PUNE, INDIA (with additional collaborations in Chennai and Mumbai)

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Country Description: India is the seventh-largest country by geographical area, the second-most populous country with over 1.2 billion people, and the most populous democracy in the world. Indian cultural history spans more than 4,500 years. India is notable for its religious diversity, with Hinduism, Sikhism, Islam, Christianity, and Jainism among the nation's major religions. Hindi, with the largest number of speakers, is the official language of the government. English is used extensively in business and administration and has the status of a "subsidiary official language"; it is important in education, especially as a medium of higher education including medical education. Pune, formerly Poona, is the eighth largest metropolis in India, with over 4 million people and is the second largest city in the state of Maharashtra after Mumbai. Pune is located in western India, and is known for its educational facilities, its wonderful weather, yoga ashram and multinational information technology and auto industries.

Site Description: The Johns Hopkins University-BJMC collaboration (Johns Hopkins University-BJMC Clinical Research Site) is an existing collaboration between the Johns Hopkins School of Medicine and the B.J. Medical College in Pune, India. It was originally started to study HIV and now offers a unique opportunity to investigate numerous other infectious diseases and comorbidities in India. The Johns Hopkins University-BJMC collaboration was initiated in 1992 with establishment of one of the first outpatient study sites for HIV transmissions studies in India. In 1999, the program was expanded through a large collaborative Indo-US NIH grant focused on the prevention of mother-to-child HIV transmission. This trial conducted between 2002 and 2007 was India’s first and only completed Phase III randomized HIV PMTCT clinical trial. Johns Hopkins University-BJMC is now funded by the NIH to conduct HIV, TB and other co-infection prevention and treatment trials including in pregnant and pediatric populations in the AIDS Clinical Trials Group (ACTG) and the International Maternal Pediatric Adolescent AIDS Trials Group (IMPAACT) Networks (http://bwictu.jhu.edu). The Johns Hopkins University-BJMC Project also provides several opportunities to conduct clinical and epidemiological studies of infectious diseases as well as for medical education and research training (http://bjgmc-tb.org/). Currently there are several HIV/TB trials and large cohort studies focused on TB (CTRIUMPH and RePORT Consortium Common protocol http://reportcohort.com/about; TB Diabetes; Immune changes of pregnancy and TB; MDR TB diagnosis and care cascade) and acute febrile illness/antimicrobial resistance underway. http://main.ccghe.net/countries/india. The collaboration receives funding from the US National Institutes of Health, CDC, Indian Department of Biotechnology, Indian Council of Medical Research, Johns Hopkins, and several foundations (Ujala, Wyncote, Gilead). There is an established a strong research infrastructure that includes clinical and laboratory services. There are 90 research staff: nurses, counselors, data managers, clinical research officers, and physicians that work with the clinical faculty, residents and staff of BJMC described below.

B.J. MEDICAL COLLEGE & SASSOON GENERAL HOSPITALS (BJMC), PUNE
BJMC is among the top ten medical schools in India. It has 200 new medical students, 130 residents every year and more than 200 teaching faculty in all major medical and surgical specialties (medicine,
surgery, orthopedics, ophthalmology, ENT, nephrology, endocrinology, plastic surgery, pediatrics, Obstetrics and gynecology and solid-organ transplantation). It also has a nursing school with 50 new nursing students each year. It is affiliated with a state-funded 1500-bed tertiary-care public hospital, Sassoon General hospitals (SGH). There is a large outpatient program, comprising of 21 clinics, that has links to multiple NGOs in the community.

SGH admits approximately 60,000 inpatients and evaluates over 200,000 outpatients annually. It has a center for HIV antiretroviral treatment (ART) run by the National AIDS Control Organization and currently has over 15,000 registered HIV patients. It also has a Indian government Revised National TB control Program (RNTCP) center where over 4000 patients are evaluated for TB each year. OBGYN department caters to over 6000 pregnant women annually and performs 8,000 deliveries.

