Programa de Ayudas para Intercambios de Formación

Title: Quantitative Statistical Analysis Tools: Implementation Guidelines
Applicant: Camila Ferreira da Costa
Institution of origin: i3S – *Instituto de Investigação e Inovação em Saúde*, Portugal
Receiving institution: Forensic Genetics Center of the Judicial Branch of Córdoba, Argentina
Purpose of the trip and main results of the exchange:

Currently, I, Camila Ferreira da Costa, am starting the third year of the doctoral program in Biology at the Faculty of Sciences of the University of Porto entitled "Dismantling blind-trusted Black Boxes: Testing the Limits and Sensitivity of Forensic DNA Software", supervised by Dr. Nádia Pinto and co-supervised by Dr. Lourdes Prieto. This project is carried out in the research group "Population Genetics & Evolution", led by Professor António Amorim, at the i3S – *Instituto de Investigação e Inovação em Saúde* in Porto, Portugal.

As a beneficiary of the "*Programa de Ayudas para Intercambios de Formación*" promoted by the Spanish and Portuguese Speaking Group of the International Society of Forensic Genetics (GHEP-ISFG), I have had the privilege of carrying out an internship in the Forensic Genetics Center (CGF) of the Judicial Branch of Córdoba, Argentina, under the supervision of Dr. Nidia Modesti.

The main purpose of this stay was the implementation and validation of the quantitative software called EuroForMix, to replace the semi-quantitative software (LRmix Studio) that is currently used in this center. This transition will allow a substantial improvement in the interpretation of complex genetic mixtures, which involve the contribution of two or three individuals. Conversely, this visit allowed me to have direct contact with the workflow of a forensic casuistic laboratory, and to improve my experience in the analysis of real casework DNA mixtures, acquiring new skills and expanding my knowledge in forensic genetics.

Regarding the implementation and validation of the EuroForMix software, a protocol was defined to be followed during this process. The first step consisted of determining and establishing the laboratory-specific value(s) for each parameter considered by the software for quantifying the weight of genetic evidence. Next, the type of samples and the characteristics they must present to be included in the software validation process were defined. Given the need for time to select the samples, the validation process will be carried out afterward by two experts from the CGF laboratory, thus guaranteeing the internal validation of the software and experts.

The opportunity to be in direct contact with a forensic casuistic laboratory allowed the comparison and confrontation of this reality with the academic reality. Thus, it was possible to observe and debate the different ways of thinking and acting, from the criteria considered when analyzing problem samples (normally, mixtures) – a very important step in the forensic routine – to the hypotheses formulated to carry out the quantification of the weight of the genetic evidence. Furthermore, it allowed me to understand which issues remain to be resolved and which still need to be worked on to improve the forensic casuistic laboratory work.

The procedure followed during the implementation of the software will be communicated to the community through a peer-reviewed publication, which may serve as guidelines for other laboratories. We also aim to solve some of the questions that arose regarding the mixture samples analysis. We expect that this project could contribute to the

validation of quantitative software in other GHEP laboratories and help with some issues that forensic casuistic laboratories have encountered.