



RECOMMENDED PROCEDURE FOR THE COLLECTION
OF CAPILLARY BLOOD LEAD SPECIMENS

Chemical Emergency Section
Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive
PO Box 7996
Madison WI 53707-7996

January 2024



Current Centers for Disease Control & Prevention (CDC) and American Academy of Pediatrics statements recommend that many children should be screened for lead poisoning. Lead poisoned children are generally asymptomatic, and detection depends on accurate laboratory measurement of blood lead concentrations. The ubiquity of lead in the environment however, makes the risk of contaminating these specimens extremely high. Contaminated specimens (false positives) necessitate costly follow-up testing, and can cause undue anxiety among affected families. Therefore, great care must be taken when collecting specimens to ensure valid results.

The following procedure provides comprehensive instructions for the collection of valid capillary blood lead specimens. Please become thoroughly familiar with these procedures before collecting any patient specimens. All steps should be followed as stated. Pay particular attention to the steps pertaining to cleaning of the hand and handling of the Multivette components, since these are the primary sources of specimen contamination.

Blood lead specimens should preferably be collected by venipuncture, using normal procedures and evacuated tubes preserved with EDTA or heparin. Venipuncture specimens are superior to capillary specimens because the risk of environmental contamination is minimal and a larger volume of blood is obtained for analysis. For this reason, venipuncture should be utilized for specimen collection whenever possible. **Capillary specimen collection should be used only for infants and young children, or when venipuncture specimens cannot be obtained.**

Capillary collection materials are provided in kit form by the Wisconsin State Laboratory of Hygiene (WSLH), and contain materials to test 100 children. Kits can be requested from the WSLH by calling (608) 224-6252 or completing the form at the following link: <http://www.slh.wisc.edu/clinical/metals/test-kit/test-kit-order-form>. The kit should be identified as Kit #6 - the capillary blood lead collection kit. A list of materials provided in the kit is found in the next section.

For information about the collection procedure, interpretation of results, or other lead-related questions, contact the Chemical Response Section of the WSLH at (608) 224-6252 or clinicalmetals@slh.wisc.edu.

A. LIST OF ITEMS INCLUDED IN WSLH KIT #6

1. Multivettes with Caps
2. Safety Lancets
3. Alcohol Swabs
4. Sterile Gauze Pads
5. Adhesive Bandages
6. Labeling Tape
7. Absorbent Material
8. Reclosable Plastic Bags or Glue-Sealed Biohazard Sample Bags
9. "Exempt Human Specimen" Labels
10. Address Mailing Labels
11. Styrofoam Shipping Containers
12. Clinical Metals Submission Forms
13. Recommended Procedure for the Collection of Capillary Blood Lead Specimens
14. Abbreviated Procedure for the Collection of Capillary Blood Lead Specimens

In the event that you run out of individual materials supplied in the collection kit, **do not** substitute other materials without first contacting the WSLH. Individual kit components can be obtained by filling in the on-line order form or contacting the Chemical Response Section via the information above. The Multivettes have an expiration date since they contain EDTA to prevent clotting. If your Multivettes have expired, discard in trash and request more from the WSLH.

OTHER NEEDED MATERIALS

1. Soap or sanitizer gel (minimum 70% alcohol)
2. Examination gloves
3. Trash bags suitable for medical waste (should be clearly identified as such)
4. Sharps container

B. PREPARING FOR BLOOD COLLECTION

All personnel engaging in specimen collection should be well-trained and thoroughly familiar with the collection procedure. The skill with which any collection procedure is performed will greatly influence overall specimen quality. All needed equipment should be available and within easy reach. The environment should be clean, secure, and as non-threatening to the child as possible. Because dust often contains lead, the materials should be stored at room temperature and covered or in some way that will minimize potential dustfall. Any necessary consent must be obtained

prior to beginning the collection procedure, and the procedure itself should be explained to the child and the parent or guardian. Throughout the procedure, used materials should be discarded into appropriate waste containers (i.e. suitable for medical waste) immediately following use. Universal precautions for the prevention of transmission of infectious disease should be strictly adhered to any time the potential for exposure to blood or other body fluids exists.

