

Heart Failure-Induced Alterations in Platelet Phenotype: Impact on Lung Microvascular Endothelial Barrier Integrity.

The endothelium, a layer of cells lining our blood vessels, is crucial for maintaining normal blood flow and preventing leaks. Unfortunately, this endothelial barrier can become disrupted in various conditions, including heart failure. Heart failure not only affects the heart but also leads to problems in the lungs, causing fluid accumulation and impaired gas exchange. Platelets have been known to support endothelial integrity, but heart failure may alter their function.

This research project aims to investigate the changes in platelets caused by heart failure and how these changes impact the integrity of the lung blood vessels. Specifically, we are interested in a molecule called transforming growth factor β 1 (TGF β 1), which can disrupt the endothelial barrier. Platelets are a significant source of TGF β 1, but in healthy conditions, they maintain endothelial integrity.

Using a mouse model of heart failure, we will collect platelet releasates from mice with failing hearts and compare them to those from healthy mice. We will then study the effects of these releasates on the barrier integrity of lung blood vessels. Our hypothesis is that heart failure alters platelets in a way that diminishes their ability to protect the endothelium from the disruptive action of TGF β 1.

To understand the underlying mechanisms, we will analyze the proteins released by platelets in both healthy and heart failure conditions. By identifying these regulatory factors, we can determine how they modulate TGF β 1 function. Then, we will verify the role of selected factors using blocking antibodies and assess their impact on junctional proteins that are vital for maintaining endothelial integrity.

This research project has significant implications for our understanding of heart failure-related platelet alterations and their impact on lung blood vessel integrity. By uncovering the factors involved and their effects on endothelium, we hope to identify potential therapeutic targets for treating heart failure and improving lung health.

In summary, this study explores the complex relationship between heart failure, platelets, and the function of lung endothelium. By investigating how heart failure alters platelets and their interactions with the endothelium, we can gain valuable insights into potential strategies for preserving lung function and developing new therapeutic approaches for heart failure patients.