Research Fellow in Computational Biology

INSTITUTE OF MEDICAL SCIENCES,
SCHOOL OF MEDICINE, MEDICAL SCIENCES & NUTRITION

Closing date: 12 July 2024
Interview date: To Be Confirmed
Reference number: IMS285R
Applications are invited for a computational biologist position jointly held in the labs of Dr Eunchai Kang and Dr Mike Morgan at the University of Aberdeen. We seek to appoint a creative, experienced and motivated individual to unravel the impact of APOE mutations on neuro-immune crosstalk and Alzheimer’s disease pathogenesis using single-cell ‘omics from human brain organoids. The collaboration involving cutting-edge neuroscience (Dr Eunchai Kang) and computational algorithm development (Dr Mike Morgan) is ideal for an independent and highly motivated individual. This is an Alzheimer’s Society-funded project that integrates single-cell ‘omic profiling of human brain cerebral brain organoids with genetic risk of Alzheimer’s disease (AD).

Growing evidence suggests that neuroinflammation plays a central role in the pathogenesis of AD. The primary innate immune cells of the brain, called microglia, are critical for neuroinflammation. Findings from large genome-wide association studies of AD have highlighted genes specifically expressed in microglia, suggesting a crucial role for these cells in AD pathology. Apolipoprotein A (APOE) is the strongest genetic risk for sporadic AD: APOE ε4 is the strongest risk factor, ε2 is the most protective, and ε3 is considered neutral. While expression of APOE is enriched in microglial in neuropathological conditions, the signalling pathways that mediate neuroprotection or inflammation during AD pathogenesis are poorly understood.

The Kang lab has pioneered the development of co-cultured brain organoids with iPSC-derived microglia, using CRISPR/Cas9 to specifically modify APOE genetic variants, for the study of AD (Kang research). The Morgan lab develops cutting-edge bioinformatic algorithms for the analysis of single-cell data (Morgan research). Together, our goal is it identify using single-cell omic profiling, how the APOE alleles that increase and decrease risk of AD alter neuro-immune crosstalk in a brain organoid model of disease pathogenesis.

This position will be hosted in the Institute of Medical Sciences, which is located at the Foresterhill health campus, adjacent to the Aberdeen Royal Infirmary, and part of the University of Aberdeen School of Medicine, Medical Sciences and Nutrition. As an integrated member of both the Kang and Morgan labs, you will interact with neuroscientists and immunologists, through the regular Neuroscience and Immunology theme meetings seminar series. The University of Aberdeen is home to the Aberdeen Computational Biology Forum, co-founded by Mike Morgan, which brings together biomedical scientists, statisticians, computer scientists and physicists from across the university, to share ideas, research, and provide an integrated community for computational biologists within the university.
MAIN PURPOSE OF THE ROLE:

The goal of the project is to dissect the molecular role of microglial APOE genetic variants in AD pathogenesis. To achieve this, the candidate will analyse newly generated single-cell RNA-sequencing using sci-RNA-seq3 data derived from co-cultured iPSCs and cerebral brain organoids carrying defined APOE genetic variants. Analyses will focus on differential gene expression and differential cell-cell communication analysis to identify the signalling pathways and neuro-immune crosstalk that is modified by APOE alleles that predispose to and protect from Alzheimer’s disease. These results will be integrated with findings from genome-wide association studies of AD to uncover the molecular regulators of AD pathogenesis. Together, these combined analyses will be used to design experiments to validate novel therapeutic targets for treating the development of AD.

The role will therefore involve the processing, curation, quality control and analysis of large single-cell RNA-sequencing data derived from neuro-immune cells. Further, integrative analysis will use publicly available GWAS summary statistics and other ‘omics data sets to contextualise the findings from the primary analyses. These analyses will guide the design of validation experiments, and hence be used to prioritise novel therapeutic targets.

