



UNIVERSITY OF
CAMBRIDGE
Department of Radiology

Newsletter

Department of Radiology

Newsletter - Autumn 2017

Message from Professor Gilbert



I would like to welcome you back for another Academic year. Our department continues to grow in numbers and in stature. Our research output is increasing and we are developing the critical mass required to be a highly rated department. In order to ensure that we are being recognised for all our hard work it is essential that we ensure that all our work is returnable in the next REF. It is likely that all publications will be submitted so we need to ensure that everything we are publishing is uploaded to the university repository within 3 months of acceptance for publication. If you are unsure how to do this please speak to Ralph. A further area which we need to consider is Impact statements – working in medical imaging we should be able to demonstrate impact from our work. Please can I ask that each PI prepares an Impact statement.

We are looking forward to Professor Evis Sala returning to our department at the beginning of January – I know you will give her a warm welcome back. She has been heading up body imaging at Memorial Sloan Kettering in New York. We have a number of new students and staff in the department – please ensure they feel welcome and chat to them when you see them around and try to include in lunch and coffee breaks. Cambridge can be a lonely place when you are unfamiliar with the system. It would be great if everyone can come to the Christmas lunch – this is a lovely opportunity to get together and relax before the Christmas break. It is really good when we can get everyone together and really does improve working relations. The other fun evening to which everyone is invited is the Christmas quiz in the Berridge room – this free event with food is open to all staff and is organised by the registrars – they love to have as many people as possible for this team evening on Wednesday 13th December 5-6pm.

And finally a date for your diaries – Professor Tom Sherwood was the first chair of the department appointed on 1st January 1978. This was the start of the University of Cambridge Radiology Department. In order to mark the first 40 years we have decided to hold a celebratory dinner in conjunction with the EARS meeting on 21st March. Please ensure you are able to come to this important celebration of the department.

Researcher Feature: Laura Lechermann



Project: Development of ^{89}Zr Zirconium Immuno-PET for cellular imaging

Immuno-Positron Emission Tomography ('Immuno-PET') was originally introduced to image and quantify labelled monoclonal antibodies (mAbs) with PET for a better understanding of disease targets and the *in vivo* behaviour of targeted drugs. Nowadays, the term 'Immuno-PET' also applies to PET imaging and *in vivo* tracking of other targeted vehicles and carriers such as peptides, proteins, nanoparticles and cells.

Depending on the biological half-life of each vehicle, different nuclides for labelling can be chosen accordingly.

Large biomolecules (e.g. mAbs) with a long biological half-life and slow clearance require long-lived radionuclides as label for imaging, whereas small molecules, peptides, proteins and small antibody fragments (e.g. nanobodies, affibodies and affimers) can be conveniently labelled with ^{68}Ga ($t_{1/2} = 68$ min) and ^{18}F ($t_{1/2} = 109$ min). Due to its favourable physical characteristics the PET isotope ^{89}Zr ($t_{1/2} = 78.4$ h) has emerged as a promising and suitable isotope within the last decade to image processes with longer pharmacokinetics. ^{89}Zr has had successful applications in antibody labelling for immuno-PET imaging in humans (e.g. ^{89}Zr -Trastuzumab for HER2 positive Breast Cancer and ^{89}Zr -Nivolumab for immune checkpoint inhibition) and is ideally suited for cell trafficking.

Dendritic cell vaccines and adoptive transfer of activated *ex vivo* expanded cells have proven effective in a variety of settings. The emergence of genetically engineered T cells expressing chimeric antigen receptors (CAR T-cells), together with modulations of immune checkpoints have brought the rapidly advancing field of Immunotherapy into a new, revolutionary spotlight with a renewed interest in cell-based therapies. This is undermined by the recent FDA approval of CAR T-cells as a type of immunotherapy (August 2017).

Clinically applicable imaging technologies for the *in vivo* tracking of administered cells is crucial for an improved understanding of pharmacokinetics and pharmacodynamics. Moreover, gaining longitudinal information about the migration of cells can greatly help in the development and clinical efficacy of cell-based cancer immunotherapies and cellular therapies in general (e.g. stem cell therapy). Methods to monitor and image cells clinically are currently limited.

