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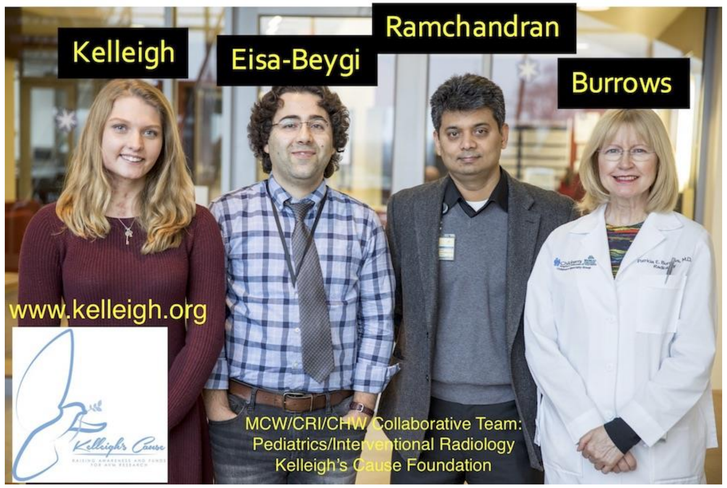


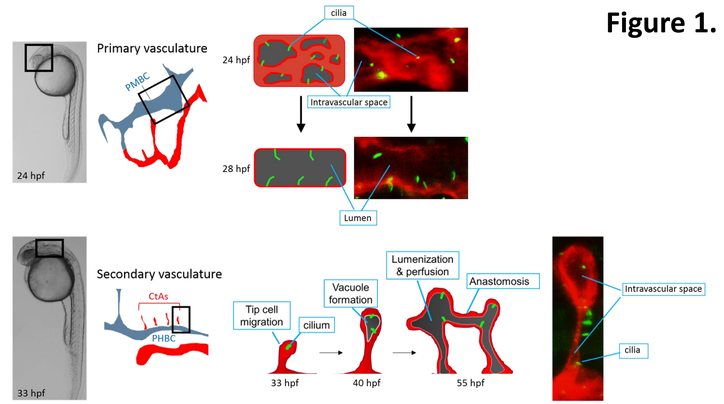
The Developmental Vascular Biology program in the Children's Research Institute, Children's Hospital of Wisconsin is directed by Professor in Pediatrics Ramani Ramchandran, Patrick J. and Margaret G. McMahon Endowed Professor in Obstetrics and Gynecology. The goal of this research program is to investigate the molecular mechanisms underlying vascular patterning in vertebrates. We are interested in understanding how endothelial cells (ECs) in the brain communicate with other cells in the microenvironment to pattern the brain vasculature during development. We use zebrafish, a genetically tractable vertebrate model, and mouse mammalian model to investigate this question. Knowing the basic underlying mechanisms of this EC-driven cross talk with other cell types in the brain is likely to provide opportunities for targeting in diseases influenced by aberrant brain vascular network namely, pediatric cerebral arteriovenous malformations (AVMs) and intracerebral hemorrhage (ICH).

"Characterization of Endothelial Cilia Distribution During Cerebral-Vascular Development in Zebrafish (Danio rerio)"

Eisa-Beygi S, Benslimane FM, El-Rass S, et al. *Arteriosclerosis, Thrombosis and Vascular Biology.* 2018;38:2806-2818.

We have identified a microtubule-based structure, cilia in brain ECs of the developing zebrafish. Using high-resolution imaging of the transgenic fish line where endothelial cells (marked in red), and cilia (marked in green), cilia were found in ECs prior to flow, which was not described before. This observation suggested that cilia plays a role beyond its traditional mechano-sensor role in the vasculature. Loss of ciliary proteins lead to brain ICH, which was rescued by endothelial-specific expression of the ciliary protein. This work was performed by the Kelleigh Gustafson Research Fellow Dr. Shahram Eisa-Beygi, first author on this work, and is supported by Kelleigh's Foundation, an organization dedicated to AVM research. Dr. Patricia Burrows who treats Kelleigh was also an integral member of this research team.

Figure 1.



Top Panel: Images depicted of cilia in green and endothelial cells in red from a 24 hours post fertilization (hpf) zebrafish embryo shown in the panel. The black box indicates the region of the head vasculature marked by primordial midbrain channel (PMBC). A drawing of the actual data is also provided adjacent to the data image.
Bottom Panel: Images depicted of cilia in green and endothelial cells in red from a 33 hours post fertilization (hpf) zebrafish embryo shown in the panel. The black box indicates the region of the head vasculature marked by primordial hindbrain channel (PHBC), and emerging central arteries (CtAs). The drawings depicts the series of data from 33 hpf to 55 hpf observed in imaging, and a single central artery data image is shown at the far right of the panel.

Figure 2.

Left Panel: Cilium in green emerging into the lumen from a red endothelial cell is shown. Note the tilt of cilium in the middle panel. These images were captured from the transgenic line described in the manuscript.
Right Panel: Cilium structure and all the components associated with the structure are labeled.