

## **2024 Arthritis Australia Grant-In-Aid Project Lay Language Report**

### **Synovial neutrophils in early rheumatoid arthritis: relationship with clinical outcome and the development of improved handling procedures.**

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#### **Report**

This project set out to better understand the role of neutrophils—an important type of immune cell—in the joint tissue of people with early rheumatoid arthritis (RA), a common and debilitating form of musculoskeletal disease. We also aimed to overcome a long-standing technical barrier in RA research: the difficulty of preserving neutrophils for laboratory studies.

In the first part of this project, we investigated the clinical relevance of neutrophils present in the joint tissue at the time of diagnosis. Our findings showed that higher neutrophil numbers were linked to more active disease and a lower chance of achieving early remission. This suggests that neutrophils play a key role in driving inflammation in the early stages of RA, may influence how well a person responds to treatment, and may have utility as predictive markers of treatment response.

Neutrophils are delicate cells that are difficult to freeze and store without losing their function, which has made them hard to study in laboratory settings. As such, in the second part of this project, we developed a new method for freezing neutrophils directly in joint fluid, which significantly improved how well these cells survived and functioned after thawing. Unlike standard preservation methods, our technique kept the neutrophils less activated and more responsive in laboratory tests. This breakthrough may allow researchers to study these cells in more detail and opens the door to developing new treatments that specifically target neutrophils.

Together, these findings offer new insights into the biology of rheumatoid arthritis and provide powerful tools to support future research. For people living with musculoskeletal conditions, this work brings us closer to more effective, personalised treatments that can reduce joint damage and improve quality of life.

#### **Outputs from this work**

Project outcomes were shared widely within the medical and research community. On May 4th, 2025, results were presented at the Australian Rheumatology Association Annual Meeting in Adelaide. Further findings were shared at the RESET RA Annual Team Meeting in Queensland on May 13th, and an abstract has been submitted for presentation at the upcoming 2025 American Congress of Rheumatology in Chicago. A full research manuscript is currently in preparation.

#### **Acknowledgements**

This work was funded by the ARA Research Fund. We thank Arthritis Australia for their support, as well as all study participants and consumer advisors.