The two single photon emission computed tomography (SPECT) tracer ^{111}In -Oxine and $^{99\text{m}}\text{Tc}$ -HMPAO have been used for labelling and imaging of patient's own autologous white blood cells to detect sites of infection and inflammation since the 1970s and 1980s, respectively. However, no PET based approach, that would offer superior quantification and imaging sensitivity characteristics over a SPECT-based approach, has made it into the clinic so far.

^{89}Zr -Oxine, the PET analogue to ^{111}In -Oxine, has recently been used in preclinical settings for cell labelling and tracking and highlights the potential and clinical applicability of ^{89}Zr in the future.

My project under the supervision of Dr. Ferdia Gallagher, co-supervised by Prof. Franklin Aighbirhio, investigates cellular labelling and imaging with ^{89}Zr (' ^{89}Zr -Immuno-PET'). ^{89}Zr has not been used in the clinic and for research in Cambridge, which is why setting up ^{89}Zr -Immuno-PET for my project was one of the major tasks since I started. I set up my cell labelling study including new ethics and a lab for my work. This also included investigating the logistics, e.g. transport of radioactivity, equipment planning and addressing all necessary radiation safety issues which had to be partly created from scratch. For cell labelling experiments I vastly developed my biological skills and started cell culture with human peripheral blood mononuclear cells (PBMCs) and other leukocyte subpopulations that we want to label and image in the future. We closely collaborate with Guus van Dongen and Danielle Vugts, amongst others, at the University Medical Center in Amsterdam (VUMC) who have been a great support and experienced source of know-how for my project set-up. I labelled two antibodies, Nivolumab and Rituximab, with ^{89}Zr and performed several chemical syntheses at the VUMC as a preparation for my future work.

Unlike most other department members, I am a chemist and I have a passion for metal- and complex chemistry. I studied Chemistry (B.Sc.) and Radiopharmaceutical Chemistry (M.Sc.) where I found my way into Cancer Research by applying this kind of chemistry to Molecular Imaging. Most of my post-graduate research during my Master's degree was dedicated to the synthesis of small molecule inhibitors of the prostate specific membrane antigen (PSMA). I labelled and preclinically evaluated two PSMA inhibitors with ^{64}Cu at the Peter MacCallum Cancer Centre in Melbourne and at the University of Melbourne where I also worked with ^{68}Ga . Following to that, I worked on a short research project about live cell fluorescent imaging to investigate intracellular processes in different contexts and with various key questions. I am now glad to be able to combine both my previous radiochemistry and cell biology experience within my PhD project in Cambridge and at the same time to have the chance to learn many new things by working multidisciplinary.

I am more than eager to help wherever I can! If there are any chemistry questions – do not hesitate to come and talk to me!

Department News

Professor Fiona Gilbert - Great Shogun!

Professor Fiona Gilbert was made a Great Shogun at the Annual Scottish Samurai awards in recognition for her services to medicine and promotion of Scottish Japanese alliance. Professor Gilbert has been an invited lecturer at the Japanese Radiological Society and has sent several medical students for electives to Japan.

Through the Anglo-Japanese Radiological Society she has visited Japan and has organised visits for Japanese radiologists to Cambridge as well as sending Drs Fleur Kilburn-Toppin, Penelope Moyle, Judith Babar, Tristan Barrett to lecture in Tokyo and at the annual Japanese Radiology meeting.



Approval for the PhD Degree

We are delighted to confirm that the Board of Graduate Studies, on the recommendation of the Degree Committee, have agreed to approve **Jianmin Yuan's** PhD Degree.

Recent Awards

Professor Gilbert has been awarded an EU Horizon 2020 – Societal Challenges (EUR 628,434) grant for the study entitled “Randomized Comparison Of Risk-Stratified versus Standard Breast Cancer Screening in European Women Aged 40-74 (MyPEBS)”. MyPEBS is a really international consortium, which will conduct for the first time ever, a cancer screening trial in 5 countries in Europe and Israel (Italy, Belgium, UK, Israel and France), with the support of scientists from Netherlands and USA.

