**Facilities & Other Resources**

**City College of New York**

The City College of New York (CCNY) is one of the largest institutions in the City University of New York (CUNY) system. CUNY historically serves a number of communities with prominent health disparities, including racial/ethnic minority and socioeconomically disadvantaged populations. CCNY brings a 150-year history of offering low-cost access to higher education to the residents of New York City. Located in Harlem, CCNY is home to over 70 undergraduate and 70 graduate (master’s and Ph.D) programs in a range of disciplines including the sciences, math, clinical psychology, biomedical engineering, translational medicine, public policy, a BS/MD program and a Physician’s Assistance (PA) program. CCNY draws most of its enrollment from the Harlem area and other areas of New York City that have high concentrations of minority and low socioeconomic status residents. CCNY’s 12,955 undergraduates, of which 72% are full-time, are 56.2% African American and/or Hispanic. CCNY students come from 159 countries and speak 109 languages in addition to English. CCNY strives to provide its students with exceptional academic opportunities and is nationally and internationally recognized as an institution with strong graduate and undergraduate programs of instruction and with excellent resources for basic and applied research in science and engineering. CCNY is the only public university in New York City that meets the stated criteria of the Carnegie Foundation for the Advancement of Teaching as a Research II university. In order to sustain this standard, CCNY has provided an array of special NIH programs to support the development of scholars such as MARC/ RISE. CCNY has also launched the Colin Powell Center for Policy Studies, with an emphasis on scholarship through the public and community service and research.

A significant research agenda is intrinsic to all departments and programs at CCNY. The Grove School of Engineering, the Division of Science, and the CUNY School of Medicine are leading the way in bringing external research funding in the areas of biomedical science and population health; engineering; environmental science, climate change and remote sensing; macromolecular assemblies and structural biology, materials science and nanotechnology; neuroscience; photonics; and sustainable energy. These are buttressed by traditional and emerging strengths in transportation and infrastructure, computer networks and communications, robotics, computational and theoretical physics, and cellular and molecular biology.

**CUNY School of Medicine/Sophie Davis School of Biomedical Education (CSOM)**

The CUNY School of Medicine/Sophie Davis School of Biomedical Education (CSOM), located in the heart of the CCNY Campus, was founded as a school within CCNY in 1973 and is in the process of becoming an accredited medical school. The mission of CSOM is to produce broadly-educated, highly-skilled primary care physicians to provide quality care to medically underserved communities. CSOM recruits underrepresented populations into medicine with the goal of increasing the availability of primary care physicians in historically underserved areas. The CSOM is effective in attracting and graduating students because it offers a unique mission-driven educational experience in an innovative seven-year BS/MD program with small class sizes and a rigorous course of study that integrates undergraduate education and community work with the medical school. Students graduate with a BS and MD degree from CCNY and a clinical partnership with St. Barnabas Health System in the Bronx. CSOM also offers a Physician Assistant (PA) Masters program. The PA program’s mission, consistent with that of the CSOM, is to improve the health of underserved communities and to eliminate healthcare disparities by providing increased access to physician assistant education to students from traditionally underrepresented populations.

The CUNY School of Medicine faculty members are active and productive researchers. Members of the Molecular, Cellular, and Biomedical Sciences (MCBS) are engaged in NIH-funded investigations in the areas of molecular, cellular and systems neurobiology, with a focus on behavioral neuropharmacology, psychopharmacology, neuronal plasticity and motor learning, spinal cord injury/recovery and neurodegenerative disorders. MCBS faculty also pursue investigations in immunology, wound healing and regenerative medicine, experimental pathology, cancer, and cardiovascular biology. Members of the Department of Community Health and Social Medicine (CHASM) have NIH-funded projects to test innovative biomedical HIV prevention strategies, as well as conduct research in environment and physical activity promotion, asthma self-management, smoking cessation, and cancer prevention. CHASM faculty research focuses on health disparities, social determinants of health and underserved populations and areas. CUNY School of Medicine faculty mentor and guide medical students, as well as doctoral students in the CUNY Graduate Center programs in: neuroscience and cognitive neuroscience, molecular, cellular, and developmental biology, and biochemistry.

Laboratory of PI:

Major Equipment:

Office:

Computers:

**Core Facilities in Marshak and/or CDI:**

**Marshak Science Building**: The 360,000 sq. ft. Robert E. Marshak Science Building is located in the heart of the CCNY campus and houses various research facilities, laboratories, and equipment.

**CDI (Center for Discovery and Innovation) Science Building:** The CDI building which opened in 2015, has 200,000 square feet of space for advanced research.

