Bone marrow cells migrate to tumors and can slow their growth

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Bone marrow-derived cells (BMDCs) participate in the growth and spread of tumors of the breast, brain, lung, and stomach. To examine the role of BMDCs, researchers developed a mouse model that could be used to track the migration of these cells while tumors formed and expanded. Their results, published in the November issue of The *American Journal of Pathology*, strongly suggest that more effective cancer treatments may be developed by exploiting the mechanism by which bone marrow cells migrate to tumors and retard their proliferation.

"Our results provide an excellent in vivo experimental model where the temporal dynamics of tumor-infiltrating BMDCs may be monitored in an immunocompetent host and novel therapies targeting BMDCs for the inhibition of tumor progression may be investigated," commented lead investigator Wafik S. El-Deiry, MD, PhD, Professor and Chief, Hematology/Oncology Division at the Penn State Hershey Medical Center and Associate Director for Translational Research at the Penn State Hershey Cancer Institute. "In the future, it may be possible to use specific identified tumor-infiltrating BMDCs to deliver therapeutic cargo."

A first group of mice expressing a fluorescence gene served as donors of the bone marrow cells. A second group of mice, whose marrow had been destroyed by radiation, were injected with the donated fluorescent bone marrow. The transplanted bone marrow cells were allowed to proliferate for 8 weeks. Then, colon cancer cells were injected into the same mice

and tumors formed over the next 3 weeks.

Monitoring tumor growth by optical imaging, researchers found that the tumors contained numerous types of BMDCs. Notably they also found that tumor growth is reduced in animals that received the bone marrow transplants, compared with untransplanted host mice.

According to the authors, cancer has long been viewed as a disease in which transformed cells grow and invade tissues. However, they believe that it is becoming clear that cancer is a more complex disease in a heterogeneous microenvironment where many cellular interactions are occurring in the malignant tissue.

"This type of mouse model allows scientists to actually see in living color the complicated relationships and interplay between the…tumor's own cells and the immune system cells within the host…" said El-Deiry, who is also an American Cancer Society Research Professor. He added: "this ongoing war on cancer within this tumor microenvironment has surprising twists and turns." El-Deiry and his colleagues hope to steer patient outcomes "with additional treatments that can help [them] overcome the cancer."

More information: The article is "High-Resolution Imaging and Antitumor Effects of GFP+ Bone Marrow-Derived Cells Homing to Syngeneic Mouse Colon Tumors" by Niklas K. Finnberg, Lori S. Hart, Nathan G. Dolloff, Zachary B. Rodgers, David T. Dicker and Wafik S. El-Deiry (doi: 10.1016/j.ajpath.2011.07.028). It will appear in The American Journal of Pathology, Volume 179, Issue 5 (November 2011)

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