

## European Stroke Organisation (ESO) “Department-to-Department Visiting Programme” Report

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Visiting: Prof. Dr. Joan Montaner, Macarena Hospital and Institute of Biomedicine of Sevilla (IBIS), Seville, Spain.



I am pleased and grateful to share that I have successfully completed my Department-to-Department Visiting program at the Institute of Biomedicine of Sevilla (IBIS), Seville, Spain, under the tutelage of Prof. Joan Montaner and his team at IBIS from 18 to 25 May 2024. Supported by the grant award from the European Stroke Organisation (ESO), I was engulfed in training and learning different projects conducted in the Stroke Lab at IBIS while interacting with varying members of the team of Prof. Montaner.

During my visit, I had the privilege of working closely with Dr. Alejandro Fernandez Vega, who shared valuable insights into the ongoing projects in the stroke lab at IBIS. The research groups were structured into four distinct categories: Advanced neuroprotection (ADNES), Ischemia reperfusion injury in stroke (IRIS), Stroke etiology and Paediatric stroke, and Cell therapy and other clinical trials. Dr. Vega, who led the stroke etiology group, is actively involved in two ongoing trials: CRESCENDO and PREViCTUS. The CRESCENDO trial involves sampling blood clots and blood serum obtained from Ischemic stroke patients presenting to the emergency department. These samples are then used for biomarker measurement using the PEA technology, an immunoassay coupled with

quantitative polymerase chain reaction (qPCR) or Next-generation sequencing (NGS). I had the opportunity to actively participate in the hands-on training on the PEA technology based on Olink, which the lab used.

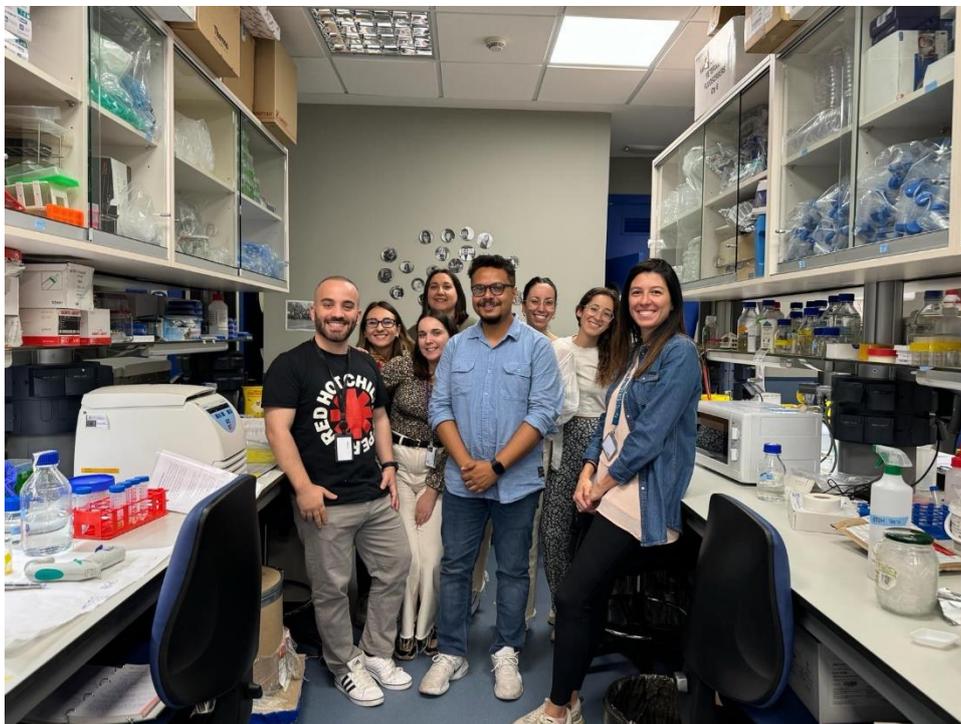


On the first day of my training, I was privileged to witness a live thrombectomy on a 56-year-old female patient at the hospital. The objective was to retrieve clots from the patient, which would be later used for biomarker analysis using the PEA technology. The procedure, which lasted for more than two hours, involved a team of skilled medical professionals. The neurosurgeons successfully retrieved many clots from the patient, which would then be stored for further analysis. After retrieving the samples, the team of lab scientists I was accompanying transported the samples to a  $-80^{\circ}\text{C}$  refrigerator. Later, I was trained in processing the clot sample to undergo biomarker analysis. The clot samples were measured physically, and their

lengths were noted. The individual samples were processed, kept in slides after further treatment, and incubated overnight before undergoing the PEA analysis.

Dr. Vega also provided me with comprehensive training regarding the operational procedure, the know-how, and the experimental processes behind using Olink technology to undergo biomarker measurement. He showed me a presentation detailing the various steps involved in the assay, followed by data analysis. I was also given a detailed seminar on data analysis using the R software. This comprehensive training equipped me with the knowledge of data validation, normalization, removing errors, data filtering, analysis, and interpretation. The biomarker measurement data was noted as optical density (OD) values, interpreted using heatmap analysis, clustering, the area under the curve, univariate and multivariate analysis, and identifying upregulated and downregulated proteins. I learned about some new bioinformatics and computational tools to determine the parameters mentioned above, along with graphical representations. Dr. Carmen del Rio oversaw the neuroprotection projects in the stroke lab and provided me with a detailed representation of the repurposing of the edible halophyte *Salicornia spp.* The lab is extracting polyphenols and other phytochemicals from this halophyte and using it as a neuroprotective agent in a trial involving healthy patients with stroke risk

factors. Moreover, Dr. Rio explained the process of selecting the halophyte from the wild and how its usage with regular medication shows progress in patients. Dr. Rio also briefed me about the previous projects that were completed in the lab. The most famous was the Veda Lab point-of-care device, developed as an optical biosensor and digitized using smartphone scanners. These rapid quantitative test devices were deployed all across Spain in a large clinical trial, where first responders, such as emergency medical technicians and nurses, were trained to use the device and fill out the case report form (CRF). They also developed an application called BRAINCheck, which was used to enter the CRF on a digital platform and monitor the form online from the hospital or laboratory. The study's primary purpose was to differentiate large vessel occlusion stroke (LVO) from other stroke subtypes. The trial was a massive success with many positive outcomes, improving thrombolysis protocols and clinical management decisions regarding stroke patients.



On the final training day, I was asked to present my project and the research objectives I was pursuing. I summarized my ideas and the project I was working on, which involved the identification of novel microRNAs that can enable stroke diagnosis and differentiation of stroke subtypes. I thoroughly enjoyed presenting to a group of eminent scientists who provided me with much knowledge and ideas for further research advancement and collaboration.

The opportunity provided by ESO through this Department-to-Department Visiting Program has been a significant learning curve in my research training. This visit has provided me with many ideas and research gaps in my country and institute that can be enhanced through better collaboration and implementation. I am grateful for this opportunity, and I look forward to collaborating with Prof. Montaner's team in the future.