

AbstractID: 7341 Title: Methods for Determining Myocardial Blood Volume & Flow using Contrast-Enhanced MRI

Clinical cardiac MRI packages have recently become available for evaluating myocardial perfusion using rapid cardiac imaging methods and power-injected contrast agents. This presentation will review the basic methodology and present examples using data obtained from two different makes of MRI scanners obtained in both humans and a porcine model. We shall also explain how this approach can be used to obtain significant physiological measurements with proper calibration. Both myocardial blood volume and myocardial blood flow can be determined if the arterial input function and the change in the longitudinal relaxation time ( $T_1$ ) during the time that the contrast agent is traversing the myocardium can be determined. We shall look at two approaches for ascertaining  $T_1$ , one that relies on external calibration of samples of the contrast agent at known dilutions and a second method that attempts to evaluate the myocardial  $T_1$  directly. Blood volume and blood flow are then analyzed by using a tracer-kinetic model that yields a first-order differential equation and solving that equation for the partition coefficient and the blood volume using a Levenberg-Marquardt algorithm. The presentation shall end with a discussion of potential applications of this method, including a brief discussion of parallels and contrasts with thallium SPECT myocardial perfusion imaging.