**Imaging Core Facility**: State-of-the art microscopes are available in the imaging core facility at Marshak and can be easily reserved for use for a moderate fee. A Zeiss LSM 710 scanning confocal microscope, a Zeiss LSM 800 and a Zeiss 880 Airyscan confocal microscopes, an Ultima 4 multiphoton microscope, and a Nikon N-STORM super-resolution microscope with TIRF, are available in Marshak. Also available in the Marshak building are two electron microscopes; a Jeol JEM2100 200 kV Transmission Electron Microscope (TEM) with a maximum resolution of 0.144 nm and a Zeiss Supra 55VP Field Emission Scanning Electron Microscope (SEM) that has a maximum resolution of 1 nm. In addition, an LSM 880 Airyscan Confocal Scanning Microscope is available on the 3rd floor of the CDI building. A MonoVista Raman Microscope with SP 2750 series spectrograph from Princeton Instruments-Acton is also available in the CDI building. This instrument has a high resolution (~0.3 cm -1 spectral resolution) and includes an upright Olympus BX51 confocal microscope (0.5 mm spatial resolution) coupled to a 750 mm imaging spectrograph for maximal confocal resolution and a thermoelectrically cooled PIXIS:400B CCD detector (1340 x 400, black illuminated).

**Mass Spectrometry:** A staffed mass spectrometry core housing a 4000 Q Trap LC/MS/MS Mass Spectrometer for liquid chromatography and mass spectrometry, a Waters Time-Of-Flight (TOF) Mass Spectrometer for analysis and identification of molecules and ions in organic synthesis, pharmaceutical and biochemical studies and in unknown compound discovery, and a Shimadzu GCMS-QP2010 Plus Gas Chromatograph Mass Spectrometer that features speed, sensitivity, and more uniform temperature control, are available on the 12th floor in Marshak for a nominal fee.

**NMR:** The Varian (Agilent) Unity -500 Nuclear Magnetic Resonance Spectrometer (500 MHz NMR) is available on the plaza level of the Marshak building. This instrument performs a wide variety of multinuclear (1H, 13C, 31P, 11B, and 15N) including 2D NMR experiments at variable temperature for structural identification of synthetic compounds. In addition, the Agilent (Varian) Mercury-300 NMR Spectrometer with an auto-switchable probe with a capability to observe 1H, 13C, 19F, 27A, and 31P NMR is available for laboratories identifying organic compounds in the CDI building. Also available in the CDI building is the Varian (Agilent) VNMRS 600 MHz Solid State NMR Spectrometer that is capable of carrying out NMR experiments in solution, semi-solid and solid states.

**Nanofabrication Facility**: A nanofabrication center has been established on the second floor of the Marshak building. This facility contains instrumentation for lithography including a Fotofab process system, a OAI Hybralign 200 Mask Aligner, and an Electron beam lithography system (NPGS-Nabity). Instrumentation available for evaporation/sputtering deposition includes a Denton Vacuum DESK IV Cold Sputter Unit-DC Magnetron for conducting film deposition and a Varian NRX 3117 E-Beam Thermal Evaporator. A Horizontal muffle furnace with a quartz tube, 1” in diameter and oxygen, nitrogen, air, argon flows is available for diffusion/oxidation and annealing. A Scanning Near Field Optical Microscope (Atomic Force Microscope) - Alpha SNOM WiTec, a Prifilometer-Tencor (alpha-step 200), and a UV-VIS-NIR Spectrophotometer-CARY 500 are available for thin film characterization.

**FACS Facility:** A staffed FACS facility located on the 6th floor of Marshak houses a 4 laser BD LSRII analyzer and a BD FACS ARIA cell sorter.

**X-Ray Diffraction (XRD):** A Bruker Discover D8 X-ray diffraction system with both high resolution and powder diffraction configurations available for measurements is housed in the CDI building.

**An Electronics Shop** is available on the 4th floor in the Marshak building. The electronic shop provides consultation and repair of research electronic instruments and computers and electronic design of circuit devices.

**The Machine shop** is available on the 2ndfloor of the Marshak building. It provides repair service or replacements for broken parts of machines.

