Studying The Impact Of Fresher Blood

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The Food and Drug Administration allows red blood cells to be stored for 42 days, and hospitals almost always use the oldest in their refrigerators first to ensure none expires. The age of the blood a patient receives depends on how much the hospital has of that type on a given day. The average age of transfused blood is just over 16 days.

This summer, hospitals around the country are researching if fresher blood really is better for at least some patients. And if so, they're hunting ways to turn back the clock for older blood and offset any deterioration.

Donated blood “saves lives every day. We certainly do not want to run out of it,” says Dr. Simone Glynn of the National Institutes of Health, which is spearheading the multi-million-dollar initiative.

Research ranges from trying to improve the oxygen-carrying capacity of stored blood to ridding it of so-called microparticles, or cell fragments that gradually build up in storage. “It's very challenging to find out what's causing this,” Miami's Dr. Wenche Jy, who's leading the microparticle work, says of the age-of-blood debate.

About one in every seven hospitalized patients requires a transfusion, a staggering 15 million bags administered in the U.S. each year — with few donations to spare. Every year, parts of the country experience spot shortages. Scientists have long known that blood breaks down the longer it's stored, but not whether those changes were enough to trigger side effects.

Several years ago, a number of small studies began suggesting that blood well under the FDA's 42-day storage limit may increase the risk of complications like blood clots, infections, or organ dysfunction. Then the Cleveland Clinic examined records of 6,000 of its past heart surgery patients — and found those who received blood that was more than two weeks old were slightly more likely to die, required a ventilator longer and had higher rates of infection and kidney failure than those who got fresher blood. Earlier this year, Connecticut researchers reported similar findings in a study of 200 trauma patients.

But that's far from proof. Maybe the sickest patients just got the oldest blood, a flaw these kinds of look-backs can't overcome. Complicating the controversy, other similarly performed studies concluded age of blood doesn't matter, finding no differences between patients who got older or fresher transfusions.

Enter the more stringent research to find out. In the largest NIH-backed study, 15 hospitals will recruit 1,800 patients about to have heart surgery who agree to be

randomly assigned to get blood more than 20 days old or less than 11 days old, and then track how they fare.

The Cleveland Clinic has enrolled about 1,000 heart-surgery patients and counting into another comparison, this one defining fresh as no older than two weeks. At the same time, the NIH is funding eight additional projects to tear apart just what happens to stored blood that might trigger side effects. One leading theory is that stored blood gradually loses its ability to get oxygen to tissues, largely through loss of a blood vessel dilator called nitric oxide.

And Jy's team has found those microparticles play a role in blood clotting and inflammation, and that they start accumulating inside blood bags around day 10. Next up is a study of 500 heart surgery patients to test if washing two or three-week-old blood in special machines that filter out the microparticles can make a difference.

However the debate turns out, it already may be spurring hospitals to be more conservative with blood. “We actively seek to avoid transfusions whenever possible,” says the Cleveland Clinic's Dr. Colleen Koch, through such steps as using devices that capture and recycle a patient's own blood during surgery.