

PET scans may allow early prediction of response to targeted therapy of thyroid cancer

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Positron emission tomography (PET) can image metabolic changes following treatment with the protein kinase inhibitor vandetanib, helping to define the therapy response or the effectiveness of the therapeutic agent, according to research published in the February issue of *The Journal of Nuclear Medicine*. Currently being tested in clinical trials, vandetanib inhibits the function of the RET (rearranged-during-transfection protein) proto-oncogene and other protein kinases involved in the development and progression of cancer.

"For the most part, clinical trials have been measuring the effectiveness of vandetanib by changes in tumor size. Based on the activating effects of mutated RET and other protein kinases on numerous intracellular metabolic pathways, we hypothesized that PET imaging could play a role in the early evaluation of response to vandetanib," said Martin A. Walter, MD, lead author of the study "Metabolic Imaging Allows Early Prediction of Response to Vandetanib."

The study examined the usefulness of metabolic imaging to determine response to vandetanib in three ways. First, medullary [thyroid cancer](#) cells were used to create an in vitro model. After cultivation, the cells were treated with vandetanib, and changes in the metabolic profile of the cells were successfully monitored by transcriptional profiling and by radiotracer uptake studies.

Using the same untreated cells, the researchers then created an in vivo model by injecting mice with the [cancerous cells](#) and treating them with vandetanib. Small animal PET/computed tomography (CT) imaging was performed and was found to reproduce the in vitro findings of metabolic activity after three days.

Finally, a 43-year old patient with biopsy-proven metastasized medullary thyroid cancer was treated with vandetanib. PET scans taken at 12 and 24 weeks after treatment were able to detect metabolic response to vandetanib, consistent with the in vitro and in vivo samples.

"With the increasing number of available treatment options, careful patient selection is necessary to ensure targeted therapy is administered to those most likely to gain clinical benefit," said Walter. "The identification of markers of treatment efficacy is a key factor for the success of these novel treatment approaches."

"Furthermore," he continued, "relating in-vivo PET imaging metabolic data with transcriptional profiling data using cluster analysis is an innovative concept that allows much potential in the field of molecular imaging."

More information: "Metabolic Imaging Allows Early Prediction of Response to Vandetanib" by Martin A. Walter, et al. *Journal of Nuclear Medicine*.

Provided by Society of Nuclear Medicine

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