QUEEN SQUARE BRAIN BANK

UCL

BRAIN MATTERS 2021

The newsletter from Queen Square Brain Bank for Neurological Disorders

Welcome

Professor Tom Warner, Head of Queen Square Brain Bank welcomes you to Brain Matters 2021, an abbreviated edition highlighting two exciting projects with updates on recent achievements.

2020 saw Queen Square Brain Bank facing Covid-19 related challenges which resulted in the difficult decision to close for the first time in its illustrious history, along with the rest of University College London.

Whilst many in the team were able to work remotely and keep an essential service operating, it became clear that with hospitals and mortuaries across the country under immense pressure, retrieving donated tissue would be unachievable. We were saddened that some relatives were unable to complete a donor's wishes, and that researchers were frustrated at the inevitable delay for tissue requests. Partially reopening in July with laboratory staff only which has since gradually increased, has enabled brain banking to reach near normal levels of activity.

On a positive note, the pause during lockdown allowed time for essential updates to QSBB databases and procedures, and an opportunity for in-house researchers to produce a number of publications in prestigious journals.

High points of the year included the appointment of Dr Tammaryn Lashley to Professor of Neuroscience. Tammaryn has progressed from brain bank technician to independent Principal Investigator with a large group of postdoctoral researchers and students, focusing on finding the underlying mechanisms for frontotemporal dementia and Alzheimer's disease. Her promotion was well deserved and reflects her international profile and extensive scientific output.

Despite disrupted times we have appointed two new members of staff, Natalie Woodman as service technician and Cheryl Pearce to the post of administrative assistant. These are key roles which will enable QSBB to catch up on time lost during the last year, expand the scope of work and maintain our global reputation as a vital resource for research into dementias and parkinsonian conditions.

I would like to thank all our donor scheme members and families for their altruism, generosity and understanding at this time, and also to our sponsors for their continued support.

QS
BB

Research

Dr Patrick Cullinane, Clinical Research Fellow is undertaking a PhD project examining a possible link between Parkinson's disease and type 2 diabetes:

Recent studies by my Queen Square Brain Bank colleague Dr Eduardo Fernandez and other researchers worldwide, have shown that having type 2 diabetes mellitus (T2DM) appears to increase the risk of developing Parkinson's disease (PD). The reason for this however, remains to be discovered. Interestingly, a treatment that is widely used for managing T2DM has already shown promising results in Parkinson's disease and is currently undergoing further clinical trials. Motivated by these observations, our aim is to investigate two potential mechanisms underpinning the association between these common conditions.

Analysing brain tissue from donors who had both PD and T2DM as well as tissue from donors who had only diabetes during life, we have looked under the microscope for the presence of amylin, a hormone that is normally released from the pancreas along with insulin. In certain circumstances, the shape of amylin may change causing it to form abnormal clumps which are damaging to the pancreas and are believed to contribute to the development of T2DM. There is evidence that this pathological process also occurs in the brain and we believe this may have detrimental effects on the nerve cells involved in Parkinson's disease.

Investigating another diabetes-associated process called glycation, a chemical reaction that attaches sugar molecules to proteins and fats within the body is also underway. Glycation occurs spontaneously as an unavoidable consequence of ageing but is accelerated in conditions where there are high sugar levels such as T2DM – it is also the chemical reaction responsible for the browning of certain food during cooking. Previous studies have indicated that glycation may enhance the toxic effects of alpha-synuclein which is the protein found in Lewy bodies, the pathological hallmark of Parkinson's disease.

Understanding the link between these two illnesses may offer insights into a potential risk factor for Parkinson's disease and in the future could reveal new ways of treatment, or ways of slowing its progression.

Consultant Neurologist Dr Helen Ling and Emeritus Professor of Neuropathology Tamas Revesz update on their explorations into corticobasal degeneration with support from Karin & Sten Mortstedt CBD Solutions:

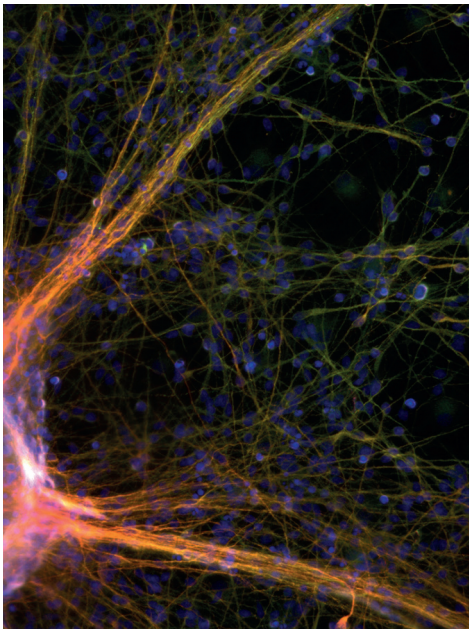
Corticobasal degeneration (CBD) is a difficult to diagnose neurodegenerative illness usually affecting individuals in their sixties who show a variety of differing symptoms involving movement, speech and mental functioning. Building on our previous work we aimed to understand the different variants of CBD and why some people have a more rapid disease course than others.

As part of our large-scale neuropathological study of 124 donors with post mortem confirmed CBD, we identified a small group who had experienced a fast clinical deterioration of three years or less from symptom onset. These were compared to selected age-matched end-stage patients

who had a typical course and died of advanced illness after around seven years.

Both groups had the pathological hallmarks of CBD including accumulation of abnormal tau protein in nerve cells as well as cell loss in a brain region called the substantia nigra, located deep in the brain where movement is organised. There were however certain neuropathological characteristics in the rapidly progressing group which identified them as a separate CBD variant. Even though these individuals had a significantly shorter illness, high levels of abnormal tau and cell loss were found which matched those with typical disease length. This indicated that the more severe group had already developed advanced pathological changes at a markedly increased rate.

We conclude that rapidly deteriorating corticobasal degeneration is a distinct aggressive variant with specific clinical and neuropathological changes. Further investigation is needed to determine if it is associated with a unique form or strain of tau. This could significantly improve our understanding of the condition and potentially open avenues for treatment trials when they become available.



Images by **Dr Núria Setó-Salvia** showing brain cells, grown in a culture dish in the laboratory, as seen under a fluorescent microscope.

Contact

If you would like further information please log on to the website:
www.ucl.ac.uk/ion/qsbb

Or contact Lynn Haddon, administrator on **020 7837 8370**
or by e-mail **l.haddon@ucl.ac.uk**