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2023 scholar

Biological and Biomedical Sciences

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A post-research reflection

In my research project I investigated the neurotoxicity of polystyrene nanoplastics on mitochondrial function in rat brains. I was working independently in Dr. Gavin Davey's lab in Trinity's Biomedical Sciences Institute. The results from my research indicated that polystyrene nanoplastics cause mitochondrial dysfunction in rat brains. They inhibit complex II/III of the electron transport chain in both synaptosomes and non-synaptic mitochondria as well as partially inhibiting complex II in synaptosomes. I also found evidence of ROS (reactive oxygen species) production with the addition of the plastics. This research has made a small but important step forwards in our understanding of these harmful plastics that are encroaching further into our lives and bodies every day.

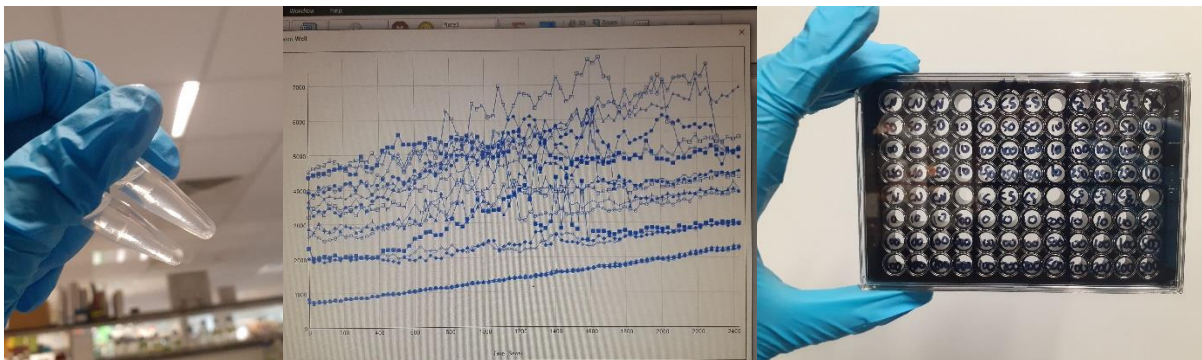


Figure: A collection of photographs from my research project. *On the left I am holding two tubes of mitochondria that I had centrifuged (seen in the white pellet at the bottom). In the middle is a graph produced by a fluorescence microplate reader. On the right is a 96-well plate that is marked for the addition of different concentration of nanoplastics.*

I learnt a lot during my research about the field but also about myself. Everything did not go according to plan, quite the opposite in fact. Often my experiments would not work at first and I would spend the next few days doing tests to figure out what was happening. From this experience I was able to get a sense of the difficulties of research but also of my own resilience and determination. You have to hold onto the small victories along the way, it can be easy to get bogged down in the day-to-day frustrations. Overall, however, with each test you are still making progress and it is important to not forget this.

I enjoyed being able to use my curiosity the most. My research was fascinating and I thoroughly enjoyed the journey of making discoveries that played into a bigger picture. My least favourite part of the experience was being involved in the killing of rats for the research. It is an ethical question that I do not have an answer for yet, on one hand doing research on rats allows us to make medical advancements that would not otherwise be possible. But on the other hand, I do not want to see any creatures harmed. It is easy to turn a blind eye until you actually see the rats being killed, it becomes impossible to ignore. It has defiantly given me food for thought about my values as a leader, and whether I consider using animals for such research ethical.

I often collaborated with the masters students in the lab to prepare the samples of mitochondria that we all used or to do ROS assay's together. I enjoyed working with other people and greatly valued the knowledge that the more experienced students brought. While I was not in a position of leadership during my research project, collaboration and working as part of a team offer opportunities to develop key leadership skills such as communication.

There is still more work to be done to fully understand the effect of nanoplastics on our brains. My research looked at rat brains which are an appropriate model organism however, it is also important that the effect of plastics is directly tested on mitochondria from human brains. Further studies are needed to understand the mechanism of inhibition found in the complex II/III assay. It is also possible that the plastics have slightly different affects over longer periods of time, this is important to understand because they build up slowly in our bodies over our lifetimes.