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**Metastatic Spine Disease: An Isolated Spine Tumor Model
with Human Breast Cancer Cells**

Shen-Ying (Richard) Ma, M.D.
University of Virginia Health System

PURPOSE: To investigate and characterize isolated spine lesions produced by direct injection of human breast cancer cells (MDA-MB-231) into the lumbar vertebral body (VB) of nude rats.

METHODS: Transperitoneal surgical exposures of the lumbar spine were performed on 3 week-old nude rats, and MDA-MB-231 cells or luciferase-labeled MDA-MB-231 cells (MBA-MB-231-D3H1) were injected into either L5 or L6 VBs. Radiographs, luciferase-based bioluminescence imaging (BLI), micro-CT, micro-PET, and histologic examination were then performed.

RESULTS: VBs injected with MDA-MB-231 developed radiographic evidence of tumor osteolysis. Histological sectioning demonstrated invasion and destruction of normal architecture of the VB. BLI confirmed isolated and quantifiable tumor photon signal in the lumbar spine region. Micro-PET was also able to localize tumor and demonstrated increase signal over time.

CONCLUSION: The radiographic and histological pattern of VB destruction after tumor implantation simulated the human disease. BLI detected tumor presence earlier than radiographs. Given early detection, intervention, and the ability to monitor tumor growth are often desirable in animal treatment studies, functional imaging modalities, such as BLI and micro-PET, are attractive alternatives for small animal tumor research. Because this novel animal model approximates spinal anatomy while delivering a consistent isolated tumor load, it is an ideal animal model for laboratory investigation of therapeutic interventions.