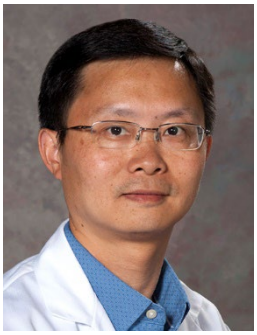

Open Kinetic Modeling Initiatives to Accelerate Quantitative Molecular Imaging Research at UC Davis and in the International Community

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Abstract: Radiotracer kinetic modeling is a technique that exploits mathematical models to enable quantitative characterization of targeted physiologically significant molecular process. The technique has a long research history in molecular imaging with positron emission tomography (PET), but its broad clinical applications have been hampered due to limited scanner performance. Along with the recent boost in sensitivity of commercial PET scanners and the advent of total-body PET technology, there is an urgent need to accelerate kinetic modeling research and clinical translation, e.g., for molecular imaging of cancer. However, the field is challenged by insufficient state-of-the-art kinetic modeling resources, limited access to educational opportunities, and a lack of young-generation researchers. We address these challenges by creating a Kinetic Modeling Service (KMS) at UC Davis and by launching an international Open Kinetic Modeling Initiative (OpenKMI). The KMS offers advanced kinetic modeling methods as a service to clinical and preclinical investigators. The service is becoming available via the UC Davis EXPLORER Molecular Imaging Center for human studies, the Center for Molecular and Genomic Imaging for small animal and non-human primate studies, and the Companion Animal Imaging Center for large animal studies. The OpenKMI for the international community is being created in collaboration with leaders from multiple institutions (e.g., Yale University, UCSF) and with initial grant support from the IEEE Nuclear and Plasma Sciences Society. The initiative includes an educational effort to organize open-access short courses and webinars on specific technical topics, and a resource effort that opens datasets and codes to promote the development and broad dissemination of tracer kinetic modeling to the wider technical society. The two internal and external initiatives are expected to help accelerate quantitative molecular imaging research and translation both at UC Davis and across international sites.

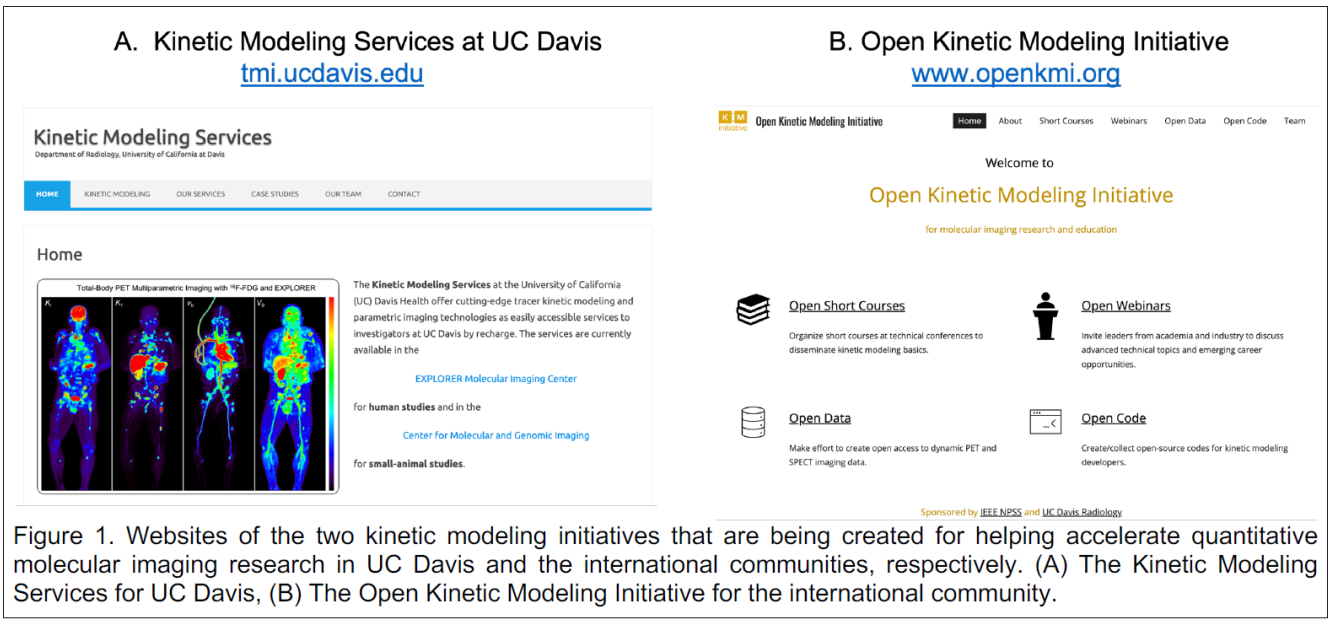

Figure 1. Websites of the two kinetic modeling initiatives that are being created for helping accelerate quantitative molecular imaging research in UC Davis and the international communities, respectively. (A) The Kinetic Modeling Services for UC Davis, (B) The Open Kinetic Modeling Initiative for the international community.