**Johns Hopkins University-BJMC project:** The site is located in the campus of BJMC-SGH. The research infrastructure includes clinical areas for research in SGH outpatient areas, private counseling rooms, research laboratories, a dedicated research pharmacy and a data management center.

**Research infrastructure and support facilities:** The Project has approximately 2000 sq ft of office space and 2000 sq ft of space for the BJMC CTU and Indo-US studies data management center. We also have about 700 sq ft of space off site for data archiving. The data management space is for data entry and storage (approximately 200 sq ft of space is used for data storage). We have 15 workstations for data entry, plus 2 servers and 2 workstations for data managers. In addition they have 10 HP laptops in the data and regulatory centers. All staff have computers, and the 10 team leaders (regulatory, study coordinator, data manager, lead pharmacist, laboratory manager, budget director) each have a HP laptops. In total, there are more than 30 computers at various locations. There is a networked 2 Mbps Internet service and a separate dedicated high speed Internet line dedicated for videoconferencing for research, and training discussions with Johns Hopkins University Collaborators. A monthly (3rd Wednesday) HIV case conference is scheduled with Johns Hopkins University and three Hospitals in Maharashtra [http://main.ccghe.net/case-archive-india](http://main.ccghe.net/case-archive-india). There are currently 90 research staff employed under the Johns Hopkins University Pune office and BJMC subcontracts to support Indo-US research studies.

**Laboratory:** The BJMC CTU lab has established laboratory infrastructure for CTU studies. It has the capacity to perform more than 30 lab analytes required by the NIH trials networks. All protocol-related lab activities (sample receiving, processing, Laboratory Data Management Systems (LDMS) entry, specimen storage, hematology, chemistry, serology, CD4, viral load, HBV, Vitamin D, etc testing) are performed at the central CTU lab. The lab performs processing for specialty immunological assays and can store samples if required. Appropriate temperature monitoring system and electricity backup are installed. The site has set up PBMC processing (i.e. filtration unit with suction pump, chemicals, reagents and Liquid Nitrogen storage are available) and is IQA certified for PBMC cryopreservation. The laboratory also performs interferon gamma release assays (IGRA) such as Quantiferon Gold in tube assay (QGIT) and Cytometric bead array (CBA) assays.

**TB and bacteriology Laboratory:** BJMC has established a microbiology laboratory (BSL-2 plus) through private donations and a public-private partnership between Becton Dickenson (BD) and the BJMC CTU. A thousand square feet of space was given by BJMC and renovated to accommodate two Bactec MGIT 960 machines, an automated BACTEC bacterial culture and Phoenix system, and an area to perform AFB smear and culture processing. The site also has a DAIDS funded Cepheid –Gene Xpert in place. A new BSL3 lab sponsored by India’s RNTCP program is underway and new MDR TB diagnostics are being established in partnership with NIH Networks ACTG, IMPAACT, as well as in collaboration with the Johns Hopkins University, Fogarty and Aundh Chest Hospital.

The facilities at Johns Hopkins University-BJMC Project support NIH sponsored research including the following networks: ACTG, and IMPAACT. Currently the Project has a large portfolio of multisite and investigator initiated studies including trials of new TB drugs, 3rd line HIV treatment, INH in pregnancy, TB meningitis in children, treatment shortening in children with less severe TB disease, Hair PK of TB drugs, Latent TB infection in pregnancy, TB and diabetes, Lung health and TB, health care workers and
TB, drug resistant TB; diagnostic studies ongoing in TB including in pregnant women and children; cryptococcal antigen screening as well as a TB and household contact cohort study. Studies in HBV in pregnancy, Vitamin D and TB, H1N1, dengue and chikungunya have also been recently conducted. An acute febrile illness and antimicrobial resistance cohort has also been established.

**Trainee Facilities**
The site has about 2000 sq. ft of office space. Trainees can share this office space with site team members. The site can help the trainees to identify a dedicated workspace during their stay. The site has established a data management center for collection and storage of research data. The data management center has facility to securely archive study documents. The data management center has 2 servers and 6 data entry stations. All data is backed-up on servers. A qualified IT Engineer is available during work hours for IT support. The site has wireless high speed Internet that can be used by students free of cost. In addition, we also have a video conferencing facility that can be used by trainees.

