

2021

RBWH

Research Report

MEDICAL
IMAGING AND
CLINICAL
SUPPORT
SERVICES

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Department of Medical Imaging

Department of Medical Imaging (DMI) led research in 2021 was carried out over a broad range of subject areas, including: improving patient outcomes after neurointerventional treatment; investigating the use of spectral CT to improve disease diagnosis, reduce patient radiation risk, decrease cannulations, and reduce healthcare costs; improving patient experience; and investigating the potential and impact of novel medical imaging software and hardware on disease diagnosis and treatment.

The department obtained site approval to conduct a first-in-human (FIH) trial of a novel angiographic guidewire that provides electrophysical measurements of intracranial clot. By analysing clot composition, the guidewire will provide interventional neuroradiologists with information on the thrombus and allow them to make informed choices as to the most effective choice of mechanical thrombectomy technique for individual patients. Patient recruitment for this trial is planned to commence February 2022.

A collaborative project with Radiation Oncology is comparing patient outcomes between two non-surgical cancer treatments (microwave ablation and stereotactic body radiotherapy) in the treatment of lung cancer. The results of this world-first pilot study will provide prospective data on the efficacy, toxicity, patient reported outcomes and cost-effectiveness of the two treatments, which will help define the optimal treatment strategy for patients with early-stage non-small cell lung cancer and may lay the foundations for a larger prospective multicentre study.

The department had 12 abstracts accepted for oral or poster presentations at the RANZCR 2021 Virtual Annual Scientific meeting, and several staff were invited as keynote speakers to the annual conference for their respective professional bodies. Radiographer- led research continues to grow, driven by enrolment in higher research degrees and expansion of the graduate radiographer research program. A number of medical imaging nursing staff were involved in a range of collaborative projects across the hospital.

Research relationships with universities have been developed and strengthened through new/existing collaborations with Deakin University, Queensland University of Technology, the University of Sydney, Griffith University, and the University of Queensland.

The department also supported over 80 service-based research studies established by other RBWH departments or external research groups. Our consultants, registrars, radiographers, and nurses provide expertise on imaging protocols, clinical diagnosis, and interventional procedures to best support these projects.

Research Grants

Investigator Names (RBWH staff in bold)	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded (whole all years)	Length of Awards in years and years active
Alan Coulthard, Rebecca Liong, Marita Prior, Anita Pelecanos, Jeffrey Lipman, Jason Roberts, Steven O'Donoghue	Department of Medical Imaging	Efficacy of single dose enoxaparin post elective neurointervention in prevention of thromboembolic events (EPPICS II)	RANZCR	\$24,800	4 yrs, 2020-2023
Kirsten Hepburn, Pedro Franca Gois, Helen Healy, Martin Wolley, Prianka Puri, Dwarakanathan Ranganathan, Carla Scuderi, Nigel Mott, Michelle Rice, Huan Zhang	Renal Medicine Pharmacy Medical Imaging	Desmopressin Acetate (DDAVP) to prevent post-Biopsy Bleeding in percutaneous kidney biopsy: a randomized, double-blind, placebo-controlled trial	RBWH Foundation	\$50,000	1 yr, 2021

Current RBWH Department / Research Group Led Research Activity

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of RBWH Patients Recruited in 2021	Total number of RBWH Patients Recruited
Rachael Anstey	John Younger, Kristyan Guppy-Coles	Comparison of left ventricular structure and function analysis by cardiac magnetic resonance	N/A	N/A
Alan Coulthard	Kate Mahady, Grace Aw, Ken Mitchell	Clotild smart guidewire system evaluation in endovascular thrombectomy procedure	0	0
Alan Coulthard	Rebecca Liong, Marita Prior, Ee Shern Liang, Anita Pelecanos, Jeffery Lipman, Jason Roberts, Steve O'Donoghue	EPICCS II	46	46
Alan Coulthard	Lindy Jeffree, Nicole Waters, Thomas Robertson, David Reutens, Maria Saithi, Jeff Hocking	High field magnetic resonance imaging of hippocampal sclerosis	7	7
Karen Dobeli	Yunshun Zhao, Peter Kench	Theoretical comparison of Hounsfield unit threshold-based bolus tracking and enhancement curve-based bolus tracking for CT angiography using contrast media enhancement patterns from normal CT brain perfusion examinations.	N/A	N/A
Brianna Hockhopper	Rachel Anstey, Marita Prior	Spectral CTPA contrast enhancement	N/A	N/A
Harry Johnston	Karen Doheny, Karen Dobeli	Radiographer confidence in providing radiation risk information	N/A	N/A
Megan Kenna Mallory Batchelor	Karen Doheny, Karen Dobeli	Use of a 'code stroke' patient's symptoms and non-contrast brain computed tomography (CT) results to predict the likelihood of stroke and the necessity for CT brain perfusion	N/A	N/A
Ee Shern Liang	Alan Coulthard, Craig Winter, Kennedy Wong, Rohan Tollenaere, Marita Prior	High resolution vessel wall imaging in ruptured intracranial aneurysms	3	3
Rebekah Onsley	Karen Dobeli, Marita Prior	Observer performance when optimising scan and reconstruction parameters affecting dose for detection of liver lesions	N/A	N/A
Stephanie Plunkett	Marita Prior, Christine McHenry, Xanthe Tusek	Education and maternal anxiety in fetal magnetic resonance imaging	45	90
Katherine Smith	Karen Dobeli, Peter Kench, Steven Meikle	Diagnostic accuracy of virtual non-contrast dual-energy CT urogram for diagnosis of renal stones	N/A	N/A
Karin Steinke Lizbeth Kennedy	Catherine Bettington, Gary Pratt, Philip Chan	MASTER	7	7

