

FACILITIES & OTHER RESOURCES – CARE NEW ENGLAND HEALTH SYSTEM
Including - Women & Infants, Butler and Memorial Hospitals

CARE NEW ENGLAND HEALTH SYSTEM

Women & Infants' Hospital of Rhode Island: Women & Infants Hospital, a Care New England hospital, is one of the nation's leading specialty hospitals for women and newborns. Women & Infants is the eighth largest stand-alone obstetrical service in the country with nearly 9000 deliveries per year. In 2009, Women & Infants opened the country's largest, single-family room neonatal intensive care unit. Women and Infants Hospital is a major teaching affiliate of The Warren Alpert Medical School of Brown University for obstetrics, gynecology and newborn pediatrics, as well as a number of specialized programs in women's medicine. Known as one of the nation's largest and most prestigious research facilities in high risk and normal obstetrics, gynecology and newborn pediatrics, it is home to two National Institutes of Health (NIH) Centers of Biomedical Research Excellence for Perinatal Biology and Reproductive Health, respectively. Women and Infants is a member of NRG Oncology, a National Cancer Institute funded, multi-institutional, cooperative research group with a major focus on gynecologic and breast cancer treatment. It is also a member of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal Fetal Medicine Units Network, a consortium of 12 premier clinical centers across the U.S. whose charge is to investigate problems in clinical obstetrics. Women and Infants is a member of the 18-center NICHD Neonatal Research Network, investigating the safety and efficacy of treatment and management strategies to improve the outcome of sick newborns. It is a member of the Eunice Kennedy Shriver NICHD Pelvic Floor Disorders Network, conducting multi-centered trials studying pelvic floor disorders. In 2015, the NICHD awarded Women & Infants Hospital and Brown University an additional five years of grant funding to support the Women's Reproductive Health Research (WRHR) Career Development Program. With just seven active sites throughout the country, this highly competitive program provides a tailored research and career development plan to enable junior faculty obstetrician/gynecologists to develop into leaders in women's health research.

Butler Hospital: Butler Hospital is the only private, nonprofit psychiatric and substance abuse hospital serving adults, adolescents, and children in Rhode Island and southeastern New England. Founded in 1844, it was the first hospital in Rhode Island, and has earned a reputation as the leading provider of innovative psychiatric treatments in the region. Affiliated with The Warren Alpert Medical School of Brown University, Butler Hospital's clinical research trials provide valuable information on brain-based diseases. Through research, new treatments are being discovered for diseases including depression and anxiety, obsessive-compulsive disorder (OCD), Alzheimer's disease, Movement Disorders, such as Parkinson's disease, and addictions. Butler Hospital is affiliated with the Norman Prince Neurosciences Institute, dedicated to advancing the neurosciences and reducing human suffering from disorders of the nervous system through world-class research, outstanding clinical care and advanced education. Butler's research activities have helped bring about groundbreaking treatments, including Transcranial Magnetic Stimulation (TMS), a treatment for depression recently approved by the U.S. Food and Drug Administration (FDA), and Deep Brain Stimulation, a "pace-maker for the brain" that is used to treat severe obsessive compulsive disorder and depression.

Memorial Hospital of Rhode Island: Memorial Hospital of Rhode Island is a 294-bed hospital that serves a community of more than 180,000 people in Pawtucket and the Blackstone Valley region of Rhode Island. Memorial's rehabilitation center focuses on services to patients afflicted by stroke, amputation, or neurological disability and includes comprehensive inpatient and outpatient services. Affiliated with The Warren Alpert Medical School of Brown University, Memorial Hospital of Rhode Island hosts clinical research trials in the laboratory and at the bedside that provide valuable information on the varied illnesses that affect the patients and community. Memorial Hospital research has helped discover new treatments for conditions like diabetes, heart conditions, cancer, and infectious diseases.

RESEARCH RESOURCES

The Brown University Center for Primary Care and Prevention at Memorial Hospital of RI is dedicated to promoting research, knowledge enrichment, and improving practice in primary care and prevention. CPCP research aims to help providers in prevention, diagnosis, and treatment of various illnesses, among a variety of other topics. The center is a hub for intellectual and scientific exploration. The Center is home to 9 principal investigators and 40 affiliate faculty. Staff members have a vested interest in improving the quality of care that patients receive. Senior CPCP faculty are well established experts in their respective fields. Their work builds upon landmark studies which have helped refine medicine's knowledge base in areas ranging from women's health to access-to-care issues. This has led to advances in patient health improvement, particularly for at-risk

populations. The Primary Care Center houses physician practices in Family Medicine and General Internal Medicine and provides a unique learning laboratory where innovations in patient care, medical education, and research are united.

