

## RESEARCH REPORT FOR THE RESEARCH OVERSIGHT BOARD

**Your report will form part of the NNUH's annual review of research activities. The annual review looks at research outputs and importantly the benefits of research that led to change in clinical practice or benefits to patients. The information provided will be collated and used to generate information for dissemination across the NNUH and externally.**

**Your input is important and much appreciated.**

**Does this form contain confidential information NO**

(delete as appropriate), if Yes indicate the confidential information

Specialty Area:	<b>Radiology</b>
Report Completed by:	<b>Dr Tom Turmezei</b>
Reporting Period:	January 2019 – December 2019 inclusive

### **Number of Non CRN Funded Staff within the Department (hospital employed):**

Dr James MacKay has 50% WTE academic time funded by UEA  
 Dr Gabriella Baio has 50% WTE academic time jointly funded by UEA and NNUH  
 Dr Samantha Low had 25% WTE academic time funded by UEA in the first half of 2019  
 Dr Tom Turmezei has 2 SPAs allocated to research and research management  
 Dr Paul Malcolm has 0.5 SPA allocated to research and research management  
 Dr Tim Ariyanayagam had 100% WTE salary support for undertaking his MD in the first half of 2019

### **Specific Areas of Research Interest within the Department:**

Multiparametric prostate MRI  
 3D imaging analysis of CT and MRI in musculoskeletal disease  
 Artificial intelligence in breast imaging  
 Metal-on-metal prosthesis imaging  
 Renal tumour cryoablation  
 Spinal cement augmentation and tumour ablation  
 Body compartment fat imaging with MRI  
 MRI of bowel motility  
 Multiparametric MRI of skeletal muscle  
 Imaging for early phase clinical trials  
 Advanced imaging of osteoarthritis

### **List of Peer Review Publications during the 2019 calendar year (only include original peer reviews and guidelines, systematic reviews, not abstracts)**

1. Dhillon B, Morrow D, Lewis M, Ali T. Abdominal Aortic Aneurysm with Aortocaval Fistula-Staged Endovascular Management. *J Vasc Interv Radiol.* 2019 Oct;30(10):1608-1609. doi: 10.1016/j.jvir.2019.02.005. No abstract available. PubMed [citation] PMID: 31547924

2. Sanmugalingam N, Rault MEG, Toms AP. Normal variations in position and relations

of the median nerve in the carpal tunnel: A cross-sectional observational study using clinical magnetic resonance imaging. *Clin Anat.* 2019 Aug 24. doi: 10.1002/ca.23458. [Epub ahead of print] PubMed [citation] PMID: 31444813

3. Alves Pereira FD, Hickson ML, Wilson PAJ. Case 268: Bilateral Adrenal Hemorrhage in the Context of Sepsis. *Radiology.* 2019 Aug;292(2):503-506. doi: 10.1148/radiol.2019170489. PubMed [citation] PMID: 31318655

4. Merinopoulos D, Saada J, Jones C, Mukhtyar C. Pattern recognition is a sequential process-accurate diagnosis and treatment 20 years after presentation. *Oxf Med Case Reports.* 2019 Jul 5;2019(7):omz058. doi: 10.1093/omcr/omz058. eCollection 2019 Jul. PubMed [citation] PMID: 31293788, PMCID: PMC6611498

5. Barrett T, Slough R, Sushentsev N, Shaida N, Koo BC, Caglic I, Kozlov V, Warren AY, Thankappannair V, Pinnock C, Shah N, Saeb-Parsy K, Gnanapragasam VJ, Sala E, Kastner C. Three-year experience of a dedicated prostate mpMRI pre-biopsy programme and effect on timed cancer diagnostic pathways. *Clin Radiol.* 2019 Nov;74(11):894.e1-894.e9. doi: 10.1016/j.crad.2019.06.004. Epub 2019 Jul 6. PubMed [citation] PMID: 31288924

