

## Title: Diabetes After Heart Transplantation Is an Increasingly Common Issue

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Andrew Jabbour PhD <sup>3,4,5</sup>

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### **Affiliations:**

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**Background:** Heart transplantation (HTx) survival rates have improved with advances in immunosuppression and surgical techniques over the last 20 years. Current five year survival rates approximate 85-90%. With these improvements there has been a greater focus on post-transplant care. Diabetes is common after transplantation and may be pre-existing (type 2 diabetes mellitus, T2DM) or develop after transplant (post-transplant diabetes mellitus, PTDM). In 2015 our institution introduced a dedicated endocrine clinic and registrar integrated into the heart and lung transplant unit.

**Aim:** The aim of this study was to compare the incidence and prevalence of diabetes in HTx recipients in two cohorts separated by 20 years.

**Methods:** Retrospective audit comparing the prevalence of T2DM and cumulative 2-year incidence of PTDM in consecutive HTx recipients in 1998 and 2018 at the same tertiary referral teaching hospital. People with type 1 diabetes mellitus were excluded from this analysis.

**Results:** There were 88 patients in the 1998 cohort and 141 in the 2018 cohort. The prevalence of T2DM at the time of HTx increased between 1998 and 2018, 6% (n=5) vs 18% (n=25) respectively, p=0.009. Similarly the incidence of PTDM increased from 15% (n=13) in 1998 to 30% (n=42) in 2018, p=0.01). HTx recipients who developed PTDM were older in 2018 (mean age  $52 \pm 11$  years) vs 1998 (mean age  $44 \pm 9$  years) (p=0.03). The groups without diabetes and with T2DM were similar in age between the two cohorts. Body mass index in the subgroups was not different between the cohorts.

Routine HTx immunosuppression differed between the two cohorts. In the 1998 cohort, maintenance immunosuppression consisted of cyclosporin, azathioprine and corticosteroids. Whereas the 2018 cohort were routinely treated with tacrolimus, mycophenolate and weaning corticosteroids.

**Conclusion:** The incidence and prevalence of diabetes after HTx at our institution has increased over 20 years. With increasing HTx survival and rates of diabetes, endocrinologists should be incorporated into the care teams of transplant recipients. Further studies of diabetes therapies in this increasing cohort of patients with diabetes after transplantation is warranted.



**Dr Lisa Mary Raven**  
PhD Candidate  
Endocrinologist

8<sup>th</sup> June 2025

To the Selection Committee, Endocrine Society of Australia and Australasian Branch of Women in Endocrinology,

**Re: ESA Australian Women in Endocrinology (AWE) Travel Award**

Thank you for considering my application for the **ESA Australian Women in Endocrinology (AWE) Travel Award**. This will support me to present an abstract entitled '*Diabetes After Heart Transplantation Is an Increasingly Common Issue*' at the USA Endocrine Society annual scientific meeting (ENDO 2025) in San Francisco (July 12-15, 2025).

I am flying from Sydney to San Francisco on Thursday 10<sup>th</sup> of July 2025 and flying from San Francisco to Sydney on the evening of Tuesday 15<sup>th</sup> of July 2025. I will attend and present my abstract at US ENDO 12<sup>th</sup> to 15<sup>th</sup> of July. I am also taking part in the ENDO 2025 Early Career Programs Focus Group on Sunday 13<sup>th</sup> of July as an alumni from the Early Career Forum which I attended in 2023.

The opportunity to attend this international endocrinology conference will expose my work, particularly my PhD research, to the largest possible audience of endocrinologists and scientists, and allow the development of international collaborations. I have already arranged a meeting at ENDO 2025 with Professor Minna Woo, Director of the Banting and Best Diabetes Centre, University of Toronto. This award would support my professional development, allowing me to network with peers and seniors. I hope to build relationships to explore international collaborations and potential post-doctoral opportunities.

