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An alternative to non-invasive ultrasound therapy with single-element spherically focused transducers is a minimally invasive approach with dual-mode linear arrays for treatment, imaging, and monitoring in situ. Minimally invasive, miniature (2.2 mm X 50 mm aperture, 3.3 mm diameter) linear arrays have been developed with high acoustic power output (120 W/cm^2 at the source), high transmit efficiency (>65% typical), and good imaging performance (50% fractional bandwidth). These therapy/imaging probes have been integrated into a flexible intense ultrasound surgery platform which also includes conventional diagnostic imaging probes. A system architecture has been developed which includes a 64-channel therapy driver with software selection of array aperture and phasing (1/16th wavelength), frequency (0.5 - 8 MHz), drive amplitude (5 W/channel, nominal), rotational steering (+/-180 degrees), and temporal sequencing/switching of imaging/therapy/monitoring modes. Real time monitoring of electric power per channel, temperature sensors, and thermal effects provide a range of feedback and safety. By combining these features into one system, several benefits result, including broadband real-time electronic imaging and monitoring, lack of spatial misregistration, multiple-frequency imaging/therapy, and the power of acoustic beamforming techniques. The high efficiency allows the transducer to be small in size, which enables minimally invasive procedures, provides close access to the region of interest with less intervening tissue layers, allows higher frequencies, and yields better spatial resolution for imaging and therapy. The array-based imaging/therapy system has produced encouraging results in preclinical studies of bulk tissue ablation and imaging.