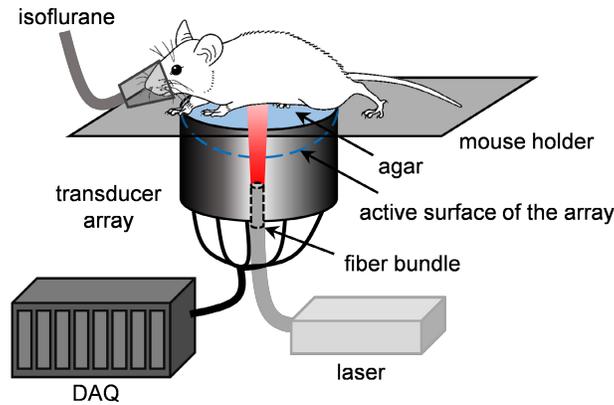
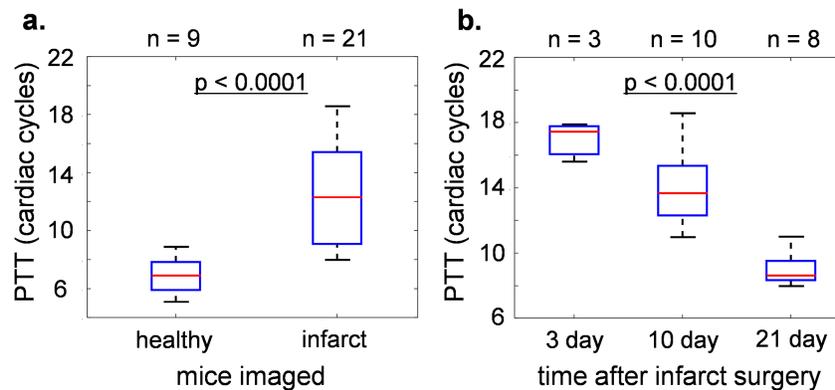


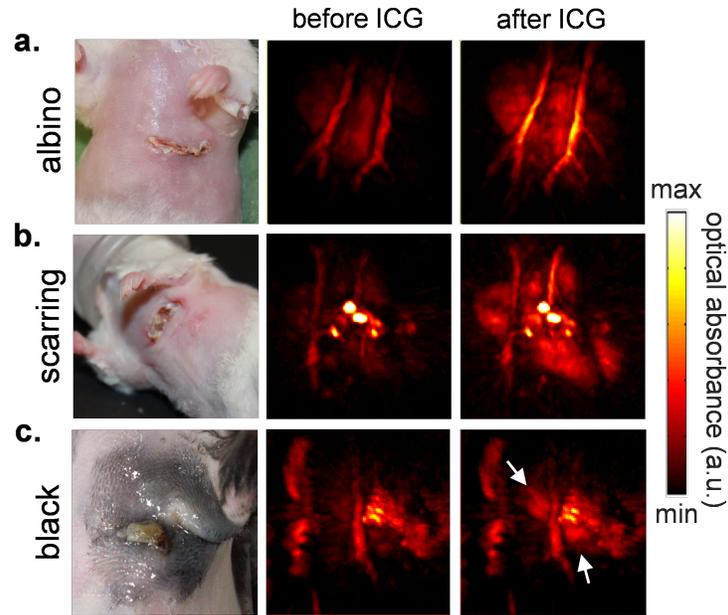
## Supplementary Material



**Supplementary Figure S1.** Lay-out of the experimental setup. The spherical transducer array is oriented up-wards. Agar gel filling the spherical cavity provides acoustic coupling. The mouse is placed in prone position and ultrasonic gel is used to guarantee seamless contact. The laser output is guided to the center of the spherical ultrasound probe by a fiber bundle. For each laser pulse, the generated optoacoustic signals detected by all the array elements were simultaneously sampled with a custom-made data acquisition system (DAQ).



**Supplementary Figure S2.** Normalized pulmonary transit time (PTT) by heartrate, represented by the number of cardiac cycles. (a) PTT of infarcted hearts (12.3 [9.1-15.4]) and of healthy mice (6.9 [5.9-7.8])  $p < 0.0001$ . (b) PTT at different time points after infarction surgery: 3 days (17.4 [16.0-17.8]), 10 days (13.7 [12.3-15.4]), and 21 days (8.6 [8.3-9.5]), ( $p < 0.0001$ ).



**Supplementary Figure S3.** Photograph and OA images of **(a)** albino infarct **(b)** albino infarct with severe scarring **(c)** black infarct mouse models at time points selected before and after the arrival of ICG in the heart, displayed as maximum intensity projections. The strong artifacts seen in (c) are caused by the skin pigmentation in the chest area shown in the photograph. The signal rise associated to the contrast agent bolus appearance in the black mouse is indicated by arrows.