

APLASTIC ANEMIA AND BONE MARROW TRANSPLANTS

Aplastic anemia is a chronic bone marrow failure condition in which the bone marrow stops making enough red and white blood cells and platelets, resulting in pancytopenia (low blood counts). This condition may be due to inherited causes, such as Fanconi anemia, or acquired causes, such as autoimmune syndromes or chemical agent exposure. However, in most cases, a specific cause cannot be identified, also known as an idiopathic disease. Aplastic anemia puts people at a higher risk for bruising and even uncontrolled bleeding, as well as for recurrent infections, because of the lower number of platelets and white blood cells in the blood. The low red blood cell count can cause fatigue, weakness, pale skin and shortness of breath. Some patients will receive red blood cell or platelet transfusions to help with low blood counts. Available treatments include immunosuppressive medications or bone marrow transplant.

LABORATORY TESTS

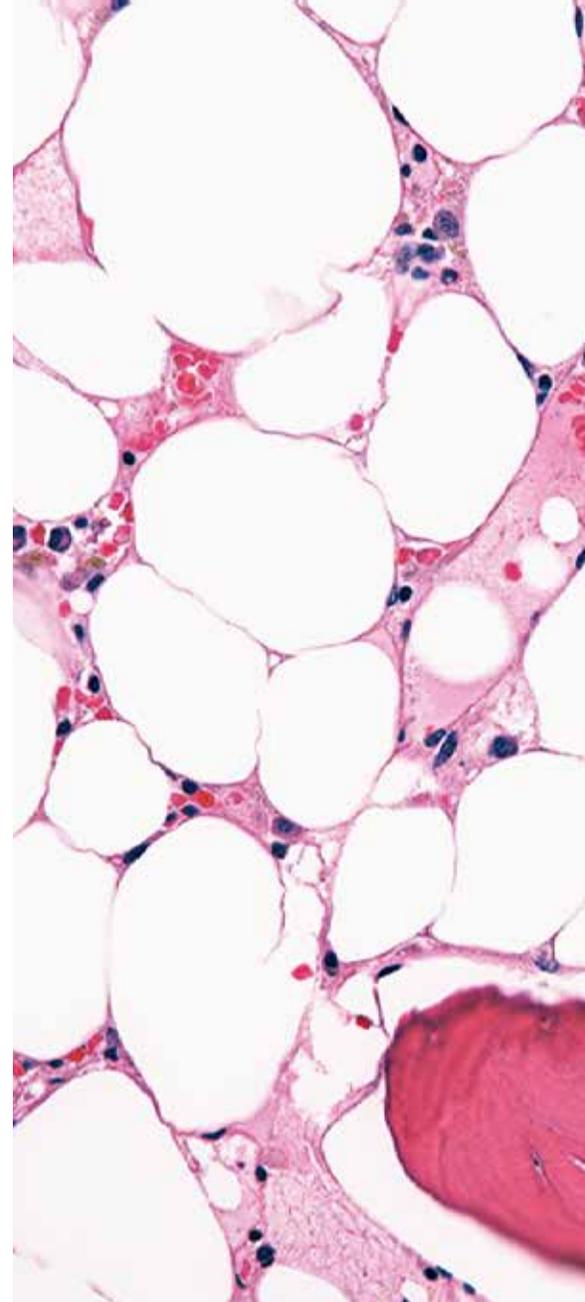
There are two categories for lab tests related to aplastic anemia. One set measures the volume, or quantity, of specific blood cells, such as platelets or hemoglobin. The other set measures the condition, or quality, of the blood cells.

QUANTITY MEASURES*

RBC Count: This lab test measures the number of red blood cells you have. This test is important because red blood cells have hemoglobin (see below). A typical reference range is between 4.7–6.1 mcL for men, 4.2–5.4 mcL for women, and 4.0–5.5 mcL for children.

Hemoglobin (HGB): This lab test measures the amount of hemoglobin you have in your blood. This test is important because hemoglobin carries oxygen to your organs and tissues. A low count reflects anemia. A typical reference range is between 13.5–17.5 g/dl for men, 12.0–15.5 g/dl for women, and 11–13 g/dl for children.

Hematocrit (HCT): This lab test measures the proportion of your blood that consists of red blood cells. This test is important because red blood cells have



UNDER THE MICROSCOPE

A pathology slide of aplastic anemia which contains very few cells (dark blue spots). Normally, bone marrow is filled with many different cells.

hemoglobin (see above). A typical reference range is between 45%–52% for men, 37%–48% for women, and 29%–65% for children.

White Blood Cell Count (WBC): This lab test measures the number of white blood cells. This test is important because low or high WBC counts may be indicative of an underlying abnormality such as infection or malignancy. A typical reference range is between 4,000–11,000 per mL for adults and 5,000–10,000 per mL for children.