**Prior trainee projects have included:** TB epidemiology in hospitalized adults and children; cryptococcal screening in HIV-infected patients with low CD4 counts; Clinical outcomes of Cryptococcal meningitis; Vitamin D status in children with and without TB; role of TB ELISPOT in children suspected with TB; epidemiology of dengue and chikungunya; latent and active TB screening in pregnancy; HIV disclosure to children; anemia in HIV-exposed children; HBV co-infection in pregnant women, pneumococcal transplacental transfer in HIV-infected pregnant women; household risk factors for children with TB; CRP and risk of TB; lung health and TB; etiology of acute febrile illness in adults and children; antibiotic use patterns; indoor air pollution and TB; use of mhealth in health care seeking; maternal inflammation and preterm birth.

**Current Research Opportunities:** The Project faculty and trainees are active in a broad array of fields and types of research including
- HIV/STIs
- TB
- Vector borne diseases
- Antimicrobial resistance
- Acute febrile illness etiology
- Hepatitis
- Cryptococcal disease
- Malaria
- Obstetric outcomes
- Non-infectious Diseases such as diabetes, smoking and its role in infectious disease

Other site affiliations and opportunities
The Johns Hopkins University-BJMC investigators also collaborate with other organizations in Pune, Chennai, Mumbai and CMC Vellore that are involved in infectious diseases (TB, HIV), respiratory diseases and other ailments. Some details about these organizations are below but also can be found on their websites (National Institutes of Research in Tuberculosis [http://www.nirt.res.in/]; DY Patil Medical College [http://medical.dpu.edu.in/]; Hinduja Hospital [http://www.hindujahospital.com/]; Chest Research Foundation [http://www.crfindia.com]; KEM Hospitals Vadu Research Center [http://www.kemhospitalvadu.org]; CMC Vellore [http://www.cmch-vellore.edu/];

- **D.Y. Patil Medical College, Hospital and Research Center.** Pune, India
  The DY Patil Hospital is a 1470-bed private facility with an existing partnership with the Global Health Leadership Program at Johns Hopkins Medicine. Through that partnership, Hopkins medical and nursing students are sent to India for 4-week interprofessional clinical electives, and 4th year medical students and masters and doctoral nursing students are eligible to do clinical rotations.
CCGHE JHU Pune Office Director, Dr. Vidya Mave, serves as coordinator for those educational initiatives. CCGHE’s partnership with DY Patil provides for additional research and education efforts, including the use of mobile health technology for directly-observed therapy, a study on antimicrobial resistance, and a monthly HIV Case Conference that is conducted between the 2 institutions. CCGHE is also in the process of establishing DY Patil as an additional clinical site for our ongoing studies on the impact of diabetes on tuberculosis treatment outcomes.

- **National Institute for Research in Tuberculosis, Chennai, India**
  Established in 1956 as India’s Tuberculosis Research Centre, NIRT is an internationally renowned TB research institution, a Supranatural Reference Laboratory, and a WHO Collaborating Centre for TB Research and Training. We have a host of ongoing studies in partnership with NIRT, including looking at the lasting pulmonary effects and respiratory impairment following recovery from TB, hair concentrations of anti-tuberculosis drugs among HIV-infected and uninfected children, improving TBM treatment outcomes in children ages 6 months to 12 years, assessing dosage levels of rifampicin and evaluating safety of TBM treatment, the relationship between diet and inflammation during pregnancy, immune changes that happen during pregnancy and how they affect different methods for latent TB screening among pregnant women, host and microbial factors associated with 1) poor response to TB treatment, 2) progression to active TB disease and 3) TB transmission/acquisition.

