

SCIENTIFIC SUMMARY

This grant from Arthritis Australia allowed me to explore three main scientific areas during my research fellowship:

1. The association between cardiovascular disease (CVD) and gout in New Zealand
2. The development of the OMERACT core domain set for calcium pyrophosphate deposition (CPPD) disease
3. The development of a radiographic scoring system for new bone formation in gout

In collaboration with the Vascular Informatics Using Epidemiology and the Web (VIEW) team at the University of Auckland (Dr. Katrina Poppe and Prof. Rod Jackson), I examined the relationship between gout and cardiovascular disease in two primary prevention cohorts in New Zealand (VARIANZ and PREDICT), the results of which were presented at the 2019 and 2020 American College of Rheumatology Annual Scientific Meeting. At the 2019 meeting, I presented an oral plenary presentation, which is awarded to the one of the top 15 abstracts at the whole conference (Cai et al. 2019; Arthritis Rheumatol.) and in 2020, I presented an oral abstract presentation (Cai et al. 2020; Arthritis Rheumatol.). I was the inaugural fellow for the OMERACT CPPD Working Group and we are in the process of developing a Core Domain Set for CPPD. As part of this development process, I was heavily involved in a scoping review of CPPD outcome domains, two qualitative studies exploring the lived experiences of people with CPPD and a framework for future CPPD prioritisation studies. I also undertook a scoping review of radiological scoring systems for new bone formation, and we are developing a radiographic scoring system for new bone formation in gout. With the support of my supervisor (Prof. Nicola Dalbeth) and co-collaborators, I was able to achieve my scientific objectives during the fellowship and I continue to be involved in research within these scientific areas.

Research Output and Dissemination

Publications

1. **Cai, K.**, Fuller, A., Hensey, O., Grossberg, D., Christensen, R., Shea, B., Singh, J.A., Abhishek, A., Tedeschi, S., Dalbeth, N. Outcome Domains reported in Calcium Pyrophosphate Deposition Studies: A Scoping Review by the OMERACT CPPD Working Group. *Seminars in Arthritis and Rheumatism*. 2020; 50(4):719-727.

2. **Cai, K.**, Fuller, A., Zhang, Y., Hensey, O., Grossberg, D., Christensen, R., Shea, B., Singh, J.A., McCarthy, G., Rosenthal, A., Filippou, G., Taylor, W., Diaz-Torne, C., Stamp, L., Edwards, N.L., Pascart, T., Tugwell, P., Beaton, D., Abhishek, A., Tedeschi, S., Dalbeth, N. Towards development of Core Domain Sets for Short Term and Long Term Studies of Calcium Pyrophosphate Crystal Deposition (CPPD) Disease: A Framework Paper by the OMERACT CPPD Working Group. *Seminars in Arthritis and Rheumatism*. 2021 (in press).
3. **Cai, K.**, Tedeschi, S. Review: Outcome Measures in Calcium Pyrophosphate Deposition Disease. *Best Practice & Research Clinical Rheumatology*. 2021 (in press).
4. **Cai, K.**, Wu, B., Mehta, S., Dalbeth, N., Jackson, R., Poppe, K. The association between gout and cardiovascular disease outcomes: a health data linkage study of approximately 1 million New Zealanders using population-level cardiovascular risk prediction equations. Manuscript submitted to *Lancet Rheumatology*
5. Fuller, A., **Cai, K.**, Hensey, O., Grossberg, D., Christensen, R., Shea, B., Singh, J.A., Tedeschi, S., Dalbeth, N., Abhishek, A. Outcome domains reported by patients, caregivers, healthcare professionals and stakeholders for calcium pyrophosphate deposition: a content analysis by the OMERACT CPPD Working Group. *Seminars in Arthritis and Rheumatism*. 2021; 51(3):650-654.
6. Fuller, A., **Cai, K.**, Filippou, G., Pascart, T., Diaz-Torne, C., Hensey, O., Grossberg, D., Christensen, R., Shea, B., Singh, J.A., Tedeschi, S., Dalbeth, N., Abhishek, A. Experience and impact of crystal pyrophosphate deposition (CPPD) from a patient and caregiver perspective: A qualitative exploration from the OMERACT CPPD working group. *Seminars in Arthritis and Rheumatism*. 2021; 51(3):655-660.

