



Institute for Systems Genomics Networking Workshop

Friday, October 30, 2015

Onyiuke Dining Room, UConn Health, 263 Farmington Avenue

10:00-10:10	Registration
10:10-10:25	Welcoming Remarks and Goals of the Academic Plan Project “Genetics, Genomics & Personalized Medicine” Marc Lalande
10:25-11:10	Center for Genome Innovation Rachel O’Neill, Michael Duff, Jill Wegrzyn, Bo Reese Ion Moraru, Brenton Graveley
11:10-11:40	Single Cell Genomics Center Paul Robson
11:40-12:00	Proteomics Facility and Lincus Demo Daniel Schwartz
12:00-12:15	hESC/iPS Targeting Core Christopher Stoddard
12:15-12:30	Q&A
12:30-1:30	Lunch

Institute for Systems Genomics Tier 1 Academic Plan

The objective of this proposal is to define a strategy for advancing UCONN's initiatives in Genetics, Genomics and Personalized Medicine (GGPM), an area that was designated to be of high strategic importance in the 2013 academic plan. The GGPM's strategic area advisory team concluded that the Institute for Systems Genomics (ISG) will serve as the organizational entity for UCONN's current and future endeavors in GGPM. The strategy that is proposed herein is that the ISG through its **Center for Genome Innovation (CGI)** will build and expand genomics technological platforms and a sophisticated computational data analysis capability that will support researchers and students across the UCONN community. The need for such an infrastructure is made clear by the results of a March 2014 survey of NextGen sequencing needs at UCONN that was commissioned by the Office of the Vice-President for Research. Responses were evoked from 76 faculty members in 27 UCONN Departments. The need for what we propose here is evident with 81.4% respondents requesting an in-house NextGen sequencing facility at UCONN. In response to the question about the most challenging aspect of NextGen sequencing, 44.2% indicated data analysis. Our specific aims to fulfill the NextGen infrastructure needs at UCONN are: 1) strengthen the portfolio of genomics research across campus; 2) allow researchers and students to stay competitive in a rapidly evolving area, and 3) keep valuable and increasingly competitive grant dollars within the UCONN system.

The Academic Plan supports two PhD-level faculty members at 75% and 25% effort, respectively, as well as one full time computational support staff (currently being recruited) and some sequencing supplies and software licenses for workshops.

Institute for Systems Genomics Tier 1 Equipment Supplement

Two cross-cutting technological areas have been identified as an integral part of the Genetics, Genomics and Personalized Medicine (GGPM), an area designated of high strategic importance in the 2013 UCONN academic plan, and as necessary for its success: Genome Data Analysis, Interpretation & Visualization, and Genome Technologies. This supplemental equipment request seeks funding for items needed to facilitate success specifically in these two technological areas as a component of the ISG Tier 1 request for support to achieve its aims to coalesce the interdisciplinary research strengths across UCONN, its affiliated hospitals, and the Jackson Laboratory. Funding of this proposal will allow the ISG's Center for Genome Innovation (CGI) to integrate current facilities and expand capacities to provide cutting-edge technologies and bioinformatics infrastructure. Moreover, this investment will support the CGI mission to serve as the hub for laboratory-based training and genomics-related research and provide access to state-of-the-art instrumentation, outreach programs, and grant project assistance for faculty and students across the UCONN campuses.

The equipment includes a small sequencing instrument (Oxford Nanopore PromethION), Custom Dedicated Hardware for Genomics Data Processing as well as licenses for Genomics/Sysbio Commercial Software. **It Should Be Noted That Our Request For Next Generation Deep Sequencing (E.G. Illumina Hiseq) Was Denied**

ISG Academic Plan Team: **Marc Lalande**, Professor of Genetics & Genome Sciences, and ISG Director; **Rachel O'Neill**, Professor Molecular and Cell Biology, and CGI Director; **Brenton Graveley**, Professor of Genetics & Genome Sciences, and Associate Director ISG; **Ion Moraru**, Professor, Cell Biology, and Director High Performance Computing Facility; **Michael O'Neill**, Associate Professor of Molecular & Cell Biology, and Assistant Director ISG; **Jill Wegrzyn**, Assistant Research Professor and Facility Scientist, Ecology and Evolutionary Biology; and **Michael Duff**, Assistant Professor of Genetics & Genome Sciences.

Center for Genome Innovation

It is the mission of the CGI to facilitate the genomics research of faculty and students across the UConn campuses by providing access to state-of-the-art instrumentation, technical support, and grant project assistance. Support will be in the form of instrument access, hands-on assistance, training and/or consultation.

I. Services (Full Service application based fee-for-service → Access Only): The CGI serves both novice and expert users, with appropriate levels of supervision, access and support based on user experience level and project need. In order to effectively serve the UConn research community, CGI staff allows expert users to work independently (with the proper clearance), freeing staff to train an expanding base of novice users with their experiments and broadening the genomics capacity.