- **P.D. Hinduja Hospital and Medical Group, Mumbai, India**
  P.D. Hinduja Hospital and Medical Group (PDHHMG) is an academic teaching hospital. The chest clinic at Hinduja Hospital has been treating drug-susceptible TB and drug-resistant TB for many years and recently played a significant role in identifying totally-drug-resistant TB. The MDR-TB cohort represents a wide demographic of TB patients in Mumbai who developed drug resistance over time or who contracted MDR-TB as a primary infection. CCGHE recently established a partnership with researchers at Hinduja Hospital to develop a clinical database of patients with multi-drug resistant tuberculosis (MDR-TB), which will contribute significantly to understanding patient profile and burden of MDR-TB. CCGHE investigators will provide technical assistance in setting up a routine data collection system, and the database is being designed to eventually link with other networks in order to be able to assess the true global burden of MDR-TB, and to inform decisions about prevention and treatment strategies.

**On site Mentors:**
Johns Hopkins University Faculty located permanently in India are available for direct and daily mentorship of students and fellows and are as follows:

- **Vidy Mave, MD, MPH & TM** is a Research associate and Clinical Director of the Project since 2010. She is a board certified infectious diseases specialist and is serving as the site leader and director of the BJMC Clinical Research Site (BJMC CRS).
- **Nikhil Gupte, PhD**, a Research Associate and is the biostatistician of the project. He has a PhD in Biostatistics with more than10 years of experience as a biostatistician working in clinical, behavioral and laboratory research related to HIV/AIDS prevention and treatment in developing
countries. In addition he has experience with clinical data management. He is the Deputy Director of the BJMC CRS.

- **Nishi Suryavanshi, PhD Suryavanshi** is a PhD in Anthropology and is currently working as the study coordinator for NIH’s IMPAACT and ACTG networks at the BJMC CRS.

**BJMC Faculty** include Drs Aarti Kinikar (pediatrics), Deelip Kadam (Medicine), Anita Basavaraj (Medicine), Amita Kale (Orthopedics), Sameer Joshi (ENT), Smita Deshpande (Microbiology), Anju Kagal (Microbiology), Renu Bharadwaj (Microbiology) and many others

http://bjgmc-tb.org/index.php/overview/

**DY Patil Pune India Faculty**

**Arjun Kakrani MD:** Professor and Head of Medicine and Director of Research. He oversees the Hopkins medical student rotations and interprofessional experiences. He spent many years running the department of medicine at BJMC and then came to DY Patil. He has specific expertise in cardiology and gastroenterology and enjoys teaching and mentoring students from around the world.

**Chest Research Foundation, Pune, India**

**Sundeep Salvi MD PhD** is the Director of Chest Research Foundation (http://www.crfindia.com/) and a Visiting Lecturer at the Imperial College in London, UK. He trained as a Pulmonologist from the University of Pune and then obtained a Doctorate from the University of Southampton in UK in Medicine where he researched on the effects of diesel exhaust on the human lung. His area of interest is Asthma and COPD and continues to work on the effects of indoor and outdoor air pollution in these common airway disorders. His work on COPD in Non-Smokers has received international recognition and continues to study this unique phenotype of COPD. He has published over 100 papers in peer reviewed journals and contributed to several book chapters as author and Editor.

**Hinduja Hospital, Mumbai, India Faculty:**

**Zarir Udwadia MD** is a well known chest physician who made the first report of totally drug resistant TB in India in Clinical Infectious Diseases. He has among the largest clinical practices of drug-resistant TB in India. He has published numerous articles and been quoted or featured in the Wall Street Journal, NYT, Scientific America, Times of India.

**Camilla Rodrigues MD** is a Professor of Microbiology who is well published (over 100 papers) and mentors numerous students in microbiology, TB, infectious diseases diagnostics. She has been part of the FIND TB diagnostics consortium and is assessing novel methods of rapid drug resistance detection for TB and other pathogens.

**Visiting Mentors:**

- **Robert Bollinger, MD, MPH,** is a Professor of Medicine and director of Center for Clinical Global Health Education (CCGHE), and has more than 30 years of experience in international public health, clinical research and education in a broad range of global health priorities, including HIV/AIDS, malaria, TB, leprosy and emerging infections. He has led the Fogarty India program at Johns Hopkins and has mentored numerous medical and public health students and fellows. He visits the site 2-3 times a year.

