Contact Dependency of Immune Cells and Endothelial Cells in Promoting Angiogenesis

Bah, Amadou

In a process called Atherosclerosis, plaque builds up within the walls of arteries, and they limit blood supply, disturb oxygen flow, and ultimately lead to other cardiovascular diseases. To replenish blood and oxygen supply to areas of vessels stricken with atherosclerosis, we decided to try to modulate angiogenesis using macrophages and their soluble factors. We have examined the effects of macrophage conditioned media and macrophages solely on the growth of endothelial cells (HUVECs). We produced these effects by using an in vitro model of conducting a 3D matrigel angiogenesis assay where endothelial tubular networks formed due to the mechanisms and functions of different macrophage soluble factors and different macrophage phenotypes. The purpose of the project is to distinguish whether soluble factors alone can produce vascular growth or whether direct contact between endothelial cells and macrophages can produce better network growth compared to its respective conditioned media. We conducted three different experiments, and one involved a hypoxic environment stimulator. What we found was that when macrophages interacted with the endothelial cells in the hypoxic condition directly, more network growth occurred, especially in the M2 wells. At the micro vasculature perspective (10x objective) in regular conditions, our scientific findings supported our hypothesis that specific macrophage phenotypes contributed to network growth as the M2 macrophages contributed to better network growth than their respective conditioned media. From an aerial perspective (4x objective), soluble factors alone were sufficient enough to produce network growth. The findings suggest that specific macrophage phenotypes can be pivotal in regrowing vessels from preexisting plagued ones.

Awards Won: