Noninvasive positron emission tomography and fluorescence imaging of CD133+ tumor stem cells

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Authors: Gaedicke S*, Braun F*, Prasad S*, Machein M, Firat E, Hettich M, Gudihal R, Zhu X, Klingner K, Schüler J, Herold-Mende CC, Grosu AL, Behe M, Weber W, Mäcke H, Niedermann G

* Equal author contribution

Abstract

The published work describes a clinically applicable tracer for the non-invasive PET imaging of tumor stem cells. Since cancer stem cells are often resistant to radiation than differentiated tumor cells, their imaging could become important clinically, both for planning of tumor irradiation and for treatment -monitoring in patients. The AC133 epitope of CD133 currently is one of the best-characterized tumor stem cell markers for many intra- and extracranial tumor entities. Here we demonstrate the successful noninvasive detection of $AC133^+$ tumor stem cells by PET and near-infrared fluorescence molecular tomography in subcutaneous and orthotopic glioma xenografts using antibody-based tracers. Particularly, microPET with ^{64}Cu-NOTA-AC133 mAb yielded high-quality images with outstanding tumor-to-background contrast, clearly delineating subcutaneous tumor stem cell-derived xenografts from surrounding tissues. Intracerebral tumors as small as 2–3 mm also were clearly discernible, and the microPET images reflected the invasive growth pattern of orthotopic cancer stem cell-derived tumors with low density of $AC133^+$ cells. The methods for the noninvasive imaging of CSCs could have profound consequences for diagnosis and therapy monitoring in oncology.

The original publication can be accessed here:

http://www.pnas.org/content/111/6/E692.full.pdf?with-ds=yes