TRANSLATION TECHNOLOGY

The UCLA-CTSI provides many state of the art technology cores and specialized service cores available to investigators. The technology core described below is available at Lundquist/Harbor-UCLA. Applications for utilization of these resources are reviewed by the Scientific Advisory Committee of the UCLA-CTSI at Lundquist/Harbor-UCLA. Support for investigators using this core is provided through a voucher system. Please contact the UCLA-CTSI office at 310-222-2503.

INSTITUTE FOR TRANSLATIONAL GENOMICS AND POPULATION SCIENCES

The Institute for Translational Genomics and Population Sciences was established in 2013 and is directed by Dr. Jerome I. Rotter. The Institute consists of 3 core laboratories—the Laboratory for Biochemistry, Molecular Phenotyping, and Cell Line Repository, directed by Dr. Y.-D. Ida Chen; the Laboratory for Statistical and Mathematical Genetics, directed by Dr. Xiuqing Guo; and the Laboratory for Molecular Genetics, Bioinformatics, and High Throughput Genotyping, directed by Dr. Kent D. Taylor.

The Genomics Institute Faculty have been extremely active in large scale genetic studies and both single cohort and in multi-cohort (and multi-ethnic) consortium efforts that have identified many genetic loci for cardiometabolic traits. In these studies, we have contributed to the design stages, to performance of biochemical phenotyping, to large scale genotyping, and to statistical genetic analysis. The many loci we and our collaborators have identified are being utilized by ourselves and others to generate multi-loci genetic risk scores as powerful tools to dissect disease etiology and to perform risk assessment in populations. Besides our involvement in many large scale genome wide association studies (GWAS), we are now actively involved in large scale whole genome sequencing studies (WGS) and Multi-Omics studies.

Investigators interested in using this resource must contact Dr. Rotter to discuss the project and utilization.

Genetic Epidemiology Computing Resources and Facilities
Microcomputer, minicomputer, and mainframe computer resources are available and are supported by The Lundquist Institute IT department. A variety of software packages are available for data management and data analysis. About twenty Pentium PC computers, 9 Linux workstations, 3 Apple Mac Pro and 10 printers are available to investigators, biostatisticians, and data entry personnel for database management and data analyses. A regular backup system and password secured ftp site for the Mathematical and Statistical Genetic Analysis group have been set up to function routinely. FilemakerPro, MySQL, PHP, HTML, JavaScript, Perl, and C++ software are available for data handling. SAS statistical packages are used for statistical analyses. There are a variety of genetic analysis programs utilized in the Institute for Translational Genomics and Population Science at LA BioMed. The programs we are currently using for statistical genetic analyses include PEDCHECK, RELCHECK, PREST, LOKI, PHYLIP, SOLAR, MEGA2, HAPLOVIEW, miLD, SNPLINK, MERLIN, PLINK, ProbABEL, EIGENSTRAT, SNPTEST, SNPMStat, Quicktest, SCAN, SNAP, LOCUSZOOM, META, and METAL. We also added more new software such as MACH, IMPUTE2, CheckVCF, SHARPEIT, Minimac3, PLINKSEQ (pseq), RVTEST, RAREMETALWORKER,vcftools, bcftools, gtool, ANNOVAR, SnpEff, WGSA, SNPnexus, and GWAF, EasyQC, GenABEL, GENESIS, EPACTS, SMMAT, and GATK. We also develop our own programs in C++, R and PERL.
The facility has a Windows 2008 HPC mini cluster server allowing for cloud computing. A remote 20TB hard drive is provided by the Scientific computing center. Two QNAP Network Attached Storage (NAS) boxes offer a total of 200TB cloud space which allows storage and retrieval of data from a centralized location for our authorized users. We have also added a hybrid disk tape system utilizing 100TB of spinning disk media and 2 tapes library's with a capacity of 1.2TB of LTO-8 tapes each. There are two 10GB high speed communication switch boxes, totaling 96 ports for internal use.

Molecular Genotyping Laboratory Facility
The genotyping facility consisting of 2300 sq. ft. of lab space encompassing one large (general bench space and major genotyping equipment) and six adjoining rooms, one for the "pre-PCR" genotyping step, one for RNA isolation and expression work, one for Mass Spectroscopy instruments (molecular phenotyping laboratory), one for server racks, and two tissue culture rooms. The adjoining hall contains five -70 degree freezers. A conference room, cold room, and office for the laboratory director are within the building. The Lundquist Institute IT department supports the 1 Gbit/sec network, internet service, two laboratory servers, weekly backup, emergency power, and additional air conditioning for the computer equipment. The genotyping operation shares these resources with the molecular phenotyping laboratory.

Biochemistry Assay and Molecular Phenotyping Facility
There is also a linked ~900 sq. ft. space in E4 and E6 that consist of cold room and will house many deep freezers. We also occupy space in the newly constructed freezer farm area where more than 20 -80 freezers and (2) cryo freezers are used to store thousands of samples to support ongoing research activities. The freezer farm utilizes over 1500 sf of the total wet lab space of 15,000 sf. This lab provides high throughput (at least 1000 samples per month) assays. All raw data are automatically transferred and processed by linked computer; no manual data entry is necessary. We have performed thousands of measurements of glucose, insulin, TG, cholesterol, HDL, hsCRP, IL-6, leptin, adiponectin, angiotensin II, IGF-1, nerve growth factors, VEFG, iCam, vCam, TNFα and associated soluble receptors I and II. All deep freezers are monitored by wireless alarm systems that auto-dial and e-mail investigators 24/7 when temperature varies by 10°C.