6. Caglic I, Kovac V, Barrett T. Multiparametric MRI - local staging of prostate cancer and beyond. *Radiol Oncol.* 2019 May 8;53(2):159-170. doi: 10.2478/raon-2019-0021. PubMed [citation] PMID: 31103999, PMCID: PMC6572496

7. Moussa A, Syed AE, Farghal A, Toms AP. Paravertebral Collateral Arteries in Patients with Carotid Stenosis: Is There a Safe Space for Transforaminal Cervical Nerve Root Injections? *Cardiovasc Intervent Radiol.* 2019 Oct;42(10):1429-1433. doi: 10.1007/s00270-019-02240-7. Epub 2019 May 17. PubMed [citation] PMID: 31101951

8. Taylor SA, Mallett S, Beare S, Bhatnagar G, Blunt D, Boavida P, Bridgewater J, Clarke CS, Duggan M, Ellis S, Glynne-Jones R, Goh V, Groves AM, Hameeduddin A, Janes SM, Johnston EW, Koh DM, Miles A, Morris S, Morton A, Navani N, O'Donohue J, et al. Diagnostic accuracy of whole-body MRI versus standard imaging pathways for metastatic disease in newly diagnosed colorectal cancer: the prospective Streamline C trial. *Lancet Gastroenterol Hepatol.* 2019 Jul;4(7):529-537. doi: 10.1016/S2468-1253(19)30056-1. Epub 2019 May 9. PubMed [citation] PMID: 31080095, PMCID: PMC6547166

9. Taylor SA, Mallett S, Ball S, Beare S, Bhatnagar G, Bhowmik A, Boavida P, Bridgewater J, Clarke CS, Duggan M, Ellis S, Glynne-Jones R, Goh V, Groves AM, Hameeduddin A, Janes SM, Johnston EW, Koh DM, Lock S, Miles A, Morris S, Morton A, et al. Diagnostic accuracy of whole-body MRI versus standard imaging pathways for metastatic disease in newly diagnosed non-small-cell lung cancer: the prospective Streamline L trial. *Lancet Respir Med.* 2019 Jun;7(6):523-532. doi: 10.1016/S2213-2600(19)30090-6. Epub 2019 May 9. PubMed [citation] PMID: 31080129, PMCID: PMC6529610

10. Bray TJP, Jones A, Bennett AN, Conaghan PG, Grainger A, Hodgson R, Hutchinson C, Leandro M, Mandl P, McGonagle D, O'Connor P, Sengupta R, Thomas M, Toms A, Winn N, Hall-Craggs MA, Marzo-Ortega H, Machado PM; British Society of Spondyloarthritis (BRITSpA).. Recommendations for acquisition and interpretation

of MRI of the spine and sacroiliac joints in the diagnosis of axial spondyloarthritis in the UK. *Rheumatology (Oxford)*. 2019 Oct 1;58(10):1831-1838. doi: 10.1093/rheumatology/kez173. PubMed [citation] PMID: 31046100

11. Culpan G, Culpan AM, Docherty P, Denton E. Radiographer reporting: A literature review to support cancer workforce planning in England. *Radiography (Lond)*. 2019 May;25(2):155-163. doi: 10.1016/j.radi.2019.02.010. Epub 2019 Mar 14. Review. PubMed [citation] PMID: 30955689

12. Alves Pereira FD, Hickson ML, Wilson PAJ. Case 268. *Radiology*. 2019 Apr;291(1):259-260. doi: 10.1148/radiol.2019170367. PubMed [citation] PMID: 30897044

13. Caglic I, Povalej Brzan P, Warren AY, Bratt O, Shah N, Barrett T. Defining the incremental value of 3D T2-weighted imaging in the assessment of prostate cancer extracapsular extension. *Eur Radiol*. 2019 Oct;29(10):5488-5497. doi: 10.1007/s00330-019-06070-6. Epub 2019 Mar 18. PubMed [citation] PMID: 30887192, PMCID: PMC6719333

