

## AuPS News – June 2022

### Mid-Year Update from the National Secretary:

Professor Glenn Wadley,  
Deakin University

Where has the time gone! We are almost halfway through 2022 and I am into my last 6 months as National Secretary. When I came into the role, I was looking forward to playing a front-line role helping to run some fabulous Annual Scientific Meetings and helping AuPS continue to deliver for its members. Given the circumstances I think we've done pretty well to grow the Society - with some new prizes, schemes and opportunities to support our members, whilst still offering annual events to disseminate physiology research and education – although not in the same formats I'd envisioned when I assumed the role.

Council worked incredibly hard last year to host the blended 2021 Gold Coast 60<sup>th</sup> Jubilee Meeting. We were one of the few Scientific societies to offer this last year as many were still entirely virtual. This was particularly impressive given we are a relatively small Society with modest finances. A/Prof Deanne Skelly and her LOC team must be congratulated for delivering an incredibly successful blended Meeting that offered something for everyone with Hubs in most capital cities. Thank you to the Hub coordinators Erin Lloyd (Perth), Nolan Hoffman & Cassandra Smith (Melbourne), Renee Ross (Hobart), Kelsi Dodds, Sam Henderson and Saeed Nourmhammadi (Adelaide), Melissa Cameron and Fred von Wegner (Sydney) and Stephen Fairweather (Canberra). Behind the scenes there was also a small army of Council members working incredibly hard to integrate the face-to-face and virtual components of the Meeting - all during times when travel rules kept changing - to ensure it ran as smoothly as possible. Pivotal to this were Danielle Hiam and Renee Ross, both instrumental behind the scenes to keep it all together. We all breathed a sigh of relief when Prof Robyn



Murphy opened the Meeting smoothly on the Sunday night and we were treated to the historical symposium by several esteemed Australian Physiologists and long-time supporters/honorary members of AuPS. Evidence of the success of the Meeting was over 200 registrants, which is similar in magnitude to many of our traditional f2f Meetings. The feedback from attendees about the Meeting has been overwhelmingly positive – although the workload behind the scenes suggests we are unlikely to offer another fully blended Meeting in the near future.

Congratulations must also go to our prize winners which were announced on the last day of the 2021 Meeting: Dr Sarah Voisin (Victoria University) for the AK McIntyre award; A/Prof Christian Moro (Bond University) for the Michael Roberts Excellence in Physiology Education award; Dr Choon Boon Sim (MCRI) and Dr. Enyuan Cao (Monash University) for the Postdoctoral publication prize; Dr. Adam Haag (University of Melbourne) and Gregory Gauthier Coles (ANU) for the PhD publication prize; and Dr Iris Lim awarded the Physiology Education grant. First and second places for the student poster prizes were Lily Pearson (UNSW) and Emily Attrill (University of Tasmania), respectively. First and second places for the Student oral presentation prize were Johannes Janssens

(University of Melbourne) and Luke Pearce (University of Queensland), respectively.

At the end of 2021 we said thank you to several people who stepped down from their roles on Council. At our AGM we said thank you to James Cuffe (Membership officer), Severine Lamon (Treasurer) and Renee Ross (Webmaster) on Council. Following elections in September 2021 we welcomed Bradley Launikonis, Dino Premilovac (Membership officer), Macsue Jacques (IT manager) and Charlotte Phelps (PhD student representative) onto Council. We were also fortunate to have co-opted onto Council and ratified by the members Severine Lamon as National Secretary-elect, Danielle Hiam as Treasurer and Renee Ross as Webmaster. Our current council is a blend of early through to more senior physiologists. In August this year we will be putting out a call for nominations for a PhD student representative, so please consider joining AuPS.

I am delighted to confirm that our Annual Scientific Meeting will be going ahead in Hobart on the 20th-23rd November, hosted by University of Tasmania with Dr Renee Ross as LOC chair. This is a joint meeting with the Australian Society for Biophysics (ASB). The Meeting will be face-to-face for the scientific program, which for many of us will be the first time for a few years, and my first (and last) full in-person Meeting as National Secretary. The 1.5 day Education stream of the Meeting will be blended so that those wanting to participate in just this stream have the option of attending in person or online (details to follow when registration opens in August). I would like to congratulate Prof Janna Morrison for being selected to present the AuPS Invited Lecture and Dr Charles Sevigny and A/Prof Christian Moro who will be presenting their Michael Roberts Excellence in Teaching Award lectures in 2022. We also have 10 AuPS symposia confirmed for the Meeting.

