Kinetic analysis of [fluorine-18]FLT, [fluorine-18]fallypride, and the environmental neutotoxin [carbon-11]paraquat in pregnant non-human primates

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Imaging with positron emission tomography (PET) is an unrivaled method for the study of human pharmacokinetic processes in vivo. Due to its non-invasive nature, PET has been introduced as tool to obtain maternal-fetal exchange data and pharmacokinetic profiles of chemicals of interest in a monkey fetus using established graphical analysis methods.

This work explores the utility of using PET to study the uptake and distribution of three representative chemicals in pregnant rhesus macaques. The tracer kinetics of the cancer imaging agent for proliferation, [^{18} F]fluorothymidine (FLT), was assessed to study fetal dosimetry. The fetal brain uptake of the selective dopamine D2 receptor marker, [^{18} F]fallypride, was imaged to study fetal dopaminergic receptor development. And lastly, the whole body distribution of paraquat, a commonly used herbicide, considered to have a role in the etiology of Parkinson's disease (PD), was assessed in both pregnant and non-pregnant rhesus monkeys. Considerable in vitro evidence has demonstrated the ability of paraquat to damage dopamine cells; however, its ability to gain access to the brain has been ambiguous due to its polar nature. Radiolabeling paraquat and imaging with PET provided quantitative assessment of the distribution and uptake of this neurotoxin in vivo.