



# International Journal of Biomedical Imaging

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## Multispectral Bioluminescence Tomography: Methodology and Simulation

Alexander X. Cong and Ge Wang

Bioluminescence Tomography Laboratory, Department of Radiology, University of Iowa, Iowa City 52242, IA, USA

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### Abstract

Bioluminescent imaging has proven to be a valuable tool for monitoring physiological and pathological activities at cellular and molecular levels in living small animals. Using biological techniques, target cells can be tagged with reporters encoding several kinds of luciferase enzymes, which generate characteristic photons in a wide spectrum covering the infrared range. Part of the diffused light can reach the body surface of the small animal, be separated into several spectral bands using appropriate filters, and collected by a sensitive CCD camera. Here we present a bioluminescence tomography (BLT) method for a bioluminescent source reconstruction from multispectral data measured on the external surface, and demonstrate the advantages of multispectral BLT in a numerical study using a heterogeneous mouse chest phantom. The results show that the multispectral approach significantly improves the accuracy and stability of the BLT reconstruction even if the data are highly noisy.

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