**Shared Equipment in the Marshak Building**

A Licor Odyssy CLx digital fluorescence, quantitative imager is available for gels, immunoblots, plates, and mounted samples. A Lonza AmaxaTM nucleofection system is available for transfection of mammalian cells. This instrument is small and can be moved between the PI/PD lab and the neighboring labs in Marshak when needed. A Molecular Devices Spectramax i3x with a multi-mode platform is available. This instrument supports highly sensitive plate based biochemical assays including those utilizing changes in absorbance, fluorescence or luminescence. It can also be used to measure cellular kinetics. An ALEXYS Neurotransmitter B ultra high performance liquid chromatography (UHPLC) analyzer has recently been acquired for highly efficient separations of neurotransmitters. Also available are a New Brunswick Scientific Excella E25R refrigerated incubator shaker with universal platform & clamps, a deionized water system, two autoclaves, a TECAN Fluorescent Plate Reader, FPLC equipment, a Nanodrop spectrophotometer, a Gel Doc system, an X-ray developer, a slide spinner, a Beckman preparative ultracentrifuge, a high-speed Sorval centrifuge, a real time PCR machine, a phosphoimager, and a Cryostat (Leica CM 1950).

**Animal Facilities:**

A state of the art PHS USDA approved barrier animal facility is located on the main floor of the Marshak Science Building. Isolator units for housing mice under specific pathogen-free barrier conditions are present in the room in which the mice are housed. A full-time staff of animal caretakers supervise the maintenance of the facility together with a veterinarian. A new 20,000 square foot, state of the art PHS USDA approved barrier animal facility is also located in the basement of the CDI/ASRC buildings. This facility has its own full-time veterinarian. The animal care staff also includes certified animal care technicians and veterinary assistants. Rooms with isolator units are available for housing mice under specific pathogen-free barrier conditions.

**The New York Structural Biology Center (NYSBC)**

The NYSBC is a consortium of 9 New York area universities and research institutions which includes CCNY. It is located on the CCNY campus at 133rd St. and Convent Avenue. It houses 9 high-field NMR spectrometers, a Dynamic Nuclear Polarization spectrometer, several Transmission Electron Microscopes with cryo-EM capabilities, and also operates two synchrotron beamlines (X4A and X4C) at the Brookhaven National Laboratory on Long Island. All NYSBC facilities are available to the PIs as part of the CUNY’s yearly time allotment.

Electron Microscopy Resources at the NYSBS include 1) three FEI 300kV Titan Krios equipped with a FAlconIII and K2 Summit direct electron detectors, volta phase plate, and Gatan GIF Quantum LS Imaging Filter, 2) an FEI 300K Titan Themis equipped with a K2 Summit direct electron detector, 3) an FEI Tecnai F20 with a DE-20 direct electron detector, 4) an FEI Tecnai T12 and a JEOL J1230. These microscopes are equipped for measurements at cryogenic temperatures. Sample preparation for cryo-EM employ the FEI Fitrobot MarkIV and two Gatan CP3 plunge freeze instruments.

**The CUNY Advanced Science Research Center (ASRC)**

The ASRC is located on the City College of New York campus, adjacent to the CDI building. Sophisticated equipment and state of the art staffed core facilities are available to all CUNY faculty for a reasonable fee. The following core facilities that are available at the ASRC include: Nanofabrication, NMR Spectroscopy, Mass Spectrometry, Photonics, Live Imaging & Bioenergetics, MRI, and Epigenetics.

**Nanofabrication Facility**: This facility contains 5000 ft2 of 100, 1000, and 10,000 cleanroom space. Major equipment includes a 100 kV high resolution e-beam lithography system, a field emission scanning electron microscope (SEM), chlorine and fluorine based inductively coupled plasma etchers, and metal dielectric deposition systems.

**NMR Facility:** This facility features three Bruker Avance III HD NMR spectrometers operating at 600, 700, and 800 MHz for all types of bio molecular NMR studies. All three spectrometers are equipped with cryogenically cooled or room temperature probes for 1H, 13C, 15N, 19F, 31P, and 2H NMR capabilities. Additional resources include two laser systems for studies of photoreceptors or other photochemical systems and a high-pressure system for acquiring NMR data at pressures up to 2500 bar and a 1.6 mm HXY magic-angle-spinning probe for solid-state NMR experiments.

**Mass Spectrometry Facility:** This facility provides MALDI-TOF and QTOF technology to measure mass and molecular formulas of intact protein quickly and accurately and to characterize inorganic and organic molecules, synthetic polymers, peptide mixtures, oligonucleotides, and carbohydrates. Instrumentation in this facility includes a Bruker Autoflex Speed TOF-TOF and a Bruker Maxis-II ETD ESI-QTOF.

