HIGH-RESOLUTION OPHTHALMIC ULTRASOUND SYSTEM FOR OCULAR STRUCTURES

Posted in Bio-Medical, Tech Briefs, Imaging & Diagnostics on Thursday, September 01 2011

This technology may be used to obtain a critical view of the posterior segment of the eye when a dense cataract or vitreous hemorrhage is present.

An ophthalmic ultrasound system evaluates ocular structures more clearly by providing images of all aspects of the anterior segment. It provides images of the eye and tissues around and behind the eye to determine the presence of pathology when doctors are prohibited from viewing it directly due to opacity of the cornea, lens, or the vitreous gel that fills the eye.

The Eye Cubed™ is used in conjunction with CT or MRI for imaging orbital tumors, optic nerve abnormalities, and to locate “foreign bodies” that get lodged in the eye or orbit from accidents. The ultrasound is currently the only method to obtain a critical view of the posterior segment when a dense cataract or vitreous hemorrhage is present in the eye.

Customized configurations of A-Scan and B-Scan modes meet various viewing needs for posterior and anterior segments, making the system suitable for both retinal sub-specialists and anteriorsegment surgeons.

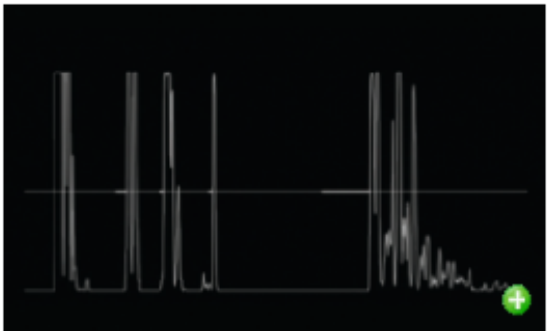

Fig. 1 – A-Scan Mode can be used for Axial Length Biometric (shown) or standardized diagnostics.

The A-Scan probe (Fig. 1) eliminates corneal compression and transmits ultrasound waves through dense cataracts. It can be used to measure the eye’s axial length (via immersion or contact methods) or to perform diagnostic scans. Builtin power calculations and analyses include the Holladay-1, SRK-T, Haigis, and Hoffer- Q formulae. The new B-Scan probe can be used for the posterior segment (Fig. 2) or wide field anterior segment to provide an unprecedented view of the lens apparatus, including zonules and ciliary muscles.

The ophthalmic ultrasound sector probes utilize a subminiature LVDT Linear Position Transducer from Macro Sensors (Pennsauken, NJ) to send a signal to the console that allows the ultrasound image to be accurately displayed on screen. The ultrasound transducer is moved back and forth by a motor to send an array of sound beams into the eye. While miniature in size to fit into the probe, the LVDT position sensor is very dependable, operating over millions of cycles without wear or signal quality degradation. Ultra-low-mass cores allow use of high-response dynamic measurements.

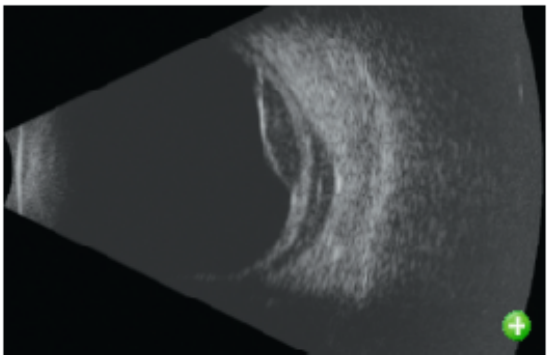

Fig. 2 – B-Scan Mode can be used for the posterior segment (as shown) or wide field anterior segment.

While axial resolution is determined by transducer frequency, lateral resolution is solely determined by LVDT quality and the system's ability to translate that position information into the proper display of echoes on the screen. This is most critical in the measurement of ocular tumors, since the lateral and axial measurements are used by radiation oncologists to calculate the amount of radiation delivered to the tumor. Incorrect lateral measurements could result in improper radiation dosage and direction, causing life-threatening problems if the entire tumor is not treated.

The unique amplifier and probe design allow this system to achieve the industry's highest signal-to-noise ratio. Because noise is reduced to a minimum, details of even the finest ocular structures become visible — including blood and inflammatory cells — during an examination of the eye.

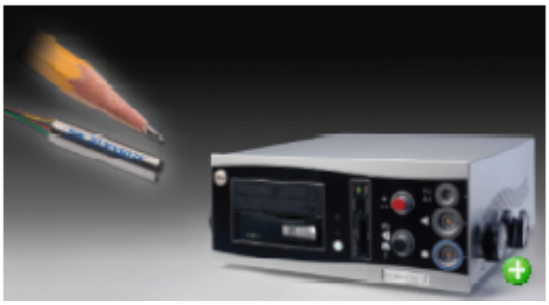

Fig. 3 – Macro Sensors' subminiature LVDT linear position sensor serves as a critical component in an ophthalmic ultrasound system.

This diagnostic ophthalmic ultrasound technology also features real-time imaging, advanced movie mode using the fastest sampling rate, and internal memory for storage of measurements. With an image

acquisition rate of up to 25 frames per second, the system allows for the visualization of delicate ocular activity, including the movement of blood cells through retinal vessels and the behavior of posterior segment membrane.

A 24-inch, widescreen LCD monitor provides for high-precision views of real-time images and movies. Images can be stored on the removable one-terabyte hard drive and recalled for additional analysis, measurement, and documentation. The system's built-in DVD burner also allows the user to quickly export patient information, improving practice efficiency.

This technology was done by Ellex - Innovative Imaging, Sacramento, CA. For more information, visit http://info.hotims.com/34458-190.