How Our Blood Can Diagnose Different Types of Cancer

by PAULA CLARK

Blood Tests for Cancer

When it comes to treating any disease, diagnosis is everything. A medical historian Darlene Berger said that from the time of Hippocrates to today, the process of diagnosis has evolved through three stages. She calls them bedside medicine, hospital medicine and laboratory medicine. The laboratory is so important to doctors today that Berger calls it “the seat of medicine”. With that said, sending samples to the lab is just one part of cancer diagnosis, and this includes blood tests for cancer.

What’s the Most Common Blood Test for Cancer?

The complete blood count (CBC) is a diagnostic staple. According to the Canadian Cancer Society your doctor may order lab tests to:

- Screen for cancer or precancerous conditions before a person has any symptoms of disease
- Help diagnose cancer
- Provide information about the stage of cancer; for malignant tumors, this includes the size and/or extent of the original tumor and whether or not the tumor has spread (metastasized) to other parts of the body
- Plan treatment
- To monitor a patient’s general health during treatment and to check for potential side effects of the treatment
- To determine whether a cancer is responding to treatment
- To find out whether a cancer has recurred

The CBC is ordered routinely to monitor general health and well being. So, if your doctor orders a CBC it does not mean they think you are sick, but they are looking for early signs that you could be sick.

Red blood cells carry oxygen, white blood cells fight infection and platelets help your blood clot, so you do not excessively bleed or bruise.

For example, test results showing a high white cell count alongside a low level of red cells and platelets can indicate leukemia.

Let’s take a look at blood tests used for a leukemia diagnosis.

What Blood Tests Are Used to Diagnose Leukemia?

The Leukemia and Lymphoma Society of Canada explains that doctors may test your blood to:

- Measure the number of red cells, white cells and platelets.
- Detect biomarkers that may indicate cancer activity.

- Examine various chemicals that can indicate how other parts of your body are functioning, including your liver, kidney, heart and lungs.

These blood tests below are in order from general to very specific.

Blood Smear

If your CBC is abnormal, the next step may be ordering a blood smear. This involves viewing your blood through a microscope to look for abnormal cells.

Blood Chemistry

A blood chemistry test may be ordered to get more detailed information from your blood about your levels of electrolytes, fats and proteins. Abnormal levels of proteins can tell your doctor about tumor growth.

White Cell Differential

If your CBC comes back with an abnormal white cell count, a white cell differential may be ordered to determine which types of white cells are in your blood.

Fluorescence In Situ Hybridization (FISH)

This test shows genetic abnormalities in blood that cannot be seen using a microscope.

Flow Cytometry

A flow cytometry test tells doctors if the abnormal white cells discovered by the earlier tests are being caused by cancer.

Immunophenotyping

For leukemia patients, this test will tell your doctor which type of leukemia you have. For example, whether you have myeloid or lymphocytic leukemia.

Karyotype Test

A Karyotype test maps your chromosomes, helping your doctor get very specific about the type of treatment plan you need.

Polymerase Chain Reaction (PCR)

Finally, a PCR test looks for specific biomarkers and helps doctors determine how a patient is responding to their treatment at a molecular level.

What About Blood Tests for Tumors?

Blood tests are also used to detect tumor markers, or “substances in the body that are produced in much higher quantities when cancer or certain benign conditions are present”. Here are a few examples of tumor marker blood tests.

Prostate-Specific Antigen Test

This test will be familiar to older men. According to Cancer Treatment Centers of America, “A prostate-specific antigen (PSA) test measures the level of PSA in the blood. The prostate gland produces PSA, a protein that at an elevated level may be a sign of prostate cancer”.

CA-125 Test

A CA-125 test used to measure the amount of cancer antigens in a person's blood. CA-125 is a protein and a biomarker. Often, this protein is found where cancer cells are highly concentrated, particularly with ovarian cancer .

These are a few more blood tests for specific tumors:

- Alpha-fetoprotein (AFP): liver cancer
- CA15-3/CA27.29: breast cancer
- CA19-9: pancreatic cancer, gallbladder cancer, bile duct cancer and gastric cancer

Testing for Hereditary and Genetic Mutations

According to the National Cancer Institute, there are several tests that detect inherited genetic mutations that can cause cancer:

- The EGFR gene mutation analysis helps determine treatment and assess prognosis in non-small cell lung cancer.
- The BRAF gene mutation analysis predicts response to targeted therapies in melanoma and colorectal cancer.
- The BCRA test is used for breast and ovarian cancer.

Are Blood Tests for Cancer Improving?

There are blood tests in the experimental stages that are designed to detect a number of different cancers much earlier. Usually, a blood test is combined with imaging tests to rule out early symptoms of cancer. The main issue that needs to be sorted out with the new tests are false positives.

What to Expect After Your Blood Is Tested

A blood test for cancer is an important part of the diagnosis, but your doctor will need additional tests to make a definitive diagnosis. This can include testing your urine and/or taking biopsies of suspicious lumps or bumps.

In cases like prostate cancer, your doctor may keep testing your blood to monitor tumor marker levels over time, that way they will know if your cancer is growing or responding to treatment.

It's true that blood tests can only solve one part of the puzzle but living in the laboratory medicine age means we can look for and reveal the clues contained in our blood.