WearOptimo

Hydration and Heat-Risk Intelligence for Elite Sports

"Exercise performance begins to decline once water loss exceeds 2% of an individual's body mass."

- American Council of Exercise[5]

Performance Opportunity

Gaining a competitive edge in elite sport often comes down to marginal improvements. Hydration is an important but underleveraged factor. Even mild dehydration can impair muscular endurance, strength, anaerobic power and explosive performance, while increasing fatigue and perceived exertion. It can also compromise thermoregulation, cardiovascular efficiency and cognitive performance.[1,2,3,4]

Because these effects may develop before dehydration is recognised, better hydration intelligence can support sustained intensity, sharper decision-making, recovery and athlete availability.

Athlete Performance Impact

Impact Area	Evidence-Based Implication
Endurance Capacity	**Hydration helps athletes sustain output for longer.** Fluid loss increases the physiological demands of cooling, circulation and aerobic work. Maintaining hydration can support pace, efficiency and sustained performance, particularly during prolonged exercise or heat exposure. [3,6,8,9]
Power and Strength Output	**Dehydration can reduce explosive performance.** Hydration status can influence strength, muscular endurance and anaerobic capacity - qualities critical to repeated sprints, jumps, collisions and other high-intensity efforts.[1,7]
Thermoregulation and Heat Stress	**Hydration supports performance in the heat.** As dehydration increases, heat dissipation becomes less effective, and core temperature can rise more rapidly. Maintaining hydration supports thermoregulation and performance under demanding environmental conditions.[3,9,10]
Cognitive Performance and Decision-Making	**Hydration supports decision-making under pressure.** Even mild dehydration may affect alertness, information processing and tactical decision-making, particularly when combined with heat and fatigue.[2]
Perceived Exertion, Fatigue and Repeat-Effort Tolerance	**Dehydration can make the same workload feel harder.** Higher perceived exertion can affect pacing, repeated efforts and late-session performance. Managing hydration can help athletes sustain demanding workloads as fatigue builds.[3,9,11]

Performance Gap

- **Surface wearables have limited access to physiology.** Optical, temperature, motion and other surface signals provide useful insights, but important internal physiological states can remain indirect, noisy or difficult to individualise.
- **Traditional hydration assessment is intermittent.** Urine testing, blood testing, weigh-ins, sweat assessment and questionnaires can provide useful information, but often before or after performance rather than continuously.
- **Monitoring remains largely reactive.** Physiological strain may already be affecting performance before changes are identified, limiting the opportunity for earlier intervention.
- **Elite sport needs biological relevance without compromising usability.** The opportunity is to combine continuous physiological sensing, individualised interpretation and practical integration into athlete and performance-team workflows.

WearOptimo Capability

WearOptimo is an AI-native physiological intelligence company combining proprietary in-skin sensing, physiology-guided AI and scalable manufacturing.

Our Microwearable microelectrodes engage only a hair's width into the skin, acquiring multi-frequency, multi-channel in-skin bioimpedance together with temperature and motion. These signals are interpreted through WearOptimo's physiology-guided AI engine to learn changing physiological state at the level of the individual.

Hydration and heat-risk intelligence is the first application and commercial proof point. Hydration-related signal detection has been demonstrated in controlled human studies, while the Hydration Index, heat-risk intelligence and performance across diverse users and real-world conditions continue to be developed.

Capability Snapshot

- **Sensing interface:** Minimally invasive Microwearable microelectrodes engaging only a hair's width into the skin.
- **Signals:** Multi-frequency, multi-channel in-skin bioimpedance, temperature and motion.
- **Intelligence:** Physiology-guided AI trained using ground-truthed human, biophysical, synthetic and field data.
- **First application:** Hydration Index and heat-risk intelligence.

Why This Matters

- Targets hydration-related physiology rather than relying only on indirect proxies or intermittent checks.
- Designed to support continuous, individualised physiological intelligence.
- Creates the potential for earlier recognition of emerging hydration and heat risk.
- Supports athletes and performance teams with objective information for training, readiness and competition decisions.

PERFORMANCE VALUE

Earlier insight can support earlier action - helping performance teams manage hydration and heat risk, sustain athlete performance and make more informed readiness and recovery decisions.

GOAL

Turn hidden hydration and heat risk into actionable physiological intelligence for elite performance.

Selected References

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