

Reflective report summer 1

Research project

In brief, what was the overall structure and methodology of your research project as it relates to your experience of conducting the research?

The overall structure of my research was carrying out specific assays. There were four assays for each of the electron transport chain complexes and a ROS assay. Each of these were repeated with both non-synaptic mitochondria and synaptosomes. Everything was done in triplicate, but only with one prep so all results are preliminary. For each assay there was a control with no nanoplastics and five tests that had different concentrations of nanoplastics.

What were the final findings of your project?

All results are preliminary and I will be continuing this research with my supervisor in order to have enough data to have legitimate findings. I did find preliminary evidence of increased levels of ROS produced in both non-synaptic mitochondria and synaptosomes (NSM and SY). There was also some evidence of inhibition of complex II/III for both NSM and SY, and inhibition of complex II in synaptosomes. Overall, there was potential evidence for mitochondrial dysfunction in NSM and SY.

How does your finished project compare to your original proposal and objectives?

The objectives remained the same throughout the project however, some of the details changed slightly. I was not able to remove the nanoplastics from the mitochondria sample to see if the effects were reversible. The experiment did not work and I ran out of time in the project before I could optimise it. I also did not have enough time to look at ROS production in intact synaptosomes.

I did however, do a lot more supporting work within my project to back up my results. I was not expecting to do as many of these experiments as I did. Every time I got some results, I would have to check every single part of the experiment and all of the reagents used for any interference with the readings.

What is the next step for this research in your view?

I need to repeat my experiments to have more data. This will confirm my results and make them significant. Some of the data also needs tidying up, this will come with repeats of the experiments.

I can also determine the mechanism of inhibition found in the complex II/III assay; the plastics may affect complex III itself or the ubiquinone binding site. Synaptic mitochondria can also be compared with synaptosomes, this will confirm whether the inhibition found in the synaptosomes was due to an effect on the mitochondria or something else. This research also needs to be done in human cells and over larger amounts of time.

What were the significant achievements and challenges of the research project experience?

Achievements:

- Having some good data (all preliminary at this point but promising)
- Finishing most of the objectives laid out in the project proposal
- Having a good foundation to continue the research

Challenges:

- Every experiment went wrong at least once which was sometimes disheartening
- Long hours; I was often in the lab for 10-12 hours. This did however, make the whole experience more rewarding because I worked so hard to get my results.
- Working with other people (see below)

How did you find the engagement process with your Supervisor?

From the start of the process to now, he put in a lot of work to help me with this project that I am so grateful for. The engagement process was occasionally difficult as we are very different people, I personally do not like uncertainty and found it quite difficult to work with. On the other hand, he was very helpful, engaged and was always willing to look at my experiments. After working with him during the project I feel more confident in engaging with someone with a similar leadership style.

What did you learn about your style of leadership while working on this project? Did you encounter other styles of leadership which you found constructive, or which created conflict?

Initially I was taken aback by my supervisor's style of leadership which mostly left everyone in the lab to figure out stuff by themselves. This caused conflict occasionally as we had different ideas of what we should do. However, it allowed us all to improve our people skills when faced with a difficult situation. By the end of the project, I was able to see the importance of his style of leadership. It allowed me to greatly improve my problem solving skills and I was able to start to think of solutions myself.

One thing I found particularly challenging was navigating a situation where everyone needs to use the same piece of equipment but everyone is saying 'no you use it' and being polite. It makes things quite hard to organise but it is hard to deal with without feeling like you are being impolite. We were able to solve this issue by creating a schedule for the equipment.

I learnt that my style of leadership is more direct and hands on, I would never usually take the approach of letting people tackle an unfamiliar problem alone. After doing this project however, I can see the value in a more removed style of leadership as it lets people learn how to solve their problems independently. In the future I would like to be somewhere in the middle, allowing people to improve their problem solving skills.

What role did team-working and collaboration play in working on your research project?

