Figure 1

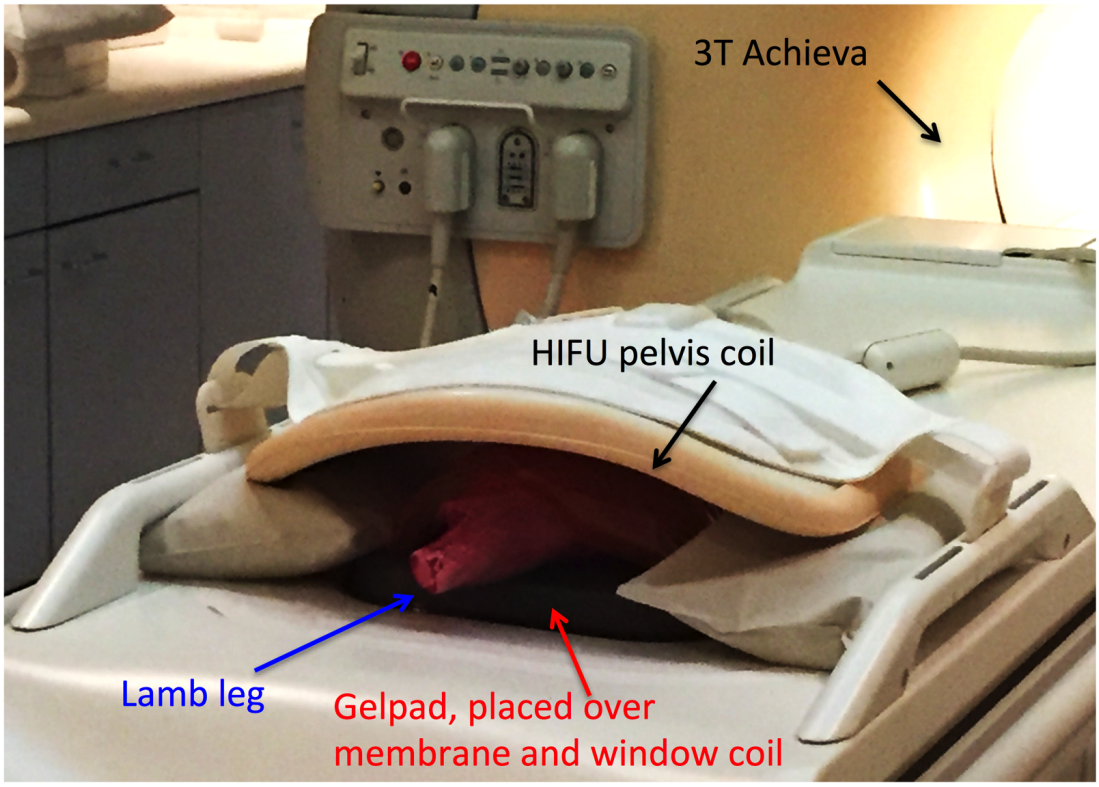

Fig. 1. Lamb leg sample shown mounted for sonication in close acoustic contact with a dampened Aquaflex gelpad. The gelpad was acoustically coupled to the membrane covering the HIFU window coil using de-gassed water. The mobile, 256-element, 14-cm radius-of-curvature, phased-array ultrasound equipment is located beneath this membrane. The lamb leg sample was secured in place using the HIFU pelvis coil. The pelvis and window coil were operated in dual coil mode for imaging.