14. Low SBL, Toms AP. Calcification of the linea aspera: A systematic narrative review. *Eur J Radiol Open*. 2019 Feb 15;6:101-105. doi: 10.1016/j.ejro.2018.12.002. eCollection 2019. Review. PubMed [citation] PMID: 30815518, PMCID: PMC6378843

15. Khan R, Hussain Z, Bari V, Fiaz AB. Safety of Percutaneous Transhepatic Biliary Stenting in Patients with Obstructive Jaundice. *J Coll Physicians Surg Pak*. 2019 Jan;29(1):24-28. doi: 10.29271/jcpsp.2019.01.24. PubMed [citation] PMID: 30630564

16. Barbara RR, Pawaroo D, Beadsmoore C, Hujairi N, Newman D. Parotid incidentalomas on positron emission tomography: what is their clinical significance? *Nucl Med Commun*. 2019 Mar;40(3):264-269. doi: 10.1097/MNM.0000000000000961. PubMed [citation] PMID: 30614921

17. Caglic I, Barrett T. Optimising prostate mpMRI: prepare for success. *Clin Radiol*. 2019 Nov;74(11):831-840. doi: 10.1016/j.crad.2018.12.003. Epub 2019 Jan 2. Review. PubMed [citation] PMID: 30611559

18. Ariyanayagam T, Drinkwater K, Cozens N, Howlett D, Malcolm P. UK national audit of safety checks for radiology interventions. *Br J Radiol*. 2019 Feb;92(1094):20180637. doi: 10.1259/bjr.20180637. Epub 2018 Nov 30. PubMed [citation] PMID: 30495979, PMCID: PMC6404821

19. Salimin L, Barber F, Limbada M, Khalil O, Williams S. Acute ICH in patients identified as being treated with either warfarin or direct-acting oral anticoagulant agents (DOACs) from a radiology perspective; a cross-sectional observational of 2359 emergency CT head studies. *Clin Radiol*. 2019 Dec 22. pii: S0009-9260(19)30652-X. doi: 10.1016/j.crad.2019.11.007. [Epub ahead of print] PubMed PMID: 31875831.

20. Price LL, Harkey MS, Ward RJ, MacKay JW, ...Driban JB 'Role of Magnetic Resonance Imaging in Classifying Individuals Who Will Develop Accelerated Radiographic Knee Osteoarthritis' *J Orthop Res* 2019 Epub ahead of print. doi: 10.1002/jor.24413

21. Davis JE, Harkey MS, Ward RJ, MacKay JW,...Driban JB 'Accelerated knee osteoarthritis is associated with pre-radiographic degeneration of the extensor mechanism and cruciate ligaments: data from the Osteoarthritis Initiative' *BMC Musculoskeletal Disorders* 2019;20(1):308

22. Jayaram PR, Sun J, Coombes E, MacKay JW,...Toms AP 'Primary care referral for knee MRI in the United Kingdom: Association with demography and subsequent surgical intervention' *Journal of Magnetic Resonance Imaging* 2019 Epub ahead of Print. doi: 10.1002/jmri.26560

23. Driban JB, Davis JE, Lu B, Price LL, Ward RJ, MacKay JW, ... McAlindon TE 'Accelerated Knee Osteoarthritis is Characterized by Destabilizing Meniscal Tears and Pre-Radiographic Structural Disease Burden'. *Arthritis Rheumatol* 2019;71(7):1089-1100. Cover article.

**List of presentations at which research plans / findings have been disseminated during the 2019 calendar year (Include only key activities such as plenary lectures, invited seminars, presentations to patient groups or charity support groups)**

**Conference scientific oral presentations**

Dr Tom Turmezei "3D structural parameters predict future total hip replacement better than current 2D radiographic standards : an AGES-Reykjavik study" International Workshop on Osteoarthritis Imaging, Prince Edward Island, Canada, June 2019.