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of RBWH Patients Recruited in 2021	Total number of RBWH Patients Recruited
Timothy Wastney	Ee Shern Liang, Craig Hacking, Karen Dobeli	Characterisation of incidental adrenal lesions with virtual non-contrast images using spectral CT	N/A	N/A

Collaborative Research Activity Involving RBWH Department / Research Group

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of RBWH Patients Recruited in 2021	Total number of RBWH Patients Recruited
David Clark	Jacobus Ungerer, Anna Zournazi, Karen Dobeli, Marita Prior	A Phase 2 study of efficacy: The validation of Gastrografin measurement in postsurgical samples following low anterior resection where the rectal tube is flushed with Gastrografin	39	57
Kirsten Hepburn	Pedro Franca Gois, Helen Healy, Martin Wolley, Prianka Puri, Dwarakanathan Ranganathan, Carla Scuderi, Nigel Mott, Michelle Rice, Huan Zhang	DABBLE trial		
Giovanni Mandarano	Karen Dobeli, Marita Prior, Jacqueline Schneider	Analysing spectral detector CT images with IntelliSpace Discovery software to map zinc and magnesium levels in the prostate gland to distinguish normal and disease affected tissue	N/A	N/A
Andreas Obermair	Shohreh Rezai, Ivana Rizzuto, Anna Lane	External validation of the diagnostic performance of various malignancy scoring models for adnexal masses.	N/A	N/A
Ryan Sommerville	Charles Lin, Jennifer Gillespie, Paul Thomas, Brett Hughes, Gishan Ratnayake, Chris Oosthuizen, Catherine Barnett, Ashivini Abeysekara, Jason Papacostas, Touraj Taheri	Perineural Spread of Head and Neck Cancers	10	12
Amanda Ullman	Katrina Southam, Alan Coulthard	PICNIC trial		
Craig Winter	Alan Coulthard, Marita Prior	CFD TWR		

Research Publications

Publications in 2021

Journal Articles (RBWH staff in bold)