Bioinformatics
Available bioinformatics services related to the above equipment include: design of custom genotyping chips, allele calling of genotyping data, on analyses of whole genome sequence data. Computing available "in-house" is optimized for speed of computation and is carried out on 4 Alienware computers and 8 custom units, all overclocked i7 processors with water-cooled radiators, Kepler graphics processing units, and 128 Gb of RAM; these are connected by a fast 40Gbit intranet. "Gluster" is used to create large workspaces across multiple hard drives; 80 Tb storage are available within the bioinformatics offices and an additional 180 Tb fast storage are made available by the Lundquist Institute IT department. Two additional Mac-Pro computers optimized for linear algebra are available for fast matrix calculations. Addition bioinformatics expertise includes: (a) database design, handling, and management using many technologies depending on the amount of data to be managed; (b) integration of local data with publicly available data; (c) programming data handling workflows; (d) integration and feature selection across multiple "omics" datasets; and (e) data visualization using a variety of methods.

EQUIPMENT

Genetic Epidemiology Computing Equipment
PC computers/workstations (20)
Linux work stations (9)
Apple Mac pro (3)
Printers (10)
Linux Hadoop cluster with 1 command server and 7 slaves, each with 8 cores and 100 Tb hard drive space
Windows 2008 HPC mini cluster server consists of 11 nodes and 1 head node. Each node consists of 2 6-core CPUs. 8 of the nodes have 96 GB of memory, and 3 of the nodes have 72 GB of memory. This allows for cloud computing.
A remote 20TB hard drive is provided by the Scientific computing center. Two QNAP Network Attached Storage (NAS) boxes offer a total of 200TB cloud space which allows storage and retrieval of data from a centralized location for our authorized users. A hybrid disk tape system utilizing 100TB of spinning disk media and 2 tapes library's with a capacity of 1.2TB of LTO-8 tapes each. There are two 10GB high speed communication switch boxes, totaling 96 ports for internal use between computer nodes and these two NAS. Also, two boxes of Cisco router for external communication use. A 32 TB 8 bay external data storage tower is also available for use of back up or transferring of data.

Core Laboratory Equipment
Qiagen QIAsymphony sample processing workstation (1)
Qiagen QIAvac System (1)
Andrew Alliance robotic sample handling system (1)
96-sample PCR machine (2)
UV/VIS spectrophotometer plus monitor (1)
Nanodrop instrument w/ computer (2)
Water baths (3)
Table-top Centrifuges (2)
Isotemp Incubator (1)
Sonicator (1)
Vortemp Incubator (1)
Vortex Mixer (3)
VWR Galaxy MiniStar Microcentrifuge (3)
Microplate Shaker (1)
Gel Electrophoresis equipment (2)
Agilent Bioanalyzer (1)
Victor X3 Plate Reader (1)
Power supplies (8)
Pipette Sets (4)
PC computers for data and database management, bioinformatics (6)

Printer (2)
Qubit 3.0 Fluorometer (1)
Qubit 2.0 Fluorometer (1)
pH Meter (1)
Autoclave (1)

Biorepository and Sample Management
4°C refrigerators (7)
-20°C freezer (7)
-80°C freezer (30)
Cryogenic LN_2 storage tanks (5)
Zebra GX430t – Tube Label Printer (1)
Dymo Labelwriter 450 (2)
PC computer for data/database management (1)

Genotyping Laboratory Equipment
for genotyping with Illumina Microarray chips
Illumina Bead Array Reader (1)
Illumina iScan chip scanner (1)
Illumina Robotic auto-loader arm for iScan (1)
Tecan robotics workstation for post-PCR setup (1)
High capacity computer work stations (2)
Thermo Scientific SORVALL LEGEND XTR refrigerated centrifuges (1)
Hybridization ovens (4)
Hybex Incubators (4)
Vacuum Desiccators (3)
Shakers (2)
Heat sealers (2)
Vortex mixers (2)
Applied Biosystems 2720 Thermo Cycler (1)
Applied Biosystems QuantStudio 6 Flex Real-time PCR (1)

for Next Generation Sequencing and handling of sequencing data
Illumina “MiSeq” NGS system (1)
Illumina “NextSeq 500” NGS system (1)
“Over-clocked” Computer with i7 water-cooled processors and Nvidia “Titan” GPU (12 stations connected with KVM)
Mac Pro servers with 48 Tb storage (2)

Biochemistry Assay and Molecular Phenotyping Facility Equipment
Applied Biosystems mass spectrometer (API 4000 LC/MS/MS system) (1)
Beckman Coulter Chemistry System (AU480) (1)
Automated Beckman Coulter Immunoassay System (Access II) (1)
ABI PRISM Model 7000 Sequence Detection System (1)
Elan Diagnostics ATAC 8000 station (2)
Tecan infinite F50 96-well ELISA plate reader (1)
Tecan 96-well plate washer (1)
Shimadzu HPLC (1)
Agilent Technologies SureScan Microarray Reader (1)
Luminex 200 multiplex analyzer (1)
Roche cobas 6000 (1)

Tissue Culture Laboratory
Class II Biological Safety Cabinets (5)
Thermo Scientific 28L G.P. water baths (2)
Thermo Scientific Precision 2864 circulating water bath (1)
Thermo Scientific HERACELL VIOS 160i CO2 incubators (5)
REVCO ULTIMA II CO2 incubators (2)

Life Technologies EVOS XL Core microscopes (3)
Life Technologies EVOS FL fluorescent microscope (1)
Leica DM IL LED microscope (1)
Thermo Scientific SORVALL LEGEND XTR refrigerated centrifuges (3)
Beckman Coulter SPINCHRON-R refrigerated centrifuge (1)
IKA KS 260 basic orbital shaker (1)
Invitrogen Neon™ transfection system (1)
Scientific Industries VORTEX GENIE 2 (1)

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