

Researcher to provide new insight for treating vascular disease

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The blood circulates through the body in an intricate process that researchers are only beginning to understand. Now, University of Missouri researcher Steven Segal has received the National Heart, Lung and Blood Institute's prestigious Method to Extend Research in Time (MERIT) Award for his work in defining the signaling processes that control blood flow in the smallest, microscopic blood vessels, the microcirculation. Understanding these events could help researchers find novel approaches to fighting vascular disease associated with hypertension and diabetes and help to combat the adverse effects of aging on physical performance.

"Blood vessels are composed of individual cells arranged to form tubes that direct blood flow in tissues and organs. Within the microcirculation, the control of blood flow requires vascular cells to synchronize their activity in order for blood vessels to constrict and reduce blood flow or to dilate and increase blood flow," said Segal, professor in the Department of Medical Pharmacology and Physiology in the School of Medicine and Investigator in the Dalton Cardiovascular Research Center. "The goal of my research is to determine how cells of the microcirculation actually coordinate their activity to control vessel diameter in order to regulate blood flow. Gaining new insight into these processes will facilitate the development of new strategies for treating vascular diseases and promoting an active lifestyle."

The microvessels that control blood flow are constantly dilating and constricting as they regulate their diameter according to the metabolic

needs of the tissues they supply. As illustrated in the accompanying figure, these vessels are lined by a continuous layer of endothelial cells which, in turn, are surrounded by smooth muscle cells that can relax (causing "vasodilation") or contract (causing "vasoconstriction").

In response to physical activity, smooth muscle and endothelial cells in the microcirculation of skeletal muscles are stimulated to produce electrical and chemical signals. These signals are essential for coordinating the activity of entire branches and networks of the microcirculation. These networks act as a team that orchestrates the delivery of oxygen and nutrients as well as removes metabolic products in active tissues.

"The research in my laboratory is concerned with understanding the cellular and molecular events that initiate the signals involved in controlling blood flow, how such signals are transmitted from cell to cell to orchestrate vasodilation and vasoconstriction in an organized manner, and how these integrative processes are governed by the nervous system," said Segal, who joined the faculty at MU in 2006. "In turn, understanding these basic processes that are integral to the microcirculation provides new insight for developing novel approaches to treating vascular disease. The research environment at Mizzou is ideal for pursuing these goals."

The MERIT Award is designed to provide long-term, stable support to investigators whose research competence, productivity and scientific contributions are distinctly superior and who are likely to continue to perform in an outstanding manner.

Source: University of Missouri-Columbia

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