MacKay JW, Turmezei TD, Sanaei F...Gilbert FJ 'Utility of Magnetic Resonance Imaging Quantitative Biomarkers for Experimental Medicine Studies of Knee OA' International Workshop on Osteoarthritis Imaging, Prince Edward Island, Canada, June 2019.

**Conference scientific poster presentations**

Dr Tom Turmezei "Multiparametric 3D imaging of the knee using standing CT data from the Multicenter Osteoarthritis Study" International Workshop on Osteoarthritis Imaging, Prince Edward Island, Canada, June 2019.

Drs Samantha Low and Tom Turmezei "3D Joint Space Mapping of the Knee: a Feasibility Study with Standing CT Data from the Multicenter Osteoarthritis Study" International Workshop on Osteoarthritis Imaging, Prince Edward Island, Canada, June 2019 and the Osteoarthritis Research Society International Annual Congress, Toronto, Canada, May 2019.

Dr Tom Turmezei "3D structural parameters predict future total hip replacement better than current 2D radiographic standards : an AGES-Reykjavik study" Osteoarthritis Research Society International Annual Congress, Toronto, Canada, May 2019.

Drs Jennifer Ross, Fatima Alves Pereira, Aziekah Fiaz, Iztok Caglic, & Paul Malcolm "Zinner Syndrome: The range of clinical presentations and use of different imaging methods to aid diagnosis" European Congress of Radiology, Vienna, Austria, March 2019.

Drs Zosia Rodak & Paul Malcolm "Speeding the Pathway for GP CT renal tracts" Clinical Radiology Audit Forum, London, UK, May 2019.

Dr Paul Malcolm "Using a conditional Generative Adversarial Network (cGAN) for Prostate Segmentation" Conference on Medical Image Understanding and Analysis, Liverpool, UK, July 2019

MacKay JW, Watkins LE, Kogan F,...Gold GE 'Imaging of bone-synovium interactions using dynamic contrast-enhanced MRI and sodium fluoride PET' International Workshop on Osteoarthritis Imaging,

Prince Edward Island, Canada, June 2019

MacKay JW, Turmezei TD, Kaggie J et al 'Cartilage Imaging for Experimental Medicine Studies: Detection of changes in short duration, small  $n$  studies using 3D Cartilage Surface Mapping' Osteoarthritis Research Society International Annual Congress, Toronto, Canada, May 2019.

Harkey MS, Davis JE, Lu B,...MacKay JW et al 'Novel composite knee structure metrics of disease activity and cumulative damage predict the development of accelerated knee osteoarthritis: data from the Osteoarthritis Initiative' Osteoarthritis Research Society International Annual Congress, Toronto, Canada, May 2019.

Harkey MS, Davis JE, Lu B,...MacKay JW et al 'Diffuse tibiofemoral cartilage change prior to the development of accelerated knee osteoarthritis: data from the Osteoarthritis Initiative' Osteoarthritis Research Society International Annual Congress, Toronto, Canada, May 2019.

Kessler DA, Kaggie J, MacKay JW et al 'Quantitative MR relaxation imaging of cartilage compositional response to exercise' International Society for Magnetic Resonance in Medicine Annual Meeting, Montreal, May 2019.

Kessler DA, Kaggie J, MacKay JW et al 'Automated Knee MRI Sematic Segmentation with Generative Adversarial Networks' International Society for Magnetic Resonance in Medicine Annual Meeting, Montreal, May 2019.

Adusumilli G, Kaggie J, D'Amore S,...MacKay JW et al 'Improving the Quantitative Classification of Erlenmeyer Flask Deformities' International Society for Magnetic Resonance in Medicine Annual Meeting, Montreal, May 2019.

Patterson I, Kaggie J, MacKay JW et al 'Fat/Water Imaging with IDEAL technique for Bone Marrow Analysis' International Society for Magnetic Resonance in Medicine Annual Meeting, Montreal, May 2019.