The following list includes examples of some of the support services offered by the CGI:

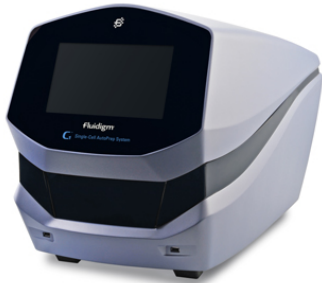
- Experimental design consultation (sequencing coverage estimates, sample number considerations, etc.)
- Experimental budget and timeline development
- Group training (workshops) for various platforms and applications
- One-on-one library preparation consultation (lab shadowing)
- Instrument access
- Fee-for-service for application support in library preparation, genotyping sample preparation and sequencing services
- Workflow troubleshooting
- Data analysis (high-level Next Generation sequencing analysis including usage of the Galaxy server and FastQC), basic alignments and mapping
- Data Storage/Data management policy statements for grant agencies
- Pipeline for data archiving to national databases according to federal guidelines
- Letters of support for grant applications

II. Training Courses/Workshops/Conferences: During the course of the year, several training courses/workshops will be offered to the UConn research community. The workshops will provide faculty and staff an opportunity to learn new techniques and gain familiarity with the instruments located in the CGI. The format of these workshops will follow previously designed executive format modules. Participation in these workshops brings an added incentive for inexperienced faculty and staff – clearance for access-only rates through experiential training as well as pilot data for their own samples used in the workshop.



Single Cell Genomics Center

UConn and the Jackson Laboratory for Genomic Medicine (JAX-GM) have entered into an agreement to jointly support a Single Cell Genomics Center (SCGC). The SCGC is located in a state-of-the-art facility within the JAX-GM building and is directed by Dr. Paul Robson, a recognized international leader in the field of single cell biology and genomics. The SCGC provides capability for high-throughput genomic screens, high-throughput Next-generation sequencing (NGS) library preparation, and many other related 'omics applications and is supported by a suite of ancillary high-throughput genomics capabilities that include robotics, confocal microscopy, sample preparation, NGS and related technologies.



C1 Microfluidic System

The core instrumentation at the Farmington JAX-GM site will include Fluidigm instrumentation (two C1 Single Cell Auto Prep Systems, a Biomark HD System, a Helios Mass Cytometer (a 3rd generation CyTOF), and the Polaris) as well as an Inverted FL-scope with automation and Nikon Ti-E camera, flow cytometers (BD Fortessa and Canto), a flow sorter (FACsARIA III), Illumina sequencers (HiSeq, NextSeq500, MiSeq), a laser capture microscope (Arcturus), and an acoustic liquid handler (Labcyte Echo 525). In addition, instrumentation for circulating tumor cell (CTC) enrichment is being established. The allied facility (Fluidigm C1, Biomark and Access Array) on the UConn Storrs campus is within [CGI](#), a facility that is directed by Core co-PI Rachel O'Neill. We believe that this inter-institutional cross campus center will enable our investigators to establish a dominant and transformational position in single cell analysis.



Helios/CyTOF Mass Cytometry System

Proteomics Facility and Lincus demo

Proteomics & Metabolomics Core

Funds were acquired through the Provost's Academic Plan internal funding mechanism, as well as from a variety of deans, departments, faculty, and the Office of the Vice President for Research, to establish a Proteomics Core facility on the Storrs campus.

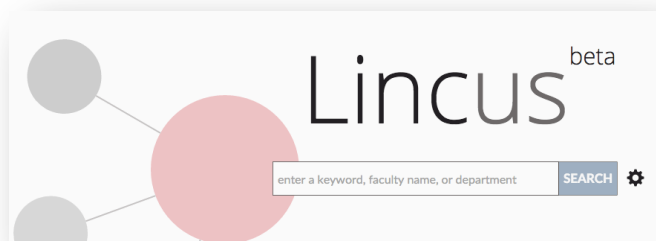
Recent developments have led to an expansion of that plan to also include metabolomic capabilities. Specifically, the facility, to be housed on the 5th floor of the Pharmacy/Biology Building, will include two state-of-the-art mass spectrometers: 1) a Thermo Scientific Q Exactive HF orbitrap instrument (primarily to be utilized for proteomic work), and 2) a Waters SYNAPT G2-Si QTOF instrument (primarily to be utilized for metabolomics work).

The proteomics portion of the core will be full-service (i.e., from sample prep to analysis), while the metabolomics portion will be self-service with basic training provided. The facility will be staffed by a Ph.D. level facility scientist, and will hopefully be functional by the end of the spring semester.



