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Journal
Cancer Research, 72(8_Supplement)

ISSN
0008-5472

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Publication Date
2012-04-15

DOI
10.1158/1538-7445.am2012-2687

Cancer Research

Clinical Research

Abstract 2687: Imaging sub-cellular dynamics of proliferating intra- and extra-vascular cancer cells

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DOI: 10.1158/1538-7445.AM2012-2687 Published April 2012

Proceedings: AACR 103rd Annual Meeting 2012-- Mar 31-Apr 4, 2012; Chicago, IL

Abstract

In order to visualize nuclear-cytoplasmic dynamics during intravascular cancer cell-proliferation and extravasation, green fluorescent protein (GFP) was expressed in the cytoplasm of HT-1080 human fibrosarcoma cells, and red fluorescent protein (m-Cherry), linked to histone H2B, was expressed in the nucleus. Nuclear m-Cherry expression enabled visualization of nuclear dynamics, whereas simultaneous cytoplasmic GFP expression enabled visualization of nuclear-cytoplasmic ratios as well as simultaneous cell and nuclear shape changes. Thus, total cellular dynamics can be visualized in the living dual-color cells in real time. The cell cycle position of individual living cells was readily visualized by the nuclear-cytoplasmic ratio and nuclear morphology. Real-time induction of apoptosis was observed by nuclear size changes and progressive nuclear fragmentation. Intra- and extra-vascular mitotic cells were visualized by imaging after injection of the cancer cells in the epigastric cranials vein in an abdominal flap. After one hour, round and elongated cancer cells were observed in the vessel. Three hours after injection, invadopodia of the cancer cells was observed. Five hours after injection, dual-color cancer cells began to divide within the vessel. By 10 hours, some intra-vascular cancer cells underwent apoptosis. Deformed new blood vessels in the tumor were observed 10 days later. Extravascular cancer cells were dividing in the tumor at day 14. The subcellular in vivo imaging approach described here provides new visual targets for trafficking, extravasating and invading cancer cells.

Citation Format: {Authors}. {Abstract title} [abstract]. In: Proceedings of the 103rd Annual Meeting of the American Association for Cancer Research; 2012 Mar 31-Apr 4; Chicago, IL. Philadelphia (PA): AACR; Cancer Res 2012;72(8

Suppl):Abstract nr 2687. doi:1538-7445.AM2012-2687

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Volume 72, Issue 8 Supplement
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