To advocate for Science more broadly, in February this year our President Robyn Murphy and myself made a submission on behalf of AuPS to the Australian Government Senate Inquiry into the Australian Research Council Amendment (Ensuring Research Independence) Bill 2018. Our submission supported the ARC College of Experts in their call to legislate amendments to the ARC Act 2001 to ensure the independence of the ARC and prevent political interference in research grants and end the Minister's use of the National Interest Test to make

unilateral decisions on individual projects outside of the peer review process. We were disappointed with the outcome of the Inquiry which rejected the bill to prevent ministers vetoing research grant. but we will continue to advocate on behalf of AuPS on these matters when they arise.

We recently announced the outcomes from the AuPS PhD grants scheme. Congratulations to Lily Pearson (University of NSW), Dylan Chung (University of Melbourne) Saeed Nourmohammadi (University of Adelaide) and Stephanie Kourakis (Victoria University) who were awarded grants from a very competitive field towards the costs of their research.

I would like to remind members that our annual prizes for Michael Roberts Teaching Award, AK McIntyre Award, the Post-Doctoral and PhD publication prizes plus the Physiology Education grant scheme will be opening in July, so please refer to our website for more information. After a 2-year postponement our Research Training Awards for PhD members will be held at Victoria University in October this year. More details will be emailed to student members in the coming weeks, but PhD students please discuss this opportunity with your supervisors when it arises.

Finally, our AuPS archives material has finally found a home. Honorary archivist Roger Dampney has deposited a large amount of AuPS archival material (including photos and Proceedings from past meetings) in the National Library of Australia Manuscripts Collection. This is a considerable achievement as AuPS has approximately 60 years of archival material and what to do with it all has been an unresolved issue for at least the past decade. When I joined Council in 2011 there was a standing agenda item regarding what to do with the archives and it was noted most of the material at the time was sitting in a filing cabinet at Monash University. So thank you Roger for finally finding a permanent and secure home for important records of our history.

I look forward to seeing many of you in Hobart for our Annual Meeting in November.

# Member Profile: Assoc. Prof. Christian Moro

## Bond University

### Winner of the Michael Roberts Excellence in Physiology Education Award



#### **Congratulations on winning the award. Can you tell us about your career in Physiology Research and Education to date?**

It was an absolute honour and surprise to win the Michael Roberts Excellence in Physiology Education Award! Conducting educational research has been something which I've become very, very fond of. It has really helped provide evidenced-based support (or highlight a lack of evidence supporting) interventions I've made to teaching. For example, we were migrating more and more into employing virtual reality (VR) based physiology laboratories, but my research was starting to show that students learnt better when VR was simply used as a supplement (rather than the main teaching mode). This meant that although I loved working with the technology, had to put the brakes on embedding it too much within the week's activities. In this way, research into physiology education has often been humbling, yet also helped me realise what genuinely works and which innovations enhance student achievement or the overall learning

experience. Aside from this research, in lab-based pursuits I investigate the function of the urinary bladder, in particular, the inner linings (urothelium and lamina propria) and their influences on bladder smooth contractions as a whole.

#### **Can you describe your achievements and teaching innovations for which you received the award?**

There has been some success towards enhancing student engagement in physiology through a variety of innovative technology-enhanced approaches. I am not a very good artist, with a very limited ability to draw a muscle or organ on the board. However, technology has helped bridge-this-gap, allowing the presentation of 3D models through augmented reality, holograms or other modes, to teach about the body and link physiology to a range of diseases. I have also created a free online computer game with an aim to stimulate in-semester revision: The King's Request: Physiology and Anatomy Game (check it out, links to play in the video description: <https://www.youtube.com/watch?v=AkCsxEiWf8I> ). On top of this, I've tried to make it easier for the public to engage with physiology content through YouTube (<https://www.youtube.com/c/PhysiologywithChristian> ), as well as Instagram (@physiologywithchristian), and other outlets such as the Ted-Ed websites and The Conversation newspaper. It's been a lot of fun. However, physiology as a discipline does make it easy – there's so many fascinating and wonderful things to learn and teach about how the human body functions!





**What are your plans or teaching practice in the future?**

I aim to focus the rollout of any new teaching interventions in a way that correlates with evidence-based practices. As much as I'd love to introduce more holograms, the metaverse, and more to classes, research shows that it can become distracting and get in the way of learning if used excessively. In addition, as much as I'd love to engage students more with serious games, activities, hands-on workshops, we don't want to overwhelm or overload them with 'stuff'. So, now is a great time to take step back, reflect, and find a nice balance between what I 'want to do', and what is 'best practice'. I'll continue to research a variety of interventions, as well as work to widely disseminate this as often as possible (e.g. conferences, publications, collaborations) over the next few years as well. Lastly, I really do want to ensure that I can find time in the research laboratories at least once a week. Collecting data, working alongside my PhD students, and just 'finding new things' definitely still holds appeal!

