Adaptive polarized photoacoustic computed tomography

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Background – Photoacoustic computed tomography (PAT) is widely studied in biomedical fields due to its advantages of high optical contrast and high spatial resolution imaging [1,2]. However, conventional PACT commonly treats the absorption coefficient as a scalar variable. In practice, the molecular arrangement in many biological tissues exhibit ordered, which means that their light absorption coefficients are dichromatic [3,4].

Methods – In this work, we proposed a novel imaging method called adaptive polarized photoacoustic computed tomography (APPAT), which can improve the quality of conventional PAT and measure the dichroic amplitude of tissue. By the linearly polarized laser beams in different directions as excitation source, and then the adaptive algorithm collects the photoacoustic signal according to the dichroic amplitude reflected by the tissue to reconstruct the image.

Results – We demonstrated the performance of APPAT by imaging the plastic polarizing film and the isolated bovine tendon.

Conclusions – The APPAT method can not only improve the imaging ability of PACT, but also provides an effective strategy for tissue polarimetry, prefiguring great potential for biological imaging and material inspection.

References

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