# BDIAP Report

My name is Sarush (Jake) Chansuwan, and I was fortunate enough to have received the BDIAP grant to undertake an MRes degree in Mitochondrial Biology and Medicine at Newcastle University. My project was titled 'Mitochondrial defects and HIV-associated neurocognitive impairment', and my supervisor was Dr Brendan Payne. Dr Payne is a Clinical Academic in the Wellcome Centre for Mitochondrial Research and has dual medical accreditation to practice in Infectious Diseases and Virology. I originally chose this topic due to my interest in HIV infections; after having read that dementia can be a complication of HIV, I decided to investigate this further in hopes of furthering the knowledge in this topic.

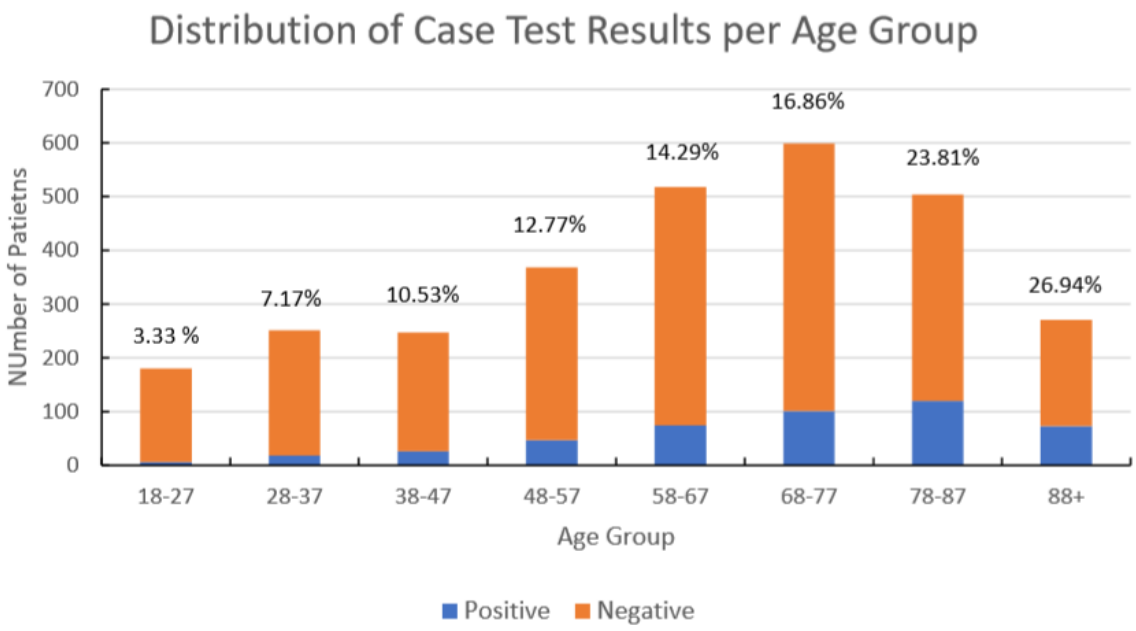
Unfortunately, I was unable to complete my MRes project as I had originally intended, as the Wellcome Centre laboratories were closed due to the national lockdown. My project was consequently changed, as I had not generated enough data before the laboratories were closed. Due to the expertise and clinical responsibilities of my supervisor, we agreed to change my MRes project to 'The Epidemiology of COVID-19 in Newcastle-Upon-Tyne'. While it was very disappointing that I was unable to complete a pathology-based project as I had intended, I was excited to undertake this new project, as I was eager to provide any additional information that may be helpful in the fight against COVID-19.

The MRes programme at Newcastle University initially starts with taught modules in the first semester, running from September and ending with essay examinations in January. The taught modules I completed include: Mitochondrial Biology, The Scientific Basis of Neurological Diseases and Ageing and Health. All students were also expected to complete a Research Skills and Principle for Biosciences module. I thoroughly enjoyed the taught modules, as it offered something completely different to the teachings I have received thus far in my medical degree. I especially appreciated being able to study the mitochondria more in depth, as this topic was not covered in any substantial amount in medicine. The teaching in the Mitochondrial Biology module was excellent, as several academics from the Wellcome Centre for Mitochondrial Research lectured as part of the module. After I have passed the essay examinations in January, the allotted time to undertake my MRes project began. After being inducted, I received training in immunohistochemistry, something which I enjoyed immensely before the untimely closure of the research laboratories.

The aim of my new project was to analyse the COVID-19 RT-PCR test results for Newcastle upon Tyne Hospitals NHS Foundation Trust (NUTH) and provide data with regards to the local COVID-19 infection characteristics in Newcastle upon Tyne. This data would then elicit any epidemiological patterns present and give insight into the transmission rate of COVID-19 in NUTH serviced areas. Ultimately, there were 4,141 tests included in the data analysis stemming from 2,938 patients (some patients generated more than one COVID-19 test). All NUTH test results were provided to me by my supervisor, Dr Payne.

The results of the data analyses highlighted a number of important characteristics of COVID-19 in Newcastle, some of the results include:

- 13.6% of the 2,938 patients received a positive result with their very first COVID-19 test
- 15.8% of the 2,938 patients received a positive result at some point in their inpatient stay
- The number of positive cases in NUTH regions doubled approximately every 4.7 days between March 11th and April 11th
- The most frequently tested age group were the 68-77s, the mean age of tested patients was 62.8 years, and the mean age of patients who tested positive was 71.2 years
- The proportion of positive test results increased as age group increases throughout all age groups (see graph below)




As part of my discussion, I was also able to compare NUTH's results to other English regions. Specifically, I found that the doubling time of COVID-19 in NUTH regions was higher than the North East region's, signifying that the transmission rate of COVID-19 was lower in NUTH regions.
I also found a statistically significant positive correlation between average regional incomes and regional doubling times, suggesting a causal link between socio-economic factors and the transmission rates of COVID-19. Further research into this area is needed however, as I was limited by the amount of data published by the UK government at the time.

While my project ultimately lacked any histopathology, aspects of it that I was exposed to during my laboratory training and taught modules only served to increase my interest in pathology. I am now able to appreciate the process that goes in to producing a histopathological stain, and what the work of a pathologist entails. In my foundation training, I aim to use some of my taster days in pathology, and I hope that there will be more opportunities in the immediate future for me in pathology.