The cardiac endocardial tissue maintains a stable population of hematopoietic cells

Cardiac function is critical for blood circulation, but whether cardiac endothelial cells differentiate into or act as a niche for hematopoietic cells remains a controversial topic. Here, using zebrafish as a model system, we find that the lumen-lining endocardial tissue contribute to maintaining a stable population of cardiac-residing hematopoietic cells. In the beating heart, we found hematopoietic cells, particularly hematopoietic stem cells, platelets and erythrocytes, are integrated into the luminal surface of the endocardial tissue. This attachment is regionally restricted to the ventricle and the atrium, but is not found in the cardiac valve which experiences the highest amount of biomechanical stress. Using photoconversion tracing, we find that these hematopoietic cells derive from the endocardium itself as well as the dorsal aorta, known to be the first vascular origin of definitive hematopoiesis. We also find photoconverted endocardial-derived hematopoietic cells are lodged in other hematopoietic niches where blood cells proliferate. Single-cell RNA sequencing of the endocardium confirms the presence of hematopoietic endocardial cells and identifies a novel regulator of hematopoietic production, the transcription factor *bloody fingers* (*blf*). We find that CRISPR-generated *blf* mutants exhibit a significant loss of cardiac hematopoietic cells. Together, our work uncovers the endocardium as a de novo source of hematopoiesis and a niche to which hematopoietic cells attach. Physiological functions of these cardiac-residing hematopoietic cells during development, injury and infection are currently under investigation.