For one researcher, a love for science is in the blood

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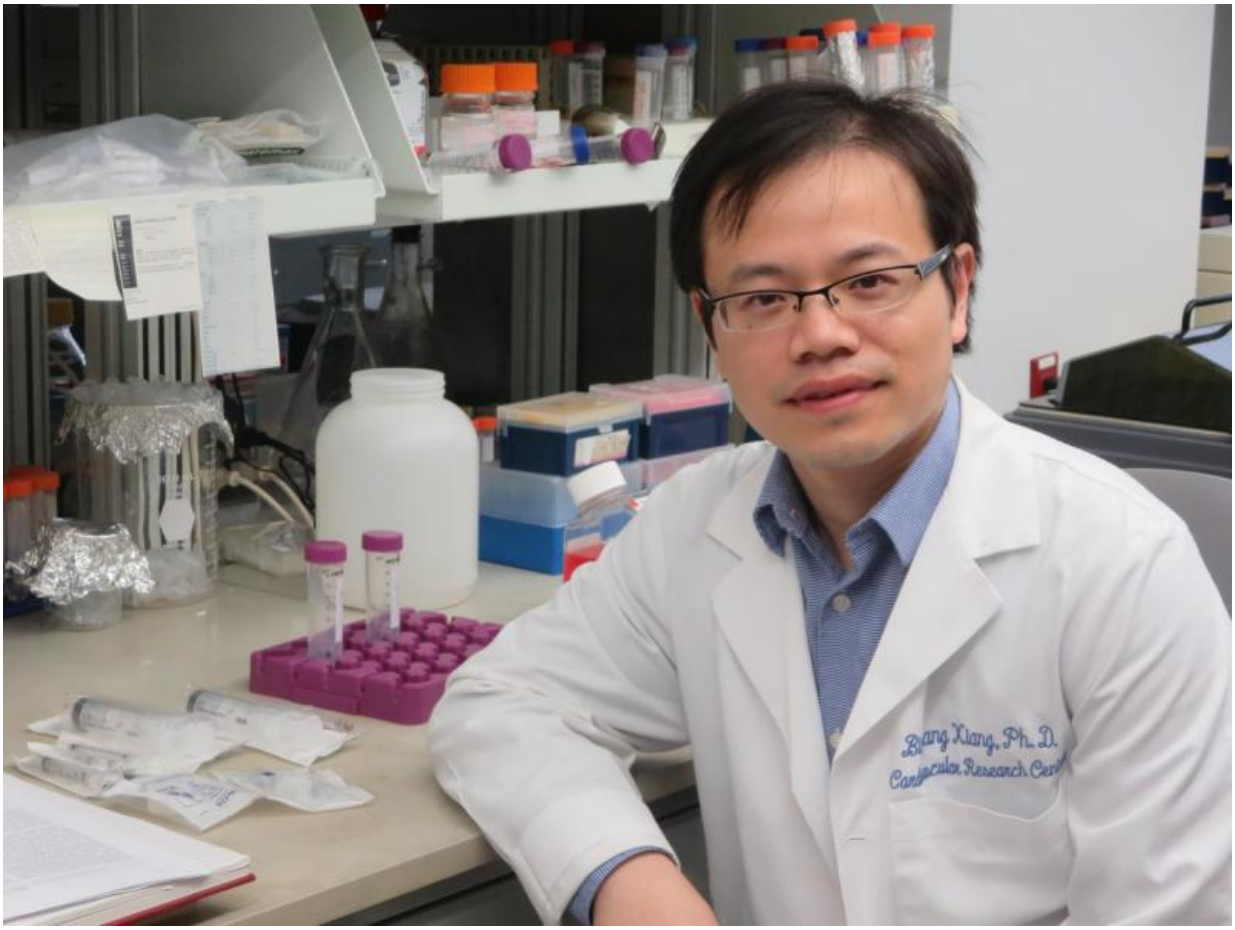

Binggang Xiang, Ph.D., of the Saha Cardiovascular Research Center at the University of Kentucky, in his lab. Xiang's research focuses on understanding how platelets work and their role in disease. His research has earned him a coveted presenters spot at the national American Heart Association conference in November. Credit: Laura Dawahare and Charles Wright, UK Public Relations

Kids skin their knees playing outside. People prick their fingers with needles trying to sew a button back onto a shirt. Others cut themselves while chopping vegetables.

