Ultrasound elastography was used to observe thermal lesions in biological soft-tissue *in vitro*. A surgical Nd:YAG laser, with a bare 600 μm silica fiber tip and operating in the range of 10W-30W, produced thermal lesions in the medullary regions of gel mounted ovine kidneys. The damage zone was ellipsoidal, the heaviest damage being at the laser fiber tip where charring was often noted. Irradiation times of 150-200 seconds produced lesion sizes of 0.5-1.5 cm in length and 0.3-0.9 cm in diameter.

Observer measurements (n=6) of the maximum length of the lesion along the apparent axis of the laser fiber and the maximum diameter of the lesion in the imaging plane were averaged. The r^2 correlation was computed and a weighted linear regression routine compared the elastographic measurements to the corresponding measurements taken from gross pathological findings using the mean uncertainty of each observer measurement as the weighting factor. The r^2 value for the correlation between the length of the lesion and the corresponding zone measured from gross pathology photos was 0.7268 (n=10) and the r^2 value for the diameter of the lesion was 0.8496 (n=10).

Elastographic imaging and independent measurement of elastic moduli show that thermal damage is highly correlated with changes in the tissue mechanical properties. Results of this study indicate that elastography is capable of assessing the extent of laser-induced lesions in soft tissue. This bodes well for the use of this new imaging technique for monitoring thermal treatments, such as focused ultrasound surgery.