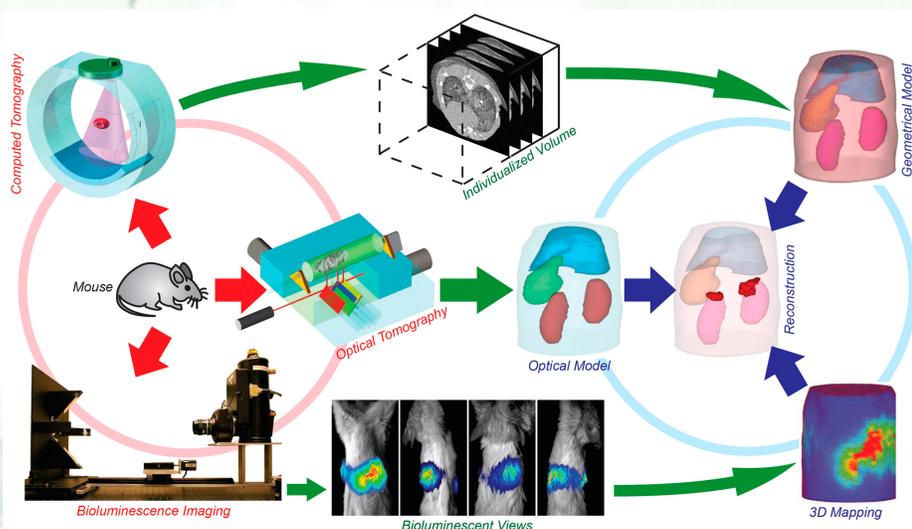


# Bioluminescence Tomography — Inner-light, Insight from Infrared



Bioluminescence tomography (BLT) is a molecular imaging modality, which derives a bioluminescent source distribution inside a small animal from external bioluminescent signals. **We published the first paper on BLT in 2004 using the modality fusion approach.** The introduction of BLT can be compared to the development of x-ray CT based on radiography. Without BLT, bioluminescent imaging is basically qualitative. With BLT, quantitative and 3D analyses become feasible inside a living mouse, which reveal important molecular and cellular information for numerous preclinical applications.

## Quotations from Distinguished Peers

Said Dr. David Piwnica-Worms, "If you just look at the number of papers published and the way the techniques are being used — comparing MR, PET, SPECT, radiopharmaceutical, fluorescence, ultrasound, and bioluminescence — in preclinical studies and in basic science studies, bioluminescence imaging seems to be dominating the playing field."

Bankhead: Bioluminescent light shines on MI. *Molecular Imaging Outlook*, March 2005;  
<http://www.dimag.com/molecularimagingoutlook/2005mar/02.jhtml>

Methods for bioluminescence tomography have recently been reported<sup>53,54</sup>, and there is a great impetus for in vivo tomographic applications for improving localization and quantification beyond what has been achieved by planar methods.

Ntziachristos, Ripoll, Wang, Weissleder: Looking and listening to light.  
*Nature Biotechnology* 23:313-320, 2005

## Papers by Our Team

Wang G, Li Y, Jiang M: Uniqueness theorems in bioluminescence tomography. *Med. Phys.* 31:2289-2299, 2004 (First paper in the BLT area, which is the reference 53 in the above quotation)

Han WM, Cong WX, Wang G: Mathematical theory and numerical analysis of bioluminescence tomography. *Inverse Problems* 22:1659-1675, 2006 (2006 highlighted article in the *Inverse Problems Journal*, selected by the Editorial Board)

Wang G, Cong WX, Kumar D, Qian X, Shen H, Sinn P, Hoffman E, McLennan G, Henry M: In vivo mouse studies with bioluminescence tomography. *Optics Express* 14:7801-7809, 2006 (In vivo reconstruction methodology and feasibility results)

Wang G, Cong WX, Shen H, Qian X, Henry M, Wang Y: Overview of bioluminescence tomography—a new molecular imaging modality. *Frontiers in Bioscience* 13:1281-1293, 2008 (Overview of the BLT area)