Absolute Neutrophil Count (ANC): This test measures a specific type of white blood cells, neutrophils. This test is important because neutrophils make up about 40%–60% of all white blood cells and are the first to attack a bacterial infection. A typical reference range is between 1.5–8.0 μm^3 for adults and greater than 1.5 μm^3 for children.

Platelet Count (PLT): This test measures the number of platelets in your blood. This test is important because platelets help form clots, which prevents you from losing too much blood. A typical reference range is between 135,000–400,000 mL for men, 157,000–400,000 mL for women, and 150,000–300,000 for children.

QUALITY MEASURES*

Mean Corpuscular Volume (MCV): This test measures the size of the red blood cells. This test is important because an abnormal size can help characterize anemia (“microcytic” = too small; “macrocytic” = too big). A typical reference range is between 80–96 femtoliters per cell (μm^3) for adults. For children aged 0–1 month, the reference range is between 88–123 femtoliters, aged 1–3 months between 91–112 femtoliters, aged 3–6 months between 74–108 femtoliters, and aged 6–12 months between 70–85 femtoliters.

Mean Corpuscular Hemoglobin (MCH): This test measures how much hemoglobin each red cell is carrying, and is proportional to the MCV. This test is important because it indicates the amount of oxygen that is carried to the rest of your body. A typical reference range is between 27–33 pg/cell for adults. For children aged 0–1 month, the reference range is between 31–37 pg/cell, aged 1–3 months between 27–36 pg/cell, aged 3–6 months between 25–35 pg/cell, and aged 6–12 months between 23–31 pg/cell.

Mean Corpuscular Hemoglobin Concentration (MCHC): This test measures how much hemoglobin is present per unit volume of blood. A typical reference range is between 33–36 g/dl for adults. For children aged 0–6 months, the reference range is between 28–36 g/dl and aged 6–12 months between 32–36 g/dl.

ASK YOUR DOCTOR

- What factors may affect the results of my test?
- What course of action may be next based on the test results?
- How does this test fit into my situation?
- If the results are still within reference range, but they are changing compared to older tests, what does that mean?
- What does it mean if my results are higher than the reference range? What if they are lower?
- How will the lab test results impact my treatment plan?

Red Cell Distribution Width (RDW): This test measures the degree of difference in red blood cell size. This test is important because it indicates how much your red blood cells vary in size, which can help pinpoint your diagnosis. A typical reference range is between 11.5%–14.5% for adults and around 13.2% for children.

Mean Platelet Volume (MPV): This test measures the average size of your platelets. This test is important because it may indicate that platelet production or release from the bone marrow is abnormally low (small platelet size) or abnormally high (large platelet size). A typical reference range is between 9.4–12.3 femtoliters for adults, which indicates spheres of around 2.65–2.9 μm in diameter. For children, a typical reference range is between 7.2–8.4 femtoliters, depending on their age.

BLOOD TRANSFUSIONS AND BONE MARROW TRANSPLANTS

Human Leukocyte Antigen (HLA): HLA genes are inherited and the gene products (antigens) are expressed on the surface of cells. Donors are chosen for bone marrow transplantation based on how closely their HLA genes match those of the recipient. Strong matches promote engraftment and decrease the chance and severity of graft-versus-host disease. Patients have a 1 in 4 chance of having identical HLA antigens as their sibling, but it is possible to find strong matches in unrelated people as well.

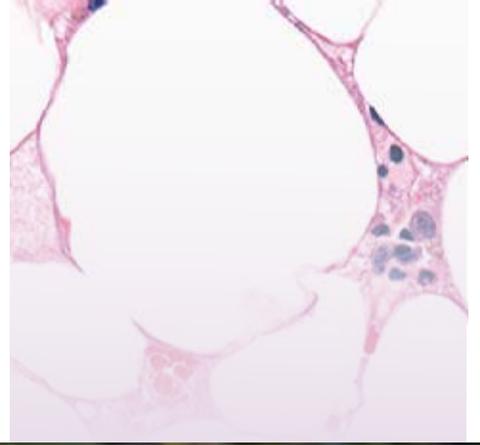
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**Please note that reference ranges are set by individual laboratories for their specific populations so reference ranges might differ slightly.*

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APLASTIC ANEMIA: MEET KYA



Kya was diagnosed with aplastic anemia at 16, a condition where bone marrow stops making enough new platelets and white and red blood cells. Kya received two bone marrow transplants from related donors, and underwent intensive chemotherapy before each transplant to eliminate her own cells.

To learn more and to watch a video about Kya, go to www.ascp.org/patients.

“Without laboratory professionals and pathologists doing their job to that high of a standard, I know I would not be alive.”

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