**What does the society and award mean to you?**

In general, it's so fantastic to see teaching recognised, and these award programs mean a lot! There is still a strong emphasis by tertiary institutions on our laboratory-based research for grants and awards, but to see an increasing focus on how we teach is awesome. This not only promotes good practice, but also benefits students in the long run! I feel like AuPS is in a highly appropriate position to stand out a key society that recognises, supports and promotes good teaching and pedagogical practice in physiology. Awards like these also promote additional discourse around teaching, which can hopefully encourage academics to try new innovative approaches or a variety of novel learning interventions in their classes.



## Member Profile: Gregory Gauthier-Coles Australian National University

Gregory Gauthier-Coles was the joint winner of the 2021 AuPS PhD publication prize

**Publication:** Quantitative modelling of amino acid transport and homeostasis in mammalian cells (2021). *Nature Communications*, **12**, 5282.

<https://www.nature.com/articles/s41467-021-25563-x>

### Congratulations on the prize. Can you tell us about your award-winning publication?

First, I wish to thank the Society for conferring me this award. The publication represents a collaborative effort spanning about six years, involving several methodological revisions with the aim of introducing a systems biology approach to understanding amino acid transport and homeostasis. We started with a simple question: with the functional characterisations of most, if not all, human amino acid transporters having been achieved, is it possible to simulate their combined effects on amino acid homeostasis in a cell model?

To this end, we selected two cancer cell lines and elucidated their amino acid transportome using a logical series of experiments, which identified and measured the functional contribution of each amino acid transporter that comprises their plasma membrane. Concurrently, we developed a computational model which could accommodate and simulate these transporters and assessed its fidelity by comparing *in silico* and *in vitro* data from amino acid equilibration experiments. The model predicted steady-state equilibria that were remarkably like those that were experimentally determined. Our work also emphasised and expanded on a new classification scheme for amino acid transporters



centred on their homeostatic functions. The model lends itself well to the identification of novel targets in disease, namely cancer and metabolic disorders, by highlighting keystone transporters over redundant ones. This is important in the context of cancer, given that malignant cells frequently exhibit redundant transport pathways rendering them impervious to the pharmacological blockade of many transporters. Among these keystone transporters, it identified two cationic amino acid transporters as viable targets in the studied cell lines.

The model is also being used to study other diseases where cellular and organismal amino acid homeostasis are dysregulated. There have also been initial attempts at simulating transport and equilibria in multi-compartment models, representing different tissues and organs. Finally, we aim to expand on this work by integrating key metabolic and nutrient signalling pathways in our model to improve its utility and applications.

### What is your current position/role?

I submitted my PhD thesis a couple weeks so I'm currently in limbo as I await feedback from my examiners. Luckily, my supervisor Stefan Bröer is able to keep me occupied on a number of very engaging projects for the foreseeable future. My

intention is to remain in the Bröer laboratory until these projects reach completion.

**What made you want to follow a career in research, and where do you see yourself heading professionally?**

I've always deeply admired the scientific enterprise and enjoyed learning about biology, chemistry and neuroscience. I chose to do a BSc at ANU roughly ten years ago but with no clear intention to do research. Upon hearing several enthusiastic endorsements of the Honours program from my peers, I decided to tack on an extra year to my degree and work in Stefan Bröer's group. While my experience of doing science is often characterised by whiplash – making progress, followed by hitting a series of roadblocks, followed by a breakthrough etc. – the sheer 'kick' and excitement I feel when I discover something, however small and esoteric, makes it all profoundly worthwhile. In that light, I decided to do a PhD and have no intention of dropping out of research. I would certainly like to do a postdoc and remain in academia provided I am up to the task. However, I'm also not opposed to working in industry so long as the position entails research and lab work.

**Outside of work/research, what do you do to relax?**

I'm afraid to say that I lead a pretty hum drum sort of life outside of work. I wish I could say that much of my spare time is spent on creative pursuits, but I tend to waste it on the usual mind-numbing activities (e.g. playing video games, bingeing TV series, Twitter, YouTube). Other than that, I enjoy good conversation over a beer or coffee, catching up with friends, cooking, reading, meditating, etc. Basically, anything but exercise, which is something I can scarcely put off as I get older and my waistline gets bigger!

