Policy D:PC-5715 v1

Entity University of Minnesota Medical Center, Fairview
University of Minnesota Amplatz Children’s Hospital
Department Laboratory
Laboratory Acute Care
Section Collection
Category Provision of Care

Subject BONE MARROW BIOPSY COLLECTION ASSISTANCE

Purpose The purpose of this procedure is for the preparation of blood smears, bone marrow aspirates, and bone trephine biopsies. This includes scheduling, procurement, preparation, and distribution.

Policy Standard procedures and protocols are used to produce quality laboratory results.

Procedure SCHEDULING

Telephone order from clinician or specified medical personnel of patient care unit (PCU) or clinic.
1. Record all required information in Outlook calendar “CAL-FUMCU-LABS-SPECIAL-HEME” located at front computer terminal BRRCV1 in Collection and Processing Area of Acute Care Lab, West.
2. Before scheduling a bone marrow procedure, consider:
   a. Time intervals between procedures
   b. Staff availability
   c. Required information
      1) Date of procedure
      2) Time of procedure
      3) Patient name
      4) MRN
      5) Location for procedure
      6) Special needs, i.e. interpreter
      7) Diagnosis with status of disease
      8) Trephine required as per disease
      9) Aspirate required as per disease
     10) Special laboratory aspirates as requested
    11) Confirm all information for the scheduled procedure is correct by reading data back to scheduler, before disconnecting the call
    12) If you have any questions, obtain name and phone number of scheduling person or pager of requesting clinician.
    13) Unclear test orders will be discussed with the clinician or appropriate personnel

In person orders from a clinician
1. Require all the above mentioned time and staff considerations
2. Request clinician to complete a Bone Marrow Request Form with all required information
3. Unclear test orders will be discussed with the clinician or appropriate personnel
EQUIPMENT NEEDED

1. Sterile bone marrow tray (from central supply). Common sites will have these on hand in their clean supply room. The tray includes:
   a. In plastic bag:
      1) Disposable bone marrow aspiration needle - individual sterile package
      2) Disposable bone marrow biopsy needle (11 gauge, 4 inch) - individual sterile package
      3) Two 30mL plastic syringes (Luer Lock) for aspiration in individual plastic rockets
   b. In sterile packaged tray:
      1) One 12 mL plastic syringe for local anesthetic
      2) Needles for local anesthetic - 1-21 gauge, 1-25 gauge
      3) Sponges - 4 X 4
      4) Kelly forceps for cleaning the skin
      5) Medicine cups for alcohol and Betadine scrub for cleaning the skin
      6) Cotton balls for cleaning the skin
      7) Sterile towels for drapes
      8) Blade for small incision - 1-11 gauge

2. Equipment on assistant tray includes:
   a. Disposable non-latex gloves for assistant
   b. Plastic screw cap tubes (5 mL) with screw caps for aspiration (at least 4)
   c. Vial with disodium EDTA powder and applicator sticks for measuring powder for aspiration
   d. Container with AZF fixative (1 for unilateral trephine, 2 for bilateral trephines, 4 for double bilateral trephines.
   e. Pusher slides (2) Dieffenbach’s serrefine forceps with hemocytometer coverslips
   f. Empty slide boxes (2)
   g. Box of frosted (write-on) slides
   h. Portable fan
   i. Alcohol swabs for fingerstick
   j. Lancets for fingerstick
   k. 2 X 2 gauze for fingerstick
   l. Band-Aids for fingerstick
   m. Needles to obtain anti-coagulant for the 30 mL syringes
   n. Foam tape for covering incision with sterile gauze
   o. Sodium heparin vial, 10 mL - 1000 unit/mL for special studies (2) - check expiration date
   p. 1% Lidocaine 50 mL bottle for local anesthetic (2) - check expiration date
   q. Surgical blade (size 11) for possible use for small incision if not on bone marrow tray
   r. Solvent-resistant permanent marker
   s. Pens
   t. Sealed packages of sterile 4 X 4 sponges, if needed, for covering incision and holding trephine core for imprinting
   u. Tube of SPS (sodium polyanetholesulfonate in NaCl) (small yellow top tube) for microbiology routine and/or fungal cultures (2) - check expiration date
   v. Blood transfer device
   w. AFB bottle (Bactec 13A) - check expiration date
   x. ACD (acid citrate dextrose) tubes (4) large yellow top tube for molecular diagnostic studies - check expiration date
   y. Sterile black stoppers to cover syringe tip before placing in plastic transport bags
BIOPSY COLLECTION
Preparation
Patient Care Unit will notify lab on Ascom phone when patient is ready for procedure. Report to site/room as soon as possible.