Oral Presentations

1. **Cai, K.**, Wu, B., Mehta, S., Dalbeth, N., Jackson, R. Poppe, K. The relationship between gout and cardiovascular disease outcomes: A health data linkage study of approximately 1 million New Zealanders using population-level cardiovascular risk prediction equations. The 2019 American College of Rheumatology Annual Meeting, **Plenary Oral Abstract Session**, Atlanta, USA, 2019.
2. **Cai, K.**, Wu, B., Dalbeth, N., Jackson, R. Poppe, K. The association between gout and cardiovascular disease outcomes: assessment and recalibration of individual-level primary prevention risk prediction equations in approximately 450,000 New Zealanders.

The 2020 American College of Rheumatology Annual Meeting: ACR Convergence.
Metabolic & Crystal Arthropathies: **Oral Abstract**, Virtual Meeting, USA, 2020.

Poster Presentations

1. **Cai, K.**, Wu, B., Dalbeth, N., Jackson, R. Poppe, K. The association between gout and cardiovascular disease outcomes: assessment and recalibration of individual-level primary prevention risk prediction equations in approximately 450,000 New Zealanders. The 2020 Gout and Crystal Arthritis Network Meeting (G-CAN), Virtual Meeting, USA, 2020.
2. **Cai, K.**, Wu, B., Mehta, S., Dalbeth, N., Jackson, R. Poppe, K. The relationship between gout and cardiovascular disease outcomes: A health data linkage study of approximately 1 million New Zealanders using population-level cardiovascular risk prediction equations. The 2019 Gout and Crystal Arthritis Network Meeting (G-CAN), Crowne Plaza Midtown, Atlanta, United States of America, 2019.
3. **Cai, K.**, Wu, B., Mehta, S., Dalbeth, N., Jackson, R. Poppe, K. The relationship between gout and cardiovascular disease outcomes: A health data linkage study of 1 million New Zealanders using population-level cardiovascular risk prediction equations. The 2019 New Zealand Rheumatology Association Annual Scientific Meeting, Novotel Rotorua Lakeside, Rotorua, New Zealand, 2019.

Abstracts

1. **Cai K.**, Wu, B., Dalbeth, N., Jackson, R., Katrina, P. The Association Between Gout and Cardiovascular Disease Outcomes: Assessment and Recalibration of Individual-level Primary Prevention Risk Prediction Equations in Approximately 450,000 New Zealanders [abstract]. *Arthritis Rheumatol.* 2020; 72(Suppl. 10).
2. **Cai, K.**, Fuller, A., Hensey, O., Grossberg, D., Christensen, R., Shea, B., Singh, J.A., Abhishek, A., Tedeschi, S., Dalbeth, N. A Scoping Review and Content Analysis of Outcome Domains reported in CPPD Clinical Studies. *Internal Medicine Journal.* 2020, 50(Suppl. 2).
3. **Cai K.**, Wu, B., Mehta, S., Dalbeth, N., Jackson, R., Katrina, P. The Relationship Between Gout and Cardiovascular Disease Outcomes: A Health Data Linkage Study of 1 Million New Zealanders Using Population-level Cardiovascular Risk Prediction Equations. *Arthritis Rheumatol.* 2019; 71(Suppl. 10).

Media/Press Releases

1. <https://www.healio.com/news/rheumatology/20191122/gout-linked-to-increased-cardiovascular-disease-risk>
2. <https://www.mdedge.com/rheumatology/article/212979/gout/large-population-based-study-underscores-link-between-gout-cvd>