Figure 2

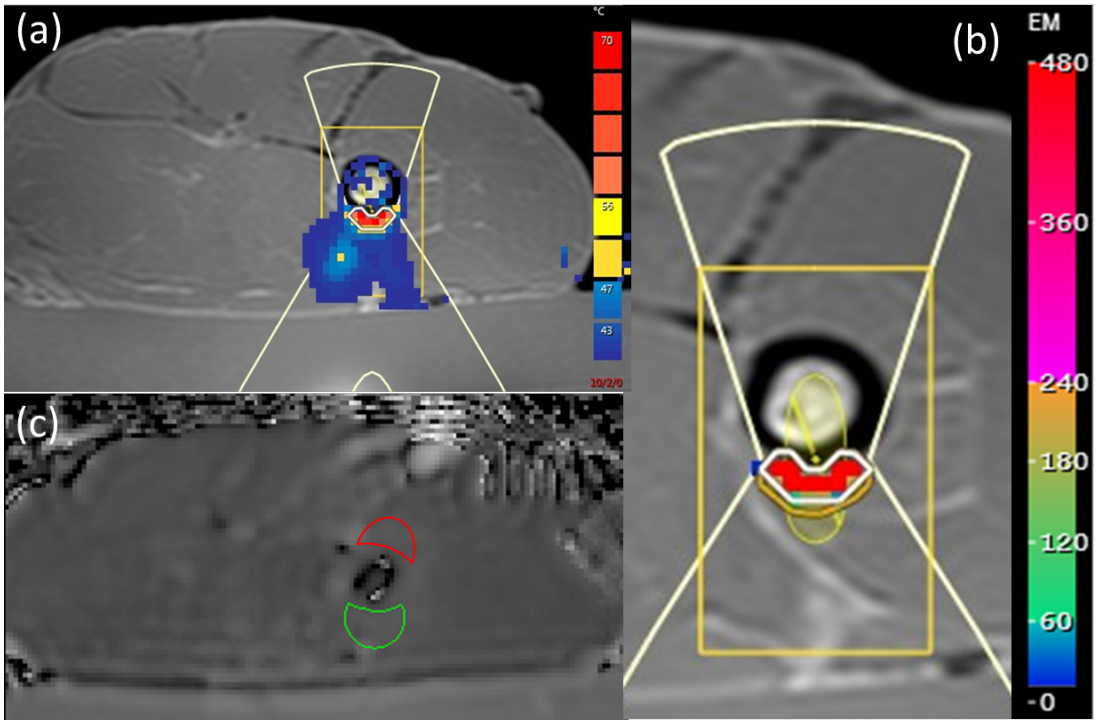

Fig. 2. a T1-weighted image showing a lamb leg sample placed on a gelpad for sonication, with the heated region indicated by a colour overlay of the temperature map derived from PRFS (red pixels > ~60^{o} C). The sonicated cell (yellow ellipsoid) is shown magnified for greater clarity in **b**, with the heated region shown in units of thermal dose (red pixels > ~400 equivalent minutes [EM]). The white line indicates the 240 EM at 43^{o}C thermal dose contour. ROI positions representing the heated region on the relevant slice of the ADC map (green outline), and a control region placed distally (red outline) are shown in **c**.

