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| Program Director/Principal Investigator (Last, First, Middle): |  |
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| RESOURCES |
| Follow the 398 application instructions in Part I, 4.7 Resources. |
| **Structural Biology Core Facility**The Structural Biology Core is currently comprised of an X-ray Crystallography Laboratory and a Biomolecular NMR Laboratory.**X-ray Crystallography Core Laboratory**The *UTHSCSA X-ray Crystallography Core Laboratory* (XRC) is fully equipped to carry out all aspects of contemporary protein crystallography. An NIH-ORIP S10 Shared Instrumentation Grant will install a state-of-the-art Rigaku HyPix 6000HE hybrid photon counting detector, VariMax VHF confocal microfocus optic and Universal Kappa Goniometer on our current high-flux Rigaku MicroMax 007-HF X-ray generator in 2021. The equipment infrastructure presently includes two complete X-ray crystallography systems: 1) a Rigaku R-AXIS HTC imaging plate area detector with VariMax HighFlux optics mounted on a high-flux MIcroMax 007-HF generator with an Oxford Cryostream 800 cryogenic crystal cooling system; and 2) a Rigaku R-AXIS HTC imaging plate area detector with VariMax HighRes optics mounted on a high-flux MIcroMax 007-HF generator with an X-STREAM cryogenic crystal cooling system. The high brilliance of the 007-HF equipped with VariMax optics gives researchers the in-house capability to work with very small or poorly diffracting crystals. Computational hardware and software (CNS, CCP4, COOT, HKL-2000, PHENIX, SHARP, SHELX, XDS, etc.) are also in place enabling the complete protein structure determination and refinement process to be accomplished in relatively short order.TheXRC possesses an Art Robbins Instruments Phoenix pipetting robot for rapid crystallization screening using 96 well sitting drop plates. The ability to accurately and reproducibly dispense 200 nanoliter volumes dramatically decreases the amount of purified protein needed to effectively sample the vast number of conditions that represent crystallization space. An Art Robbins Scorpion Screen Builder is available for developing crystal optimization screens and for single-channel liquid handling. In addition, the XRC has a Formulatrix Rock Imager 54 which has the ability to automatically take high resolution, composite photographs of each crystallization experiment in a 96-well plate. Remote data collection at the Advanced Photon Source (APS) at Argonne National Laboratory (Argonne, IL) is available as needed to reach our protein structure determination goals.The XRC has subdivided conference space, wet laboratory bench space and equipment space totaling 580 ft2. Major laboratory items include two -20°C freezers, a 4°C cold box, two microfuges, two Äkta FPLC chromatography systems, a PCR system, a sonicator, NanoDrop 2000 spectrophotometer, and high voltage power supplies and gel electrophoresis setups. Complementing the instrumentation is a range of shared equipment including a -80°C freezer, centrifuges, spectrophotometers, benchtop and floor incubator/shakers. Immediately adjacent to the wet laboratory is the 111 ft2 Macromolecular Structure Computer Laboratory that houses five Intel 12-core Linux workstations and an AMD 32-core server linked in a TORQUE cluster with 12 terabytes of networked hard disk space. **Biomolecular NMR Core Laboratory**The NMR spectrometers are located in Rooms 5.414 and 5.420 in the Research Adminstration Building on the UTHSCSA Greehey campus. These rooms are 396 and 524 sq ft, respectively, and are dedicated solely for housing the instruments that comprise the NMR facility. These include two state-of-the-art Bruker Avance NMR spectrometers – a Bruker AVIII 500 in Room 5.414 and a Bruker AVI 700 in Room 5.420. The spectrometers are each equipped with four independent RF channels, triple-axis pulsed field gradients, deuterium decoupling capability, a variable temperature controller, and high sensitivity cryogenically cooled 1H/13C/15N probes (1.7 mm ‘TCI’ on the 500 and a 5.0 mm ‘TCI’ on the 700). Additionally, the 500 MHz NMR spectrometer is equipped with nitrogen recycling systems, which allows for continuous operation of the spectrometers, the 500 is fitted with an automated sample changer than can handle up to 500 1.7-mm tubes, and there is a Gilson 513 liquid handler available for the automated preparation of NMR samples. As configured, the 500 is ideal for