

Radiotracer Methodology with Applications to Functional PET/TMS

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The NEC 9SDH-2 Pelletron is a dual particle machine that has been adapted to the production of positron emission tomography (PET) isotopes at the Keck Lab for Functional Brain Imaging. Initially the Pelletron was specified for the production of ^{17}F ($t_{1/2}=64.5$ sec) and ^{15}O ($t_{1/2}=122.5$ sec) for cerebral blood flow studies, but through novel targetry and high current capabilities production has been expanded to include ^{11}C ($t_{1/2}= 20.5$ min) and ^{18}F ($t_{1/2}=108$ min). Using $[^{17}\text{F}]\text{CH}_3\text{F}$ and $[^{15}\text{O}]\text{H}_2\text{O}$ we have studied the effects of transcranial magnetic stimulation (TMS), a short burst magnetic field that induces electrical currents in the brain resulting in changes in regional cerebral blood flow (rCBF). We are encouraged by the results of these experiments to pursue further work combining TMS and radiolabeled dopamine postsynaptic receptor ligands (e.g. $[^{18}\text{F}]\text{desmethoxyfallypride}$).