KEY RESPONSIBILITIES:

- Develop a pipeline to process, curate and quality control single-cell RNA-sequencing data from split-ligation-pool sequencing experiments.
- Perform differential analyses to identify genes and autocrine/paracrine signalling pathways modified by microglial APOE alleles.
- Integrate publicly available GWAS summary statistics and multi-modal data to interpret findings from primary analyses.
- Manage project data and sharing and contribute to design of validation experiments.
- Provide regular informative updates to project team and lab members.
- Be an active member of the Kang and Morgan labs, including presentation and dissemination of research findings and engagement with the University of Aberdeen research community.
TERMS OF APPOINTMENT

Salary will be at the appropriate point on the Grade 6, £37,099 - £41,732 per annum, pro rata and negotiable with placement according to qualifications and experience.

Any appointment will be made subject to satisfactory references and probation period.

For further information on various staff benefits and policies please visit www.abdn.ac.uk/staffnet/working-here

This role is based in the UK and as such the successful candidate will be required to live and work in the UK.

Prior to employment, the successful candidate must be able to demonstrate their right to work in the UK. This role may be eligible for sponsorship under the Skilled Worker route under the UKVI immigration rules but is dependent on factors specific to the candidate and if tradeable points can be used under the rules.

Information on other visa options is available at https://www.gov.uk/check-uk-visa.

Please do not hesitate to contact Grant Rae, HR Adviser (e-mail: grant.rae@abdn.ac.uk) for further information.

AT A GLANCE

SALARY:
Grade 6
£37,099 - £41,732 per annum, pro rata

HOURS OF WORK:
Full-time, 37.5 hours per week

CONTRACT TYPE:
Funding-limited for three years, from 1 September 2024

LOCATION:
Aberdeen
**PERSON SPECIFICATION**

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<th>Education/Qualifications</th>
<th>ESSENTIAL</th>
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<tr>
<td>Academic, technical and professional education and training</td>
<td>• PhD in neuroscience, data science, bioinformatics or computational biology (or other related disciplines)</td>
<td>• Contributed to open-source version-controlled software project(s).</td>
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<td>• Experience of analysing single-cell ‘omics data (RNA-seq, ATAC-seq, multi-omics)</td>
<td>• Familiarity with variational autoencoders and/or cell-cell inference algorithms</td>
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<td>• Advanced programming skills in R and/or Python</td>
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<td>• Familiar with HPC workload management systems, e.g. slurm/LSF</td>
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<td>e.g. Specialist knowledge, levels of experience, supervisory experience, research</td>
<td>• Applicants are required to be proficient in the English language (at least B2 level).</td>
<td>• Motivated to improve outcomes for people with Alzheimer’s disease</td>
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<td>• Excellent communication skills</td>
<td>• Neuroimmunology experience</td>
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<td>• Experience of working both independently and collaboratively.</td>
<td>• Willingness to develop new computational skills</td>
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<td>• Good organisational and time management skills.</td>
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<td>e.g. initiative, leadership, ability to work on own or with others, communication skills</td>
<td>• Curious and driven by problem-solving.</td>
<td>• Desire to actively contribute to a positive research culture</td>
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<td>• Willingness to travel for work conferences.</td>
<td>• Driven by interdisciplinary approaches to solving medical problems</td>
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<td>• Fair, open-minded and values-oriented</td>
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<td>e.g. special circumstances (if any) appropriate to the role such as unsocial hours, travelling, Gaelic language requirements etc.</td>
<td>• PhD in neuroscience, data science, bioinformatics or computational biology (or other related disciplines)</td>
<td>• Contributed to open-source version-controlled software project(s).</td>
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The University of Aberdeen is a broad based, research intensive University, and we put students at the centre of everything we do. Outstanding in a wide range of discipline areas, Aberdeen is credited for its international reach and commercialisation of research ideas into spin out companies. The University has over 16,000 matriculated students and 3,600 staff representing 130 nationalities. We encourage bold thinking, creativity and innovation, and we nurture ambition with many opportunities for professional and personal development in an inclusive learning environment which challenges and inspires.