Cancer Research: Oncologists with The Cancer Center at Memorial Hospital split their time between patient care and researching new ways to identify, treat and cure a wide variety of cancers affecting men and women. This includes studies into advances in endoscopy, trends in treating prostate cancer, chemotherapy for women with HER2-positive breast cancer, and presentation of small cell lung cancer. More information

Cardiology Research: The Brigham and Women's Cardiovascular Associates at Care New England offer a variety of clinical trials, offering cutting-edge treatments to patients who meet eligibility requirements for specific trials.

The Brown Center for the Study of Children at Risk (The Center) at the Alpert Medical School of Brown University and Women & Infants Hospital (WIH). The Center occupies 14,100 square feet of space and houses a 60 member staff. The laboratory and offices are located at 50 Holden Street, Providence, 2.28 miles from the WIH campus. The mission of the Center is: (1) to advance theories of the developmental pathways from fetal and infancy periods in at-risk children, (2) to enhance synergy between research and clinical practice that advances child development research, intervention programs and social policy, (3) to train scientists and practitioners in interdisciplinary methods from the field of child development. The Center's functions are: 1) fundamental research on mechanisms that explain long term developmental outcome with emphasis on at-risk children, 2) applied research on interventions for children and their families, 3) education and training of students, scientists, and practitioners, and 4) services for populations of children of interest for fundamental and applied research.

Clinical: The Center is supported by WIH and is a Division of the Department of Pediatrics at WIH. WIH is located at 101 Dudley Street. The Holden St. facility provides office space and work stations for the 60 members of the Center including 12 Brown Medical School faculty, a reception/waiting area for research subjects and patients, four dedicated laboratories/evaluation rooms for research on fetal function and behavior, kinematic motor lab for children ages 3-5 years; eye tracking lab for high risk children including those with autism spectrum disorder; medical examination room. 12 research and clinical testing and evaluation rooms with 5 one way observation rooms, physiological and videotape recording facilities, and a data center that includes biostatistical and technical support, and 5 video coding stations. The Center has two conference rooms for colloquiums, seminars presentations and work group meetings. Both rooms are equipped with audio-video equipment. Five work stations are also available with coding systems to extract data for data analyses.

Computer: All members of the Center, including trainees, have personal computers equipped for word processing, data analysis, and graphics. All Investigators and trainees have access to color laser printers and digital scanners. All computers have access to the Internet, E-mail, library information and database searches via connection to Brown University. Further, the Center has an internal network and dual servers that interface with the WIH network. The Center technical engineer is the network administrator with back up from WIH information services. The facility is site licensed for all statistical software proposed in this project (SPSS, MPLUS, SAS). The hospital main campus and the Brown Center are connected on the same system-wide secure network.

Other: The kinematics lab is designed to test visual-motor and fine motor control in young children when reaching and grasping a series of pegs. The Vicon Motus software was installed on the specialized computer that guided the procedure. The set up includes two cameras with infrared illuminator rings that recorded the procedure from different angles. Prior to the assessment, the reaching space was calibrated by a 12" by 12" frame with 16 markers by the two infrared cameras. With calibrated space, the software is able to determine the moving position of the child's hand.

Equipment: The biomarkers lab provides information on how children with autism spectrum disorder engage and respond to interesting stimuli. Visual attention is used (eye tracking measures of social attention) and tests of autonomic regulation (sympathetic and parasympathetic functioning) as a potential battery of biomarkers. The equipment required includes: REDn Eye Tracking System (system laptop, eye tracking hardware, and system software); MindWare Physiological Data Analysis Software (2 license keys); 2 Actiwave Cardio ECG Waveform Data Recorders; Dell Latitude Laptop; 3 Dell OptiPlex 9020 Computers (1 is refurbished); 2 E4 EDA recording wristbands; 2 Q-sensor EDA recording wristbands (on loan from

Northeastern University); CIP Pupilometer with Laptop (on loan from Simons Foundation); 1 Macbook Air; Dell 24" Monitor. Eye-tracking measures of visual attention to people and social stimuli indicate social attention and information processing. ANS activation has bottom up influences on attentional and emotional responses, and ANS responses are influenced by top down higher order processing of experiences. Activation of the sympathetic and parasympathetic branches of the ANS measure emotion regulation and social responsiveness. Skin conductance is one measure of sympathetic activity, whereas heart rate variability is a measure of parasympathetic activity. Together, emotion regulation, social responsiveness, and attention to social information can be expected to correlate with dysfunctions seen in ASD.

