# COLLABORATIONS BETWEEN THE CONNECT LAB AND THE DOMINICAN REPUBLIC

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The Control Network and Connectivity Team (CONNECT lab), located in the Beckman Institute for Advanced Science and Technology, is studying connectivity and cognitive functions of large-scale brain networks. Distant brain regions are in constant communication with each other. This communication, also called functional connectivity, is foundational to all cognition. Functional connectivity is spatially organized into many large brain networks. But how this network organization is maintained and modulated in the service of flexible cognition is poorly understood. The CONNECT lab combines various techniques to address these questions in the human brain including functional magnetic resonance imaging (fMRI), electroencephalography (EEG), simultaneous EEG-fMRI and genetic analyses in healthy participants and clinical populations.

There are two current neuroimaging collaborations between the Dominican Republic and the CONNECT lab. With the support of the CONNECT lab Principal Investigator, Dr. Sepideh Sadaghiani, Richard Bido-Medina, a young physician from the Dominican Republic who is also a candidate to the PhD in Neuroscience at University of Illinois, had the initiative of carrying out these collaborative projects. One of them consists of a longitudinal study of the brain functional and structural organization in adult's patients suffering from ZIKA virus infection with neurological complications. The second study intends to understand the brain connectivity in patients with depression by using an innovative fMRI paradigm.

*Dr. Sadaghiani at the Dominican Republic (Neurology Society Conference 2016).*
*Photo credit: Richard Bido-Medina*

There are two Dominican institutions involved in these projects: Hospital Salvador B. Gautier and the Centro Diagnostico y Medicina Avanzada y Telemedicina (CEDIMAT), both located in Santo Domingo, the capital of the Dominican Republic. The subject's recruitment and clinical assessment occurs at Hospital Gautier. Zika patients are recruited at the Neurology Department of Hospital Gautier, were the director of the Department is Dr. Luis Tusen, and Dr. Minelly Rodriguez lead the investigation; whereas the patients in the depression study are gathered in the Psychiatry Department, led by Dr. Alejandro Uribe (Head of Psychiatry) and Dr. Nathalia Montero, the residents' chief. The images acquisition takes place at the MRI facilities in CEDIMAT, the only center in the Dominican Republic with a 3 Tesla MRI scanner, which is suitable for high resolution brain images and the implementation of functional sequences. The images acquisition team is integrated by Dr. Peter Stoeter, the neuroradiologist in charge of research, and Jairo Oviedo a specialized technician who had a rotation at University of Illinois. Once both the clinical and imaging data is collected it is analyzed by using sophisticated methods and equipment at the CONNECT lab.

The support of the Center for Latin-American and the Caribbean Studies (CLACS) of University of Illinois, through Faculty Travel Awards and a Graduate Summer Research Fellowship have been crucial for the development of these collaborations. CLACS's support allowed Dr. Nathalia Montero, a psychiatry resident from Hospital Gautier, to visit University of Illinois and have a rotation as part of the Neuroscience Program. During her rotation, Dr. Montero learned about different research techniques and methods in neuroscience, participated in the research activities and lab meetings of the CONNECT lab, and visited other Cognitive Neuroscience laboratories. She also had the opportunity to participate in the process of clinical and neuropsychological assessment of subjects (e.g., patients) involved in a behavioral study and had access to several courses and seminars in the Neuroscience Program and in the Department of Psychology, and attended as her schedule permitted. The CLACS Tinker fellowship funded Dr. Richard Bido-Medina for conducting the second stage of his longitudinal ZIKA research project.

These collaborations can provide an important basis for a number of research and clinical applications. It is expected that society will benefit from potential advances in our understanding of the neural basis of disease, in general, and with regard to ZIKV infection with neurological manifestations and depression, in particular. In the case of Zika virus, this investigation is an important step for the comprehension of this disease that is affecting Latin America, and particularly the Central and Caribbean region. Once the nature and time course of structural and functional changes of ZIKV neurological manifestations are identified, more targeted efforts for development of treatments will become possible, and new avenues for translational investigations, e.g. into the pathophysiology of ZIKV, will open. This project will not only enhance the knowledge of this global-impacting emerging disease, but will also strengthen the collaborations between the Dominican Republic involved institutions (Hospital Gautier and CEDIMAT). In the Dominican Republic there is not any PhD program in the science to date. This investigation represents a unique opportunity to the development of research in Santo Domingo, where the lack of both human and technological resources have limited the research growth for decades.

*Dr. Richard Bido-Medina and Dr. Minelly Rodriguez at CEDIMAT 3 Tesla scanner.*
*Photo credit: Richard Bido-Medina*

*Hospital Dr. Salvador B. Gautier, Santo Domingo, Dominican Republic.*
*Photo credit: Richard Bido-Medina*