

# Bone Marrow Tests

**Bone marrow tests** are used to check whether the bone marrow is healthy and making normal amounts of blood cells. Bone marrow is the sponge-like tissue inside the bones. It contains stem cells that develop into the three types of blood cells: Red blood cells (RBCs), which carry oxygen through the body; white blood cells (WBCs), which fight infection; and platelets, which stop bleeding.

## Types

Bone marrow aspiration and biopsy are the most frequently used bone marrow tests. Often aspiration is performed first then the biopsy of the bone marrow tissue is performed.

## Why Bone Marrow Tests are Done

Doctors use bone marrow tests to diagnose many blood and bone marrow diseases and conditions:

- **Neutropenia**—This condition is characterized by abnormally low levels of WBCs.
- **Anemia**—Anemia is characterized by impaired oxygen-carrying capacity of RBCs, either because the level of mature RBCs is low or the RBCs don't have enough hemoglobin. Examples of the former include Myelofibrosis and aplastic anemia, and an example of the latter is X-linked sideroblastic anemia.
- **Thrombocytopenia**—This group of conditions occurs when the body doesn't make enough platelets and the blood doesn't clot as it should.
- **Myeloproliferative Neoplasms**—This is a disease in which the bone marrow makes too many blood cells. For example, essential thrombocythemia is when the bone marrow makes too many platelets

Bone marrow tests are also used to detect various types of cancers:

- **Leukemia**—This is a cancer of the WBCs. Some leukemias are acute and others are chronic.
- **Multiple myeloma** is a cancer of the WBCs that make antibodies (plasma cells).
- **Myelodysplastic Syndrome**—This is a group of diseases in which the bone marrow doesn't make enough normal blood cells. They occasionally progress to acute leukemia.
- **Breast cancer** and **Prostate cancer** that has spread to the bone
- **Hodgkin lymphoma**
- **non-Hodgkin lymphoma**

In cancer, doctors can use bone marrow tests to determine severity and whether it has spread. Bone marrow tests can sometimes determine the cause of a fever. They're also used for patients who may have uncommon bacterial infections.

## Preparation

Bone marrow tests are generally done on the pelvic bone, sometimes bone marrow aspiration can also be done on the breastbone. The pelvic bone is accessible in most people through the lower back.

In preparation, a doctor cleans the area where the needle will be inserted. The area is draped in cloth and an anesthetic is applied to numb the area. The doctor then makes a small incision (cut). This makes it easier to insert the needle into the bone. Stitches may be needed to close the cut after the test.

## How Bone Marrow Tests are Done

Bone marrow aspiration and biopsy take about 20 minutes each. They differ in the type of tissue removed from the bone marrow. Throughout both procedures, doctors monitor breathing, heart rate, and pain.

To make a diagnosis, doctors combine information from bone marrow tests with information from physical exams, blood tests, and other tests such as imaging techniques (e.g., x-rays or CT scans).

### Aspiration

Bone marrow aspirations are usually performed before a biopsy. In the aspiration, a doctor uses a needle to remove a small amount of fluid bone marrow. A brief, sharp pain is sometimes felt when the needle is inserted into the marrow. The fluid is removed and sent to a pathologist for examination. This sample provides doctors with useful information about the cells in the bone marrow.

### Biopsy

A bone marrow biopsy is a follow-up test. It is done to examine the bone marrow structure itself. In a biopsy, the needle (which is larger than that used for an aspiration) is inserted into the bone, and bone marrow tissue is sampled by removing the core of the needle. In this way, some bone marrow is forced up into the needle. Thin sections of this tissue are studied under a microscope.

## Complications

Bleeding and infection are the two most common risks of bone marrow tests, but they are rare. The tests are fairly simple, and they are safe for most people. Excessive bleeding is more likely to occur in people with certain bleeding disorders (like hemophilia). Refrain from heavy lifting or vigorous exercise for several days after the procedure reduces the risk of bleeding from the needle insertion site. Some signs of infection include the following:

- fever
- excess pain
- redness, swelling, or discharge at the site
- Mild discomfort is sometimes experienced for about a week after the procedure. Some medications, including those available over-the-counter, may help alleviate the pain.

## Recovery

When the tests are done, a bandage is applied to the needle insertion site. Most people can go home the same day. After 24 hours, the bandage may be removed.

## Clinical Trials

U.S. clinical trials on bone marrow tests

[http://www.clinicaltrials.gov/ct/search;jsessionid=1F2EE32F0D07F3FC90394481E56760D4?](http://www.clinicaltrials.gov/ct/search;jsessionid=1F2EE32F0D07F3FC90394481E56760D4?term=bone+marrow+biopsy)  
term=bone+marrow+biopsy are ongoing.

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