Integrative analysis of coronary anatomy and physiology using computed tomography imaging

James Min / Guanglei Xiong, Cornell University

Image-based blood flow simulations holds great potential in characterizing *in vivo* hemodynamics in human coronary arteries. Evaluated in three multicenter studies, noninvasive computation of fractional flow reserve from CT have been shown to agree well with invasive tests and have greater diagnostic accuracy in detecting significant coronary lesions than CT alone. However, there are at least two challenges for wider acceptance in clinical settings. One is the tedious and expensive process to generate patient-specific anatomic models and boundary conditions from CTA images. The other is the lack of utilizing physiological measurements from emerging myocardial CT perfusion imaging. To address these issues, we propose an integrative framework to study coronary anatomy and physiology using CT imaging. We have developed automated tools to segment coronary arteries and four heart chambers, as well as analyze static and dynamic myocardial perfusion data. It is hoped that the framework will offer a thorough and one-stop shop to assess coronary artery diseases based on the information from both computer simulations and emerging CT capabilities.