**Member Profile:  
Dr. Adam Hagg  
Melbourne University**

**Dr. Adam Hagg was the joint winner of the 2021 AuPS PhD publication prize**

*Publication:* Perturbed BMP signaling and denervation promote muscle wasting in cancer cachexia (2021). *Science Translational Medicine*, **13**, 605, eaay9592.

<https://www.science.org/doi/10.1126/scitranslmed.aay9592>



**Congratulations on the prize. Can you tell us about your award-winning publication?**

Our manuscript focused on better understanding the mechanisms underpinning cancer cachexia, the loss of functional muscle mass caused by cancer. In a collaborative effort with Australian and international researchers, we were able to describe two critical mechanisms underlying the pathophysiology of cancer cachexia in tumour-bearing mice. 1) We showed that inflammatory processes associated with tumour burden act to inhibit the Bone Morphogenetic

Protein (BMP) signalling pathway in skeletal muscle leading to muscle mass loss. We also demonstrated that inhibiting the BMP pathway in the muscles of healthy mice with genetic tools recapitulated muscle atrophy observed in tumour-bearing mice. 2) In tumour-bearing mice, we observed that the neuromuscular junction underwent significant remodelling at timepoints that precede muscle wasting. Using microscopy and electromyography, we revealed a functional disconnect between the muscle and nerve contributing to cachexia. Interestingly, we also observed features of neuromuscular junction dysfunction in skeletal muscle biopsies and plasma taken from cachectic cancer patients.

Excitingly, in tumour-bearing mice, we were able to reduce cachexia progression by administering the BMP activator, Tilorone. This repurposed drug was able to extend the lifespan of tumour-bearing mice compared to vehicle controls.

#### **What is your current position/role?**

After wrapping up my PhD studies at the Centre for Muscle Research at the University of Melbourne, I have relocated interstate and I am now looking for new post-doc opportunities.

#### **What made you want to follow a career in research, and where do you see yourself heading professionally?**

I was always fascinated by the human body. I distinctly remember my year 10 biology teacher, Ms Nicholson, teaching the various body systems and how they worked in unison to form what I now know as the integrated physiological unit. I found disease the most interesting of all. As 'Nicho' (a nickname I'm not sure she was fond of) taught high school level pathophysiology, I became hooked on understanding how and why the physiological unit came to break down and fail. I enrolled in undergraduate biomedical science and the rest is history.

In terms of my future, I aim to become an independent researcher doing coolest science I can while also mentoring the next generation of researchers as they complete their studies.

#### **Outside of work/research, what do you do to relax?**

I'm a shameless motoring enthusiast. I've spent years upgrading, breaking and repairing my V8 which I race on the track. I also love live music and I'm frequently found at musical festivals. Now I think about it, none of my hobbies are particularly relaxing....

A promotional banner for the Australian Physiological Society Scientific Meeting. The banner is divided into two main sections. On the left, there is a yellow square with the AuPS logo, followed by the text 'Australian Physiological Society Scientific Meeting'. On the right, the text reads 'Hobart 2022 20-23 November' and 'Hosted by UNIVERSITY of TASMANIA' with the University of Tasmania logo. The background of the banner features a photograph of a modern building with a grid-like facade and illuminated windows.

**Post-doc position in the lab of David Attwell  
to work on control of cerebral blood flow in dementia**

**Department of Neuroscience, Physiology and Pharmacology  
University College London, UK**

Applications are invited for a post-doctoral position in a friendly, international and highly interactive neuroscience research group in London, studying how cerebral blood flow decreases in dementia and other neurological conditions, and how blood flow changes may be reversed therapeutically.

Two-photon, CCD and confocal imaging, electrophysiology, calcium imaging, histological techniques and mathematical modelling will be used in vivo and on brain slices to study the control of blood flow in the brain and retina, in rodents and in human tissue from neurosurgical operations, both in health and in pathological conditions.

The current focus of our vascular work is on the control of blood flow at the capillary level, and on how immune cell function impacts on this, but the post-doc will have considerable freedom to devise their own projects. The salary will be according to experience and number of years from obtaining a PhD (~£40K/year straight out of a PhD). Start date is flexible, but could be immediate. Further information is available from David Attwell, by emailing a CV and names of referees to [d.attwell@ucl.ac.uk](mailto:d.attwell@ucl.ac.uk)

**Website:** [www.ucl.ac.uk/biosciences/david-attwell](http://www.ucl.ac.uk/biosciences/david-attwell)

**Specimen recent papers:**

Korte, N., Ilkan, Z., ... Attwell, D., Tamarro, P. (2022) [The Ca<sup>2+</sup>-gated channel TMEM16A amplifies capillary pericyte contraction and reduces cerebral blood flow after ischemia](#). J Clin Invest 132, e154118.