Ranmuthu CDS, MacKay JW, Kessler DA et al 'Compositional imaging of the cruciate ligaments: Comparison between mild-to-moderate osteoarthritis and healthy controls' British Association for Surgery of the Knee, Brighton, March 2019

Harkey MS, Davis JE, Lu B,...MacKay JW et al 'Changes in Novel Composite Scores of Disease Activity and Cumulative Damage are Prognostic of Accelerated Knee Osteoarthritis: Data from the Osteoarthritis Initiative' American College of Rheumatology Annual Meeting, Atlanta, November 2019

Ranmuthu CDS, Kessler DA, Kaggie J, MacKay JW, McDonnell S 'Quantitative regional compositional analysis of human ACL and PCL using advanced MRI in health and disease: a new biomarker for studying ACL biology and repair' International Cartilage Repair Society, Vancouver, October 2019

#### **Invited lectures**

Dr Stuart Williams "Better Living Through Radiology - Optimism, Evidence and Exhaustion" BIR Trainees Day, London, December 2019.

Dr Tom Turmezei "Meniscal tears, degeneration and normal variants" BIR East of England Musculoskeletal Radiology Branch, October 2019

Dr Tom Turmezei "Back to Basics: Musculoskeletal Quiz" BIR Annual Congress, London, November 2019

Dr Tom Marshall "Bone biopsies: Tips and tricks" BIR East of England Musculoskeletal Radiology Branch, October 2019

Prof. Andoni Toms "Labroligamentous injuries of the shoulder" BIR East of England Musculoskeletal



Radiology Branch, October 2019

Dr Paul Malcolm, Faculty Speaker, Multidisciplinary Prostate Course and MRI Workshop, Riyadh, Saudi Arabia, November 2019

Dr James MacKay 'Development and validation of 3D cartilage surface mapping' APPROACH consortium annual project meeting, A Coruña, November 2019. Keynote speaker.

Dr James MacKay 'Compositional MRI techniques for cartilage assessment -where are we and where are we headed?' European Orthopaedic Research Society Annual Meeting, Maastricht, November 2019

Dr James MacKay 'Does cartilage compositional imaging have a role in defining early OA?' Osteoarthritis Research Society International Annual Congress, Toronto, Canada, May 2019.

**New websites / pages (give link)**

N/A

**New external funding (eg grants, commercial)**

Dr Tom Turmezei was awarded £18k for an independent research project developing AI segmentation and 3D joint space mapping of the knee joint from Action Arthritis and the Gwen Fish Trust (a further £9k has been applied for to the NMEDERT charity)

Dr Tom Marshall received £15k from Medtronic for collating baseline and outcome clinical data on all kyphoplasty procedure performed at NNUH in the last 2 years.

Dr Mark Lewis is PI for the commercial study *A Multicenter Observational Registry to Develop Ablation Parameter Guidance for Microwave Liver Ablation of Soft Tissue Lesions* sponsored by NeuWave Medical Inc.

**Changes in clinical practice / guidelines or benefit to patients that have occurred where those changes have been brought about by research**

*If you have already sent this to Jenny Longmore in response to evidence of impact in relation to CQC then we will copy this in for you*

**New intellectual property (eg patents, licences, databases) include any conversations you have had with technology transfer offices, attorneys, Health Enterprise East etc**

N/A

**Professional development**

**MSc, MD, PhD or other degrees (name the person and indicate if awarded or commenced this year)**

Dr Gabriella Baio was awarded her PhD from the University of East Anglia

Dr Rachael Forton (radiographer) was awarded her PhD from the University of Bradford

Dr Tim Ariyanayagam has viva'd for his MD and received minor corrections (to be submitted)

Dr Jamie MacKay was awarded his PhD from the University of Cambridge

**Promotions / new roles (related to research, research management or research driven change)**

Dr Tom Turmezei sat on the NNUH Research Oversight Board in 2019

Dr James MacKay was appointed an Academic Clinical Lecturer in Radiology in 2019

**Positions of responsibility eg journal editor, strategy/review boards**

Dr Tom Turmezei sits on the Royal College of Radiologists Academic Committee

Dr Tom Turmezei is a scientific advisory board member of the International Society of Osteoarthritis Imaging

