

# Imaging agents offer new view of inflammation, cancer

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A series of novel imaging agents could make it possible to "see" tumors in their earliest stages, before they turn deadly.

The compounds, derived from inhibitors of the enzyme cyclooxygenase-2 (COX-2) and detectable by positron emission tomography (PET) imaging, may have broad applications for [cancer detection](#), diagnosis and treatment.

Vanderbilt University investigators describe the new [imaging agents](#) in a paper featured on the cover of the October issue of [Cancer Prevention Research](#).

"This is the first COX-2-targeted PET imaging agent validated for use in animal models of inflammation and cancer," said Lawrence Marnett, Ph.D., director of the Vanderbilt Institute of [Chemical Biology](#) and leader of the team that developed the compounds.

COX-2 is an attractive target for molecular imaging. It's not found in most normal tissues, and then it is "turned on" in inflammatory lesions and tumors, Marnett explained.

"As a tumor grows and becomes increasingly malignant, COX-2 levels go up," Marnett said.

To develop compounds that target COX-2 and can be detected by PET imaging, Jashim Uddin, Ph.D., research assistant professor of

Biochemistry, started with the "core" chemical structures of the anti-inflammatory medicines indomethacin and celecoxib and modified them to add the element fluorine in various chemical configurations.

After demonstrating that the fluorinated compounds were selective inhibitors of COX-2, the investigators incorporated radioactive fluorine (18-F) into the most promising compound. [Intravenous injection](#) of this 18-F compound into animal models provided sufficient signal for PET imaging.

The researchers demonstrated the potential of this 18-F compound for in vivo [PET imaging](#) in two animal models: irritant-induced inflammation in the rat footpad and human tumors grafted into mice.

They showed that the 18-F compound accumulated in the inflamed foot, but not the non-inflamed foot, and that pre-treatment of the animals with celecoxib blocked the signal. In mice bearing both COX-2-positive and COX-2-negative human tumors, the 18-F compound accumulated only in the COX-2-positive tumor.

The studies support further development of these agents as probes for early detection of cancer and for evaluation of the COX-2 status of pre-malignant and malignant tumors.

"Because COX-2 levels increase during cancer progression in virtually all solid tumors, we think these imaging tools will have many, many different applications," Marnett said.

Provided by Vanderbilt University Medical Center

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