DFCI Center for Patient Derived Models (CPDM)

Given the increasing use of patient derived models within the DFHCC the DFCI has made a major institutional investment and financial commitment to further support the professional creation and use of models within the DFHCC sites and clinical trials by forming a center focused on these efforts. The DFCI Center for Patient Derived Models (CPDM) is a strategic collaborative research center with the expertise to support professional patient cancer model generation, characterization and use in research studies and clinical trials in collaborations with principal investigators.

Staff and Expertise
Dr. Keith Ligon, MD PhD, serves as Director and Dr. Kin-Hoe Chow, PhD serves as the Associate Director of the CPDM. The CPDM has expertise in generation of patient derived cell lines, patient derived xenografts, organoid cultures, and acute cell models drug testing. The CPDM has trained staff of 10 FTEs focused solely on cancer patient modeling and includes dedicated technician support for all aspects of research in vitro and in vivo models.

In addition, the CPDM has dedicated clinical research coordinators (CRCs) trained in human subjects research and specialized in patient models research and regulatory requirements. They have direct experience in patient consenting to models research. The CPDM also has specific bioinformatics support for analysis and curation of models generated within the CPDM including support for clinical database management, generation of novel approaches for model sequencing and characterization, and web-based interfaces (cBioPortal for Models, ProXe, PDX Finder) which aid in researcher identification of appropriate models for research. The CPDM has a staff of 3 full-time model focused clinical research coordinators who collect relevant clinical information related to the models and patients in a HIPAA and IRB compliant manner. The CPDM also aids in performance of genomic and other baseline characterization of patient models to aid investigators in rapidly correlating this information with experimental results from the models. The CPDM is currently serving projects and collaborations on research within NCI SPORE, P01, U54, and NCI-CTEP Consortium Clinical trials programs and investigators (COG, ALLIANCE, NRG).

A key priority of the CPDM is to support the professional generation of models from Phase 0-3 clinical trial patients or other patients participating in clinical trials. The CPDM aids in clinical trial design in order to facilitate creation of models within or in parallel to clinical trials for novel therapeutics. CPDM CRCs offer services to aid in consenting patients to models research and specific consent language currently required for full model study. CPDM actively collaborates with investigators and the department of Pathology at hospitals to capture tissue from pre- and post-model generation along with prior and subsequent treatment data to examine model resistance. CPDM is part of the collaborative international effort of Human Cancer Model Initiative funded by NCI to support the generation of 1000+ clinically annotated cell lines. CPDM has optimized multiple approaches to make cell line or xenograft models using minimal patient materials, such as those recovered from routine surgical biopsies. CPDM has success in working with external trial collaborators to send in trial specimens in fresh tissue or viably cryopreserved format to generate models. A key area of synergy for NCI and the CPDM is to synergize these international HCMI efforts with ETCTN supported clinical trials efforts.

Model Resources
Specifically, CPDM manages data and distribution of more than 1000 patient derived models. These include cell lines, organoids, xenografts, and live cell preparations. The CPDM has created and characterized currently more than 500 models from 30+ different cancer types using multiple approaches.
Equipment
The CPDM has more than 1200 Sq ft of wet lab space and this includes dedicated tissue culture area with 2 tissue culture hoods, 5 incubators, and a semi-automated MACS Octo tissue dissociator, an automated DNA/RNA extraction system QIAcube Connect, in addition to fluorescent automated cell counter, a multimode microplate reader, a Tecan D300e digital dispenser for rapid delivery of biomolecules for in vitro drug testing assays, and Incucyte device for measuring live cell growth and response to drugs in the acute setting through live cell imaging or luminescence/fluorescence-based cell assays. CPDM’s biobanking effort of cell line/xenograft models as well as patient specimens are tracked using the state-of-the-art LabCollector LIMS system. The laboratory has two microscopes equipped with digital cameras for slide/tissue culture review, a tissue dissecting microscope, a cryostat microtome, and an automated nuclei acids purification platform to extract DNA/RNA for model characterization. CPDM has access to small animal ultrasonography, in vivo bioluminescence, PET-SPECT-CT, and MRI imaging platform in the mouse facility to support creation and characterization of patient derived xenografts.