1. Forms needed:
   a. Bone Marrow Evaluation Form
   b. Bone Marrow Biopsy Order Form
   c. Other Laboratory forms as requested.

2. Labels needed:
   a. CoPath labels for slides
   b. Sunquest labels for special tests when available

3. Supplies
   a. Label the request slips with a patient label. The bone marrow order form must be dated and timed by ordering physician, physician assistant, or nurse practitioner. If no label is available, hand write patient name, hospital number, encounter number, today’s date, PCU and date of birth. Make additional labels as needed for specimen vials and slide boxes.
   b. See procedure, “Patient and Specimen Identification” for patient and specimen identification.
   c. The following equipment is needed from the tray. Place on a counter top in the patient’s room.
      1) Set out AZF fixative vials. One vial is used for a unilateral biopsy. Two vials are used for bilateral. Four vials are used for double bilateral biopsies.
      2) Vials for marrow aspirate
         • One vial contains approximately 1 mg of EDTA for 1-2 mL of marrow
         • One vial contains approximately .5 mg of EDTA for less than 1 mL of marrow
      3) Portable fan
      4) Tape to hold vial aspirates (this avoids spills)
      5) Frosted (write-on) slides
      6) Pusher slides (2)
7) 1% Lidocaine (50 mL bottle) - check expiration date
8) Alcohol swabs to clean top of lidocaine, sodium heparin, ACD etc. tops
9) Sealed package of sterile 4X4 gauge for holding trephine biopsy
10) Marker/Superfrost permanent solvent-resistant
11) Empty slide boxes
12) Needles
13) Anti-coagulants for special studies of aspirates - check expiration date
14) Sterile black stoppers
15) Specimen transport bags
16) Foam tape
17) Request slips
18) Trephine needle
19) Aspiration needle
20) Bottle of Betadine scrub
21) Bottle of rubbing alcohol
22) Sterile gloves for the doctor (2)
23) Disposable gloves for the tech
24) Extra 30 mL syringes for additional marrow studies
25) Betadine swabs or pads for culture vials

Blood Morphology Smears
Blood smears are usually obtained before the bone marrow procedure, but can be obtained after the procedure. These smears can be either fingerstick (preferred), venipuncture, or line draw. Note this on the history sheet. Twelve smears are desired. An EDTA tube of blood is also obtained for a hemogram, if needed.

1. For fingerstick see procedure, “Blood Collection by Skin Puncture”.
2. For venipuncture see procedure “Blood Collection by Venipuncture”.
3. For VAD see procedure “Blood Collection by Vascular Access Device”
4. Clinical staff may also collect peripheral blood specimen
5. Making Slides
   a. Place drop of blood on a clean glass slide (1/2 inch from bottom opposite the frosted edge).

   ![Blood smear](attachment://image.png)

   b. Using “pusher”, pull back on blood drop toward bottom of slide until entire drop is spread evenly behind “pusher” (pivot pusher slightly to help distribute blood evenly). Using a 45 degree angle, push “pusher”, carrying blood drop toward the frosted edge of slide, leaving an even, squared, feather edge of smear.
   c. Using “pusher”, pull back on blood drop toward bottom of slide until entire drop is spread evenly behind “pusher” (pivot pusher slightly to help distribute blood evenly). Using a 45 degree angle, push “pusher”, carrying blood drop toward the frosted edge of slide, leaving an even, squared, feather edge of smear.
   d. Entire length of smear should be 1/2-2/3 of slide.
   e. Immediately air dry slide beneath portable fan.
   f. Make 10-12 satisfactory slides.
   g. Label 3 best blood smears with patient’s last name with solvent-resistant pen.
   h. Remaining slides are placed in box with patient’s name label on cover.
   i. Dispose of lancet and any blood slides not saved into designated “Sharps”
receptacle.

j. Clean workspace with provided disinfectant or 70% isopropyl alcohol.

