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A New Diagnostic System in Cancer Research: Bioluminescent Imaging (BLI)

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Abstract: Bioluminescent imaging (BLI) is particularly well suited for imaging small animals, and it can be readily used by scientists who are already routinely using the luciferase gene as a reporter in cell-based assays. This strategy relies on ATP and an O₂ dependent photochemical reaction between luciferin and luciferase, resulting in the release of photons from only live cells. In BLI, the intensity of the light detected by the device is proportional to the intensity of light emitted and the relationship is quantitative. This study was performed to determine the sensitivity of BLI for the imaging of lung metastasis and breast cancer models in addition to primary flank tumors. A549 lung cancer and MDA-MB 231 breast cancer cell lines were transfected with a lentiviral construct containing the luciferase gene and transfected cells were used as xenograft animal models. BLI was used to monitor tumor development and growth. Noninvasive bioluminescent imaging in vivo provides easy visualization of the tumor size and location so that imaging results can be used as an indicator of the treatment effectiveness, potentially accelerating the optimization of cancer treatment protocols.

Key Words: Cancer, bioluminescence, imaging

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