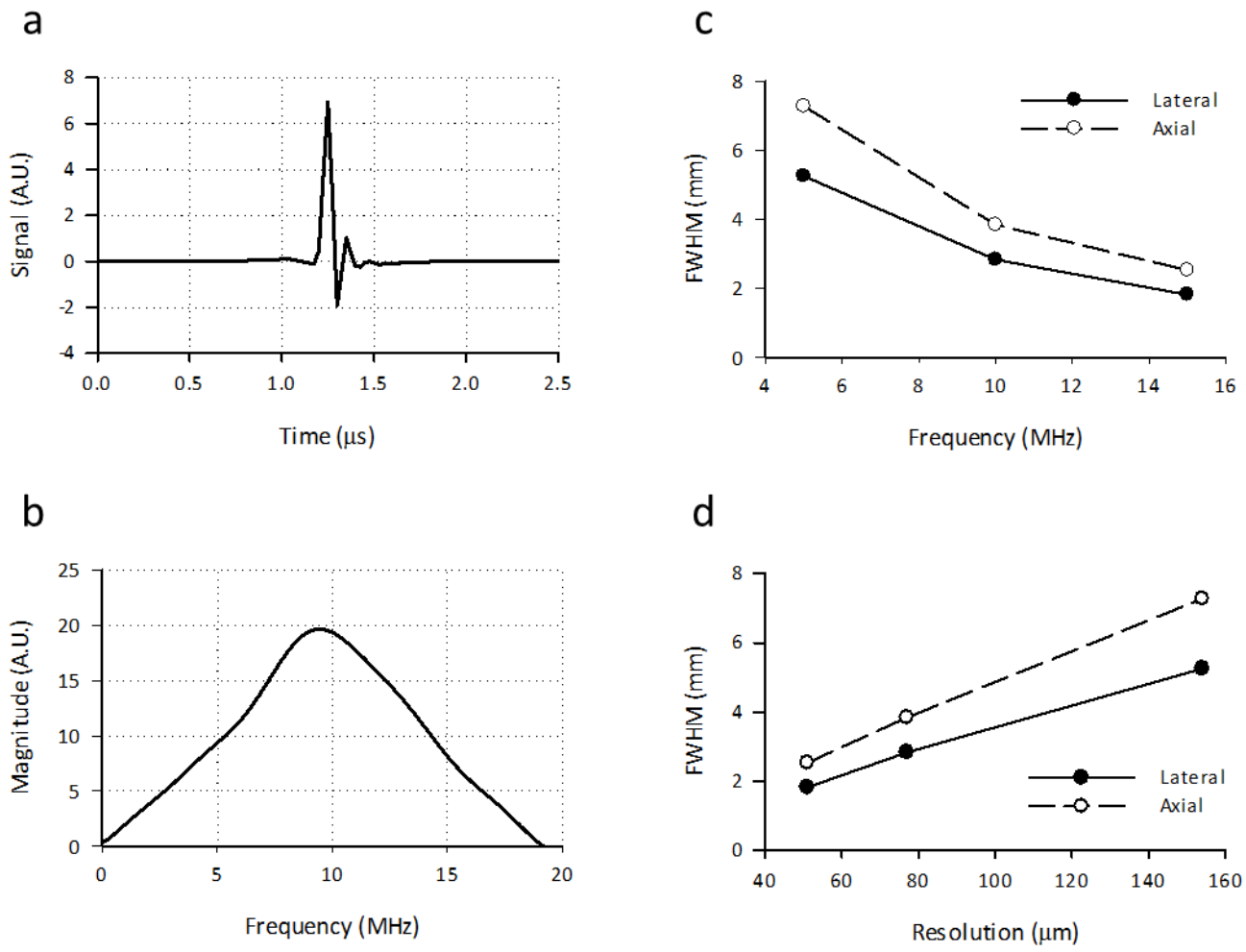
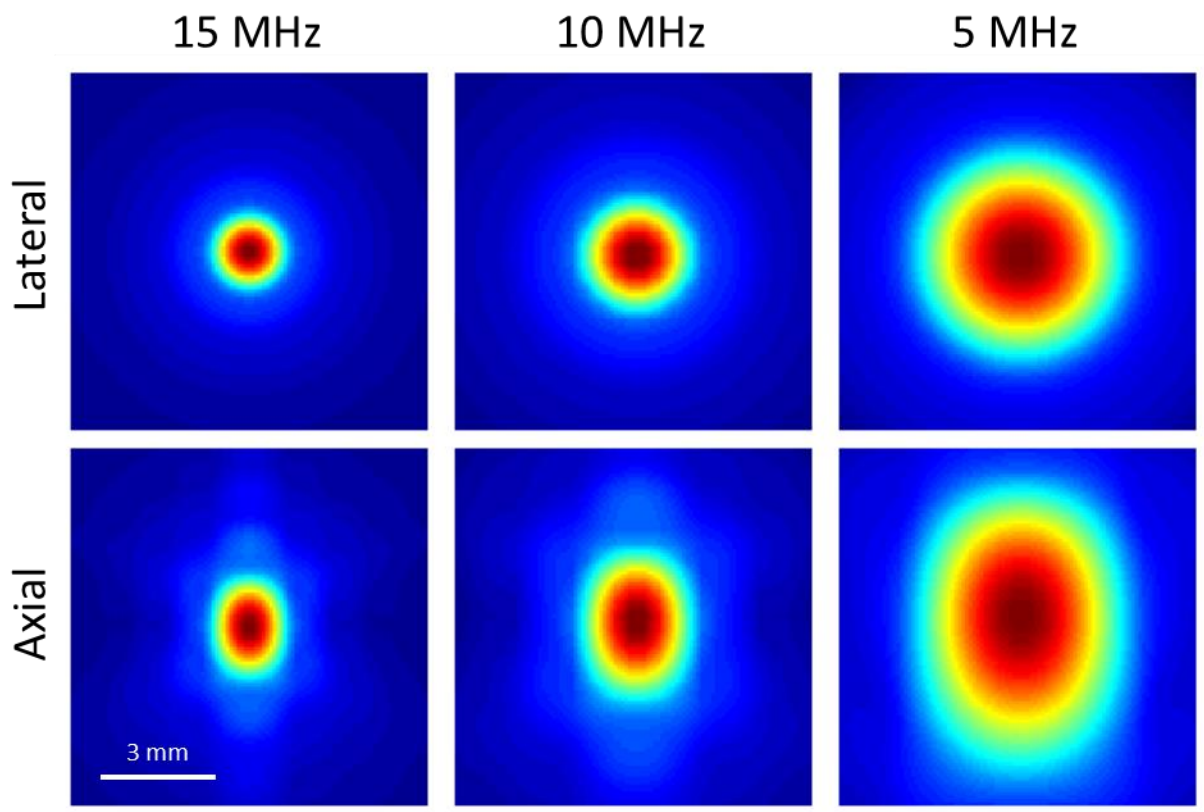
Movie 1: Handheld operation and visualization of hair follicles and vessels on the scalp. The video demonstrates data taken from a single scan operated in hand-held mode. The scan was performed at 850nm, acquired at a rate of 20 volumetric frames per second, slowed to 10 Hz for easy visualization. The three panels represent the maximal intensity projections along the z-, y-, and x-directions. The scanning region is indicated on the inset model of the head and anatomical features are separated into two major features: 1) the dermal layer, including hair follicle shafts and vessels; and 2) the subcutaneous layer with larger arterioles.

Movie 2: Rotation of a single-frame vMSOT image after multispectral unmixing. The ability to spatially resolve chromophores is demonstrated in this video, with melanin concentrated in the hair shaft, hemoglobin in the dermal papilla and hypodermis, and lipid in the hyperdermis between the dermal papilla and skin surface. Colors correspond to the respective chromophores (melanin, yellow; hemoglobin, red; lipid, green).



Supplemental Figure 1: Characteristics of the detector elements and spatial resolution of the system. The impulse response of individual detector elements, measured by laser excitation of a 50 um bead, is shown in panel A, with the corresponding frequency response shown in panel B. Panels C and D plot the full-width half maximum of the combined sensitivity fields as a function of frequency and resolution, respectively.



Supplemental Figure 2: Combined three-dimensional sensitivity field of the spherical detector array assuming a point source located at the center of the spherical array. The sensitivity field was simulated at 3 different frequencies, namely 5, 10, and 15 MHz.