**CAUTION: PROTECT YOURSELF**

Always use gloves and observe Standard Precautions when handling potentially infectious biological specimens. Use face shield or other personal protective equipment when handling blood or control specimens.

Marrow Procedure (posterior iliac crest)

1. Discuss the samples requested with the doctor to ensure all requests have been identified correctly. If there are any questions call or page the staff doctor requesting this procedure and obtain additional request slips and labels, if needed.

2. Perform “Pause for the Cause” with clinician present. Have the patient state their name, date of birth, and the procedure they are undergoing. Document this on the bone marrow evaluation form with the tech’s signature/title and another professional’s signature/title.

3. The doctor landmarks the hip architecture by feel. The clinician washes his/her hands and puts on sterile gloves.

4. Open the bone marrow tray by sterile technique: rip the tape off the tray and open using only the edges of the cover.
   a. Pour Betadine scrub into one medicine cup
   b. Pour rubbing alcohol into one medicine cup
   c. Drop the proper number of 30 mL syringes on the tray.
   d. Open the bone marrow biopsy needle bag for the doctor to remove
   e. Open the bone marrow aspiration needle bag for the doctor to remove

5. When the doctor is ready, cover the top of the 1% lidocaine with a sterile alcohol swab. After the doctor checks the lidocaine label, remove the alcohol swab and hold the bottle bottom securely. The doctor will aspirate the anesthetic with a 21-gauge needle on a 12-mL syringe.

6. Prepare syringes for special aspirate specimens. All anti-coagulants for specimens are obtained the same way. See “Special Study Requirements” section of procedure.
   a. Hold a sterile needle with the plastic holder. The doctor attaches the syringe to the needle and pulls away from the plastic cap.
   b. Place a sterile swab on top of the correct anti-coagulant vial or tube. Remove the alcohol swab - the doctor’s will obtain the correct amount of anticoagulant. This is done for all heparinized and ACD specimens. Make sure the clinician adequately coats the sides of the syringes with anti-coagulant before aspirating the marrow.
   c. Make sure the clinician and the assistant know which syringe contains ACD or sodium heparin as it is arranged on the sterile tray.
   d. It is preferred to collect the trephine core sample collected first, then the aspirate.
   e. Contact a nurse if the patient experiences an adverse reaction.

7. Trephine biopsy procedure:
   a. After obtaining the core, the doctor will remove it from the tapered end of the trephine needle with the shepherd’s rod and then will place it on a sterile 4X4
gauze held by the assistant. The gauze absorbs some of the blood from around the bone. Imprint the core sample 3 times each on 6 slides, rotating the core after every slide made. This is done for each core obtained.

b. If it is a unilateral core, the label is marked with a T using a solvent-resistant pen. If more than one core is obtained from the unilateral they are labeled T1 then T2 etc.

c. If this is a bilateral core, the labels are marked TL (for trephine left) and TR (for trephine right). If multiple samples are obtained from the same side the labels can be marked with TL1, TL2, etc.

d. If double bilateral cores are obtained, label the first core imprint from right side A1 right and the next core imprint A2 right. From the left side, label the first core imprint from left side B1 left and the next B2 left.

e. Measure the length of the core and write down the total length on the bone marrow evaluation form. Circle the diameter of the core sample: 13-gauge is 1 mm, 11-gauge is 2 mm, and 8-gauge is 3 mm. Enter 1 for the number of cassettes used. (Rarely are 2 cassettes needed.)

f. Place the core in the patient labeled AZF fixative vial. Write the time on the plastic top with a pen. The vials containing AZF fixative should be marked left or right if it is a bilateral sample along with the time placed in AZF. Label the double bilateral AZF vials as the imprints.

g. Often times the doctors ask if it is a good core sample. This knowledge comes with experience and sometimes it is very hard to judge.

h. Place the labeled imprints in a slide box and place the vials with the core in a specimen bag.

