Exploring the Temporal Relationship Between Sweat and Blood Lactate Using a Wearable Biosensor in Cyclists: A Pilot Study

The Study

- Cohort: **18 recreational cyclists (13M/5F).**
- Protocol: **Incremental cycling (60W + 20W every 4 min) at 25°C, 50%RH.**
- Method: **Comparing capillary blood lactate to PF ACE sweat lactate.**
- Analysis: **Cross-correlation optimization to align continuous sweat data with discrete blood points.**

Key Findings

- High Correlation: **Initial raw correlation of 0.9166 ± 0.1010 increased to 0.9547 ± 0.0327 after optimizing for temporal alignment.**
- Physiological Lag: **Identified lag time of 85s and 73s for optimizing Global Pearson Correlation (r) and RMSE.**
- Threshold Detection: **Proves that SL can reliably track systemic metabolic stress when personalized calibration is applied.**