CURRENT CONTEXT
The University continues to uphold the principals of the foundational purpose. We remain committed to delivering positive change both locally and globally. We work together and with our partners in an interdisciplinary way, catalysing world-leading research in our areas of strength: Energy Transition; Social Inclusion and Cultural Diversity; Environment and Biodiversity; Data and Artificial Intelligence; and Health, Nutrition and Wellbeing. We are investing in our future and have committed £100m to upgrading our campus, including the new fully digitised Science Teaching Hub, the regeneration of the historic King’s Quarter and a new Business School building. Our commitment to our students, campus and community has led to us being named a Top 20 UK institution in two major league tables\(^1\) and 4\(^{th}\) in the UK for overall student satisfaction\(^2\).

\(^1\) The Times and Sunday Times Good University Guide 2023 and the Guardian University Guide 2023
\(^2\) National Student Survey (NSS) 2022

Updated October 2022
ABERDEEN 2040
On our 525th anniversary as a University we launched Aberdeen 2040, our strategic vision for the next 20 years. Four strategic themes will shape our learning and discovery, underlined by 20 commitments we have made against each theme:

- **Inclusive**
  We welcome students, staff and partners from all backgrounds, organisations and communities. We value diversity.

- **Interdisciplinary**
  We innovate in education and research by generating, sharing and applying new kinds of knowledge. We learn together.

- **International**
  We connect with others and extend our networks and partnerships around the world. We think across borders.

- **Sustainable**
  We understand and nurture our environment, and take care of our resources, including our people and finances.
  
  We work responsibly.

OUR EDUCATION
Recognised as the Scottish University of the Year in the Times and Sunday Times Good University Guide 2019, we remain true to our roots as an ancient Scottish university, combining breadth and depth in our degree programmes and drawing strength from the quality of our research. Our flexible curriculum encourages students to grow as independent learners and therefore to thrive as graduates in the diverse workplaces of the future. Our education is open to all and we are setting ambitious targets to further widen access.

OUR RESEARCH
Researchers at the University of Aberdeen have been at the forefront of innovation and excellence throughout the centuries, generating insights in medicine, science, engineering, law, social sciences, arts and humanities. This research has contributed to five Nobel prizes as well as other awards such as the Queen’s Anniversary prize. Our research is intellectually rigorous working within our established areas of excellence as well as new methods of enquiry. We will continue to generate new knowledge addressing economic and societal issues with ambition and imagination, ensuring that it is globally excellent and locally relevant.

INTERNATIONAL
Aberdeen is increasing its international presence, positioning the University as a global organisation and building on established global partnerships around the world, including Qatar, China, North America, Europe. We feature in the top 50 institutions worldwide for international students³.

³ Times Higher Education World University Rankings 2021
IMPACT

In 2020 the University signed the United Nations Sustainable Development Goals accord, solidifying our commitment to developing the world in a sustainable way. In 2022 we were listed in the global Top 100 for 8 of these goals⁴.

Our highly cited work in zero-carbon technology and global outlooks makes us Scotland’s best institution for environmental research⁵.

⁴ Times Higher Education Impact Rankings 2022
⁵ QS World University Rankings 2022

Updated October 2022
The School of Medicine, Medical Sciences and Nutrition

The School (https://www.abdn.ac.uk/smmnsn/index.php) encompasses all of the disciplines that underpin today’s medicine, including biomedical sciences, health sciences, nutrition and medical, medical science and dental education and these are organised into five Institutes. The largest school in the University, the SMMSN has five Institutes: the Institute of Medical Sciences (IMS), the Institute of Applied Health Sciences (IAHS), the Rowett Institute, the Institute of Education in Healthcare and Medical Sciences (IEHMS) and the Institute of Dentistry, comprising all of our undergraduate and postgraduate programmes and our own graduate entry Dental School.