determining the structures of smaller cancer-related proteins and natural products with anticancer activity and for carrying out NMR-based fragment screening; the 700 is ideally configured for determining the structures of larger cancer-related macromolecules and related complexes with therapeutic agents, including small molecules, purified natural products, and peptides. Additionally, a Jasco 815 Circular Dichroism Spectrometer is available for structural analysis and thermal stability of proteins and nucleic acids.The NMR facility also supports a network of off-line computer workstations and associated software to facilitate off-line processing (TopSpin, nmrPipe) and analysis (Sparky, Cyana, CNS, NIH-XPLOR, ARIA, Chimera, etc.) of data collected in the facility. This computer system is Linux-based and includes a cluster of six dual and quad workstations networked using the NIS and NFS protocols. The computer workstations are housed in Room 5.210 in the Research Administration Building. *Personnel:*  The Structural Biology Core is operated by Director Shaun Olsen, Ph.D., Associate Professor in Biochemistry and Structural Biology, Associate Director Alex Taylor, Ph.D., Assistant Professor/Research in Biochemistry and Structural Biology, and Technical Director Kristin Cano, Ph.D.Dr. Olsen joined the faculty of the UT Health San Antonio in the Department of Biochemistry & Structural Biology in 2020 and holds the rank of tenured Associate Professor. Dr. Olsen has degrees in biology (B.A.) and biophysics & biochemistry (Ph.D.). Dr. Olsen received training in structural biology and the biochemical/biophysical analysis of proteins as a graduate student in Dr. Moosa Mohammadi’s laboratory at New York University and as a postdoc in Dr. Christopher Lima’s laboratory at the Sloan-Kettering Institute. Dr. Olsen has emerged as an international leader in the structural biology of ubiquitin and ubiquitin-like protein signal transduction. His multidisciplinary research on the molecular mechanisms of Ub/Ubl signaling and its role cancer and other diseases has resulted in several groundbreaking discoveries in the field. Dr. Olsen’s discoveries have provided unprecedented insights into basic mechanisms of the E1, E2, E3 cascade of enzymes responsible for Ub/Ubl signaling, discovery of the molecular mechanisms of small molecule inhibitors targeting these enzymes, and more recently mechanistic and drug discovery efforts focused on the CoV-2 PLpro enzyme which is essential for viral replication and interferes with host innate immunity by removing Ub and ISG15 conjugates from cellular proteins.Dr. Taylor has nearly 30 years of experience in biochemistry and X-ray Crystallography. He earned his doctorate at the University of Texas at Austin with supervisor Prof. Marvin Hackert and completed his post-doctoral training in the laboratory of Nobel laureate Prof. Hans Deisenhofer at the University of Texas Southwestern Medical Center. He has investigated structure and function of protein targets in multiple areas such as infectious disease, cancer biology, innate immunity, virology, metabolism and structure-guided drug design.Dr. Cano has more than 15 years of experience in the area of small molecule and protein NMR. Dr. Cano has degrees in chemistry & mathematics (B.A) and physical chemistry (Ph.D.) She has published articles focused on studies of biological macromolecules using NMR spectroscopy, development of optimized NMR methods, biochemical analyses of proteins, and studies of cancer treatment using NMR-based metabolomics. She has served as Technical Director for the UTHSCSA NMR Facility since February 2014. *Services*: <https://uthscsa.corefacilities.org/service_center/show_external/3541> <https://uthscsa.corefacilities.org/service_center/show_external/3542>**Investigators preparing grant proposals or manuscripts that involve X-ray crystallography experiments or interpretation of structural data are encouraged to contact Dr. Olsen or Dr. Taylor for a consultation and assistance.** **Investigators preparing grant proposals or manuscripts that involve NMR experiments or interpretation of NMR spectral data are encouraged to contact Dr. Olsen or Dr. Cano for a consultation and assistance.** Director Shaun K. Olsen, Ph.D. Office: 210-450-3091E-mail: olsens@uthscsa.edu Published work: https://www.ncbi.nlm.nih.gov/myncbi/shaun.olsen.1/bibliography/public Associate Director Alex B. 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