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Are You Ready For Final Jeopardy?

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Imagine you're in the final round of Jeopardy. Alex Trebek is looking at you expectantly. The category: medical science. Being from the health care sector, you're pretty confident. Alex says, "This is the only human tissue not perfused by blood. Remember, your response must be in the form of a question!"

"What is the cornea?" That's the question Alex is looking for. There are no blood vessels in the cornea because its highly specialized function demands transparency – uniquely, it receives its nutrients through a process of liquid diffusion. But all other tissues and organs in your body are perfused by blood.

We know that blood is amazing, that it carries oxygen and nutrients to every cell in your body, to every organ and tissue -- except that one Alex was asking about. It fights infections. It helps heal wounds. Blood and its components are used in surgeries, and for treatment of trauma and burns. It's used in transplants and cancer therapies. But we've only just begun to discover everything we need to know about how blood therapies can benefit patient care.

Puget Sound Blood Center's Research Institute conducts comprehensive, multidisciplinary investigations into blood. We intensively study the diverse ways blood is used in health care, seeking to further improve the safety and efficacy of blood applications. We study red blood cells containing hemoglobin that transport oxygen throughout the body. And white cells – leukocytes – which are part of our immune system defending against infection. There are platelets (thrombocytes) which prevent blood loss by plugging leaky vessels, but which are also capable of killing us by forming deadly clots. And we study plasma, a fluid in which all of these cells are suspended. We do research on blood "containers," which in our world includes both vessels in our bodies and the specialized bags we use to receive donations and from which patients receive transfusions.

Let's focus on just two areas of investigation into blood: genetic typing and thrombosis prevention.

Most people will need a red blood cell transfusion at some time during their lives. Traditional blood typing began in 1901 when A, B, and O groups were identified. Advancing science revealed that blood cells carry many proteins and other molecules that differ between individuals that can be recognized by the immune system. After a patient receives a transfusion, antibodies sometimes form against those molecules. If a patient needs transfusion again, they may require specially matched blood to prevent harmful immune reactions. Emerging genetic-typing technologies make it more likely that these problems can be prevented -- and if they've occurred in the past, they can be avoided in the future. Better matching between donor and patient blood types reduces the possibility of adverse, immune system reactions arising

from transfusion. Our research in this area is translational — what we are learning in the lab is applied to diagnosis and treatment. And we're involved in clinical studies, studying patients and outcomes directly.

So what do stroke, heart attacks, cancer, diabetes, malaria and lupus have in common? Thrombosis is the common mechanism that connects them. Thrombosis, or unwanted pathologic blood clotting, is our newest and biggest research challenge. Strokes and heart attacks are the leading cause of premature death in the world. By conducting new research on clotting we're seeking to identify, prevent and avoid events or conditions that lead to thrombosis. Ours is the only research team in the Northwest dedicated to thrombosis research.

Blood research saves lives, and helps people regain productive, meaningful lives. Our discoveries helped make open heart surgery and bone marrow transplants possible. We've improved transfusion therapy for surgeries, and increased life expectancy for people with blood and clotting disorders.

Our new research facility in the South Lake Union neighborhood houses scientists recognized worldwide for expertise in transfusion medicine, blood vessel biology, blood genetics, thrombosis, treatment of hemophilia and sickle cell disease. We're working collaboratively towards new discoveries and new cures – both internally, and with a host of partners at UW Medicine, Seattle Cancer Care Alliance, Fred Hutchinson Cancer Research Center, Seattle Children's and other institutions in the region.

So now you're ready to impress your friends while playing Jeopardy. Even the one tissue in your body that doesn't depend on blood perfusion (hint: "what is the cornea?) is depending on all the other tissues and organs that do. Our blood research saves lives – perhaps one day, even yours. To learn more about our research investigations, visit our website at psbc.org/research.

José A. López, MD is Chief Scientific Officer for Puget Sound Blood Center and leads its Research Institute. The López laboratory has been involved for many years in studies aimed at understanding the basic mechanisms of platelet adhesion, vessel blockages in sickle cell disease, and the role platelets play in inflammation. Additional focus areas include thrombosis and the role of microparticles in normal hemostasis. López is a Professor of Medicine (Hematology) and Adjunct Professor of Biochemistry at the UW School of Medicine. Prior to joining PSBC in 2006, López was Vice Chair of Medicine for Research at Baylor College, Houston.

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