Lezmy, J., Arancibia-Cárcamo, I.L., .. Attwell, D. (2021) [Astrocyte Ca<sup>2+</sup>-evoked ATP release regulates myelinated axon excitability and conduction speed](#). Science 374, eabh2858.

Korte, N., Nortley, R. & Attwell, D. (2020) [Cerebral blood flow decrease as an early pathological mechanism in Alzheimer's disease](#). Acta Neuropathologica 140, 793-810.

Nortley, R., Korte, N., .. Attwell, D. (2019) [Amyloid oligomers constrict human capillaries in Alzheimer's disease via signaling to pericytes](#). Science 365, 250 DOI: 10.1126/science.aav9518.

Krasnow, A.M., Ford, M.C., ... Attwell, D. (2018) [Regulation of developing myelin sheath elongation by oligodendrocyte calcium transients in vivo](#). Nature Neurosci. 21, 24-28.

Madry, C., Kyrargyri, V., .. Attwell, D. [Microglial ramification, surveillance, and interleukin-1 release are regulated by the two-pore domain K<sup>+</sup> channel THIK-1](#). Neuron. 2018 Jan 17;97, 299-312.

O'Farrell, F.M., Mastitskaya, S., .. Attwell, D. (2017) [Capillary pericytes mediate coronary no-reflow after myocardial ischaemia](#). Elife 6. pii: e29280. doi: 10.7554/eLife.29280.

Arancibia-Carcamo, I.L., Ford, M.C., Cossell, L., Ishida, K., Tohyama, K. & Attwell, D. (2017) [Node of Ranvier length as a potential regulator of myelinated axon conduction speed](#). eLife e23329.

Mishra, A., Reynolds, J., Chen, Y., .. Attwell, D. (2016) [Astrocytes mediate neurovascular signalling to capillary pericytes but not to arterioles](#). Nature Neuroscience 19, 1619-1627.

Hamilton, N.B., Kolodziejczyk, K., Kougioumtzidou, E. & Attwell, D. (2016) [Proton-gated Ca<sup>2+</sup>-permeable TRP channels damage myelin in conditions mimicking ischaemia](#). Nature 529, 523-527.

Hall, C.N., Reynell, C., Gesslein, B., Hamilton, N.B., Mishra, A., Sutherland, B., O'Farrell, F.M., Buchan, A.M., Lauritzen, M. & Attwell, D. (2014) [Capillary pericytes regulate cerebral blood flow in health and disease](#). Nature 508, 55-60.

# AuPS Council

**President**

Prof Robyn Murphy  
La Trobe University  
[president@auaps.org.au](mailto:president@auaps.org.au)

**National Secretary**

Prof Glenn Wadley  
Deakin University  
[secretary@auaps.org.au](mailto:secretary@auaps.org.au)

**Treasurer**

A/Prof Séverine Lamon  
Deakin University  
[treasurer@auaps.org.au](mailto:treasurer@auaps.org.au)

**Production Editor**

Prof Nir Eynon  
Victoria University  
[editor@auaps.org.au](mailto:editor@auaps.org.au)

**Associate Editor**

Dr Ben Perry  
Western Sydney University  
[associateeditor@auaps.org.au](mailto:associateeditor@auaps.org.au)

**Webmaster**

Dr Renee Ross  
University of Tasmania  
[webmaster@auaps.org.au](mailto:webmaster@auaps.org.au)

**IT Manager**

Dr Danielle Hiam Deakin University  
[ITmanager@auaps.org.au](mailto:ITmanager@auaps.org.au)

**Membership Officer**

Dr Dino Premilovac  
University of Tasmania  
[membershipofficer@auaps.org.au](mailto:membershipofficer@auaps.org.au)

**Education Officer**

A/Prof Andrew Moorhouse  
University of New South Wales  
[educationofficer@auaps.org.au](mailto:educationofficer@auaps.org.au)

**Sponsorship Officer**

Dr Kevin Watt  
The University of Melbourne  
[Adam.rose@monash.edu.au](mailto:Adam.rose@monash.edu.au)

**Social Media Coordinator**

Dr Adam Rose  
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**Councillors**

Dr Macsue Jacques  
Victoria University

A/Prof Bradley Launikonis  
University of Queensland

**Student Representative**

Charlotte Phelps  
Bond University

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