposure Limits:

Chemical Name	ACGIH (TLV)	OSHA (PEL)	NIOSH (REL)
Potassium phosphate	None established	None established	None established

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If misty conditions prevail, work in fume hood or wear a NIOSH/MSHA approved respirator.

Section 9 Physical and Chemical Properties

Appearance: Clear, colorless liquid.
Odor: No odor.
Odor threshold: Data not available.
pH: 8.0
Melting/Freezing point: Approx. 0°C (32°F) (water)
Boiling point: Approx. 100°C (212°F) (water)
Flash point: Data not available

Evaporation rate (Water = 1): <1
Flammability (solid/gas): Data not available.
Explosion limits: Lower/Upper: Data not available
Vapor pressure (mm Hg): 14 (water)
Vapor density (Air = 1): 0.7 (water)
Relative density (Specific gravity): Approx. 1.0 (water)
Solubility(ies): Complete in water.

Partition coefficient: Data not available
Auto-ignition temp.: Data not available
Decomposition temp.: Data not available
Viscosity: Data not available.
Molecular formula: Mixture
Molecular weight: Mixture

Section 10 Stability and Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures which cause evaporation.
Incompatibilities with other materials: Acids, alkalies, and air will change the buffer's ability.
Hazardous decomposition products: Thermal decomposition will yield phosphates and sodium oxide and/or hydroxides.

Section 11 Toxicological Information

Acute toxicity: Oral-rat LD50: 3,200 mg/kg [Potassium phosphate]
Serious eye damage/irritation: Data not available
Germ cell mutagenicity: Data not available

Skin corrosion/irritation: Data not available
Respiratory or skin sensitization: Data not available
Carcinogenity: Data not available

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity: Data not available
Aspiration hazard: Data not available

STOT-single exposure: Data not available
STOT-repeated exposure: Data not available

Potential health effects:
Inhalation: May be harmful if inhaled.
Ingestion: May be harmful if swallowed.
Skin: May cause mild irritation.
Eyes: May cause mild irritation.

Signs and symptoms of exposure: To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.
Additional information: RTECS #: TC661500 [Potassium phosphate]

Section 12 Ecological Information

Toxicity to fish: No data available
Toxicity to daphnia and other aquatic invertebrates: No data available
Toxicity to algae: No data available
Persistence and degradability: No data available
Mobility in soil: No data available
Bioaccumulative potential: No data available
PBT and vPvB assessment: No data available
Other adverse effects: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: Not applicable
Hazard class: Not applicable
Exceptions: Not applicable
Shipping name: Not Regulated
Packing group: Not applicable
2012 ERG Guide # Not applicable
Reportable Quantity: No
Marine pollutant: No

Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.

Component	TSCA	CERLCA (RQ)	RCRA code	DSL	NDSL	WHMIS Classification
Potassium phosphate	Listed	Not Listed	Not Listed	Listed	Not Listed	Uncontrolled Product
Sodium hydroxide	Listed	1,000 lbs (454 kg)	D002	Listed	Not Listed	E

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees.
NTP: National Toxicology Program, IARC: International Agency for Research on Cancer, OSHA: Occupational Safety and Health Administration, STOT: Specific Target Organ Toxicity, SE: Single Exposure, RE: Repeated Exposure, ERG: Emergency Response Guidebook.

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