A novel scanner design for ophthalmic OCT and hand-held OCT angiography

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Value Proposition

Angiography is a medical imaging technique used to visualize the inside of blood vessels and organs of the body. Optical coherence tomography angiography (OCTA) is a new non-invasive imaging technique of the retinal microvessel (smallest system of blood vessels in the body) that employs motion contrast imaging to high-resolution volumetric blood flow information. It generates angiographic images in a matter of seconds.

Currently, only table top OCTA systems are commercially available. These systems require a compliant seated patient, leaving OCTA unavailable to several patient populations including young children and other patients not able to cooperate with head placement and ocular fixation, such as bed-ridden patients or intra-operative use. Typically, these patients are imaged with hand held systems but the line rate of current hand-held systems (20 kHz) is too slow to support the high density, repeated scans needed for OCTA.

Technology

This new Duke technolgy uses a custom, lightweight, hand-held OCT probe based on a high-speed swept source engine for imaging in the intensive care nursery. The probe uses custom optics, optomechanics, and a MEMS mirror to achieve a weight of only 211g. The portability and imaging speed of this probe facilitates repeat, volumetric, bedside imaging in a challenging imaging environment. To date, there are over 43 pre-term and full-term infants imaged in the intensive care nursery, with some patients having up to 15 imaging sessions starting at 30 weeks post menstrual age. Volumetric OCT enables visualization of the complex 3D structures associated with retinal pathology that is unavailable to slower, B-scan based probes. Repeat imaging shows the development of both normal and diseased retinal structures. It is believed that OCT imaging of these infants will reveal retinal abnormalities, enable further study of pediatric retinal diseases, and allow for better management and prediction of future visual outcomes.

Advantages

- Able to image bedridden patients such as infants
- The probe is ergonomic, easier to hold and stabilize
- High-speed imaging
- Can be moved without the restricted degrees of freedom from the armature
- The system is easier to align and image with both axially and laterally
- Allows easier imaging and monitoring of retinal diseases