Platelets prevent these minor injuries from being fatal.

When people think of blood, they may think of red blood cells that help carry oxygen, or white blood cells which protect the body against infection. But our blood also contains small, colorless cells known as platelets which serve a critical role in blood clotting. When they work properly, platelets protect people from bleeding to death from the dozens of minor cuts and scrapes they inevitably get each year.

Research scientists like Binggang Xiang at the University of Kentucky's Saha Cardiovascular Research Center (CVRC) devote their lives to understanding how platelets work and how they relate to disease.

Born and raised in China, Xiang earned his Ph.D. from the prestigious Shanghai Jiao Tong University School of Medicine. While there, Xiang's interest in medical research blossomed while investigating the damaging effects of reactive oxygen species (ROS), which are known to contribute to disease, on cell health.

Immediately after earning his Ph.D., Xiang joined the laboratory of Zhenyu Li at the Saha CVRC here at UK to further develop his scientific skills. Under Li's mentorship, Xiang immersed himself in the world of platelet research. Of particular interest to Xiang while he worked under Li's mentorship was the crucial question of how, exactly, platelets work to stop bleeding.

"Blood clotting is an enormously complex process, and trying to figure out how all of the components inside and outside the cell come together to make it happen is a bit like trying to put together a puzzle without

knowing what the final picture is supposed to look like," Xiang said. "We began to explore how a class of proteins known as integrins aided in the clotting process."

According to Xiang, platelets rely on a complex cascade of communication from both inside and outside the cells to indicate the need for clotting. Integrins help mediate those signaling events.

Platelets use these integrin proteins to attach to the injured blood vessel wall. Integrins also help platelets stick together and change shape to form a blood clot—much like a plug—to stanch blood flow and allow healing to begin.

For a long time, doctors and scientists knew platelets were crucial for blood clot formation and that errors in clotting could contribute to disease. While investigating integrin proteins and platelets, Xiang and his colleagues found these unique cells also play a surprising role in sepsis as well.

According to the Centers for Disease Control and Prevention (CDC), more than one million people develop sepsis each year, a life-threatening condition caused by an overreaction of the immune system to a blood infection. Normally, the immune response attacks a pathogen with precision, but in sepsis, the response directly harms the patient's own cells and tissues.

Physicians knew thrombocytopenia, or low platelet levels in the blood, corresponded with a worse prognosis for a patient with sepsis, but the connection between the two has long been unclear.

When Xiang began studying the link between thrombocytopenia and sepsis, he and his colleagues were shocked to find that platelets were directly responsible for keeping the immune system in check. The cells

normally known for blood clotting also produced anti-inflammatory agents to prevent immune cells from becoming too active during a blood infection.

In other words, if a patient had too few platelets in the blood, there was nothing to protect the patient's own immune system from turning on itself. For Xiang, this important finding has so far been the highlight of his career.

"The most exciting finding, I think, is that [we have uncovered] the protective role of platelets in severe sepsis," Xiang said. "Our findings suggest that platelet transfusions may be effective for treating severely septic patients."

The excitement surrounding Xiang's work has expanded beyond UK. The American Heart Association (AHA) recently honored Xiang with the Kenneth M. Brinkhous Young Investigator Award in Thrombosis for his exceptional work in studying platelets. A significant career achievement, Xiang will present some of the latest findings from his laboratory at the upcoming national AHA conference in November.

For Xiang, though, the work is not about the publicity or the prestige, but rather about the enjoyment it brings to his life.

"I really like the peace in the lab and enjoy the excitement when we have novel findings useful for treating patients," Xiang said. "My goal is to have a team doing excellent research to help cure patients."

Provided by University of Kentucky