I have been a financial member of ESA since 2018 and am registered as a member of the Australasian Branch of Women in Endocrinology. I am a current PhD student through the Garvan Institute of Medical Research & University of New South Wales (4<sup>th</sup> year) under the supervision of Professor Jerry Greenfield, Associate Professor Andrew Jabbour (cardiologist) and Dr Christopher Muir. I am active within the society, as a regular attendee of the Seminar Meeting, Clinical Weekend, and Annual Scientific Meeting; and holding positions as the Social Media Officer, Communication Committee member and previous WOMENDO (Women in Endocrinology) Chair.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Lisa Mary Raven'.

Dr Lisa Mary Raven MBBS FRACP

Contact Details	Current Positions
Lisa Mary RAVEN 0432761524 lisa.raven@svha.org.au	Endocrinologist, Staff Specialist, St Vincent's Hospital, Sydney PhD Candidate, Garvan Institute of Medical Research, University of NSW Conjoint Lecturer, University of NSW

### Awards

2024	International Society for Heart and Lung Transplantation Annual Meeting Travel Award
2024	New South Wales Pride in Health + Wellbeing LGBTQ+ Ally Award
2023	Australian Diabetes Society President's Prize – Clinical Young Investigator Award
2023	PhD Scholarship, The National Heart Foundation

### Scientific Publications (total 29, h-index 7)

- Raven LM**, Greenfield JR, Jabbour A, Macdonald PS, Muir CA. Sodium glucose co-transporter 2 inhibitors are associated with renal stabilisation in heart transplantation. **JHLT Open**. 2025 Mar 22;8:100255. doi: 10.1016/j.jhlto.2025.100255. PMID: 40247995.
- Raven LM**, Lever W, MacIsaac RJ, Greenfield JR, Deane A, Plummer M, Umaphysivam M. Heterogeneity in the management of diabetic ketoacidosis in Australia: a national survey. **Intern Med J**. 2025 May;55(5):728-733. doi: 10.1111/imj.70024. Epub 2025 Mar 6. PMID: 40045881.
- Raven LM**, Center JR, Muir CA. Romosozumab as treatment for severe osteoporosis in heart and lung transplant recipients. **Endocrines**. 2025, 6, 2. doi: 10.3390/endocrines6010002
- Raven LM**, Muir CA, Deveza RC, Kessler Iglesias C, Bart NK, Muthiah K, Kotlyar E, Hayward CS, Macdonald P, Jabbour A, Greenfield JR. Effect of sodium glucose cotransporter 2 inhibition immediately prior to heart transplantation. **JHLT Open**. 2024 Apr 12;5:100088. doi: 10.1016/j.jhlto.2024.100088. PMID: 40143902; PMCID: PMC11935458.
- Raven LM**. Understanding the cardiovascular benefits of glucagon-like peptide-1 (GLP-1) receptor agonists. **Trends Cardiovasc Med**. 2024 Nov;34(8):558-559. doi: 10.1016/j.tcm.2024.03.007. Epub 2024 Mar 27. PMID: 38552887..
- Raven LM**, Cao JY, Macdonald PS, Jabbour A, Greenfield JR. Fournier's gangrene in recent transplant recipient on empagliflozin. **JHLT Open**. 2024 Jan 24;4:100060. doi: 10.1016/j.jhlto.2024.100060. PMID: 40144254; PMCID: PMC11935312.
- Raven LM**, Goodall L, Center JR, Muir CA. Teriparatide as treatment for severe osteoporosis in lung transplant recipients. **JCEM Case Reports**. 2024 March; 2:3. doi: 10.1210/jcemcr/luac026
- Muir CA, Kuang W, Muthiah K, Greenfield JR, **Raven LM**. Association of early post-transplant hyperglycaemia and diabetes mellitus on outcomes following heart transplantation. **Diabet Med**. 2024 Sep 25:e15441. doi: 10.1111/dme.15441. Epub ahead of print. PMID: 39323029.
- Kuang W, **Raven LM**, Muir CA. Early post-transplant hyperglycemia and post-transplant diabetes mellitus following heart transplantation. **Expert Rev of Endocrinol Metab**. 2024 Jan 16. doi: 10.1080/17446651.2024.2307011
- Raven LM**, Muir CA, Greenfield JR. Sodium glucose cotransporter 2 inhibitor-induced ketoacidosis is unlikely in patients without diabetes. **Med J Aust**. 2023 Oct 2;219(7):293-294. doi: 10.5694/mja2.52067. Epub 2023 Aug 7. PMID: 37549922.
- Raven LM**, Stoita A, Feller RB, Brown C, Greenfield JR. Delayed gastric emptying with perioperative use of glucagon-like peptide-1 receptor agonists. **Am J Med**. 2023. doi: 10.1016/j.amjmed.2023.07.016
- Raven LM**, Brown C, Greenfield JR. Considerations of delayed gastric emptying with peri-operative use of glucagon-like peptide-1 receptor agonists. **Med J Aust**. 2023 Nov 27. doi: 10.5694/mja2.52170. Epub ahead of print. PMID: 38009941.
- Raven LM**, Muir CA, Pouliopoulos J, Hayward CS, Macdonald PS, Greenfield JR, Jabbour A. Metabolic Sequelae of Everolimus Treatment After Cardiac Transplant: A Hypothesis-Generating Study. **Heart Lung Circ**. 2023. ISSN 1443-9506. doi: 10.1016/j.hlc.2023.05.014
- Raven LM**, Muir CA, Kessler Iglesias C, Bart NK, Muthiah K, Kotlyar E, Macdonald P, Hayward CS, Jabbour A, Greenfield JR. Sodium glucose co-transporter 2 inhibition with empagliflozin on metabolic, cardiac and renal outcomes in recent cardiac transplant recipients (EMPA-HTx): protocol for a randomised controlled trial. **BMJ Open**. 2023 Mar 29;13(3):e069641. doi: 10.1136/bmjopen-2022-069641