Figure 3

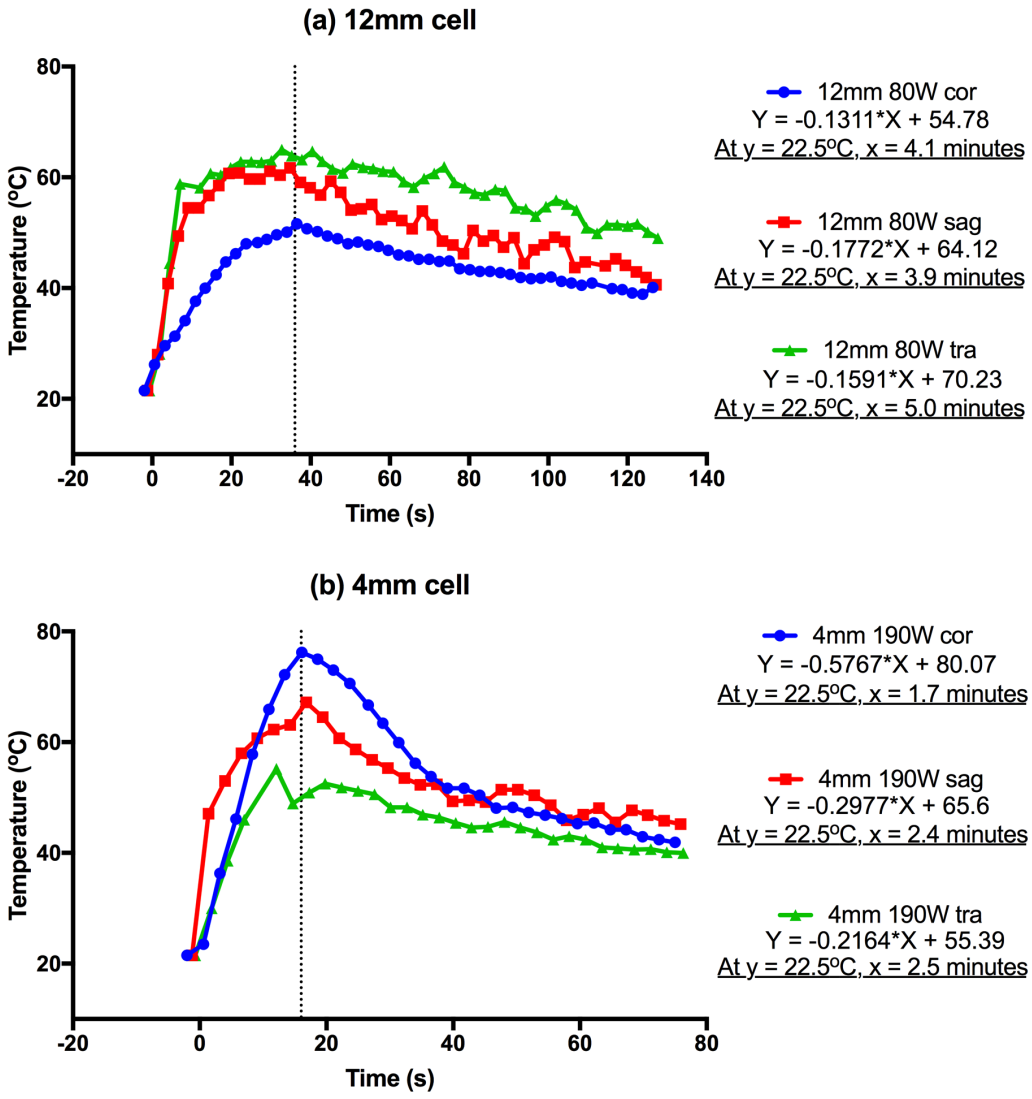

Figure 3: Time versus temperature curves from data acquired at the focus in the coronal (blue), sagittal (red) and transverse (green) planes for (**a**) 80-W exposure of a 12-mm diameter cell over 36 s, and (**b**) 190-W exposure of a 4-mm diameter cell over 16 s. Solving the regression equations for the cooling portions of the curves (to the right of the blacked dashed lines) indicated that tissue temperature would return to baseline (22.5 ^{o}C as measured by PRFS) within 5 min for a 12-mm cell and 2.5 min for a 4-mm cell.

