Adaptive Optics guided Therapies

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Adaptive optics correction of the eye is important to imaging the earliest events in diseases of the eye in order to improve our understanding of these diseases and to facilitate earlier diagnosis and therapy. In addition there is the potential to deliver localized light based therapies to the eye with the use of AO.

Here I will describe sight threatening ocular conditions for which we believe that AO correction will assist in early diagnosis and improved understanding, including eye complications of diabetes. In addition AO may enable the diagnosis of systemic conditions, including cerebral malaria and Alzheimer's disease. AO can be used for light assisted activation of drugs or implants, imaging and guidance in the delivery of genetic therapies and therapies for apoptosis as well as image guided surgeries. In particular I will discuss our development of two photon excitation photodynamic therapy for age related macular degeneration.

Larger stroke adaptive optics (AO) with fine control is needed both to correct rodent eye models of disease and diseased human eyes. Good optical correction and the ability to optically slice through the retina is also important to both these applications. Here I will discuss a novel ferrofluid deformable mirror (FDM) to correct larger ocular wavefront errors.