Lincus

Lincus is an in-house tool sponsored by the OVPR to find faculty expertise across all UConn campuses. The system automatically generates profiles for all UConn faculty and allows users to quickly explore and interact with the research landscape at the University in a keyword-specific manner. Although Lincus it is still in "beta", it is available to be used by anyone internal to the University (via NetID authentication).



hESC/iPS Targeting Core

The hESC/iPS targeting core provides services to investigators interested in genome editing of any mammalian cell type. We will work with the investigator to provide services to create research models through the use of genome editing technology. We offer full service TALEN and CRISPR/Cas9 strategies to engineer cell lines for research use. We can provide services in many types for projects including; introduction of mutations or correction of mutations to create isogenic cell lines, CRISPR and lenti-CRISPR based strategies for creating gene KOs, and design and creation of KI reporter constructs for use in genome editing.

The core can also create custom targeting vectors to be used in combination with TALEN/CRISPRs to create point mutation KIs, correction of point mutations in disease cell lines, or reporter vectors.

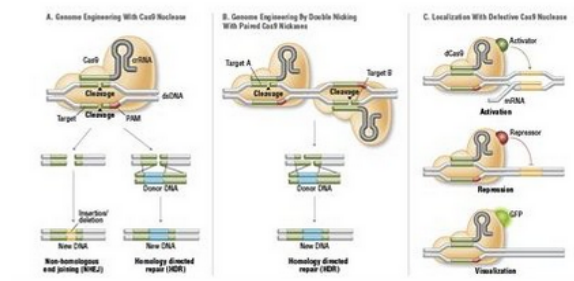
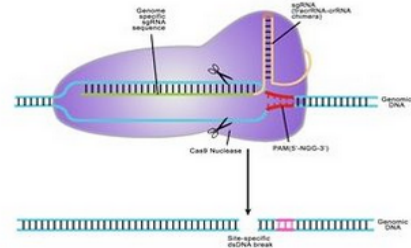
In addition to material used for targeting experiments the core can provide the cell culture services. This service can be used to perform cell targeting experiments, selection and genotyping of resistant clones, expansion and freeze of positive cells clones.

The core can be utilized as a full service provider, materials design and creation, or as a consultant for your in-laboratory experiments performed by an individual investigators staff.

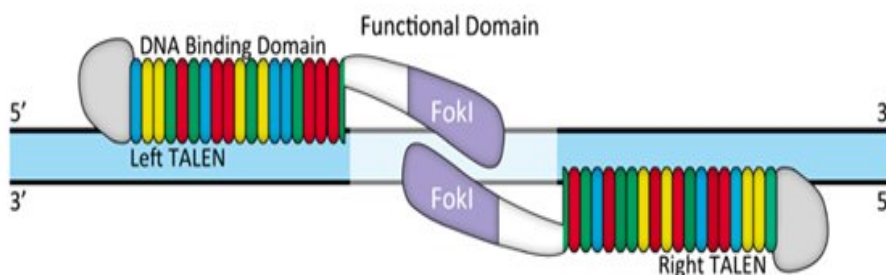
In addition to genome editing, CRISPR/Cas9 technology can be used to alter regulation of a gene coupled with activators or repressors, or for in cell visualization using GFP fused dCas9.

Consultation to discuss a potential project is at no charge. Following consultation a project outline can be developed and a custom quote will be made for your particular project. There are many custom applications of these technologies that can be used for many experiment types. Contact Chris Stoddard at stoddard@uchc.edu to discuss any projects to see how we can help you in your research projects.

Custom CRISPR Design



Custom TALEN design



Murine Behavioral Neurogenetics Facility

The new **MBNF**, located in BOUS 083 Suite, will soon begin testing our inaugural batch of engineered mice (cortical dysgenesis; *Kanadia*, *PNB*). We plan a second study using a knock-out of a dyslexia risk gene (*LoTurco*, *PNB*), and a third to phenotype mice exposed to prenatal immune factors as a model of autism (*O'Neill*, *MCB*). We are negotiating to receive mice with an insertion of the human COMT gene (related to reading skill) from *UCSD*, with preliminary evaluation of the effects of COMT on motivation already underway. Finally, we are developing new behavioral tasks to model skills crucial to language/reading development (rule-learning, complex visual motion discrimination) in collaboration with the new *Institute for Brain and Cognitive Sciences*. Results will be used in several grant applications under preparation.

UCONN | UNIVERSITY OF CONNECTICUT



Murine Behavioral Neurogenetics Facility

[Home](#)

[Contact Us](#)

[Affiliated Faculty](#)

[Resources](#)

[Gene Targeting and Transgenic Facility/UCHC](#)

[Behavioral Task Menu](#)

[Testing fee schedule](#)

[Customized fee calculator](#)

[Request custom task\(s\)](#)

[Check availability](#)

[Task Information](#)

