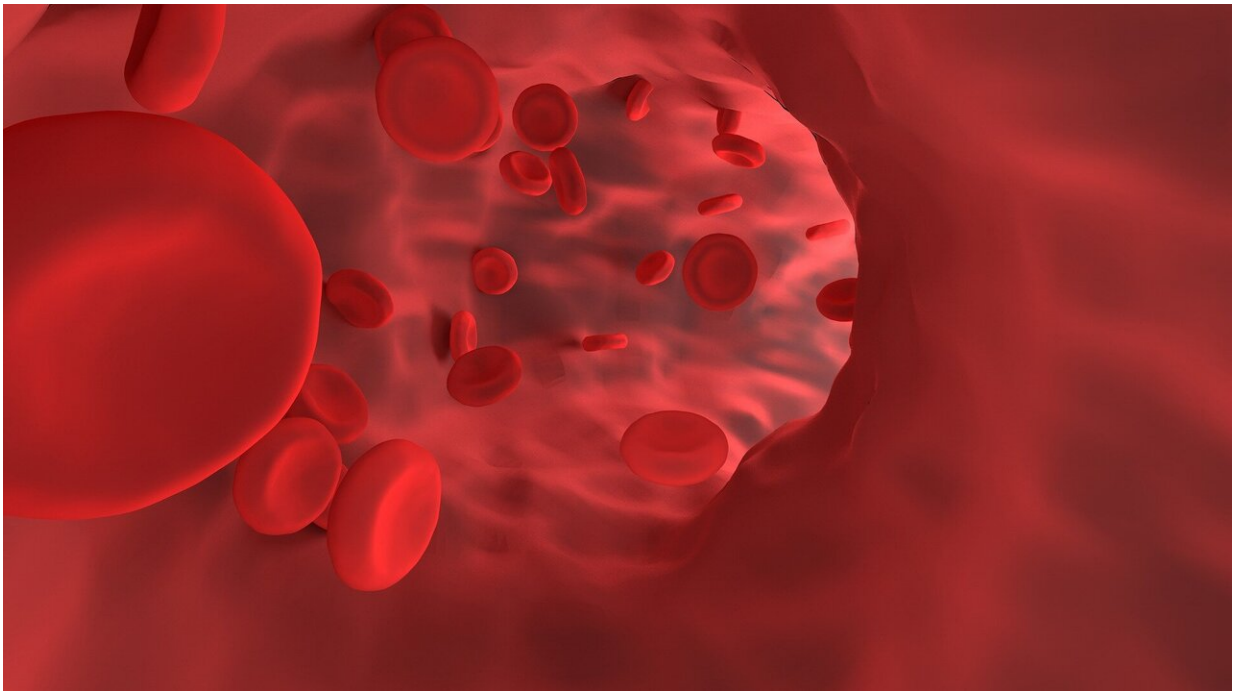
# AI-powered, big data research enhances understanding of systemic vasculitis

August 27 2024



Credit: CC0 Public Domain

Researchers from the School of Medicine and the ADAPT Centre at the School of Computer Science and Statistics at Trinity College Dublin have made a significant breakthrough in vasculitis research, in collaboration with researchers in Lund University. Their findings, recently published in *The Lancet Rheumatology*, offer new insights into the diagnosis and treatment of systemic vasculitis, a group of rare and

complex autoimmune diseases.

The study, part of the FAIRVASC project, leverages advanced artificial intelligence (AI) and big data techniques to address critical challenges in diagnosing and treating systemic vasculitis. FAIRVASC connects vasculitis patient registries across Europe, enabling seamless data sharing and advanced analysis to drive forward research and improve patient care.

Focusing on antineutrophil cytoplasm antibody (ANCA)-associated vasculitis, the research introduces a novel approach to classifying this disease using a federated dataset ten times larger than previous studies.

Access to this much larger dataset enabled more detailed analysis, revealing previously unidentified disease clusters. This new classification method offers more accurate predictions of outcomes like overall survival and kidney health, paving the way for more personalized treatment strategies that can significantly enhance patient care.

Professor Mark Little, Professor of Nephrology and Consultant Nephrologist at Trinity College Dublin, and Tallaght and Beaumont Hospitals, said, "Our research shows that by leveraging advanced AI systems and broad datasets, we can uncover new patterns of this rare autoimmune disease, which have impacts on the probability of adverse outcomes. This allows us to focus potentially toxic therapies on those most likely to benefit.

"Such progress was possible only through a multidisciplinary approach and with direct involvement of patients with lived experience of the condition, and this collaborative project has successfully brought together experts in medicine, computer science, and statistics."

Professor Declan O'Sullivan, ADAPT Principal Investigator and

Professor in Computer Science at Trinity, said, "I am delighted to see the research that we focus on in our group, Knowledge Graphs for data integration, is bringing impact in advancing medical research. In particular here, federating patient registries for rare diseases."

The study highlights the transformative potential of AI in medical research, particularly in addressing the complexities of rare diseases, where it has previously been impossible to generate sufficiently large cohorts to enable meaningful research.

By enabling more precise identification of disease patterns, AI can revolutionize how clinicians approach diagnosis and treatment, offering hope for better outcomes not only for vasculitis patients but also for those suffering from other rare and challenging diseases.

This research provides a blueprint for using advanced technologies to tackle similar challenges in the broader field of rare diseases, potentially leading to breakthroughs that could benefit countless patients worldwide.

**More information:** Karl Gisslander et al, Data-driven subclassification of ANCA-associated vasculitis: model-based clustering of a federated international cohort, *The Lancet Rheumatology* (2024). DOI: 10.1016/S2665-9913(24)00187-5

Provided by Trinity College Dublin