8. **Aspiration procedure**

a. Preparation

1) 2 vials with correct varied amounts of EDTA
2) 15 slides on counter
3) 2 pusher slides
4) Fan angled to dry

b. When the bone marrow aspiration needle is placed in the hip and the trocar removed, a syringe is Luer locked into position and 1-3 mL of marrow is aspirated.

c. **SPEED** is very important since the marrow can clot quite readily.

d. The clinician unscrews the syringe. Take the syringe from the clinician without contaminating his/her gloves.

e. Squirt the marrow into the appropriate EDTA vial. (Use the 1 mg. EDTA vial for 1-2 mL marrow, use .5 mg EDTA tube for <1 mL marrow.)

f. Quickly mix the marrow in the vial with the EDTA by capping, inverting and shaking.

g. With the fluid left in the syringe, make 12-15 direct marrow smears as follows and place in front of fan to dry.

1) Place individual drops of marrow on slides and make smears.

OR

2) Place a big drop of marrow on one slide. Back into the drop with the pusher slide and smear the fluid retained on the pusher slide on a new slide. Repeat the procedure as needed.

h. A good marrow aspirate will have fat and particles at the feather edge.

i. Write a D on all the labeled smears with a solvent-resistant pen.

j. Sometimes if the first aspiration is judged not adequate, a second aspiration is obtained. Squirt into another vial and make another set of direct smears. Label the first set and vial 1, and the next set 2.

k. Sometimes direct smears only are obtained.
1. If only a little fluid is obtained just in the needle itself, the needle can be removed from the patient and the fluid ejected from the needle by the stylus onto a slide and direct smears can be made from that.

m. If it is a “dry tap”, a piece of bone can be obtained and imprinted on slides, or a piece can be cut off and crushed between slides to obtain imprints. These are labeled B.C. (bone crush). These core crushes can be done at the bedside or in the laboratory (if done in the laboratory the core must be kept on saline soaked gauze for transport back to the laboratory).

9. **Special Studies**
   a. After the morphology part of the aspiration is done, the special studies are obtained. Usually the chromosome sample is aspirated next, followed by immunophenotyping, molecular diagnostics and finally the marrow microbiology cultures.
   b. If post bone marrow transplant patient, the RFLP is obtained after morphology. This allows time to work with the other samples and to avoid clotting the aspirate for culture. This aspirate has NO anti-coagulant and is injected into the SPS tube or Bactec 13A bottle.
   c. Make sure an adequate amount of marrow is in each tube or bottle before doctor removes the Illinois needle from the patient. All labels have bone marrow aspirate site, anti-coagulant and test written on them.

10. **Clean Up**
   a. Upon completion of the bone marrow, the doctor cleans the Betadine soap off the patient with alcohol.
   b. When the skin is dry, secure a sterile 4 X 4 gauze with either foam or paper tape. (Check with patient for any tape allergies.)
   c. Turn patient over on their back. Position patient so pressure is on the procedure site. Lower bed if elevated. Put side railings up.
   d. Notify nursing staff upon completion and have them check on patient.
   e. Remove sharps from the tray and place in Sharps container. Place drapes in laundry bags; take the rest of the tray to the soiled utility room.
   f. Fill out the laboratory part of the bone marrow biopsy evaluation form. This includes:
      1) Date, time
      2) Patient Location
      3) Clinician doing marrow
      4) Floor tech initials
      5) Doctor reading marrow
      6) “Pause for the Cause” and co-signature
      7) Site of biopsy/biopsies - mark side done first on bilateral cores and aspirates with a #1
      8) Measurements of bone core samples
      9) Site of aspiration
      10) Special requests with aspirate and/or core sites
      11) Kind of blood smear morphology
      12) Ordering physician
   g. Leave Bone Marrow consent form and white copy of Bone Marrow Biopsy Order Form on the patient care unit to be charted.
   h. Place all slides in patient labeled slide boxes in groups (e.g. bloods, Directs, T) and cover.
   i. Place the patient labeled aspirate vials in a transport bag. Place the bone samples in a separate transport bag. Place all bagged samples in the tray to come down to the laboratory.
j. If a set up tray from central sterile supply is used, fill out their slip. Use a patient label and write in date and station. Check the box for in-service charge.

**SPECIAL STUDY REQUIREMENTS AND SPECIMEN DISTRIBUTION**

**Chromosomes**  
Collect 3-5 mL of marrow in a 30 mL syringe containing 1 mL of 1000 unit sodium heparin. Cap with sterile black stopper, label, place in a transport bag labeled as “Cytogenetics”. On the labeled request slip write the date, time, PCU, specimen (usually bone marrow aspirate—identify which site), working diagnosis and requesting doctor. Place request slip and a copy of the Bone Marrow Biopsy Order Form in transport bag. Place specimen on a transport batch and send to Specimen Management department. Overnight storage - room temperature.