Figure 4

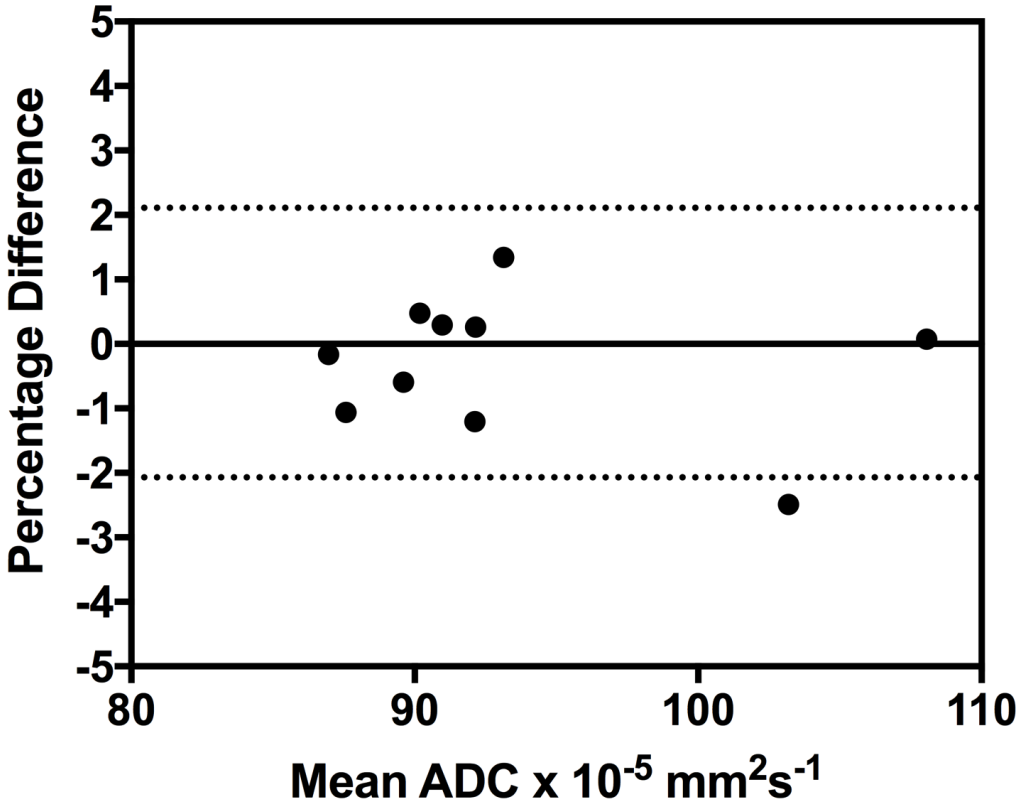

Fig. 4. Bland-Altman plot from 10 pairs of baseline measurements of mean ADC in ROIs copied from those later drawn in heated regions identified on PRFS after sonications. The 95% limits of agreement (from 2.1% to -2.1%) are indicated by the dashed black lines.