Staff are line managed and research opportunities are supported through our institutes which work together in an integrated and coordinated way to deliver research and teaching across the School, details of which can be found on their websites as below.

- The Institute of Applied Health Sciences https://www.abdn.ac.uk/iahs/
- The Institute of Medical Sciences http://www.abdn.ac.uk/ims/
- The Rowett Institute http://www.abdn.ac.uk/rowett/
- The Institute of Education in Healthcare and Medical Sciences https://www.abdn.ac.uk/IEHMS/
- The Institute of Dentistry https://www.abdn.ac.uk/dental/ https://www.abdn.ac.uk/dental/

Within the IMS, our scientists are working towards the creation of effective therapies for patients with a range of debilitating and life-threatening conditions. Current research areas include: arthritis and musculoskeletal medicine; cell developmental and cancer biology; immunity, infection and inflammation; metabolic and cardiovascular health; microbiology and translational neuroscience.

Within the IAHS, research is focused on improving health and health care delivery. It is home to a multidisciplinary grouping of around 100 university academic staff who conduct population and clinically-orientated health research and hosts the Health Services Research Unit (HSRU) and Health Economics Research Unit (HERU), both funded by the Chief Scientist’s Office (CSO) of the Scottish Government.

As well as being the organisational home to the teaching scholarship staff and responsible for oversight of the UG and PGT programmes offered by the School, the IEHMS promotes and supports excellence in medical education through research and development, with a focus on conceptually and theoretically robust research and development which has strong potential for reaching international recognition. The highly regarded University of Aberdeen MBChB programme and several postgraduate programmes including a Masters in Clinical Education are delivered by IEHMS.

The Dental Institute runs an undergraduate BDS programme and a growing suite of masters programmes for professional development.

We have a number of specialist Centres representing areas of particular research strength and capacity within the School all of which are willing to support colleagues on projects in their areas. More information is available at the following websites.
• The Centre for Healthcare Education Research and Innovation (https://www.abdn.ac.uk/cheri/)
• The Centre for Health Data Science (https://www.abdn.ac.uk/achds/)
• The Aberdeen Cardiovascular & Diabetes Centre (https://www.abdn.ac.uk/acdc/) and
• The Aberdeen Centre for Arthritis and Musculoskeletal Health (https://www.abdn.ac.uk/acamh/)

The School is home to over 800 staff and 2000fte students. It is located on the Foresterhill site, shared with our main clinical partner, NHS Grampian, with whom we work in close collaboration at primary and secondary care levels.

This is one of the largest integrated healthcare delivery, training and research sites in Europe and has rich assets including state-of-the-art academic (research and teaching) and clinical buildings. Excellent infrastructure is also provided through core facilities for biomedical science including flow cytometry, proteomics, microscopy and genome sequencing, support for data health science projects and clinical trials.

The last major academic capital development was the opening of the Rowett Institute, occupied in March 2016, whose staff undertakes nutrition research to help improve people’s lives through the prevention of ill-health and disease. Their new £40M building has provided the University of Aberdeen with a facility with unique capabilities for human nutrition and metabolic research.
Aberdeen and Aberdeenshire

Scotland’s third largest city, Aberdeen sits on the coast between the mountains of Aberdeenshire and the stunning North Sea coastline. The Aberdeen City region is a can-do place that is actively investing, at scale, in its future.

Renowned as a Global Energy Hub, Aberdeen is a vibrant, entrepreneurial region, home to a unique mix of business opportunities and specialist skills across various sectors including energy, technology, life sciences and food & drink. More than 20% of Scotland’s top businesses are located in this region which is taking great strides to ensure that it continues to compete on a world stage. Investments of more than £10 billion of public and private infrastructure is due to be delivered before 2030, marking an exciting time to be part of a genuine world-class location.

