Ultra-wideband three-dimensional optoacoustic tomography.

Abstract:

Broadband optoacoustic waves generated by biological tissues excited with nanosecond laser pulses carry information corresponding to a wide range of geometrical scales. Typically, the frequency content present in the signals generated during optoacoustic imaging is much larger compared to the frequency band captured by common ultrasonic detectors, the latter typically acting as bandpass filters. To image optical absorption within structures ranging from entire organs to microvasculature in three dimensions, we implemented optoacoustic tomography with two ultrasound linear arrays featuring a center frequency of 6 and 24 MHz, respectively. In the present work, we show that complementary information on anatomical features could be retrieved and provide a better understanding on the localization of structures in the general anatomy by analyzing multi-bandwidth datasets acquired on a freshly excised kidney.