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Innovations in Medical Ultrasound Transducers

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Physical principles are fundamental to ultrasound imaging and dominate the materials, design, and production of the transducer. Transducers convert electrical signals into ultrasonic waves and then re-convert the reflected waves into electrical signals for subsequent processing. This presentation will describe: 1) How transducer design elements depend critically on the detailed application. 2) How arrays have evolved from a single row of elements to visualize a single image plane to spatially Nyquist-sampled arrays in two dimensions that enable full volumetric imaging. 3) How advances in single crystal piezoelectric material have enhanced image performance. 4)How electrostatic and MEMs based arrays have recently become commercially available. Along with ultrasounds simplicity, speed, precision, and safety, this technological momentum suggests even more widespread adoption of ultrasound. The sixty percent of the worlds population currently without access to medical imaging may benefit most.