**Bone Core Samples**  
Fill sterile serum tube with sterile normal saline and place bone in solution. Label and place in transport bag labeled “Cytogenetics”. Place on transport batch and send to Specimen Management department.  
OR  
(Preferred) Obtain RPMI solution from Immunophenotyping. Place bone in tube. Specify core site. Label and place in transport bag labeled “Cytogenetics”. Place on transport batch and send to Specimen Management department.

**Immunophenotyping:**  
Collect 3-5 mL of marrow in a 30 mL syringe containing 1 mL of 1000 unit sodium heparin. (Several direct smears are also made at the bedside and labeled D hep.) Cap with a sterile black stopper, label and place in transport bag labeled as “IFC”. On the labeled request slip write the date, time, PCU, specimen identifying which site, working diagnosis and requesting doctor. Include both request form and copy of Bone Marrow Biopsy Order Form in transport bag. Place specimen on a transport batch and send to Specimen Management department. Overnight storage - refrigerate 4°C

*If “dry tap”, a core can be obtained and placed in a vial of RPMI solution obtained from Immunophenotyping Lab in lieu of aspirate.

**Molecular Diagnostics**
- **STR/DNA marker/RFLP**  
  Collect 3-5 mL of marrow in a 30 mL syringe containing all the ACD fluid from a 10 mL tube. Cap with a sterile black stopper, label and place in a transport bag labeled as Molecular Diagnostics. On the labeled request slip write the date, time, PCU, specimen identifying which site, and requesting doctor and check RFLP on slip. Place request form along with copy of Bone Marrow Request Order Form into transport bag. Place specimen on a transport batch and send to Specimen Management department. Overnight storage - room temperature

  *If “dry tap”, a core can be obtained and placed in saline soaked sterile gauze in a Petri dish, which is taped shut or placed in a sterile tube. Label with identifying core site

- **BCR/ABL:** Same as STR above.
- **Gene rearrangement:** Same as STR above.
• **C-Kit for mastocytosis**
  Collect 6-10 mL of marrow in a 30 mL syringe. With transfer device aspirate 3-5 mL of marrow in two ACD tubes. Label and place in transport bag labeled as ‘Sendouts’. Labeled special request form is filled out with date, time, PCU, specimen identity, which site and requesting doctor, along with copy of Bone Marrow Request Order form. Give to Sendout desk to send to Mayo Laboratory.

• **NPM-1**
  Collect 3-5 mL of marrow in a 30 mL syringe. With transfer device aspirate sample into an EDTA tube. Label and place in transport bag. Store on ice. Labeled special request form is filled out with date, time, PCU, specimen identity, which site and requesting doctor, along with a copy of Bone Marrow Order form. Give to Sendout desk to send to Mayo Laboratory.

**Dr. Wagner’s specimens**
Collect 5 mL marrow in a 30 mL syringe containing 1 mL of 1000 unit sodium heparin. Cap, label, place in a transport bag labeled as “Special Heme” A labeled special request form is filled out with the date, time, PCU, requesting doctor and specimen identifying which site along with copy of Bone Marrow Request Order Form. Place on a batch for Specimen Management Department and return to Special Hematology. A labeled special request form is filled out with the date, time, PCU, requesting doctor and specimen identifying which site along with copy of Bone Marrow Request Order Form. Overnight storage - refrigerate 4°C

**Neuroblastoma Reference Study**
Collect 3-5 mL marrow in a 30 mL syringe with 2 mL of 100 unit sodium heparin. Cap with a sterile black stopper, label and place in transport bag labeled as “Special Heme”. Labeled special request form is filled out with date, time, PCU, specimen identifying which site, and requesting doctor along with copy of Bone Marrow Request Order Form. Place on a batch for Specimen Management Department and return to Special Hematology. **Do NOT draw on Friday.**

**Routine Electron Microscopy (EM)**
Collect extra bone marrow aspirate in EDTA tube. Label tube including site aspirated. Fill out Request for Electron Microscope Examination form. Place sample in transport bag labeled “Sendout HCMC. This will be sent to HCMC (call 612-873-2175 before sending) via 1-hour MedSTAT courier (763-586-8146).