**Biomolecular Spectroscopy Facility** contains equipment for studies of macromolecular structure and interactions. The Microscale Thermophoresis Nanotemper Monolith NT.115 is available to measure binding reactions using changes in thermophoretic mobility. The Multiangle Light Scattering Wyatt Minidawn TREOS and OPTILAB REX are available for measuring molar mass and size of macromolecules in solution and the Circular Dichroism and Fluorescence Jasco J-1500 is available for studies of protein secondary and tertiary structure.

**Macromolecular Crystallization Facility:** This facility is equipped with robotics for macromolecular crystallization. Resources include the generation of standard and custom crystallization screens using an Alchemist robot, automated drop setting with Gryphon robots, and visualization using Minstrel imaging robots and hotels (for use at 4oC and 25oC).

**Imaging:** The Imaging facility houses a state-of-the-art FEI Titan Halo 80-300 kV Transmission Electron Microscope (TEM) (cryo-EM) for characterizations of biological and materials oriented samples at ambient and cryogenic conditions, a FEI Titan Themis 200 kV TEM with a Cs corrected platform to deliver the fastest time to data with high image quality, a FEI Tecnai G2 Spirit Twin 120 kV TEM for high resolution screening and training at ambient and cryogenic conditions, a dual beam FEI Helios Nanolab 660 SEM/FIB for resolving the finest details in 2D and 3D with clearest contrast, preparing the thinnest and highest quality samples, and a Leica TCS SP8 STED 3X super-resolution microscope for advanced imaging of materials and biological samples. The services provided at this facility, include data collection for single particle 3D reconstruction, S/TEM and SEM imaging, advanced FIB applications (i.e. patterning, site-specific cross-sectional imaging, 2D image stack, and TEM lamella preparation). The facility also houses plunge freezers for cryo-EM, specimen preparation, plasma cleaner for SEM samples and TEM grids cleaning, and coater for coating of carbon (thermal evaporation), gold and platinum (sputter coating).

**Live Imaging & Bioenergetics Facility:** The live imaging facility contains a Zeiss LSM 880 NLO upright two photon confocal microscope with Airyscan, FAST model and CLARITY lens that allows for deeper imaging of fixed tissues or live animals with a superior signal to noise ratio and high speed confocal imaging, a LSM 880 inverted live cell imaging confocal microscope with Airyscan and FAST model that provides high resolution, sensitivity, and speed that enables gentle live cell imaging with super resolution, and an Agilent Seahorse XFE24 live cell metabolic analyzer that is capable of measuring oxygen consumption rate and extracellular acidification rate of live cells. These equipment support in vivo imaging of live animals, time-lapse live cell imaging with high-resolution optical sectioning, deep imaging of fixed CLARITY tissues, calcium imaging, photo switching and photo uncaging, Fluorescence Recovery After Photobleaching (FRAP), Forster Resonance Energy Transfer (F), laser ablation, and measuring mitochondrial respiration and glycolysis in live cells in real time. Advanced imaging analysis software, Bitplane Imaris is available for data processing.

**MRI Facility**: This facility houses a Siemens 3 Tesla Prisma MRI Scanner equipped with a variety of RF coils: 20, 32, and 64 channel head/neck receivers, total spine RF coil integrated into the table, 3 flex coils for arm, leg, or chest imaging, a body coil for whole body imaging, and ancillary equipment for 64/32 channel MRI compatible EEG, physiological monitoring, and eye tracking. Separate computers connect to the EEG, physiological monitoring sensors, eye tracker, and Audiovisual stimulus. The stimulus computer has several common fMRI software installed such as Pyschtoolbox-3, PsychoPy2, Presentation, Eprime, and SuperLab 5.0.

**Epigenetics Facility:** This facility provides the following services; automated single cell isolation and subsequent nucleic acid extraction, quantitative gene expression analysis, DNA/chromatin extraction and fragmentation and protein nucleic acid association (ChIP) from tissue and enriched population, and next generation sequencing library preparation (RNA-seq and ChIP-seq) and quality control check. Available equipment includes a BD Aria Fusion cell sorter equipped with 4 lasers and capable of detecting up to 11 colors for single cell sorting, a Quantstudio 7 Flex Real-Time qPCR System, a Pipetmax for qPCR set up, a Qubit 3.0 Fluorometer for nucleic acid quantification and next generation sequencing, a TapeStation 4200 for sample quality control for next-generation sequencing, a Sage Science PIPPINHT for high throughput size selection for next generation sequencing, a Diagenode Bioruptor Pico Sonication system for shearing DNA, RNA, and chromatin, a Nanodrop spectrophotometer, and a Massarray System with Epityper DNA Methylation Analysis for non-fluorescent detection by mass spectrometry to measure DNA methylation.