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Secondment at Eli Lilly (UK)

In the community more than half of the patients with Alzheimer's Disease (AD), are also suffering from chronic pain. This is partially attributed to concomitant comorbid diseases such as inflammatory conditions, most common of which is Rheumatoid Arthritis (RA). Interestingly, AD patients are prescribed with analgesics less frequently compared to cognitively intact individuals, raising the issue of altered pain mechanisms in neurodegeneration. Moreover, untreated pain and Rheumatoid Arthritis in AD patients has been associated with depression and anxiety disorders, highlighting the need to gain a deeper insight into the dysregulation of the inflammatory pain mechanisms in AD.

Aiming to describe the alteration of pain mechanisms in inflammatory pain in AD, we follow a preclinical approach utilising a mouse model of AD and inflammatory arthritis. More specifically, we have previously shown that neuroinflammation in the form of altered microglia responses, is an integral component of the inflammatory pain mechanisms in AD. Therefore, in collaboration with David Collier's group at the Neuroscience Genetics Department of Eli Lilly (UK), we have followed a RNA sequencing approach with RNA isolated from spinal microglia, to define the transcriptional profile of spinal microglia in inflammatory arthritis and study its dysregulation in a mouse model of AD.

During my secondment at Eli Lilly, I have been provided with exceptional hands-on training to interact with a high-performance computing (HPC) system as well to gain a deeper insight into using the command line to navigate in the HPC. Furthermore, I have been trained to use Shell, Python and R to analyse and achieve well-defined goals. Moreover, I have gained access to invaluable software to perfom state-of-the-art analysis using transcriptomics data. Finally, I have been introduced to the workflow to analyse RNA sequencing data and evaluate their statistical significance, an essential step to become increasingly competent in bioinformatics.

Following the completion of my 6-month virtual secondment at Eli Lilly, our bioinformatics analysis demonstrated that arthritis significantly affects spinal microglia as their transcriptional profile is altered. Moreover, changes could be observed in the transcriptional profile of microglia in a mouse model of AD. Finally, by employing cutting edge software we were able to identify the molecular pathways differentially regulated in arthritis and AD are associated with inflammatory response, further highlighting the association of neuroinflammation with inflammatory nociception in a mouse model of AD.

It would not be an exaggeration to state that my secondment at the Neuroscience Genetics Dept of Eli Lilly has transformed my understanding of how well-defined clinical problems can be approached using basic science. Finally, the secondment along with the interaction with other stuff scientists working for Eli Lilly has undoubtedly provided me with invaluable experience in the industry as well as with a solid background on new skill such as Bioinformatics and statistics.

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