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OxiDx test detects muscle damage in elite athletes - Tracking muscle recovery after a marathon: a new diagnostic test emerges

- **Groundbreaking results demonstrate the OxiDx test can identify and assess recovery from exercise-induced muscle damage in elite marathon runners**
- **New results show OxiDx's novel technology offers a simple solution for monitoring levels of muscle damage using an easy-to-use fingerprick blood test**
- **Results are a significant milestone proving the OxiDx test can be used to monitor athletic performance**
- **Results published in the peer-reviewed journal *Physiological Reports***
- **Oxidative stress has been implicated in many disease and injury states – target applications include high-performance athletes and the horse racing industry**
- **In professional sports muscle injuries account for up to 55% of all injuries - \$1.2 billion was spent in Australia alone on treating potentially avoidable sports injuries in 2023**

Proteomics International Laboratories Ltd (Proteomics International; ASX: PIQ), a pioneer in precision diagnostics, is pleased to announce that its subsidiary OxiDx Pty Ltd, has published groundbreaking results demonstrating the unique OxiDx test for oxidative stress can identify muscle damage and assess recovery in elite marathon runners.

The study addresses a significant gap in the field of sports science, focusing on the lack of sensitive biomarkers for exercise-induced muscle damage. In professional sports, muscle injuries are the most frequent cause of incapacity, accounting for up to 55% of all injuries. Similarly, in the horse racing industry, 85% of thoroughbreds suffer at least one injury during their first 2-3 years of their racing career¹. In 2023, \$1.2 billion was spent on treating potentially avoidable sports injuries in Australia².

Proteomics International Managing Director Dr Richard Lipscombe said, *"these results could literally be a game changer for sports medicine - they have implications for all high-performance athletes, from footballers to horse racing. If we can detect unseen muscle damage, then athletes can adjust their training regime to avoid more serious injury."*

Marathon running causes extensive muscle damage, known as exercise-induced muscle damage (EIMD), which can impair performance and increase injury risk if recovery is incomplete. This study, published in the international peer-reviewed journal *Physiological Reports*, highlighted the ability of the OxiDx oxidative stress test as a novel diagnostic for monitoring this recovery. Levels of oxidative stress peaked 48 hours post-marathon and remained elevated for up to five days, correlating with traditional muscle damage indicators like reduced muscle force, increased soreness, and elevated creatine kinase.

¹ Appraising the Welfare of Thoroughbred Racehorses in Training in Queensland

² Australian Institute of Health and Welfare (2023): Economics of sports and physical activity participation and injury

Proteomics International Laboratories Ltd
ABN 78 169 979 971

Box 3008, Broadway, Nedlands, WA 6009, Australia

T: +61 8 9389 1992 | E: enquiries@proteomicsinternational.com | W: www.proteomicsinternational.com

Group data across the 20 participants indicated recovery by day six, however, individual variability was significant, with some runners showing prolonged recovery times. This variability emphasises the importance of individualised recovery monitoring to prevent premature training resumption. OxiDx's diagnostic sensitivity to recovery processes surpasses traditional markers by offering athletes and coaches a novel reliable tool for optimising post-marathon recovery and enhancing performance.

The world-first, patented OxiDx technology measures levels of muscle damage using a simple finger-prick blood sample to detect protein biomarkers in the blood. There is no equivalent test on the market. This successful study is a significant milestone in the commercialisation of the OxiDx test which is targeted for an Australian launch in H1 CY25.

Summary of Study

Published in the journal *Physiological Reports* (December 2024 issue; Article available online)³.

Titled: "Temporal changes in thiol-oxidized plasma albumin are associated with recovery from exercise induced muscle damage after a marathon"

Authors: C James¹, E Lloyd², P G Arthur³;

¹OxiDx, Nedlands, Western Australia, ²School of Human Sciences, The University of Western Australia