Figure 5

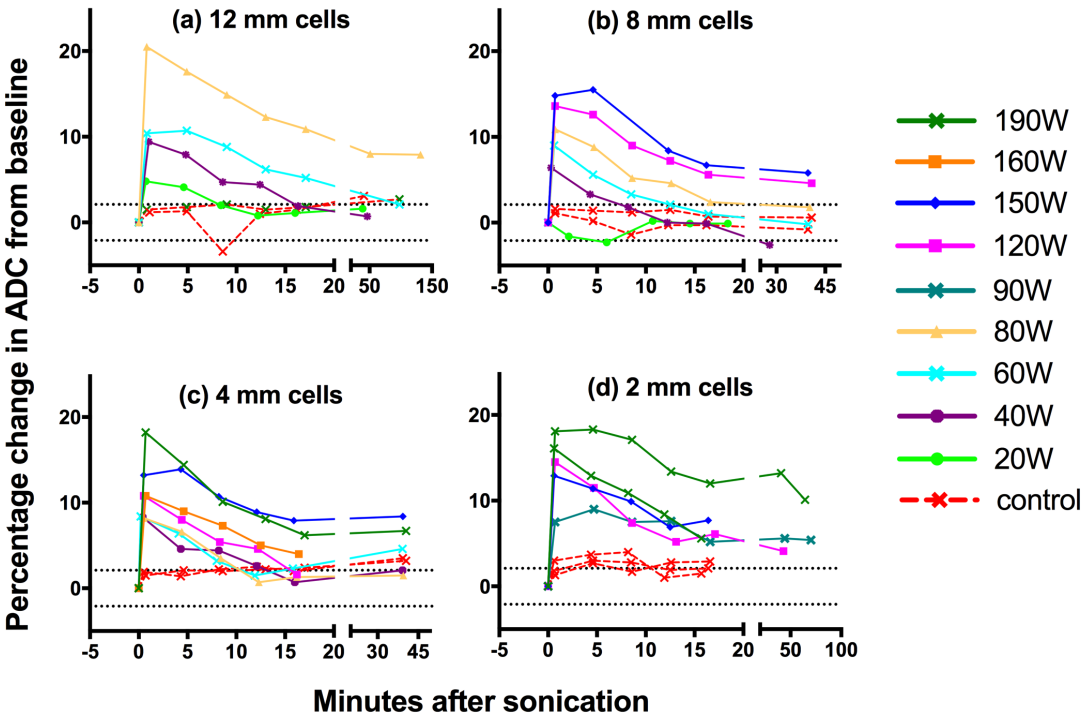

Fig. 5. ADC time-intensity series for (**a**) 12-mm, (**b**) 8-mm, (**c**) 4-mm, and (**d**) 2-mm diameter cells. For each cell size, the magnitude of ADC change immediately after sonication was related to the acoustic power, with sustained ADC changes higher than limits of agreement (black dashed lines) only seen when the applied acoustic energy (determined by the power and duration of the exposure) exceeded approximately 1.5 kJ. Similar ADC changes were not seen in the control ROIs (red dashed lines). For image clarity of the separate time-intensity curves, the 20-W exposure data is not shown for the 4-mm cell.