1. Clarke L, Arnett S, **Coulthard A**, et. al. MRI Patterns Distinguish AQP4 Antibody Positive Neuromyelitis Optica Spectrum Disorder From Multiple Sclerosis. *Front Neurol*. 2021 Sep 9;12:722237. doi: 10.3389/fneur.2021.722237.
2. **Dare N**, Ramis M. Factors influencing duration of neonatal cranial ultrasound: A pilot study of retrospective data. *Sonography*. 2021 Nov 22. Epub ahead of print. Doi: 10.1002/sono.12297
3. **Drew Z**, Jain D, Rathnamma BM. Migrating appendicolith: A retained appendicolith causing recurrent infection and migrating to the skin. *BJR Case Reports*. 2021;7(6). Published Online:18 Aug 2021 <https://doi.org/10.1259/bjrcr.20210093>
4. Ioannides ZA, Csurhes PA, **Coulthard A**, et. al. Sustained Clinical Improvement in a Subset of Patients with Progressive Multiple Sclerosis Treated With Epstein-Barr Virus-Specific T Cell Therapy. *Front Neurol*. 2021 Mar 15;12:652811. doi: 10.3389/fneur.2021.652811.
5. **Liang ES**, Efendy M, Winter C, **Coulthard A**. Intracranial perianeurysmal cysts: case series and review of the literature. *J Neurointerv Surg*. 2021 Aug 11:neurintsurg-2021-017807. doi: 10.1136/neurintsurg-2021-017807. Epub ahead of print. PMID: 34380710.
6. **Loh, B., Liong, R.,** Malacova, E., & **Bain, R.** (2021). Risk factors associated with complex inferior vena cava filter retrievals and complications: A 7-year retrieval database analysis and the impact on retrieval rates at an Australian tertiary centre. *Journal of Medical Imaging and Radiation Oncology*, 65(7), 875–882. <https://doi.org/10.1111/1754-9485.13305>
7. Mander GTW, **Dobeli K**, Steffensen C, Munn Z. Diagnostic accuracy of prospectively gated, 128-slice or greater CTCA at high heart rates: a systematic review and meta-analysis. *J Med Radiat Sci*. 2021;68:435–445 doi: 10.1002/jmrs.525.
8. Mulcahy T, Ma N, **Mitchell K**. Endovascular treatment of trigeminal neuralgia with cranial autonomic symptoms due to a right-sided petrous ridge dAVF. *Br J Neurosurg*. 2021 Jan 20:1-7. doi: 10.1080/02688697.2021.1874295. Epub ahead of print.
9. Pattison DA., **Debowski M**, Gulhane, B. et al. Prospective intra-individual blinded comparison of [18F]PSMA-1007 and [68 Ga]Ga-PSMA-11 PET/CT imaging in patients with confirmed prostate cancer. *Eur J Nucl Med Mol Imaging* 49, 763–776 (2022). <https://doi.org/10.1007/s00259-021-05520-y>
10. Seymour M, Robertson, T, Papacostas J, Morris K, **Gillespie J**, Norris D, Duncan EL. A woman with visual loss, amenorrhoea and polyuria: the first reported case of nodular lymphocyte-predominant Hodgkin lymphoma presenting with hypopituitarism. *Endocrinol Diabetes Metab Case Rep*. 2021 May 1;2021:20-0100. doi: 10.1530/EDM-20-0100. Epub ahead of print.
11. Truong Q, Ryder SJ, **Gillespie J**, Papacostas J, McLeod DS. Clival prolactinoma masquerading as a chordoma: a case report. *Radiol Case Rep*. 2021;16(6):1320-1324. doi: 10.1016/j.radcr.2021.02.071.
12. Ullman AJ, August D, Kleidon T, Walker R, Marsh NM, Bulmer A, Pearch B, Runnegar N, Schults JA, Leema J, Lee-Archer P, Biles C, **Southam K**, Gibson V, Byrnes J, Ware RS, Chopra V, **Coulthard A**, Mollee P, Rickard CM, Harris PNA. Peripherally Inserted Central catheter iNnovation to reduce Infections and Clots (the PICNIC trial): a randomised controlled trial protocol. *BMJ Open*. 2021 Apr 14;11(4):e042475. doi: 10.1136/bmjopen-2020-042475.
13. Van Eijk L, Seidel M, Pannek K, Georges JM, Fiori S, Guzzetta A, Coulthard A, Bursle J, et.al. Automating Quantitative Measures of an Established Conventional MRI Scoring System for Preterm-Born Infants Scanned between 29 and 47 Weeks' Postmenstrual Age" *AJNR* 2021;42:1870-1877. Doi: 10.3174/ajnr.A7230. Epub 2021 Aug 19

Keynote or Plenary Lectures given in 2021

Date	Title
09/2021	Anstey R. Tips, tricks and pitfalls CTA. Philips Webinar
09/2021	Clouston J. Cost-effectiveness and value in IR, RANZCR ASM, 2021
06/2021	Dobeli K. Overview of medications used for patient preparation in cardiac CT, ASMIRT-NZIMRT national conference (virtual)

06/2021	Dobeli K. Chair MI-Chest session, ASMIRT-NZIMRT national conference (virtual)
06/2021	Dobeli K. The emergence of CT perfusion (CTP): Added value or waste of time?, ASMIRT-NZIMRT national conference (virtual)
07/2021	Gillespie J. Imaging of the post-operative neck. Radiopaedia 2021
11/2021	Gillespie J. Pituitary adenoma or mimic? RSNA 2021
04/2021	Hacking C. Trauma in pregnancy radiology. Irish Faculty of Radiologists Combined Spring Virtual Meeting
06/2021	Hacking C. Spectral CT implementation in a large tertiary teaching radiology department. Philips 16 th MDCT user meeting online
06/2021	Hacking C. Emergency spectral CT. Philips Spectral CT Academy.
07/2021	Hacking C. Imaging of acute aortic syndromes. Radiopaedia 2021 Virtual Conference
07/2021	Hacking C. Introduction to chest CT and CTPA. Radiopaedia 2021 Virtual Conference
07/2021	Hacking C. Anatomy of the mediastinum. Radiopaedia 2021 Virtual Conference
07/2021	Hacking C. X-ray assessment of shoulder injuries. Radiopaedia 2021 Virtual Conference
09/2021	Hacking C. Spectral CT, Always on, in Queensland's largest hospital. Philips Asia Pacific Spectral CT Webinar
11/2021	Hacking C. Spectral CT implementation in a large tertiary teaching radiology department. Philips North American CT and AI Summit
11/2021	Hacking C. Spectral CT. Philips Spectral Virtual Academy.
09/2021	McHenery C. MRI- Back to the future. Herston Healthcare Symposium