Dr Tom Turmezei is the chair of OCTA-Research, an international focus group on the use of computed tomography in Osteoarthritis research

Dr Tom Turmezei is Imaging Editor for *Gray's Anatomy 42<sup>nd</sup> edition*

Dr Tom Turmezei is co-editor for the *Imaging Atlas of Human Anatomy 6<sup>th</sup> edition*

Dr James MacKay is a scientific advisory board member of the International Society of Osteoarthritis Imaging

Dr James MacKay is musculoskeletal section editor for the *European Radiology* journal

Dr James MacKay is a member of OCTA-Research.

Dr James MacKay was the Young Investigator member of the 2019 International Workshop on Osteoarthritis Imaging organisational committee

Dr James MacKay sits on the musculoskeletal MRI medical advisory board for GE Healthcare

Dr James MacKay provides consultancy services to GlaxoSmithKline

Dr Paul Malcolm sits on the Prostate Cancer UK training group for multiparametric MRI

Dr Hameed Rafiee is the editor for *Chapman & Nakielny's Aids to Radiological Differential Diagnosis 7<sup>th</sup> Edition*

Dr Stuart Williams is a member of the scientific advisory board of *European Radiology* journal

Dr Stuart Williams is a member of the NICE Technology Appraisal Committee B

Dr Paul Malcom is a chapter editor, Ch .20 *Registration of Facial and Medical Images Groupwise Non-Rigid Image Alignment Using Few Parameters, Human-Computer Interfaces and New Modes of Interactivity*

Dr Nathan Chan is the national chair of the new RCR RADIANT network (Radiology trainee research and audit network).

Drs Nathan Chan and Nicholas Clarke are trainee representatives on the RCR RADIANT network as one of the first-phase participant centres.

**Recognition: awards, prizes, nominations, other accolades**

Dr Tom Turmezei was awarded the Royal College of Radiologists 2020 Roentgen Professorship, a travelling professorship to promote research in trainees across the UK

Dr Tom Turmezei won a Young Investigator award at the 2019 International Workshop on Osteoarthritis Imaging, Prince Edwards Island, Canada

Dr Tom Turmezei won a "Most Creative" poster award at the 2019 International Workshop on Osteoarthritis Imaging, Prince Edwards Island, Canada

Dr James MacKay won a "Clearest Message" poster award at the 2019 International Workshop on Osteoarthritis Imaging, Prince Edwards Island, Canada

Dr James MacKay was awarded British Society of Skeletal Radiologists Travel Bursary for a visiting scholarship at Stanford University

Names of person(s) contributing to this form

Dr Tom Turmezei  
 Dr James Mackay  
 Dr Gabriella Baio  
 Prof. Andoni Toms  
 Dr Geeta Kapoor  
 Dr Rachael Forton (radiographer)  
 Dr Tom Marshall  
 Dr Paul Malcolm  
 Dr Iztok Caglic (consultant now departed)  
 Dr Tim Ariyanayagam (trainee now on fellowship)  
 Prof. Erika Denton  
 Dr Arne Juette  
 Dr Jan Saada  
 Dr Ramona-Rita Barbara  
 Dr Davina Pawaroo  
 Dr Clare Beadsmoore  
 Dr Amr Moussa

Dr Baljeet Dhillon  
Dr Samantha Low (trainee on fellowship)  
Dr Aziekah Fiaz  
Dr Fatima Alves Pereira  
Dr Paddy Wilson  
Dr Hameed Rafiee  
Dr Marcus Rault  
Dr Nim Sanmugalingam  
Dr Tariq Ali  
Dr Mark Lewis  
Dr Stuart Williams  
Dr Lislely Salimin  
Dr Jennifer Ross  
Dr Fred Barber  
Dr Zosia Rodak (trainee now consultant elsewhere)  
Dr Nathan Chan  
Dr Nicholas Clarke

Date 28/01/2020