Built from sparkling local granite Aberdeen has earned the name of the Silver City. As the energy capital of Europe, Aberdeen nevertheless retains its old-fashioned charm and character making it an attractive place in which to live, work and study. Due to its global business and international energy industry credentials, Aberdeen is well served by local and national transport infrastructure with excellent rail networks that run both North and South of Scotland and the rest of the UK. It also acts as an international travel hub. Flying time to London is just over one hour with regular daily flights and serves international travel to European centres such as Amsterdam (Schiphol) and Paris (Charles de Gaulle) as well as flights to other European destinations.

The City and the surrounding countryside provide a variety of urban, seaside and country attractions. Aberdeen has first class amenities including His Majesty’s Theatre, Music Hall, Art Gallery, the P&J Arena, Museums, and Beach Leisure Centre. The City is framed by its accessible beach front which is within a short walk of the city centre and there are an array of activities available across the region such as hill walking; mountaineering; sailing; surfing; salmon, trout and sea fishing; golf; sailing; surfing and windsurfing. The surrounding countryside, known as Aberdeenshire, is also one of Scotland’s most appealing regions. Royal Deeside and the Cairngorms National Park are within easy access of the city, and there are a variety of towns and villages scattered along the coastline.

The city and the surrounding area have ranked consistently highly in nationally recognised quality of life surveys, coming out top 10 as one of the best places to live in Scotland in 2020 in the annual Bank of Scotland survey.

To find out more visit www.visitabdn.com
EQUALITY AND DIVERSITY

The University values and celebrates a diverse working and learning environment and recognises the richness this brings, both in terms of contributing to the success of the University and creating safe and inclusive cultures. The University welcomes applications from individuals with diverse lived experiences.

The University supports flexible working, including hybrid working arrangements, and has policies in place to facilitate this where it is appropriate. The policies can be found at https://www.abdn.ac.uk/staffnet/working-here/flexible-working--5607.php.

The University is committed to progressing gender equality across all its functions and has been a proud member of the Advance HE Athena Swan Charter, achieving an institutional Bronze award, one Silver departmental award for the School of Psychology and eleven departmental Bronze awards. LGBTQ+ equality is championed through the University’s membership of the Stonewall Diversity Champions Programme, where the University has achieved a Silver award in the Workplace Equality Index. The University is on a continual journey to respond to, and combat, GBV in our community and beyond. We are proud to be working towards the EmilyTest Charter, in partnership with the charity, EmilyTest. We all have a role to play in knowing how to signpost colleagues and students to support for gender-based violence, and training and support is available to all staff on this topic.

The University is signed up to Advance HE’s Race Equality Charter, affirming the University’s commitment to the Charter’s aim of improving the representation, progression and success of staff and students who identify as belonging to a racialised group. The University launched its Antiracism Strategy in 2022, representing a bold framework for progress on race equality. Recognising the importance of addressing the under-representation of racialised groups in the senior team, the University’s new Recruitment and Selection Policy embeds specific positive action measures to address this.

The University is delighted to be accredited as a Disability Confident employer and strives to ensure that disabled staff and students have the opportunity to work and study in an inclusive, accessible and supportive environment. The University’s Wellbeing Strategy commits it to progressing work to tackle stigma related to mental health and action to promote and improve health and wellbeing for staff and students. Candidates who are British Sign Language (BSL) users can contact us directly by using contact SCOTLAND-BSL.

The University’s work on equality, diversity and inclusion is supported by a range of networks and engagement activities, designed to provide safe spaces and raise awareness of the support available and the steps everyone can take to create inclusive campuses.

www.abdn.ac.uk/staffnet/governance/equality-and-diversity-277
HOW TO APPLY

Online application forms are available at www.abdn.ac.uk/jobs

The closing date for receipt of applications is **12 July 2024**

Should you wish to make an informal enquiry please contact:

Dr Eunchai Kang, Lecturer
Eunchai.kang@abdn.ac.uk

Please do not send application forms or CVs to Dr Kang

**Please quote reference number IMS285R on all correspondence**