Dr Joshua Kaggie, in collaboration with the Department of Surgery, has been awarded EC2020 funding for the project entitled “NanoSTARs imaging for STEM cell therapy for arthritic joints”. STARSTEM will develop, validate and demonstrate a novel nanotechnology enhanced optoacoustic imaging (OAI) platform for regenerative medicine.

Dr Zhongzhao Teng, in collaboration with the Department of Engineering, has been awarded EOSRC funding for the project entitled “A technique to measure the strength and stiffness of soft biological tissues”.

Mr James Grist won the Best Presentation Prize at the British Chapter of ISMRM in Liverpool.

Dr Oshaani Abeyakoon has been awarded the student travel award for RSNA for having one of the highest rated abstracts.

Jianmin Yuan was shortlisted for a 2017 Young Investigator Award at ESMRMB Congress 2017 in Barcelona in October, and was awarded the third place prize.

Dr Fulvio Zaccagna was awarded the "RSNA student travel award" to present the abstract “SSQ15-02: CT Texture of Carotid Arteries identifies Vulnerable Plaque in Stroke and Transient Ischaemic Attack: A Preliminary Outcome Study” at RSNA 2017.

New Arrivals

Welcome our new Phd Students joining our department!



Dr Rafael Rehwald

Supervised by Professor Jonathan Gillard
Development of new imaging techniques and diagnostic criteria in vascular imaging.



Chang Sun

Supervised by Professor Jonathan Gillard
Risk assessment of human atherosclerotic plaque with 3D finite element analysis and imaging



Stephan Ursprung

Supervised by Dr Ferdia Gallagher
Development of clinical applications of functional and molecular imaging techniques in cancer.



Gabrielle Baxter

Supervised by Professor Fiona Gilbert
Functional PET/MR in triple-negative or BRCA mutation breast cancer



Dr Sally Andrews

Supervised by Professor Fiona Gilbert and Dr Pat Set
An evaluation of dental development in UK subjects of diverse ancestry

Please welcome our new department staff!

Our two new Clinical Lecturers:



Dr Karen Eley



Dr Eva Serrao

Our new PA to Head of Department



Debbie Cartwright

And new IT and Admin Assistant



Carlos Coutinho

Joining us as new Research Technicians on the Hyperpolariser Project:



Brian White



Ashley Grimmer



Emma Ward

Please welcome the new Radiology Registrars joining us in 2017



Tarini Ratneswaren



Janice Lee



Holly Christopher



Maria Pantelidou



Dexter Valencia

And extend a warm Radiology welcome the ESOR Students working with the department



Dr Heike Preibsch

working with Dr Ruchi Sinnatamby
in Breast Radiology



Dr Enrico Boninsegna

working with Dr Ed Godfrey
in Abdominal Radiology



Dr Lorenzo Carlo Pescatori

working with Dr Miltiadis Krokidis
in Interventional Radiology



Dr Dorota Czyzewska

working with Dr Tristan Barrett
in Urogenital Radiology

Research Updates

Update on some of the impact of Dr Teng's research from Department of Radiology



The award ceremony of TENOKE in the China-UK HiSTAR Innovation & Entrepreneurship Competition.

Dr Zhongzhao Teng is a Senior Research Associate leading the biomedical engineering group in the Department of Radiology. In 2016, Dr Teng and Ms Jinhua (Elyn) Shen founded TENOKE, LTD to vascular health management including stroke prevention and aneurysm monitoring by using the combination of multi modalities in vivo imaging and analyses. The mission of TENOKE is to provide researchers with high quality in vivo imaging data acquired using cutting-edge techniques to investigate factors that determine the occurrence of cardiovascular risks with personal omics profile, daily activities and environment with the aim to provide an optimal personalized management strategy for individuals who are in a higher risk of experiencing cardiovascular events.

The company has won the following prizes in 2016:

Cambridge University Entrepreneurs £1K competition, Mar 2016.

Winner of Cambridge University Entrepreneurs Grand Final £5k, May 2016, Cambridge, UK, May 2016 (560 teams).

