Faculty of Engineering
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Development of New Tools for Molecule-Targeted MR Imaging

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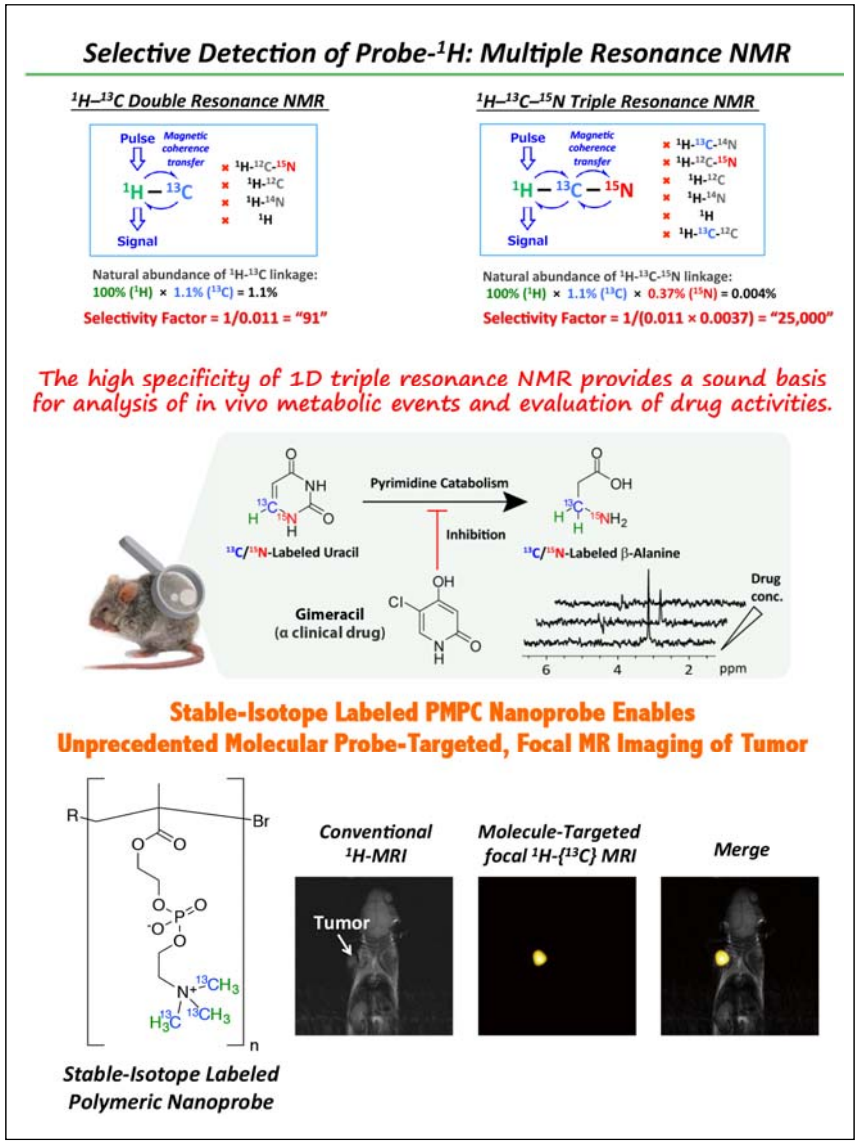

My current research interest is focused on the development of new molecular probes for minimally invasive and diagnostic imaging. NMR/MR is one of the most promising techniques for the analysis of biochemical/biomedical reactions, but it has a couple of problems if it is to be applied to complicated living systems. We first aimed at the application of multiple-resonance NMR to in situ monitoring of a particular cellular reaction. Multiple-resonance NMR is a method that correlates three successive NMR-active nuclei with different Larmor frequencies (^{1}H-^{13}C-^{15}N in the present case). This method, which is applicable, in principle, to various HCN compounds, should markedly suppress background noise. Recently, we revealed that (1) multiple-resonance NMR is applicable to metabolic analysis of ^{13}C/^{15}N-labeled uracil, (2) integration of stable isotopes into the biocompatible polymer-tag (^{13}C/^{15}N-PMPC) enabled observation of the selective triple resonance NMR signal of ^{13}C/^{15}N-PMPC at a nano-molar level in a mouse liver lysate, and (3) application of a multiple-resonance NMR technique to a MR imaging allows us to obtain the selective MR image of ^{13}C/^{15}N-PMPC without endogenous noise signals. A final goal of our research is the application of this strategy to molecule-targeted functional MRI.

Keywords: Multiple-resonance NMR, Probes, Imaging

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