The following steps should be performed with clean, well washed hands. Label the Multivette with the child's name and a second identifier (i.e. date of birth, age), using the label tape supplied. Most ink and felt tip pens work well. This labeling can also be done at a later time, but you may find it easier to manipulate the tape without gloved hands. Take care so that the label adhesive is not exposed, otherwise further handling of the Multivette may be difficult. Avoid contact between the capillary tip and environmental surfaces to minimize potential contamination. Additional information on the handling of these components can be found in the FILLING THE MULTIVETTE section.

STEPWISE PROCEDURE FOR INITIAL PREPARATION

1. Store materials at room temperature in a dust-free environment.
2. Ensure Multivette has not expired.
3. Arrange materials for easy access.
4. Obtain any necessary consent.
5. Label the Multivette with the patient's name and second identifier.

C. PREPARING THE FINGER FOR PUNCTURE

Examination gloves should be worn by collection personnel any time the potential for contact with blood exists. Many gloves are coated with powder. If present, powder should be rinsed off of the gloves with tap water, because glove powder has been reported to cause contamination. It is easiest to do this while wearing the gloves.

The child's hands should be thoroughly washed with soap and then dried using a clean, low lint towel. The use of warm water during washing will facilitate blood flow. If water is unavailable, sanitizer gel (minimum 70% alcohol) can be used without water. Plain, unprinted towels are preferred. A brush can be used for cleaning if desired, and use of a brush during washing can facilitate circulation in the finger. **Once washed, the finger must not be allowed to come into contact with any surface, including the child's other fingers.** The finger to be punctured (often the middle finger) must be free of any visible infection or wound, and should be massaged to increase circulation prior to puncturing with the lancet. This can be accomplished during or after washing.

STEPWISE PROCEDURE FOR FINGER PREPARATION

1. Select examination gloves. If gloves are not powder-free, rinse to remove any powder from the gloves.
2. Thoroughly wash child's hands with soap and warm water, then dry using appropriate toweling.
3. Using thumb and index finger, grasp the finger that has been selected for puncture.
4. Gently massage the fleshy portion of the finger, if not done during washing.
5. Using the alcohol swab, clean the ball or pad of the finger to be punctured. Dry the fingertip using the sterile gauze or cotton ball.

D. PUNCTURE OF THE FINGER

When the finger is ready for puncture, the actual puncture and subsequent steps of forming a drop of blood and filling the collection container should be performed quickly and efficiently, as any delay can make collection more difficult (e.g. clotting of blood, resisting child, etc.), and can also compromise the quality of the specimen for analysis.

The lancets included in the collection kit should make a puncture of sufficient depth to ensure adequate blood flow. The lancets also have a lip to control the depth of the puncture. The puncture should be made swiftly and cleanly, to minimize any anxiety the child might experience. **NOTE: Capillary specimen collection is not recommended for children less than one year of age. Great care must be taken if attempting a specimen collection in younger infants, due to the risk of bone injury (CLSI standard GP42).**

The site of the puncture should be slightly lateral of the ball of the finger. This region is generally less calloused, improving the ease of puncture, and may make for a slightly less painful puncture. The initial drop of blood contains tissue fluids which will produce inaccurate results, and should be removed using the sterile gauze or cotton ball. The orientation of the puncture site is a matter of personal preference for the collector, but **the puncture site should face downward** (fingernail facing up) to facilitate collection. The lancet should be discarded immediately following puncture.

Blood which runs down the finger or around the fingernail area is no longer suitable for collection. Blood flow may be enhanced if the punctured finger is kept lower than the heart. If blood flow is not adequate, it can be promoted by gently massaging the base of the finger toward the tip, then pressing firmly at the joint of the punctured finger nearest the tip, (restricting blood flow out of the fingertip) and gently squeezing the sides of the fingertip. Excessive squeezing or

“milking” the fingertip will cause the expression of tissue fluid, leading to inaccurate results.

STEP-WISE PROCEDURE FOR PUNCTURE AND BLOOD DROP FORMATION

1. Grasping the finger, quickly puncture with a sterile lancet, in a position slightly lateral of the center of the fingertip.
2. Blot off the first droplet of blood using the sterile gauze or cotton ball.
3. If blood flow is inadequate, gently massage the proximal (base) portion of the finger, then press firmly on the distal (nearest the tip) joint of the finger.
4. A drop of blood should form at the puncture site.
5. Take care to prevent the blood from running down the finger or onto the fingernail area.