- **Amita Gupta, MD, MHS,** is an Associate Professor of Medicine and International Health at Johns Hopkins University and Deputy Director of the CCGHE. She currently is the Principal Investigator for the NIH-funded Johns Hopkins University-BJMC HIV CTU which conducts HIV trials in PMTCT and HIV and co-infection treatment in India. She has mentored several ID fellows, residents, medical and public health students. She visits the site 3-4 times a year.
• **Anita Shankar, PhD, MPH**, is a social and behavioral scientist on faculty at Bloomberg School of Public Health. She has a focus on qualitative research methods to examine HIV interventions in low- and middle-income countries. She visits the site 2-3 times a year.

• **Sanjay Jain, MD**, is an Associate Professor of Pediatrics at Johns Hopkins University. He conducts translational research in TB pathogenesis and imaging at the Hopkins Center for TB research. He is the Principal Investigator for the NIH-funded Indo-US study that evaluates the pediatric TB diagnostics in Pune, India. He visits the site 2-3 times a year.

• **Jonathon Golub PhD**, is an Associate Professor of Medicine at Johns Hopkins Center for TB research. He is an epidemiologist and conducts TB cohort research in low-income countries. He is now initiating TB studies in India with Johns Hopkins University-BJMC Project.

• **Kelly Dooley MD PhD** is an Assistant Professor of Medicine, Pharmacology and Molecular Sciences at Johns Hopkins University. She conducts PK studies of TB/HIV drugs in adults and children globally. Among her many studies/trials, she is currently leading a trial of pediatric TB meningitis in India and Malawi to look at PK and outcomes of improved regimens for TBM.

• **Maunank Shah MD PhD** is an Assistant Professor of Medicine who heads the Baltimore City TB department. He conducts research in Africa and in India and focuses on TB diagnostics, HIV care, and education. He has developed models for HIV care globally and teaches the medical student microbiology course. He has developed a novel mhealth application to assess smartphone based video direct observed therapy, miDOT. This is now going to be evaluated in India at DY Patil and St Johns Bangalore.

**Project descriptions** Fellows would work in one or more of the following areas:

**Prevention of Mother to Child Transmission of HIV.** Assess barriers to optimal PMTCT implementation. Assess implementation of HAART for pregnant women with HIV.

**HIV Treatment.** Assess factors associated with loss to follow-up in public sector HIV and ANC services. Determine rates of TB for patients failing first line and second line ART. Screening for gender based violence. Assessing nutrition, microbiome and inflammation in HIV-infected pregnant women.

**Tuberculosis:** Prospective study to determine the risk factors and outcomes of drug-sensitive and drug-resistant TB. MDR TB care cascade; MDR TB diagnostics; Prospective household contact study to assess social, environmental and biological factors associated with TB risk and disease progression. Assess infection control practices and risk of TB among hospital staff. Lung inflammation and pulmonary function during and after TB treatment; TB infection and impact of pregnancy on host immunity; indoor air pollution and TB; Interactions between TB and diabetes; Assessing TB meningitis outcomes, including neurocognition, in children. Pilot feasibility study of miDOT, a smartphone application for video monitoring of direct observed TB medication.

**TB diagnostics:** assessment of Gene Xpert and other novel TB diagnostics among adults and children.

**Family Planning:** Mixed methods study to assess contraceptive practices in postpartum HIV-infected and uninfected women

**Antibiotic resistance and hospital associated infections:** prospective study of drug resistance profiles from blood and stool in febrile hospitalized adults and children

**Acute febrile illness etiology and novel pathogen discovery:** Prospective study with banked samples to assess novel pathogens or test new diagnostics for rapid pathogen detection.

**Vector-borne diseases:** dengue and chikungunya epidemiology

**Use of mobile health tools:** operational research and mixed methods to assess use of mhealth in research and in clinical practice.