

Angiogenesis



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Goals and Projects:

Understanding the basic molecular mechanisms of angiogenesis with a special focus on Tissue Inhibitors of Metalloproteinases (TIMPs).

Examination of the physiological and pathological pathways that regulate retinal vascular leakage.

Research and Innovations:

With the discovery of TIMP-3 mutations being causative in an inherited retinal degeneration, Sorsby Fundus Dystrophy, in which patients developed florid choroidal neovascularization, we focused our studies on using the retina as a model to study the role of TIMPs in angiogenesis.

We have made significant progress in being able to dissect out the mechanisms by which mutations in TIMP-3 cause the Sorsby fundus dystrophy phenotype as well as identifying the regions of TIMP-3 that are responsible for angiogenesis inhibition. We have recently been awarded a patent for the use of TIMP-3 peptides for the inhibition of angiogenesis in a number of diseases in which neovascularization plays a major role. For the most part we have focused our efforts on the regulation of neovascularization in the eye with some activities in tumor angiogenesis.

Using both human, animal in vivo and in vitro studies we have identified insulin and betacellulin to play a role in the development of macular edema in patients with diabetes. We have established a novel transgenic zebrafish model that can be used for high throughput screening of drugs that effect retinal and brain vascular leakage. Our ultimate goal is the understanding, prevention and/or reversal of angiogenesis and retinal vascular permeability, in an effort to control the devastating blinding consequences of ocular diseases.

Lab Staff Members:

- Bela Anand-Apte, *Principal Investigator*
- Jing Xie, *Project Staff*
- Jian-Hua Qi, *Project Staff*
- Mariya Ali, *Research Technologist*
- Alecia Cutler, *Research Laboratory Coordinator*
- Peter Stan, *Research Student*
- Nicholas Prayson, *Research Student*