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University of Intercalation: Queen Mary University of London
Medical School: Newcastle University

I completed my intercalated MSc in Neuroscience and Translational Medicine at Queen Mary University of London. The first semester focused on the fundamentals of drug discovery and development in neuroscience, which granted us a thorough insight into a complex process that has proven near-impenetrable, even leading to the abandonment of the speciality from some leading pharmaceutical companies. Through exploring the stages of drug development, from the identification of physiological targets and biomarkers to the development of compounds, and through the stages of preclinical and clinical trials, we learnt to critique and understand the challenges that have led to the failure of many drugs in neuroscience. Furthermore, by exploring emerging concepts, such as gene-editing techniques and the use of cerebral organoids for preclinical testing, we gathered a sense of the future direction of pharmaceuticals, and what these could potentially bring in the ever-changing landscape of scientific research.

The second semester built upon our foundation knowledge of drug development to explore the current state of pharmaceutical development for specific neurological conditions in more depth to prepare us for our research project. In the Neuro-Oncology module, we learnt the histopathological basis of brain tumours and how this revised classification can predict prognosis and treatment response, indicating a new era of personalised medicine. My chosen project was part of a collaboration between Queen Mary University of London and the University of British Colombia, in which we explored the effect of a blend of multi-nutrients, Fortasyn® Connect, on the corticospinal tract of rats with cervical spinal cord injury.

My role entailed the microscopic examination of fluorescent-stained sections of the corticospinal tract to identify whether treatment with the multi-nutrient led to the reorganisation of spinal cord circuitry after injury, which would suggest neuroplastic modulation. I also assessed the grey matter for markers of neuroprotection in sections stained with two different classical histology dyeing techniques. Prior to this course, I had little knowledge of histopathology beyond what was necessary to know for medical school. This project demanded an entirely distinct skill set from that necessary for medicine, such as the use of customised macros for image analysis programmes for the quantification of markers of traumatised spinal cord tissue. After much practice, I became familiar with the histology of the spinal cord and was able to reliably assess the tissue for quantification of neurons and the assessment of white matter degeneration, corticospinal tract sparing, and axon sprouting into the grey matter.

Fascinatingly, it was found that treatment with the nutrient supplement did lead to reorganisation of spinal cord circuitry in the treatment groups, even when the administration of the treatment was delayed to 14 weeks post-injury. Considering the scarcity of compounds that can penetrate the blood-spinal cord barrier and act at their target to elicit a therapeutic effect, as well as the difficulty in the handling and analysis of traumatised tissue, the results obtained may well mean that this therapy will progress along the stages of drug development. Indeed, it was recently confirmed that a multi-site clinical trial of Souvenaid, an innovative

product for the dietary management of early Alzheimer's disease whose neuroactive compound is Fortasyn® Connect, will start any time soon, driven by a team in Glasgow. I have learnt that research in neuropathology is often challenging, can be tiring, and is rarely straightforward, but it offers an incomparable intimate exploration of the central nervous system that cannot be simulated in life. It is an old discipline that is still of major importance in modern neuroscientific research if we want to get closer to finding a therapy for some of the most life-changing conditions in all of medicine.