E. FILLING THE MULTIVETTE

Touching the capillary tip of the Multivette to the drop of blood will cause blood to flow into the tip by capillary action. **The Multivette must be horizontal or with the bottom at a slight downward angle for best blood flow.** Blood will not be drawn upward into the tip. Actual contact of the tip with the skin surface should be minimized. The steps of blood droplet formation and collection in the Multivette can be repeated to increase the volume of blood collected, but should be performed quickly and efficiently. However, if air gaps form in the tip, blood flow into the Multivette will be inhibited. An air gap can be eliminated by tipping the top of the Multivette down so that blood flows back to the end of the capillary tip. Fill the capillary tip at least until blood is flush with the top of the screw cap of the Multivette. This will provide ~ 100 microliters of blood. If this volume of blood cannot be obtained, do not “milk” the finger excessively to obtain the recommended volume. It is preferable to submit a specimen with less than optimum volume than one which has compromised integrity.

When blood has been collected, unscrew and remove the capillary tip assembly and discard. Blood will be drawn into the Multivette container when the capillary tip is unscrewed. Screw a regular cap onto the Multivette container, and shake vigorously to mix anticoagulant through the blood. Noise from the plastic mixing doughnut should be audible while shaking. An adhesive bandage should then be applied to the punctured finger.

STEPWISE PROCEDURE FOR FILLING THE COLLECTION CONTAINER

1. Continuing to grasp the finger with one hand, touch the capillary tip to the drop of blood. The Multivette must horizontal or with the bottom at a slight downward angle.
2. Blood will be drawn into the tip.
3. Quickly form another droplet of blood and repeat steps 1 and 2.
4. If possible, fill the tip to at least the top of the screw cap of the tip assembly.
5. Remove the tip assembly, discard, and replace with a regular cap.
6. Mix the anticoagulant through the blood by vigorously shaking the tube for several seconds
7. Cover the finger with an adhesive bandage. Bleeding should stop very quickly. If bleeding is slow to stop, apply pressure to the puncture site using sterile gauze or a cotton ball. If bleeding continues after 3-5 minutes of applying pressure, a physician should be consulted.

F. REQUEST FORMS AND SHIPMENT OF SPECIMENS

Disclaimer: The following information is based on WSLH interpretation of current shipping regulations. Customers should consult their own legal advisors for interpretation of all laws and regulations that may apply to their organizations. January 2024

The packaging materials provided by WSLH meet current shipping regulations for typical specimens. However, if a specimen is known or suspected to contain an infectious agent, different packaging may be required. Consult the laboratory or Postal Service for more information. Note that the shipping containers should contain an “Exempt Human Specimen” label in a convenient location, and should NOT contain a biohazard or other similar label.

A completed WSLH Clinical Metals Submission form must accompany each specimen. It is important to LEGIBLY provide all requested information, including the Provider’s NPI number and ICD code. The WSLH is responsible for reporting all blood lead results to the WI Division of Public Health (DPH), and detailed information is needed for DPH to effectively track these children.

The labeled tube and absorbent material should be placed in the provided biohazard bag and sealed. Do not tape the Multivette cap or affix laboratory film to the tubes prior to shipment. Place the specimens and completed test request forms in the provided shipping container. For convenience and postage savings, several biohazard bags containing labeled tubes and absorbent material can be placed in one Styrofoam shipping container. Affix address mailing and “Exempt Human Specimen” labels to the shipping container. Ensure that the shipping container is sealed closed prior to shipment.

The specimens are stable at room temperature, but please refrigerate if possible, when shipment is delayed. No other special handling is necessary, but high temperatures should be avoided.

The WSLH requires a copy of the submission information.

G. RESULTS

The WSLH will obtain results in four working days of receipt in the laboratory, and a written report will be provided. Reports will contain a numerical result in $\mu\text{g}/100\text{ mL}$, along with acceptable range information. If a specimen is insufficient or unsuitable for analysis, a descriptive notation will appear in place of a result. All results $\geq 20\ \mu\text{g}/100\text{ mL}$ will be phoned to the submitting agency in addition to the written report.

H. REFERENCE

CLSI. *Collection of Capillary Blood Specimens*. 7th ed. CLSI standard GP42. Clinical and Laboratory Standards Institute, Wayne, PA, 2020.