



Editorial

Guest Editorial

The Macquarie University Military Biomarker Symposium was held in Sydney, Australia June 27–29, 2022. The first of its kind, this symposium sought to expand the commonly accepted concept of blood-, saliva-, and sweat-borne biomarkers to include those measured externally, hence the symposium tagline “Biomarkers of performance and injury in the warfighter – Inside and Out”. A novel point of difference for this event was the unique opportunity for leading international researchers and key stakeholders to directly engage and collaboratively explore strategies to increase and optimise the utility of biomarker monitoring in practice for military organisations. Over 100 delegates attending from 6 countries, with 2 keynote speakers, 3 invited presentations, 7 thematic sessions, and a showcase from Macquarie University researchers were represented. This supplement of the Journal of Science and Medicine in Sport outlines the continuum of established and emerging biomarker/biosensing monitoring methods and technologies identified and discussed across the facilitated sessions. Broadly, the following three key themes were addressed: 1) traditional and contemporary biomarkers, 2) laboratory to field advancements and analytics, and 3) applied biomarker and biosensing monitoring and predicting for health, injury, and performance. Accepted symposium abstracts are available through an online Journal of Science and Medicine in Sport supplement.²

A traditional view of biomarkers is to simply consider the two parts of the word bio (life) and marker (an indicator of something). In that sense anything we measure which indicates something about a living human (in this specific context of a warfighter) can be considered a ‘biomarker’. Increasingly scientists are using and understanding that how we move can be used to indicate health and performance status.¹ This concept can be considered the framework of how this symposium was constructed.

The manuscripts in this supplement highlight and emphasise the important use and applications of real-time and continuous biomarker monitoring. Dr. Karl Friedl opened the symposium describing this and setting the scene for how we should all be considering the use of biomarkers to monitor life; “with life there is motion”. Invited talks provided the latest advances in musculoskeletal health monitoring and the use of traditional biomarkers to monitor soldier resilience and physical performance.

Targeted thematic sessions were formed by inviting key international researchers to form groups of scientists to present the latest evidence and direction in their areas of expertise. The use of technology and artificial intelligence to track performance of teams and predict health and injury status were presented by researchers from Australia, New Zealand, and United States. Bone health monitoring and prosthetic development was a key feature from researchers working with the United States, United Kingdom, and Australian

Defence Organisations supported by an invited talk on modelling fracture risk. Real-time monitoring of blood-borne biomarkers by United States researchers was an exciting session. The possibilities for key information to be used in real-time were a key talking point during this specific session. The breadth of biomarker usage was stretched from kinematic measures, measures for hot and cold tolerance, and cognitive and fatigue management. The thematic sessions were a real treasure trove of information that sparked collegial discussions about the possibilities for application and future research. As hoped, these thematic sessions resulted in cohesive and in-depth presentations about the state-of-the-art research being conducted around the world.

Macquarie University showcased their research including: the use of biomechanics in biomarker monitoring, engineering solutions, and cognitive science approaches to warfighter monitoring. Each of the presentations provided discussion points for the formal and informal breakout sessions that were facilitated as a key part of the symposium to help drive the development of new relationships areas of investigation.

To close out the symposium we heard from senior Australian Army leadership on how biomarkers are currently being used and potential applications of these measures into the future. This is key for academic researchers to remember; that is, who are we doing this work for and how can it improve the health, well-being, and performance of the ones who keep us safe.

In all, the Macquarie University Military Biomarker Symposium was a huge success as evidenced by the positive feedback from the delegates and speakers. Everyone left buoyed after their attendance and enthused to continue their existing research and develop new areas of investigation.

On behalf of the scientific committee, we thank everyone who attended, presented, participated in discussions, and made this symposium a success.

Thank you.

Drs. Tim Doyle, and Jodie Wills.

Declaration of competing interest

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Transparency declaration

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2. *Proceedings of the Macquarie University Military Biomarker Symposium 2022. J Sci Med Sport 2022:25S1.*

Tim Doyle
Jodie Wills

References

1. Friedl KE, Looney DP. With life there is motion. Activity biomarkers signal important health and performance outcomes. *J Sci Med Sport 2023;26S1:S3-S8.*