**Cultures**
- **Routine and fungal**
  SPS tube (small yellow top tube). Swab the top with sterile alcohol prep and let dry. Cap the 30 mL syringe containing non-anticoagulant marrow with blood transfer device. Insert SPS tube and expel marrow. Label and place in a transport bag labeled “Micro”. Fill out labeled microbiology slip with date, time, PCU and requesting doctor along with copy of Bone Marrow Request Order Form. Check bone marrow identifying which site and appropriate test. Place on transport batch to Specimen Management department.

- **TB Culture**
  MA1 Bactec bottle. Remove plastic protector on bottle. Swab the top with sterile alcohol prep and let dry. Insert marrow from non-anticoagulant 30 mL syringe with a blood transfer device. Label and place in transport bag labeled...
“Micro”. Fill out labeled microbiology slip with date, time, PCU, requesting doctor, check bone marrow identifying which site, and proper test along with copy of Bone Marrow Request Order Form. Place on transport batch to Specimen Management department.

- **Virology**
  Collect 3-5 mL of marrow in a 30 mL syringe with 1 mL of 1000 unit sodium heparin. Cap with a sterile black stopper, label and place in transport bag labeled “Virology”. On the labeled virology request write the date, time, PCU, specimen identifying which site, and requesting doctor along with copy of Bone Marrow Request Order Form. Place on transport batch to Specimen Management department.

- **Adenovirus**: Collect 5 mL of bone marrow in a 30 mL syringe with 1 mL of 1,000 unit sodium heparin. Cap with sterile black stopper, label and place in transport bag labeled “Virology”. Fill out labeled virology form with date, time, PCU, specimen identifying what site, and requesting doctor. Mark request form and syringe “for adenovirus culture”. Place on transport batch to Specimen Management department.

- **PCR-CMV quantitative**: Collect 5 mL of non-anticoagulant marrow aspirate in a 30 mL syringe and expel with blood transfer device into a 5 mL EDTA tube (purple top). Label and place in transport bag labeled “Virology”. Fill out labeled Virology slip with date, time, PCU, specimen identifying which site, requesting doctor and write CMV-PCR quantitative, along with a Bone Marrow Request order form. Place on transport batch to Specimen Management department. Overnight storage - refrigerate at 4°C if marrow is obtained after 3:30 pm Saturday through Sunday.

- **PCR - Human Herpes Virus 6 (HHV6)**: Collect 5 mL of non-anticoagulant aspirate and expel with blood transfer device into a 5 mL EDTA tube (purple top). Label and place in transport bag for Sendouts. Store on ice at 4°C. Fill out labeled Special Laboratory Service slip with date, time, PCU, specimen identifying which site, requesting doctor and write in HHV6 along with copy of Bone Marrow Request Order Form. Place on a batch for Specimen Management Department.

- **PCR - parvovirus**: Collect 5 mL of non-anticoagulant aspirate and expel with blood transfer device into 5 mL EDTA tube (purple top) - preferred. Also acceptable, collect 3-5mL of bone marrow in a 30 mL syringe with all ACD fluid from 10 mL yellow tube. **Do not ever use heparin.** Cap with black stopper. Label and place in transport bag for Sendouts. Fill out labeled virology slip with date, time, PCU, specimen identifying which site, requesting doctor and write in: parvovirus send out Arup #65017 along with copy of Bone Marrow Request Order Form. Give to Sendouts desk to include in ARUP batch.
Label and bag all specimens together in a transport bag labeled “Special Heme”. Place on a batch for Specimen Management Department. Special Hematology will prepare samples.

Place all specimens to be sent to Specimen Management on one transport batch and package together in large biohazard bags found in the Sendouts desk. Each department’s specimens will be individually bagged inside large bag for distribution once received in Specimen Management.

References
1. Fairview Special Hematology Procedure: Blood and Bone Marrow Specimens
5. Laboratory Guide, Fairview

File Location Acutecare\Web_Intranet\Collection\DPC 5715_Bone Marrow Biopsy Collection
Original Date 4/2011 Original Author(s): J Forys
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