### Women in Medicine Involvement

2025	Franklin Women Mentoring Program (mentee), sponsored by St Vincent's
Since 2024	UNSW Women in Medicine Mentoring Program (mentor)
2022-2024	Chair, WOMENDO (Women in Endo), Endocrine Society of Australia
Since 2021	Women in Medicine Committee, St Vincent's Hospital
2011	South Australian Student Representative, Australian Federation of Medical Women



8 June 2025

**To Whom It May Concern**

**Re: Letter of Support for Lisa Raven**

I write this letter in support of **Dr Lisa Raven's** application for the ESA Australian Women in Endocrinology (AWE) Travel Award 2025.

Dr Lisa Raven has submitted an abstract to ENDO 2025 titled "Diabetes After Heart Transplantation Is an Increasingly Common Issue". This project forms part of Lisa's PhD topic on post-transplant diabetes and the effects of SGLT2 inhibition in heart transplant recipients.

I can confirm that Dr Lisa Raven is:

- The presenting author on an abstract accepted for presentation at the Endocrine Society meeting (USA);
- A financial member of ESA and a current registered member of the Australasian Branch of Women in Endocrinology;
- A PhD student at an the Garvan Institute of Medical Research (4<sup>th</sup> year).

Lisa is a hard-working, talented and dedicated PhD student and Endocrinologist. Lisa is committed and dedicated to achieving her goals and her work is of the highest calibre.

Lisa has proven that she is a capable and hard-working researcher. She has published 29 scientific papers in peer-reviewed journals and one book chapter. She has presented 28 conference abstracts (6 oral presentations) at national and international conferences. Lisa has presented abstracts at ESA Scientific Meetings every year since she was an advanced trainee in 2019.

Lisa is very engaged in the research community and has attended multiple conferences every year. Lisa has exhausted all other available funds to assist with travel expenses.

I am very proud to support her application.

Yours sincerely

*Electronically signed by*

**Jerry Greenfield MBBS (Hons 1) PhD FRACP**

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## ESA Australian Women in Endocrinology (AWE) Travel Award Application

### Budget justification

Applying for up to \$1000  
(Any amount would be appreciated)

Item	Cost
Return flights to San Francisco (economy)	\$AUD 3618.18
Conference registration	\$US 486.00 = \$AUD 811.57
Abstract submission fee	\$US 99 = \$AUD 164.81