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Commentary

A Note on Bone Marrow and Bone Marrow Aspiration

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DESCRIPTION

Hematopoietic tissue and the structured stroma that promotes hematopoietic cell growth and differentiation make up the bone marrow. The primary way of examining this tissue in normal toxicological research is peripheral blood hematology and histological sections of bone marrow; however, the spleen and, in some situations, the liver may also be included in the overall assessment of the hematopoietic system. Histopathology can reveal bone marrow architecture, general cellularity, megakaryocyte numbers and shape, a myeloid to erythroid ratio estimate, and iron storage, as well as show focal or mild lesions. The frequent spontaneous and chemically linked alterations or lesions seen in histological sections of bone marrow, as well as normal bone marrow development and histology, are discussed in this chapter.

Place the patient in one of two positions: lateral decubitus with knees flexed at the hips or prone. Each iliac crest should be followed to its posterosuperior spine. Use ink or the pressure of a needle cap to mark this spot. Put on sterile gloves and apply a circular pattern of 10% povidone-iodine antiseptic to the biopsy region. Using the fenestrated sterile drape, drape the location. Place the fenestration over the intended biopsy site's centre. Make a 1 percent lidocaine skin wheal with the 25-gauge needle and 5-mL syringe. To anaesthetize deeper structures, switch to the 22-gauge needle/5-mL syringe. Introduce the needle until it reaches the periosteum. Because most of the bone pain fibres are located here, infiltrating the periosteum with 1 mL of lidocaine is critical. As the needle is removed, inject 2 mL to 3 mL of lidocaine down the departing tract. To facilitate insertion of the aspiration needle, make a 2 mm to 3 mm skin incision using the scalpel.

Make sure the aspiration needle is perpendicular to the bone and the stylet is securely in place. Insert the needle into the anaesthetized periosteum until it reaches the anaesthetized periosteum. Use enough force to enter the bony cortex by rotating the needle clockwise and counterclockwise. When the marrow cavity is accessed, the sensation of "give" is felt. Stop pushing and make sure the needle is still stationary without any assistance. Remove the stylet and replace it with a 10-mL syringe that has been washed with EDTA. As the marrow is aspirated, inform the patient that he or she will experience pain. Pull the plunger and aspirate 0.2 mL to 2 mL of marrow to prepare the slide (higher volumes dilute the specimen with blood). A further 5 mL of aspirate may be withdrawn if more material is required for other studies.

Aspirate the material and give it to an assistant to prepare the slides. The presence of substantially visible marrow spicules in an aspirate is used to determine its quality. Thin films should be made fast and with as little specimen manipulation as possible. Several drops of aspirate are placed on the edge of a glass slide, and the aspirate is thinly spread across the first slide using the edge of another slide. Four slides are produced and dried in the open air. Wright or May-Grünwald-Giemsa stain is used to stain the slides. Place the leftover aspirate in a tube with EDTA, mix thoroughly, and set aside to clot until the histologist can repair and process it. Use another sterile syringe to withdraw more aspirates from the aspirate needle if more material is needed for flow cytometry, culture, cytogenetics, or other special research. Replace the stylet and advance the needle 1 mm to 2 mm if a dry tap occurs. If no aspirate is collected, withdraw the needle and re-insert it at the initial site in another section of the anaesthetized periosteum. Replace the stylet and, using a twisting motion, withdraw the entire needle once the aspirate sample has been judged adequate. Apply pressure to the location with dry gauze until the bleeding stops. Unless you're having a bone marrow biopsy, cover the region with an adhesive bandage.

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