Won 1st place with £50k cash prize during China-UK HiSTAR Innovation & Entrepreneurship Competition, London, UK, Aug 2016 (over 200 teams).

Selected by MassChallenge Acceleration Program, London, UK, Sept 2016 (1,268 teams).

As reported in the Cardiovascular Disease Statistics 2014, British Heart Foundation (BHF), in 2012, cardiovascular diseases (CVD) caused 28% of all deaths in the UK. In 2014, the UK faced a total cost of £15.4 billion from CVD, equivalent to 1.4% of GDP. The prevalence of cardiovascular disease is more prominent in China. According to the recent Report on Cardiovascular Diseases in China 2014, issued by National Center for Cardiovascular Diseases, China, CVD is responsible for over 40% of total deaths. By 2020, heart disease and stroke will continue to be the leading causes of death and disability with the number of fatalities projected to increase 37% by 2030.

It is therefore a call to the responsibility of all of us as individuals, as scientists, as physicians, as entrepreneurs, and as members of various societies, to fight together against CVD to keep our hearts beating and to end strokes.

With TENOKE, Dr Teng and Ms Shen are hoping to tackle this social challenge through continuous innovation and development. TENOKE and Jingsan aim to harness the strengths of UK and China in healthcare for a sustainable development for both nations and the rest of counties in the world.



The certificate of the winner of Cambridge University Entrepreneurs (CUE) Grand Final 2016

Recent Publications - August - October 2017

Addley H, Moyle P, Freeman S. Diffusion-weighted imaging in gynaecological malignancy. *Clin Radiol*. 2017 Aug 22; <http://www.sciencedirect.com/science/article/pii/S0009926017303896?via%3Dihub>

Casey RT, Challis BG, Marker A, Pitfield D, Cheow HK, Shaw A, et al. A case of a metastatic SDHA mutated paraganglioma re-presenting twenty-three years after initial surgery. *Endocr Relat Cancer*. 2017 Aug;24(8):L69–71.

<http://erc.endocrinology-journals.org/content/24/8/L69>

Challis BG, Powlson AS, Casey RT, Pearson C, Lam B, Ma M, et al. Adult-onset hyperinsulinaemic hypoglycaemia in clinical practice: diagnosis, aetiology and management. *Endocr Connect*. 2017 Aug 7;

<http://www.endocrineconnections.com/content/6/7/540>

Gallagher FA, Daniels CJ. Unsupervised Segmentation of 5D Hyperpolarized Carbon-13 MRI Data Using a Fuzzy Markov Random Field Model. *IEEE Trans Med Imaging*. 2017 Sep 4;

<http://ieeexplore.ieee.org/document/8025597/>

Hansen NL, Koo BC, Warren AY, Kastner C, Barrett T. Sub-differentiating equivocal PI-RADS-3 lesions in multiparametric magnetic resonance imaging of the prostate to improve cancer detection. *European Journal of Radiology*. 2017 Oct 1;95:307–13.

<http://www.sciencedirect.com/science/article/pii/S0720048X17303364>

Higgins JNP, Pickard JD, Lever AML. Chronic fatigue syndrome and idiopathic intracranial hypertension: Different manifestations of the same disorder of intracranial pressure? *Med Hypotheses*. 2017 Aug;105:6–9.

<http://www.sciencedirect.com/science/article/pii/S0306987717304188?via%3Dihub>

Murphy IG, Mitchell EL, Raso-Barnett L, Godfrey AL, Godfrey EM. Imaging features of myeloproliferative neoplasms. *Clin Radiol*. 2017 Oct;72(10):801–9.

<http://www.sciencedirect.com/science/article/pii/S0009926017302064?via%3Dihub>

Sampaziotis F, Justin AW, Tysoe OC, Sawiak S, Godfrey EM, Upponi SS, et al. Reconstruction of the mouse extrahepatic biliary tree using primary human extrahepatic cholangiocyte organoids. *Nat Med*. 2017 Aug;23(8):954–63.

