**Molecular imaging and theranostic approaches for cardiovascular diseases**

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Molecular imaging is a fascinating, rapidly growing field with many preclinical and clinical applications, particularly for personalized medicine. By targeting the biomarkers of cardiovascular diseases, we can use molecular imaging for early and more sensitive diagnosis. I have developed recombinant antibodies that specifically targeted biomarkers, such as inflamed endothelial cells or activated platelets. We can perform molecular imaging across a range of imaging technologies by conjugating these antibodies onto their respective contrast agents. 1) microbubbles for ultrasound, 2) near-infrared dyes for 3D fluorescence imaging and 3) iron oxides for MRI. Using a ferric chloride included thrombosis murine model, we successfully imaged the thrombi using molecular ultrasound, and 3D fluorescence imaging. We have also demonstrated a significant reduction in thrombus size after treatment with a thrombolytic drug. We have demonstrated that targeted iron oxide particles bind to the area of myocardial infarction in a murine model. We further investigated a novel theranostic approach that simultaneously allows diagnosis and therapy in a single approach. In a thrombosis model, we injected activated platelets targeted contrast agents, loaded with thrombolytic drugs; and we observed the diagnosis of thrombosis, the breakdown of the blood clot and its reduction in size via real-time ultrasound imaging. In a murine model of abdominal aortic aneurysm (AAA), we demonstrated that our theranostic agents (targeting inflamed endothelial cells and loaded with microRNA for gene therapy) downregulated inflammation and provided therapy for AAA. Overall, molecular imaging and theranostic approaches are rapidly advancing field that hold promise of major benefits to many patients with cardiovascular diseases.