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## Optical imaging and development of human cancers in mouse models

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Non-invasive real-time in vivo imaging of tumor growth and metastasis in small animals is becoming popular because more traditional methods of imaging, such as x-ray, magnetic resonance imaging, and single photon emission tomography, have been shown to have sensitivity limitations in regards to smaller animals. These limitations have lead to the development of bioluminscent imaging systems in which cells produce bioluminescent proteins such as luciferase and generate light when in the appropriate substrates. Optical imaging affords an unparalleled opportunity to monitor the effects of agents such as peptides on tumor growth and metastasis non-invasively in real time in living animals and will expedite tumor-targeted cancer drug development. To this end, we are examining the ability of peptides that target breast, prostate, or melanoma tumors to inhibit tumor growth and metastasis in mouse models of cancer. Specifically, we are analyzing tumor growth of luciferase-tagged breast carcinoma cells (MDA-MB-231-luc), prostate carcinoma cells (PC-3M-luc) and melanoma cells (B16F10-luc) in vitro and in vivo. Then we will determine if peptides that target galectin-3, overexpressed in breast and prostate carcinomas, and peptides that target the alpha-MSH receptor, overexpressed in melanomas effect tumor adhesion, growth, and metastasis. The presence of galectin-3 and/or the alpha-MSH receptor in these cell lines was first confirmed by immunoblotting experiments. The growth properties and detection limits of the luc-tagged cell lines were analyzed in vitro, prior to establishment of tumors in vivo. Experiments have shown the superior sensitivity of tumor detection using bioluminescent detection, compared to caliper-based tumor measurement or 18-FDG (glucose) tumor uptake. Establishment of bioluminscent tumors in small animals greatly enhances our ability to identify and image metastases early and quantitate the therapeutic effects of novel treatment strategies.