Figure 6

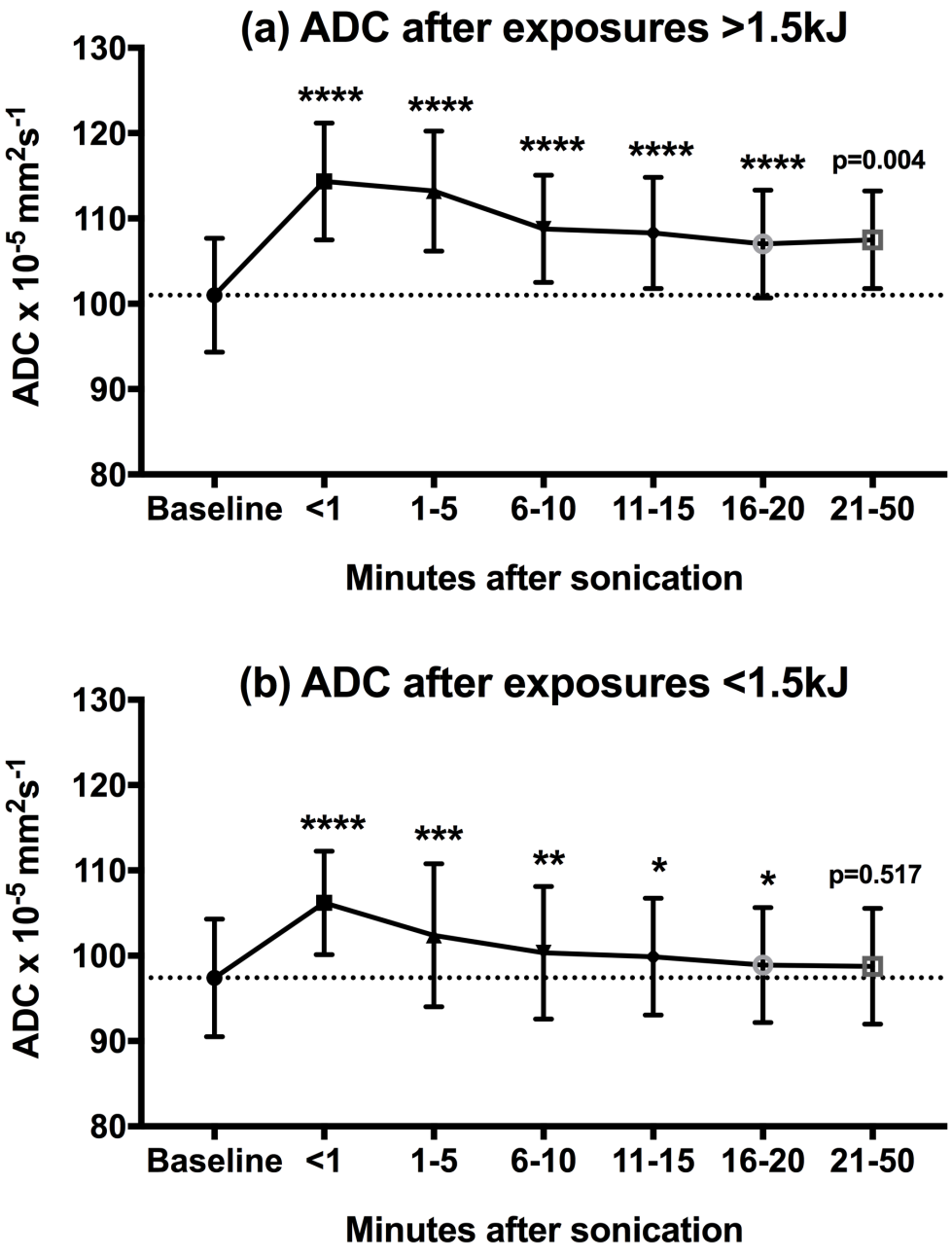

Fig. 6. ADC values (mean±SD) as a function of time after sonication for (**a**) delivered energies above 1.5 kJ remained significantly higher than baseline (dashed line) 21-50 min after sonication (p=0.004), whereas (**b**) for exposures below this threshold had almost returned to baseline values at this time-point (p=0.517). Significance levels: **** = p<0.0001, *** = p<0.001, ** = p<0.01, * = $p<0.05$.

Figure 7

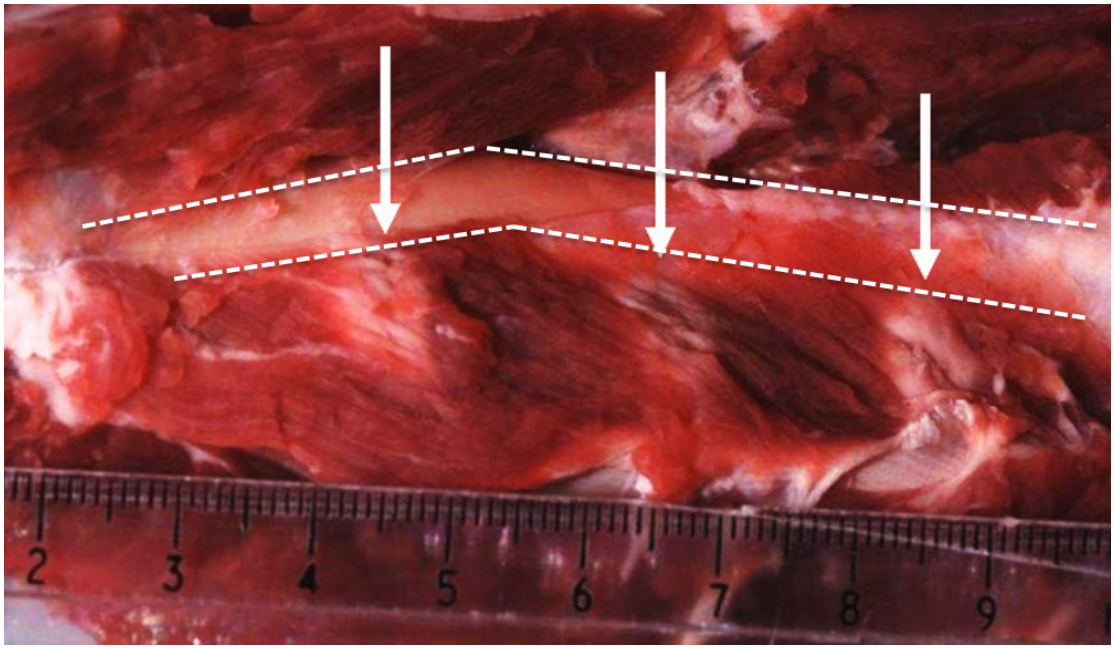

Figure 7: Three of four thermal lesions seen after exposures to lamb leg sample 8. Macroscopic tissue change were seen as focal regions of pale muscle tissue (white arrows), adjacent to the bone surface, whose approximate outline is indicated by the white dashed lines. In these muscle tissue lesions, post sonication ADC values were 20% higher than the pre-sonication measurements.