



THE UNIVERSITY OF
SYDNEY

Brain Matters

Issue 35 Using our Brains Donor Program

From the Director, Professor Jillian Kril

A time of change.....

While 2020 has been described in many ways – unprecedented, challenging, remarkable, surreal, chaotic, tragic – what is clear is that it has been a very different year than any we have experienced previously and that we have all been affected in some way. For many it was dealing with the devastating effects of the bushfires in NSW, or helping communities rebuild, while for others it was the impact of covid on their career and their financial, social and physical wellbeing. I, like many of you, am hoping that the coming year will see many aspects of our life return to normal.

I am pleased to report that throughout 2020 the Using our Brains (UoB) program and Brain Tissue Resource Centre (BTRC) were able to keep going. Other than for a brief period early in the course of the pandemic we have been able to continue to honour the gift of brain donation and have maintained contact with our donors through surveys and our newly established facebook account. These achievements were made possible because of the dedication of the BTRC team who have adapted to initially working from home and then a staged return to on-campus working in covid-safe mode. We were able to manage work schedules and priorities through on-line meetings and even had a few virtual social gatherings. Pleasingly, the preparation and delivery of samples to researchers was uninterrupted, minimising the long-term effect of the pandemic on research outcomes.

2021 will bring some major changes to the program. Firstly, after almost 35 years association with the University of Sydney, I am retiring from my substantive position as Professor of Neuropathology in February and handing over the Directorship of UoB and BTRC to A/Prof Greg Sutherland, the current Scientific Director



of BTRC. Greg has played a major role in the program for many years and is ideally placed to lead it into the future. While I am stepping down from the leadership role, I will continue an association with the program in an honorary capacity and look forward to continuing to work with community groups to raise awareness of brain donation and brain research.

Secondly, the manager of the BTRC Donna Sheedy will also be retiring in March. Donna has overseen the day-to-day operation of the program for more than 26 years and has been instrumental in shaping the BTRC as a world-class brain bank. Personally, I owe a huge debt of gratitude to Donna for all she has done in making my job as easy as possible. Her management skills and common-sense approach have proved invaluable for the effective and efficient running of the facility. Donna has also nurtured a long list of staff who have passed through the laboratory over the years. I'm sure they will all join me in wishing Donna all the best for the next chapter of her life and a well-earned rest.

In closing, I would like to thank you all for your commitment to furthering brain research and for helping to make the UoB program an ongoing success. I encourage you all to follow us on facebook (<https://www.facebook.com/usingourbrains/>) to see items of interest for brain research and maintaining a healthy brain.

All the best for 2021 and beyond.

Greg Sutherland

I have worked with Prof Kril and Donna Sheedy with the UoB since 2010. With their recent retirements, I have taken over management of the program, working with Julia Stevens and Ali Sweeney and I am very passionate about brain banking and how it can combine with other biobanking initiatives to solve Australia's health priorities (1). The UoB is our flagship resource for brain research and is a totally novel concept in brain banking worldwide. Through the generous gift of the UoB donors we are able to supply tissue from neurologically normal individuals as controls for studying all different kinds of brain diseases. My own laboratory interests are in Alzheimer's disease (AD) and alcohol-related brain injury. Being based in the Charles Perkins Centre, we have many opportunities to work with experts in other potential risks factors for brain diseases such as Western diets, obesity and diabetes. One important focus of this research is microglia – the brain's immune cells. A PhD student, Patrick Paasila has led these studies and we have been able to show that there are fewer microglia (2, 3) in the AD brain

and that these remaining cells attack the connections between neurons called synapses (4). My other area of interest is looking at gene expressions patterns in the brains of people with diseases versus controls to understand why some people are susceptible to diseases like AD. This technique is called transcriptomics and we have recently shown how immune systems in the brain, including microglia, are some of the earliest changes in the disease (5). We are very privileged to be now working with colleagues at the University of North Carolina on how early alcohol exposure in life may prime microglia to promote AD in old age and colleagues at the University of Washington in St Louis to determine whether there are subtypes of microglia that are more likely to promote AD. Both these latter studies are using an exciting new technique called single cell transcriptomics which is proving to be revolutionary in how we think about brain cells and the relationships between them.

1. Rush A and Sutherland GT. The Future of Brain Banking in Australia: An Integrated Brain and Body Bio-library. Medical Journal of Australia (accepted 14 Dec 2020).
2. Paasila PJ, Davies DS, Kril JJ, Goldsbury C, Sutherland GT. The relationship between the morphological subtypes of microglia and



Alzheimer's disease neuropathology. Brain Pathol. 2019 Feb 25.