I worked closely with the masters students in my supervisor's lab. We prepared the mitochondria together as we were all using them, we also were using some of the same experiments to research our separate topics. There was no direct collaboration though as my research was independent to the research done in the lab.

It was fantastic to have a team to work with, we were able to support each other through the difficulties of research. That support network was crucial for me when all of my experiments were not working. I think team-work is essential in the work place and allows for better performance, especially for me.

What did you learn about yourself as a researcher?

I learned that I value the integrity of my research as well as working with other people. I have a lot of drive and resilience when I'm passionate about something. I also learned about the importance of leadership and how it can affect people so much.

Which part did you most/least like in the process?

I enjoyed the process of discovery the most, it was very exciting when I started to get results. I did find it difficult to deal with the frustrations sometimes but after I was able to adjust my expectations and perspective, I enjoyed the experience more. After this project I feel more prepared for research in the future and how to deal with the problems that come up.

Did you learn anything about your personal resilience and levels of determination while working on this project? Did you face any challenges which hampered this resilience and determination and if so, how did you deal with this?

I learned that I have a lot of resilience and drive especially when I'm working on something that I'm passionate about. It is hampered when I feel overwhelmed. I learned to deal with this by making a list of the things I need to do or figure out and then pick the easiest thing to work on. Even if its just sending an email that's been in the back of my mind for a while, it can really help to make me feel like I have a handle on things. And some times you just need to take a nap!

Were you surprised by anything in the process of undertaking your research project?

I was surprised by how much went wrong. None of the experimental protocols I was using were optimised so I spent a lot of my time working on this. I assumed before hand that everything would be optimised as the experiments are used a lot in research. I could not have been more wrong; it seems that in all biological research it takes a long time to optimise the experiments. During the process of the project, I learned how to deal with this and how to manage the disappointment. I had to learn that experiments going wrong was all a part of the process and once they did go well it felt so rewarding.

Leadership Development

What at did you learn about yourself as a leader, and about your perspective on leadership, during the summer?

Over the summer I worked as Head Sailing Instructor, as this is a leadership role, I had many opportunities to learn about myself as a leader. I was surprised by some of the challenges I faced and my perspective on leadership has definitely evolved.

Here are some of the lessons I learned as a leader:

It is important to think about your reasons when saying something negative. Constructive criticism holds value in the workplace but anything else will no longer be helpful. As long as you are fair and give your reasoning people will not hold it against you, this was also important when navigated friendships within the team but also work related situations.

When you feel that you have no idea what your doing, it is important to remember why you are the leader. Perhaps you are more qualified or experienced. You must be able to learn however, mistakes are meant to be made but only once. A leader who is willing to learn is able to better adapt to different teams.

Often, I find that perspective and reflection will equip you to lead in difficult situations

How did your experience compare and contrast to the goals you set out in your PDP?

Goal 1 set out in PDP: improve networking skills

I attended the Neuroscience Ireland Conference in August in RCSI, with the goal of practicing network. The conference was interesting and there were some very thought-provoking panels. Over all it was a good experience however, my networking skills still need improvement. I spoke to some of the researchers that had posters on display however, I did not speak to any one else. I was surprised at how intimidating it was, it seemed that most people just wanted to talk to the people they already knew.

Goal 2: Use more rhetoric devices/inspiring language when presenting my ideas

This is something I have been struggling with; in most scientific literature/presenting these techniques are not used often. They are more likely to be seen in other fields. On one hand I can see the value in using inspiring language when it comes to my research but I also want to fit in with the professionals in my field.

Goal 3: Become better at motivating people

This goal is harder to define but it was something I had a chance to work on over the summer as I worked in a leadership position. It was especially difficult to keep motivation up as the weather was so bad this summer (I work outdoors) and events had to be cancelled constantly. I tried to think about how I was motivating my team by making a mental note on which methods worked best. I was able to reflect on this later and saw a noticeable difference in the response to any of the methods once my team trusted me. Being outwardly

motivated myself greatly improved response as well. Sometimes its more about creating an environment where people have the time to become excited about what their doing.