Quantum dots deliver vitamin D to tumors for possible inflammatory breast cancer treatment

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The shortened daylight of a Maine winter may make for long, dark nights – but it has shone a light on a novel experimental approach to fighting inflammatory breast cancer (IBC), an especially deadly form of breast cancer.

The new approach enlists the active form of Vitamin D3, called calcitriol, which is delivered therapeutically by quantum dots. Quantum dots are an engineered light-emitting nanoscale delivery vehicle. This new preliminary work shows the dots can be used to rapidly move high concentrations of calcitriol to targeted tumor sites where cancer cells accumulate, and also through the lymph system where the cancer spreads. With this approach, the calcitriol can fight on multiple fronts and the targeted location can be visualized with an imaging system tracking the quantum dots. The research will be presented at the 57th Annual Meeting of the Biophysical Society (BPS), held Feb. 2-6, 2013, in Philadelphia, Pa.

University of Delaware cancer researcher Anja Nohe was living in Maine when she first received funding from the Maine Cancer Foundation to determine the effect of calcitriol on breast cancer cells. Reading cancer literature helped her make connections between cancer, vitamin D, and the daylight regime of higher latitudes. "By talking with talented colleagues about these ideas, the foundation was set for the current project," she says. After moving to the University of Delaware,

she began working with Kenneth Van Golen, "an expert in the biology of IBC," to evaluate calcitriol.

Compared to other forms of breast cancer, IBC is especially difficult to treat. It has a five-year survival rate of 40% versus 87% for all other breast cancers. A big part of what makes IBC treatment difficult is its multi-site growth pattern. Current aggressive treatments such as combinations of chemotherapy, surgery and radiation, have failed to significantly improve IBC survival rates.

This early experimental work on mice is encouraging because data show calcitriol can inhibit invasion and migration of SUM149 cells, an IBC cell line. "New IBC therapies are urgently needed, which is why the goal of my work is to find a successful treatment for inflammatory breast cancer, especially one with fewer side effects," Nohe says.

More information: Presentation #2953-Pos, "Using calcitriol conjugated quantum dots to target inflammatory breast cancer tumors and metastasis in vivo," will take place at 10:30 a.m. on Wednesday, Feb. 6, 2013, in the Pennsylvania Convention Center, Hall C. ABSTRACT: tinyurl.com/acw94xg

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