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Bone Marrow Collection Procedure

BONE MARROW COLLECTION PROCEDURE

Procedure for bone marrow preparations evaluated at Rice Laboratory.

***BEFORE STARTING THE BONE MARROW COLLECTION PROCEDURE PROPER IDENTIFICATION OF YOUR PATIENT AND A TIME OUT CHECK MUST BE PERFORMED.**

A. The Pathologist will initiate the time-out prior to making an incision. All team members will cease their activity. (The anesthesia care provider will continue to manage ventilation)

B. The Bone Marrow Assistant will then conduct the time-out by audibly reading the following information. (Patient Name, DOB, Procedure and Site of procedure)

C. The team verification will be conducted audibly in the following role sequence.

1. The Anesthesia Care Provider will state Patient Name and DOB from Patient armband.
2. The Bone Marrow Assistant will read Patient Name, DOB, and procedure from Consent form.
3. The Pathologist will state the Patient Name, procedure, and site marking from memory.

Fixative:

For marrow aspirates and marrow core biopsies

A. 10% Formalin

Vials:

Prepare before marrow aspiration.

A. For Bone Marrow Aspirate
    1. Clot Preparation— 10% Formalin container

B. For Marrow Core Biopsy
    1. 10% Formalin container(s)
    2. Have two core containers ready when bilateral core biopsies are ordered. Label container(s) **"right"** or "**left**" when appropriate.

C. For Special Studies:
    1. Check with the pathologist at the time the procedure is scheduled to see if special studies will be needed. Note: If the procedure is to be performed by a non-pathologist, check with pathologist for any other special testing that they may want collected. Special testing may require specific tube(s) and should be obtained from the lab prior to bone marrow sampling. Refer to on-line catalog for requirements.

Marrow Aspirate: (Do not use heparinized marrow to make slide preparations)

A. *A word of caution: Marrow aspirate will clot almost immediately after it is removed from the patient. Clotted marrow is very difficult to work with and is also very difficult for the pathologist to interpret. The next three steps **must** be performed very quickly by the technician.*
    1. **"Squash or Slant Smears"**
    Take the syringe containing the marrow aspirate from the physician and immediately expel some aspirate onto 3-4 slant smear slides. See page 4 for technique on making squash/slant smear.
    2. **"Direct Smear"**
    Place a drop of marrow on 4-6 glass slides, and smear as you would to make a peripheral smear.
    3. Check the slides for spicules. If the slides are not clearly adequate, notify the collecting pathologist/physician. She (he) may wish to recollect a new aspirate sample after repositioning the needle.
    4. Label the slides with BM#, Squash or Direct, Patient Name, and Patient DOB. Slide labels may also be printed and used for identification.
    5. **"Clot Preparation"**
    Allow the remaining marrow to clot in the syringe. After the marrow has completely clotted, remove the plunger from the syringe, and pour the marrow clot into a 10% formalin container.

Marrow Core(s):

A. Core Smears; with a delicate pointed metal forceps, grasp the core by the sides and blot excess blood off of core sample. Place the core at one end of a slide, invert a second slide on top of the core piece, and **gently** roll core sample between slides. Label this slide or smears as core smear(s).

B. Label slides "L Core" or "R Core" as appropriate. In addition; label the slides in this order BM#, Patient Name, Patient DOB, and type of smear. Slide labels may also be printed and used for identification.

C. Measure length of core for estimation. The biopsy should measure at least 1.5 cm in length. Notify the collecting pathologist/physician if the specimen measures less than 1.5 cm. A second specimen may need to be obtained. Shorter specimens may be acceptable for certain rare indications, however, it is important to make sure the physician understands at the time of procedure that the optimal length is 1.5 cm. The technologist may also indicate to the collecting physician that the pathologists are requesting 1.5 cm or greater of core biopsy.

D. Core Vials: Place core(s) into 10% formalin container.

E. When packaging the specimens, make sure that no formalin contacts the smeared slides. Even a small amount of formalin fumes will ruin the smears.

CBC, CBC with Diff, and Peripheral Smears:

A. Draw an EDTA tube from patient. Order, run, and verify a CBC. Place a BM order sticker onto the same EDTA tube and rerun specimen to retrieve CBC with Diff results. Make 2-4 peripheral smears. **NOTE**: If a CBC with Diff has been done earlier in the day of the marrow biopsy, or within an appropriate time frame verified by the pathologist, a new sample may not need to be drawn.

HEPARIN tube- "ASPIRATE":

A. If excess bone marrow is collected, it may be placed into a heparin tube before clotting. This tube may be used for special studies if added.

B. **NOTE**: If sample volume of aspirate is small, always prepare bedside slides and clot specimen first. If you feel you have ample specimen you may put some of the specimen into a Heparin tube.

Summary of bone marrow components:

A. Bone Marrow Request Form (To include CBC with Diff and any other related clinical information with the clinician's reason for request.)

B. Peripheral Smears 2 to 4

C. Squash/ Slant Smears 6 to 8 for each side biopsied

D. Direct Smears 4 to 6 for each side biopsied

E. Core smears 2 to 4 for each side biopsied

F. Core tube(s) 1 or 2 (Depending on whether both right and left biopsies are obtained.)

G. Aspirate tubes(s) (As needed for special testing if necessary)

H. Patient's age/Date of Birth--Important for a diagnosis. Also include patient's address, Insurance/Medicare information if applicable and a brief summation of the requesting physician's diagnostic impression of the patient's illness. This information can also be obtained in EPIC.