3. Paasila P.J., Davies D, Sutherland GT, Goldsbury C. (2020). Clustering of activated microglia occurs before the formation of dystrophic neurites in the evolution of A β plaques in Alzheimer's disease. Free Neuropathology, 1, <https://doi.org/10.17879/freeneuropathology-2020-2845>.
4. Paasila PJ, Fok SY, Flores-Rodriguez N, Sajjan SS, Dennis CV; Holsinger, D, Kril JJ, Becker T, Banati R, Sutherland GT, Graeber MB. Ground state depletion microscopy as a tool for studying microglia-synapse interactions (accepted Feb 6, 2021, Journal of Neuroscience Research).
5. Guennewig B*, Lim J*, Marshall LL, McCorkindale AN, Paasila PJ, Halliday GM, Kril JJ, Cooper AS, Sutherland GT. Defining early changes in Alzheimer's disease from RNA sequencing of brain regions differentially affected by pathology (accepted Feb 2, 2021, Scientific Reports).



Research Participation

What do people with heart problems know about the Mediterranean Diet?

Have you ever had a heart problem or heart surgery? Our dietician friends at The University of Sydney want to see if a new questionnaire can tell us more about what people know about the Mediterranean Diet. By participating in this survey, you will help us learn how to provide better care for people with heart problems. If you would like to participate or want more information, please visit <https://bit.ly/medietstudy> or scan the QR code.

2020 Grants and Awards

Last year five staff members from different areas of the BTRC were recipients of Early to Mid Career Researcher Professional Development Awards: Julia Stevens, Research Officer; Ali Sweeney, Donor Liaison Officer; Claire De Sousa, Laboratory Technician; Caine Smith, PhD Candidate/ Laboratory Technician; Hamish Mundell, Research Assistant. They were awarded funding for training to enhance their specific research skills and career goals.

Greg is a co-investigator on two research grants recently funded by the U.S. National Institute of Health (NIH), the largest public funder of biomedical research worldwide.

The BTRC received approval in 2020 for the Biobank Certification Program from NSW Health, ensuring world-class bio-banking standards are upheld at our facility.



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UoB Publications

Many have asked about the research performed over the years. Here is a current snapshot of the research community working on a variety of projects. The word cloud below shows the key words noted by authors of over 560 publications generated from the use of the BTRC.

The researchers (Chief investigators 219) are from many institutions worldwide: Australasia 150; USA and Canada 47; European 15 and UK 7 with many colleagues and students working with them.

The number of research projects currently in progress is 270 while 348 have been completed. Examples of these studies concern addiction pathways, cellular functions, immune system function, neuropathic pain, psychological stress and brain microarchitecture, as well as those relating to the main themes of neurodegeneration and psychiatric disorders.

A list of these publications has been added to our website, to view follow the link and download the PDF of BTRC Research Outcomes (2000-2020): <https://www.sydney.edu.au/medicine/pathology/btrc/>



Staff update

**Caine Smith, PhD Candidate
NSW BTRC**



I've been working on the final project that will make up my thesis. This project will explore how statin use affects fats in the brain. These fats, which are chemically and functionally different to body fat, make up about 60% of the brain's weight and are essential for normal brain function. Statins are a commonly prescribed drug to lower 'bad' cholesterol, however there is also some evidence that statins may provide other brain benefits, such as anti-inflammatory and anti-oxidative properties.



Dementia Advocacy

Using our Brains is a champion organization for StepUp for Dementia Research. StepUp would like to acknowledge all those who volunteer for dementia advocacy, and share the story of one of their volunteers. Bobby Redman is a retired psychologist who was given a provisional diagnosis of mild cognitive impairment. She has committed herself to Dementia Advocacy by creating awareness, giving support and participating in dementia research which she says helps her maintain a strong purpose in life. To learn more about Bobby's story follow the link:

<https://www.stepupfordementiaresearch.org.au/meet-bobby>

For more information about StepUp visit their website:

<https://www.stepupfordementiaresearch.org.au>

Wellbeing Survey

We have had an incredible response to the Wellbeing During Covid-19 Survey and would like to extend a huge thank you to everyone who has participated. If you chose to participate you will have recently received, or will soon receive, an email to the final 6 month follow up survey. Please keep in mind that although some questions in this years Annual Medical Update overlap with the Wellbeing Surveys, the Annual Update refers to your health and lifestyle over the previous 12 months, not just the past month.

Annual update 2021

This year we have implemented an auto-fill function into our online surveys, therefore if you completed the 2019-20 Annual Update, many of your details will pre-fill from your previous answers. We hope this saves some time in filling it out! Because of this function, the link in the email you received is unique to you. Please still read through and confirm that your details are correct. There are also additional questions included in the 2021 Annual Update that relate to emerging research on the effect of hearing and sleep on brain function, so please still complete the entire form.

Please particularly ensure that your Next of Kin details are up to date.

Connect with us

To connect with us on social media click the link or scan the QR code:



<https://www.facebook.com/usingourbrains/>

In Memoriam

The Using our Brains Donor Program would like to acknowledge the generosity shown by our donors and donor families. It is an act of great foresight and kindness to give at a time of loss, so that others may be helped in the future.

To the families of donors that have died this year, the Using our Brains Donor Program would like to extend its sincere sympathy and gratitude. Over the years, friends and families of donors have given memorial donations to the Using our Brains Donor Program in lieu of flowers. If you would like to donate to our research program, please contact us for details.

For more information

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