<http://www.nature.com/nm/journal/v23/n8/full/nm.4360.html?foxtrotcallback=true>

Slough RA, Caglic I, Hansen NL, Patterson AJ, Barrett T. Effect of hyoscine butylbromide on prostate multiparametric MRI anatomical and functional image quality. *Clinical Radiology* [Internet]. 2017 Aug 10; Available from:

<http://www.sciencedirect.com/science/article/pii/S0009926017303884>

Soon WC, Fountain DM, Koczyk K, Abdulla M, Giri S, Allinson K, et al. Correlation of volumetric growth and histological grade in 50 meningiomas. *Acta Neurochir (Wien)* [Internet]. 2017 Aug 9; Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/28791500>

Warren LM, Halling-Brown MD, Looney PT, Dance DR, Wallis MG, Given-Wilson RM, et al. Image processing can cause some malignant soft-tissue lesions to be missed in digital mammography images. *Clin Radiol*. 2017 Sep;72(9):799.e1-799.e8.

<https://www.ncbi.nlm.nih.gov/pubmed/28457521>

Upcoming Events

EARS Meeting and Department of Radiology 40th Anniversary

Save the Date!

The next East Anglian Radiological Society meeting is taking place on 21st March 2018 and will also incorporate the celebration of the 40th Anniversary of the Department of Radiology!

We are diligently working on bringing excellent speakers, as well as leaders in the field to explore important topics in Radiology.

Wednesday Forums

Date	Speaker and Title
1 st November	Dr Fiona Walter - "Primary care cancer research in Cambridge"
8th November	Professor Ronald L. Eisenberg, MD - 'Radiology: Challenging Conventional Wisdom'
15th November	ESOR Scholars Reports

Radiology Research Seminars

These research-focused seminars are regularly advertised in advance, take place on Mondays at noon and include a pizza lunch.

CHRISTMAS LUNCH

Our department Christmas lunch will be the 19th of December at Strada Restaurant.

There is a £10 deposit required. Please contact Debbie Cartwright for more information.

Department Website

In every newsletter, we will be requesting that all department members – **including students** - do three things for us:

1 – Please ensure that your Symplectic account is up to date. We pull publication data for the website using this database, so to make sure your publications are up to date on the website, this account must be up to date.

2 – Please send us any news or information about the projects you're working on! We want to publicise the department's achievements as much as possible, and get your names out there.

It goes without saying that it is essential in the current academic market to promote your work, and we want to help you do that!

OPEN ACCESS UPDATE

As you all know, since HEFCE's policy change, in order for any publications to be eligible for the REF they must be made Open Access. We want to make sure that as a department we are 100% compliant.

The university has a team in place dedicated to making sure this process is as simple as possible and has now linked Open Access with Symplectic Elements so that publication data will be filled automatically from databases.

When a journal accepts your paper for publication, upload it through [Symplectic](#) before you sign any copyright or Open Access agreements.

See this page for more information on how to submit accepted publications: <http://osc.cam.ac.uk/open-research/symplectic-elements-deposit-pilot/depositing-articles-symplectic-elements>

You can also contact the open access team directly at: info@openaccess.cam.ac.uk

Open Access FAQs

- **If I am not the first or last author do I still need to submit?**

If the first author is in our department → ask them to submit.

If they are in another Cambridge department and you have access to the accepted manuscript → please submit it anyway.

If you are the only Cambridge author → please submit if possible.

The bottom line is to have as many of our publications be eligible for the REF as possible. The Clinical School evaluates us on our compliance levels, and this reflects on both the department and the University.

- **When do I submit to/contact the Open Access Team?**

As soon as the paper is **ACCEPTED**. This is because the Open Access Team will want to support you in making sure the publication is published under the correct Open Access license, and this needs to happen during the initial negotiations, before you have signed the publisher agreement.

The acceptance date is also how compliance with the HEFCE policy is determined.

Feedback

We are currently working hard to improve communication and development within the department, and a big part of that work requires feedback from you. We are open to hearing any feedback or suggestions you have. If you'd like to provide feedback on anything department related, in addition to coming to see us, you can now provide it through a feedback form located on the Internal website via this link:

<http://radiology.medschl.cam.ac.uk/internal/feedback/>

We want to hear from all of you in relation to achievements, updates, news and any information you would like to share with the Department.