Kilguss Research Institute of Women & Infants Hospital: This facility is a 33,000 square foot interdisciplinary research center located 0.4 miles from Women & Infants adjoining the Brown University Laboratory for Molecular Medicine and across the street from AMS. It supports WIH investigators and collaborating partners. Research covers a broad range of areas including: developmental biology, physiology, cancer, infectious diseases, and reproductive biology. Designed and organized around on a "common user, common benefit" concept, laboratory modules have been created largely without walls, offering a central core of common of equipment, cell culture, imaging and cold room and dark room facilities. This design has maximized useful space and facilitated interaction among investigators.

Computer: All investigators, trainees and research personnel have computers equipped for word processing, data analysis, and graphics. All Investigators and trainees have access to color laser printers and digital scanners. All computers have access to the Internet, E-mail, a massive eJournals collection, library information and database searches via connection to Brown University. The hospital main campus and the Kilguss Research Institute are connected on the same system-wide secure network. An EPCOR Infrastructure Improvement Award to Brown University provides 10Gbps per lambda connectivity. The improved cyber-connectivity is providing high-speed connection from the Jewelry District, to campus sites, to the University of Rhode Island and further afield, both regionally and nationally. In addition, Brown and IBM developed a \$4M investment in a high performance computing service platform know as OSCAR that is available State-wide to researchers. The High Performance Computing Service Platform is maintained and operated by the staff of the Center for Computation and Visualization (CCV). CCV is providing limited-resource "exploratory" accounts to all faculty, "Priority" accounts allowing access to more computational resources and storage resources in a "condominium" model which provides more dedicated access to resources. CCV provides a wide range of visualization services, including: immersive high-end centralized visualization technology, expertise in graphics software and packages, support for genomics resources and data analysis, and custom software development. Extensive next-generation sequencing projects and genetic analysis is being carried out by Kilguss investigators using this state-of-the-art support.

Major Equipment: As noted, Kilguss is home to two National Institutes of Health (NIH) Centers of Biomedical Research Excellence for Perinatal Biology and Reproductive Health. It supports a full complement of contemporary molecular biology and imaging resources which are available to investigators in the facility and nearby collaborators. A large amount of *common* equipment is available to support these studies including: high speed and ultra-centrifuges, a refrigerated bench-top centrifuge, beta and gamma counters, a luminometer, freezers (-20 and -80), HPLC dedicated to catecholamines with flow-through radioisotope detection, spectrophotometer, FPLC (2), multiple gel electrophoresis units (vertical and horizontal) and transfer units with power supplies, 8 thermal cyclers, micro well plate reader, 2 speed vac concentrators, an automated *AutoMACS[™]* instrument for magnetic cell isolation, tissue homogenizers, sonicator, stationary and rotary water baths, scanning densitometer with integrator, 2 phosphoimagers, automatic CO₂ incubators, phase contrast inverted microscopes (one of which is camera equipped), a Zeiss light microscope equipped for epifluorescent photomicroscopy, digital video-display photomicroscopy and image analysis, a Flexercell FX-3000 microprocessor controlled strain unit, # 2ABI 7700 Real-Time PCR machines, a BD FACS-Canto flow cytometry instrument, a NIKON E-2000 inverted stage microscope equipped with bright field, phase, fluorescence, DIC and spinning disc confocal imaging, a fully equipped mouse histopathology laboratory, and a cardiovascular physiology laboratory for studies on isolated mouse heart equipped with BioPac software and computer acquisition station.

COMPUTER AND INFORMATION SERVICES

Electronic Health Record Systems: The Warren Alpert Medical School is affiliated with seven area hospitals - all within a fifteen-minute drive of the Brown campus - that serve one and a half million people of diverse

backgrounds and socioeconomic status. Emma Pendleton Bradley Hospital, Rhode Island Hospital and its Hasbro Children's Hospital, and The Miriam Hospital are part of Lifespan, Rhode Island's first health system, which transitioned to an Epic-based EHR in 2015. Lifespan's Legacy Data Warehouse archives clinical and patient financial data from retired EHR systems, including Siemens INVISION and the MEDHOST Emergency Department Information System, which were in use until March 2015. Butler Hospital, Memorial Hospital of Rhode Island, and Women & Infants Hospital of Rhode Island are part of the Care New England Health System, which have been using multiple EHR systems in different settings and are in the process of transitioning to the Epic EHR, initially for outpatient care.

