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Analysis of fluorine via $^{19}F(n,\gamma)^{20}F$ decay in the presence of a Na interferant using NAA

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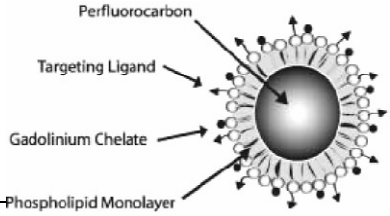
Society's concern with the development of innovative diagnostic tools in medicine has prompted a great deal of interest in research. An important area of research includes the development of molecular imaging agents. These agents hold promise for noninvasive in vivo imaging, quantification, and monitoring of important biomarkers for several diseases including atherosclerosis and cancer. This area of research has benefited greatly from instrumental neutron activation analysis. INAA is an analytical technique that is useful for performing quantitative multi-elemental analysis. NAA is superior to other forms of analysis of its ability to simultaneously analyze several elements in a sample and it offers high sensitivity; part per million to low part per billion level. The imaging agent of interest in this project is a lipid encapsulated, liquid perfluorocarbon nanoparticle directly coupled to a selective $\alpha_v\beta_3$-integrin ligand. The nanoparticle also contains the paramagnetic contrast agent gadolinium linked to the nanoparticle as Gd-DTPA-bis-oleate.[1] Utilizing INAA, analysis of this molecular imaging agent for its concentration in biological tissue, specifically, rabbit aortas via a $^{19}F(n, \gamma)^{20}F$ reaction. Measurement of fluorine in tissue is particularly difficult due to fluorine's short half-life ($t_{1/2}$ = 11s) and sodium's interference via a fast neutron reaction. INAA will also be employed to quantitatively determine the concentration of gadolinium in biological tissues. These measurements will allow for the comparison of Gd to F ratio pre-injection to the Gd to F ratio post-injection. Efficiency of Gd's arrival at the target location will be determined by the comparison of these ratios.

Molecular Imaging Agent



[1]Ref. see footnote

[1] **Characterization and biodistribution of a novel MRI molecular imaging agent by neutron activation analysis**
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