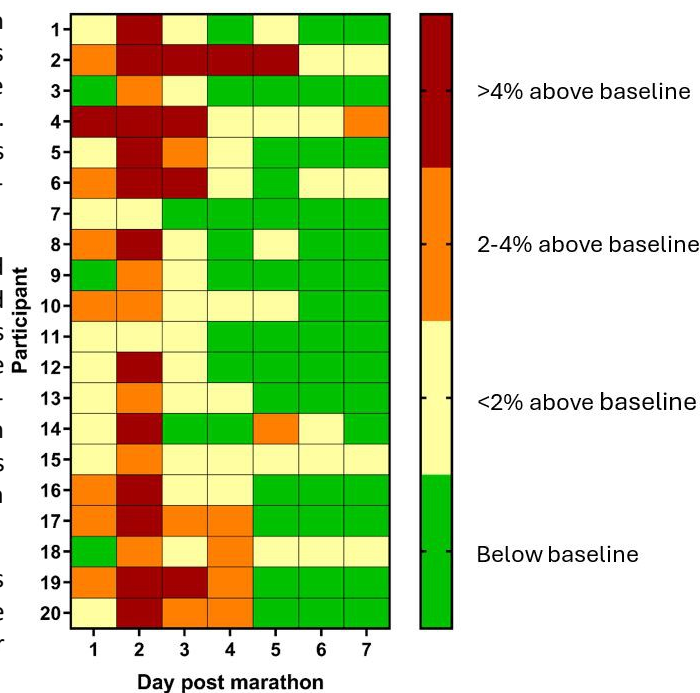
³School of Molecular Sciences, The University of Western Australia

Aim: To assess whether the OxiDx test (measuring oxidative stress levels via thiol-oxidised albumin) can detect muscle damage in elite athletes who completed a marathon.

Method: Twenty participants completed a marathon and collected daily dried blood spots from 3 days prior to and 7 days after the marathon to measure thiol-oxidised albumin using the OxiDx test. Participants were also assessed for indirect markers of muscle damage prior to and on days 2 and 5 post-marathon.

Results: On average, the level of thiol-oxidised albumin peaked at 2 days and remained elevated until 5 days after the marathon. OxiDx values correlated well with indirect measures of muscle damage. Notably, the time of recovery for thiol-oxidised albumin varied between participants, with some recovering by day 3 post-marathon whereas others were elevated beyond day 7 post marathon (Figure 1).

Figure 1. Heatmap depicting oxidative stress levels (thiol-oxidised albumin) that are below or above the baseline value for 20 athletes each day after completing the marathon.



Conclusions: Tracking temporal changes in the level of oxidative stress (via thiol-oxidised albumin) provides an accurate, sensitive measure of muscle damage in individual athletes. The simplicity of the OxiDx methodology offers a novel tool for managing recovery from exercise induced muscle damage in high-performance athletes.

Authorised by the Board of Proteomics International Laboratories Ltd (ASX: PIQ).

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About OxiDx

OxiDx Pty Ltd (Perth, Western Australia) is a 66 per cent owned subsidiary of Proteomics International. OxiDx is commercialising technology for measuring oxidative stress developed in collaboration with The University of Western Australia. OxiDx uses next generation diagnostics technology, moving beyond

³ *Physiological Reports*: doi.org/10.14814/phy2.70155

measuring protein concentrations to detect subtle changes in protein structures known as post-translational modifications or 'decorations' that reside on the surface of a protein. The patented OxiDx platform technology measures systemic oxidative stress in a fingerpick blood sample by using a sensitive ratiometric method to detect protein biomarkers in the blood. Samples can be collected in the home, clinic or on the field with high specificity to provide a comprehensive solution for monitoring oxidative stress levels.

Oxidative stress is implicated in over 70 health conditions⁴ with a person's levels often reflective of health and fitness. The ability to measure oxidative stress has broad application across multiple markets, from an athletic monitoring tool for competition preparedness and injury reduction in professional sports and horse racing industries, to a monitoring tool for health and wellbeing, including in primary industries such as stock production. It could also serve as a complementary diagnostic (CDx) test for assessing treatment efficacy and precision medicine by enabling personalised dosing in clinical trials.

About Proteomics International Laboratories (PILL) (www.proteomicsinternational.com)

Proteomics International (Perth, Western Australia) is a wholly owned subsidiary and trading name of PILL (ASX: PIQ), a medical technology company at the forefront of predictive diagnostics and bio-analytical services. The Company specialises in the area of proteomics – the industrial scale study of the structure and function of proteins. Proteomics International's mission is to improve the quality of lives by the creation and application of innovative tools that enable the improved treatment of disease.

For further information please contact:

Dirk van Dissel
Investor Relations
Candour Advisory
T: +61 408 326 367
E: dirk@candouradvisory.com.au

Dr Richard Lipscombe
Managing Director
Proteomics International Laboratories Ltd
T: +61 8 9389 1992
E: enquiries@proteomicsinternational.com

Proteomics International (Europe)
Plesmanweg 9, 7602 PD Almelo
The Netherlands
T: +31 85 40 11 173
E: Europe@PromarkerD.eu

⁴ Doi: 10.1373/clinchem.2005.061408