Syllabus: Imaging Biomarkers in Cardiovascular Disease, Thursday April 23, Chun Yuan, Ph.D.

This course will cover Imaging Biomarkers for cardiovascular disease. Although many imaging biomarkers exist, this lecture will focus on biomarkers related to atherosclerosis imaging. Atherosclerosis has been increasingly recognized as a complex, multi-factorial disease. An ideal imaging method will recognize tissue components, wall morphology, and factors such as inflammation and shear stress which are coming to light as markers of plaque vulnerability. This course will focus on validated imaging biomarkers and the information they provide about plaque status, biomarker validation and use in clinical trials, and will also discuss novel targeted imaging approaches and their applications, and future directions and targets for plaque imaging.

Key References:

Yuan C, Kerwin WS, Yarnykh VL, Cai J, Saam T, Chu B, Takaya N, Ferguson MS, Underhill H, Xu D, Liu F, Hatsukami TS. MRI of atherosclerosis in clinical trials. NMR Biomed. 2006 Oct;19(6):636-54.

Corti R, Fuster V, Fayad ZA, Worthley SG, Helft G, Chaplin WF, Muntwyler J, Viles-Gonzalez JF, Weinberger J, Smith DA, Mizsei G, Badimon JJ. Effects of aggressive versus conventional lipid-lowering therapy by simvastatin on human atherosclerotic lesions: a prospective, randomized, double-blind trial with high-resolution magnetic resonance imaging. J Am Coll Cardiol. 2005 Jul 5;46(1):106-12.

Underhill HR, Yuan C, Zhao XQ, Kraiss LW, Parker DL, Saam T, Chu B, Takaya N, Liu F, Polissar NL, Neradilek B, Raichlen JS, Cain VA, Waterton JC, Hamar W, Hatsukami TS. Effect of rosuvastatin therapy on carotid plaque morphology and composition in moderately hypercholesterolemic patients: a high-resolution magnetic resonance imaging trial. Am Heart J. 2008 Mar;155(3):584.e1-8. Epub 2008 Jan 18. Erratum in: Am Heart J. 2008 Jun;155(6):1127.

Müller K, Skepper JN, Tang TY, Graves MJ, Patterson AJ, Corot C, Lancelot E, Thompson PW, Brown AP, Gillard JH. Atorvastatin and uptake of ultrasmall superparamagnetic iron oxide nanoparticles (Ferumoxtran-10) in human monocytemacrophages: implications for magnetic resonance imaging. Biomaterials. 2008 Jun;29(17):2656-62.

Zhao XQ, Phan BA, Chu B, Bray F, Moore AB, Polissar NL, Dodge JT Jr, Lee CD, Hatsukami TS, Yuan C. Testing the hypothesis of atherosclerotic plaque lipid depletion during lipid therapy by magnetic resonance imaging: study design of Carotid Plaque Composition Study. Am Heart J. 2007 Aug;154(2):239-46.

Choudhury RP, Fuster V, Fayad ZA Molecular, cellular and functional imaging of atherothrombosis. Nat Rev Drug Discov. 2004 Nov;3(11):913-25.