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Novel peptides targeting circulating cellular biomarkers for molecular imaging of tumor angiogenesis

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Malignant tumors acquire new blood vessels either locally by remodeling pre-existing mature capillaries or by recruiting circulating cells derived from the bone marrow. Recent laboratory and clinical evidence validate the role of circulating bone marrow derived pro-angiogenic, tumor homing cells as biomarkers of the tumor angiogenic status. Peptide sequences specific for these circulating biomarkers represent a new approach in angiogenic medicine and can be used for several different applications that will benefit the diagnosis and treatment of cancer.

In this investigation we report on the discovery of high affinity peptide ligands that are specific for bone marrow derived tumor homing cell populations. We screened a peptide phage display library and devised a novel selection approach that combines in vitro and in vivo protocols. To assess the utility of the novel high affinity, high specificity peptides we examined the ability of the peptide ligands to direct imaging reagents in vivo and monitored the process by noninvasive positron emission tomography (PET) scans. For this purpose we developed a labeling platform employing the phage that displays the cell specific peptide as a molecularly targeted imaging agent. These proof-of-principal experiments demonstrate the ability of the peptide to deliver payload (radiolabeled phage conjugates) in vivo to angiogenic tumors. The novel peptides provide molecular tools with which to monitor noninvasively the status of tumor angiogenesis on a cellular and molecular level.

Biography

Dr. Anka (Dobreva) Veleva is a faculty member at the Joint UNC/NCSU Department of Biomedical Engineering. Dr. Veleva is also a Principal Investigator at the McAllister Heart Institute at the University of North Carolina at Chapel Hill. Her multidisciplinary research program integrates aspects and utilizes methodologies from disciplines such as high-throughput molecular screening, vascular stem cell biology, medical engineering, and high-resolution imaging. She is an author of 40+ peer reviewed articles in reputed journals and a number of patent applications. Dr. Veleva serves as a manuscript reviewer for various journal including Molecules among others.