

Targeting EGFR for fluorescence optical imaging of cancer

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Dysregulation of epidermal growth factor receptor (EGFR) is associated with many types of cancers. It is of great interest to noninvasively image the EGFR expression *in vivo*. Among different modalities, fluorescence optical imaging has the advantage of low cost, easiness of handling and simplicity for multiplexing. Fluorescence in the near-infrared (NIR) spectral region is especially desirable due to its reduced background and high penetration capability. Various EGFR-targeting molecules have been studied for molecular imaging. These include antibodies, antibody fragments, natural ligand EGF, nanobody and affibody. A couple of examples will be discussed, with the focus on IRDye® 800CW labeled EGF (EGF800) and EGFR-specific affibody (Eaff800).

Both EGF800 and Eaff800 were characterized for binding/uptake using EGFR-overexpressing cells. When used for *in vivo* tumor imaging, the signal intensities of EGF800 had a good correlation with tumor sizes. In an orthotopic prostate tumor model, the tumor growth was successfully tracked by EGF800. *In vivo* imaging study of Eaff800 was conducted in A431 xenograft tumors. The accumulation of EGF800 in the tumor could be identified 1 hr post-injection, and became most prominent after 1 d. The specificity of Eaff800 was confirmed by its high level of binding/uptake by A431 cells and low binding/uptake by HER2-overexpressing cells. In combination with an HER2-specific probe Haff682, Eaff800 could be used to distinguish between A431 (EGFR-overexpressing) and SKOV3 (HER2-overexpressing) tumors. Interestingly, the organ distribution pattern and clearance rate of Eaff800 were different from those of Haff682. While Haff682 accumulated predominantly in the kidney, more Eaff800 was found in the liver.

Biography

Haibiao (Herbert) Gong earned a Ph.D. degree in molecular biology at National University of Singapore. He did his postdoctoral research at University of Pittsburgh, School of Pharmacy, and joined LI-COR Biosciences as a research scientist in 2007. His research focus at LI-COR is near-infrared fluorescence imaging. He has published more than 30 papers in reputed journals.