The hospitals use a single electronic health record system (Epic), guaranteeing seamless communication at all levels of the institution. The system provides real-time information regarding patient age, complaint, and other demographics from the time that a patient presents to the emergency department. Numerous Epic workstations, both fixed and portable, are located throughout the emergency department, the Center for Medical Imaging, the Operating Suite, the Post-Anesthesia Care Unit and the surgical wards, as well as within the Pediatric Emergency Medicine office suite and in the Emergency Medicine Research Assistants' office. Project research assistants use tablet computers to securely screen potential patients and to complete baseline measures for those enrolled. This blend of information technologies permits effective and secure data collection, transmission, storage, and analysis. These resources provide the research team with the facilities necessary for research development, research implementation, analysis, and preparation of data reports and manuscripts.

REDCap Software: Hosted at Lifespan's Department of Information Services, REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources. REDCap is implemented at Lifespan using a 2 server architecture housed at a secure Data Center location dedicated to Information Services and manned 24x7x365. One server is public facing, supplying the web portion and giving users access to the REDCap URL. The other server is inside the Lifespan network and has all the collection data. This architecture was designed by network engineering and approved by IS Security. Both servers are backed up daily and monitored for hardware failures. Spare parts are kept on site with more severe hardware failures managed with a 4 hour turnaround time through a contract with SMS.

URSA and RI-REd: Through a partnership between Lifespan and Care New England, Rhode Island Research and Education (RI-REd) was established as a shared infrastructure for the secure collection, management, and analysis of electronic health data for research and educational purposes. As a functional proof-of-concept, RI-REd has hosted REDCap (Research Electronic Data Capture) for more than a year in a cloud-based environment. Brown University recently joined the partnership and is working with the partner institutions to migrate RI-REd into the "Stronghold" computing environment at Brown that adopts HIPAA security measures. This effort is being coordinated by BCBI in close collaboration with information services, compliance programs, and research offices at Brown, Lifespan, and Care New England. In addition to REDCap, RI-REd will house other research systems such as i2b2 (Informatics for Integrating Biology & the Bedside). The URSA (Unified Research data Sharing and Access) initiative provides a formal framework for requesting and using data from these systems, as well as other sources including EHR systems at Lifespan and Care New England, for Brown-affiliated investigators.

RESEARCH ADMINISTRATIVE RESOURCES

Human Subjects Institutional Review Boards: The major research hospitals in the Care New England system are Women & Infants Hospital and Butler Hospital. Both organizations have Institutional Review Boards (IRB), committees established to review and approve research involving human subjects. The purpose of the IRBs is to protect the rights and welfare of human research subjects and to ensure that all human subject research be conducted in accordance with federal, institutional, and ethical guidelines. The IRB administrative offices also serve as the administrative offices for the Institutional Officials. The IRBs function as an integral part of the research process in that IRB approval must be granted prior to commencing any research activities. Their goal is to "develop original research through collaboration, education, training, and support services, and to transform this knowledge into practical information that can be shared with health care providers and the community to improve the health of women and newborns." All members of Care the New England Health System use *IRBNet* as their electronic portal for IRB submissions and document maintenance. This was

chosen and implemented more than 3 years ago to facilitate inter-institutional collaboration as it is web-based, wide-spread and Investigators in the Lifespan Health System all use IRBNet which facilitates interinstitutional reviews. CNE researchers collaborate across the Care New England Health System (Butler, Kent and Memorial Hospitals, The Providence Center and the VNA of Care New England) as well as with investigators at Brown University, Lifespan, PVAMC and the University of Rhode Island. There are well established mechanisms and precedent for issuance of IRB Assurance Agreements (IAA) across the network. The first COBRE award at Women & Infants' Hospital has used this mechanism since they were first funded in 2003 to provide oversight and compliance for participating investigators from Brown and Lifespan. With many NIH funded networks (Neonatal Research Network, Maternal Fetal Medicine Units Network, Pelvic Floors Network, Contraceptive Trials Network, GOG) the IRBs have endorsed and implemented the process for Central IRB management of Network and other consortium projects. This includes the recent Environmental Child Health Outcomes Network (ECHO) sponsored Pediatric Clinical Trials Network where the Co-PI is a Women & Infants Hospital Investigator. CNE endorses and is in the process of joining the SMART IRB Reliance system.