Special Tests

A. Check Rice and Mayo Catalogs for required sample type and volume before collection.

B. A separate syringe should be used to collect special studies. For tests that are require to be collected in heparin tubes, a pre-heparinize syringe with 2-4 mls of 1000 U/ml heparin must be used.

Processing Bone Marrow Specimen:

A. **Clerical**

1. Test order

   a. Release "Bone Marrow Examination" order in EPIC. Go to patient station and search for patient. Select correct encounter. Find held orders in "Manage Orders" or "Order Inquiry". Release just the Bone Marrow Examination. This will print three stickers.

   b. Take patient stickers to histology, they will "Build a Case" and this will generate two cassettes to be printed in the gross room. Four additional labels will print at this time.

   c. Use cassette to print slides for in-house collections. Histology staff can log in and print the "Unstained" slide options in the case. This will generate 20 slides

   d. After collection is complete, release and collect any special studies and the CBC in EPIC. Label tubes with appropriate orders.

   e. Fill out "Bone Marrow Gross" examination form, indicating all appropriate information.

   f. All patient information including: requisition, CBC/Diff data, Gross form, and any other patient information provided needs to be scanned into LIS. Follow "Scanning Documents" procedure found in General Lab Manual.

2. Double check all labeled slides (CentraCare RMH cases will be pre-printed using the Slidemate labeling system) include BM#, patients name, patient DOB, and type of smear. Label slides right or left when bi-lateral is collected.

B. **Fixation of Cores and Clots**: Cores and Clots must be fixed with 10% formalin. **Routinely core and clot specimens are labeled with an LIS label containing a "BM#"and time placed in formalin. Place all paperwork, vials, and one direct or squash slide, in slide holder, for iron**

stain and send upstairs for processing. Core and clot specimens must remain in fixative for 1-4 hours after collection. They may be in fixative overnight, if necessary.

C. **Staining Procedure**:

1. Stain 1 peripheral blood smear, 1 direct smear from each biopsy site, 1 squash prep from each biopsy site, and 1 core smear from each biopsy site, if available. Stain 1 additional direct or squash smear when a Flow Cytometry is ordered. Label this slide with the "F" number. All extra smears are retained for special stains, if necessary.
2. Follow Wright's Giemsa Staining Procedure for staining of slides.
3. Take stained slides to histology where they will be cover slipped and matched to paperwork.
4. Take one direct or squash slide to Histo lab for Iron stain. Iron staining is performed by Histo lab. Because of the importance of iron stains for evaluation of iron deficiency, sideroblastic anemia, and iron stores in general, iron stains are performed on all bone marrow specimens evaluated at CentraCare RMH Lab. In general, one iron stain is performed on an aspirate smear or touch prep, and one on a clot section. However, stains can be performed on the decalcified core biopsy or on core biopsy touch preps at the discretion of the pathologist."
5. Histology will assign the case to the Pathologist.

SLANT SMEAR TECHNIQUE FOR BONE MARROW

A. Bone marrow aspiration smears should be made at the patient's bedside, usually by the hematology technologist assisting the pathologist/physician. Since bone marrow aspirations are not always easy to obtain and since some aspirates yield few spicules, making smears at bedside is preferable to having the anticoagulated aspirations brought down to the laboratory for smearing.

B. One disadvantage of the bedside smearing technique is that the smearing must be performed immediately and correctly to prevent clotting and to produce a good smear. Time cannot be wasted and the person making the smear of the marrow spicules must be experienced or the end result will be a difficult smear evaluation.

C. An actual aspiration is performed by inserting a special aspirating needle into the marrow of such bones as the sternum and the iliac crest, and then drawing out blood containing spicules from that marrow. Our technique for the actual smearing is to place drops of the spicule-laden marrow on slides which are tilted at 60º. The blood runs down the slide, leaving behind the spicule(s). The excess blood then is wiped or blotted away quickly and the spicule(s) smeared by placing another clean slide across the specimen slide parallel to it. The slides are then gently pulled away in opposite directions as the spicule is spreading under the gentle pressure of the upper slide. Fan slides to quickly air dry.

TRAINING TECHNIQUE

A. The training technique involves scrapings from a slightly softened bar of soap. The scrapings should be small to simulate a spicule and should range in size from a "period" in a type-written

article to a lower case "o" in that article. Place the scrapings into a test tube and add anticoagulated blood to the tube. Place some glass microscope slides at 60° angles and pour or dispense a few drops of the blood on the slides. Allow the blood to run down the slides and blot away the excess. The soap "spicules" will remain behind. Place a clean slide parallel to the specimen slide and gently lower it until it touches the "spicule". Exert a little back and forth pressure upon the particle until it begins to spread out. When it is spread approximately three times its original size, pull the slides in opposite directions gently. The resulting smear will appear oval with tapered ends and will give a glistening appearance surrounded by a thin layer of blood. This technique closely simulates the technique used in actual bone marrow smears.

REGULATORY CITATIONS

Facility specific, none stated

REFERENCE CITATIONS

Facility specific, none stated

Policy Approvals Prior to PolicyStat

Document was imported from MediaLab. For prior revision history, refer to historical documents.

Attachments

BONE MARROW GROSS FORM (PDF Version).pdf

BONE MARROW GROSS FORM.docx

Bone Marrow Smear Technique.pdf

Approval Signatures

Step Description	Approver	Date
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Applicability

CentraCare - Laboratories