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The Effects of SSRI Treatment on Neuroblastoma Cell Viability

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1. INTRODUCTION

- Alzheimer's Disease (AD) claims more lives in the UK than any other condition, 1 in 10, with 55 million individuals affected worldwide
- In AD, the brain's uptake of important nutrients such as glucose is altered
- Selective Serotonin Reuptake Inhibitors (SSRIs) have been shown by recent studies to have potential to slow the advancement of the disease by slowing progression of cognitive dysfunction and restoration of glucose metabolism[1-4]
- Previous studies have utilised the SSRI citalopram to test changes in glucose uptake by cells, assessing its impact as a potential treatment for AD[4]

2. AIMS & OBJECTIVES

- This theory has been investigated in this study by testing the viability of neuroblastoma cells in varying concentrations of the citalopram (SSRI) and prucalopride (serotonin agonist)
- Viability curves will be used to inform dosages used in future experiments to assess the impact on glucose metabolism

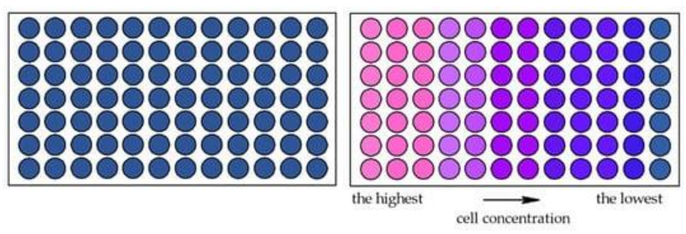
Objectives to achieve this are:

- To investigate the effect of SSRI treatment on cell viability and their potential role in treating AD
- To utilise Alamar Blue to determine a non-toxic amount of drug for future testing of glucose metabolism and calcium imaging
- To identify suitable dosages for future experiments exploring the potential link between SSRI treatment and brain glucose metabolism

3. METHODS



- 96 well plates containing SH-SY5Y cells were treated
- 0-100μM of Prucalopride and 0-200μM of Citalopram were used



- Removed the drug containing media, treated with Alamar Blue
- Solution turned pink in higher cell concentrations.



- Scanned plates using a plate reader and fluorescence at Ex 565 nm, Em 590 nm
- Viability curves generated with the control representing 100% viability

4. RESULTS

- Cell viabilities across increasing concentrations of prucalopride and citalopram have been shown in Figure 2
- Prucalopride had no significant effects on metabolism of Alamar Blue across all tested concentrations
- Citalopram initially increased metabolism, but after the 50μM concentration metabolism decreases by 35%, however this was not a significant difference at any value of p
- Initial increases in viability in those treated citalopram were seen, suggesting an increase in cell activity
- Drug concentrations below 1μM will therefore be used in later experiments

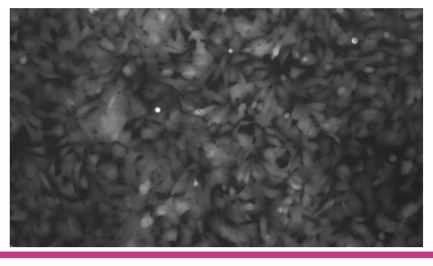


Figure 1: Imaging of SH-SY5Y cells utilised for cell viability testing and Alamar Blue staining

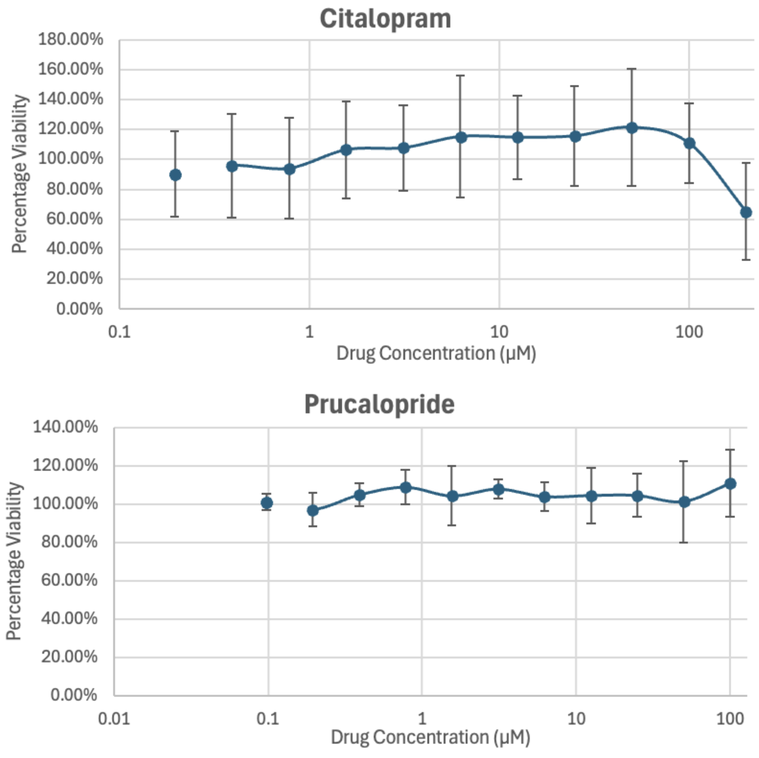


Figure 2: The percentage viability of SH-SY5Y upon treatment with citalopram or prucalopride compared to the control (media treatment only), using Alamar Blue staining and fluorescence. n=3

5. DISCUSSION

- At low concentrations mirroring physiological values, neither drug presented adverse effects to viability of SH-SY5Y cells, showing suitability for medicinal use
- Citalopram increasing metabolism of Alamar Blue shows promise as a potential treatment for restoring glucose metabolism in the brain of AD patients
- Future dosages based on the viability curves resemble literature concentrations in both blood serum (0.347μM) and cerebral spinal fluid (0.110), within physiological range for treatment of depression[5]
- Future studies should expand the range of SSRIs tested

6. CONCLUSIONS

- **Low concentrations of either SSRI had no harmful effects on cell viability**
- **For future experiments, concentrations below 1μM will be used to treat cells for assessing potential changes in metabolism**
- **Increases in viability and therefore metabolism merit further experiments to see if these drugs could counter AD-induced reductions in brain glucose metabolism**

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