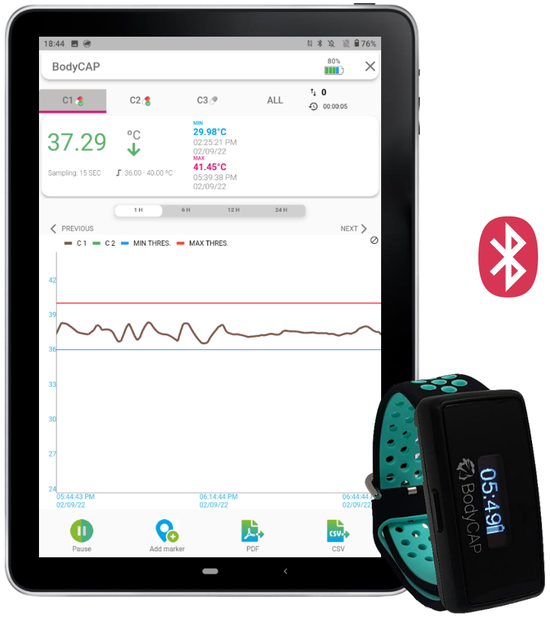
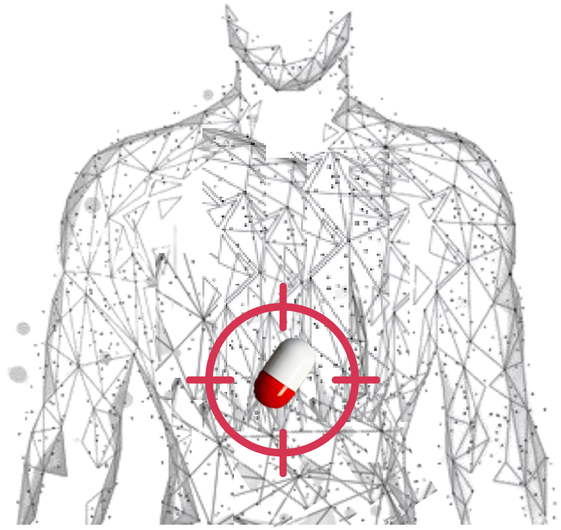
Celsius
Performance Connect





eCelsius Performance Connect brochure

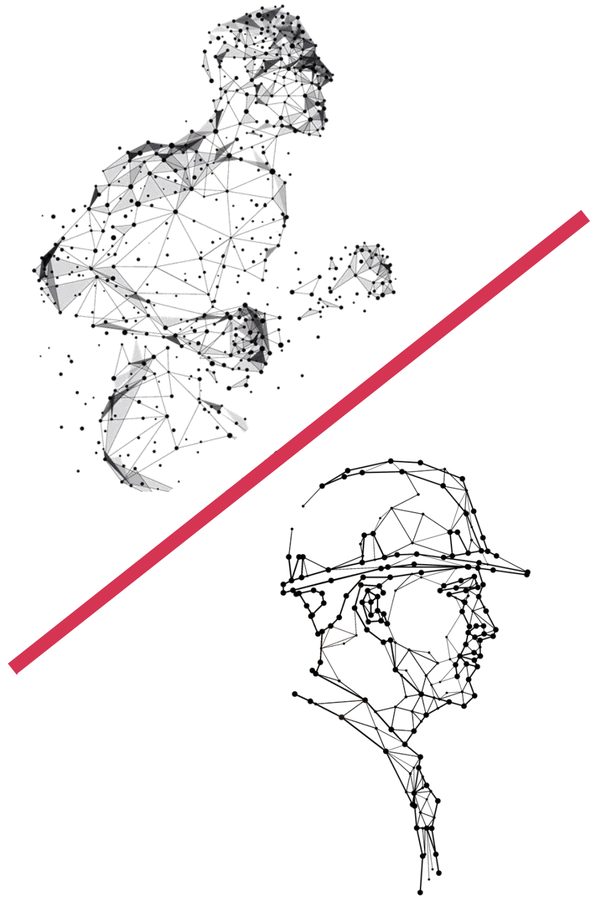
A system for a reliable and accurate temperature monitoring

Scientifically approved
Gold standard for core temperature monitoring

Version 10-21-2022

Summary

Current human fields of application



Current human fields of application

Few examples

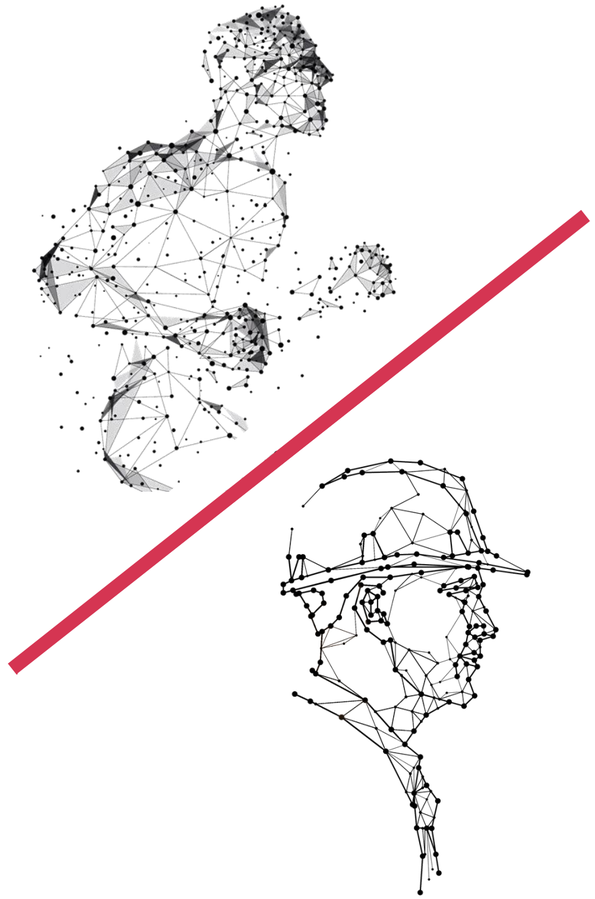
SPORTS APPLICATIONS

- Performance assessment/optimization
- Thermoregulation - Heat acclimatization
- Hypothermia/Hyperthermia prevention
- Warm up – recovery process optimization
- Preventing, quantifying and avoiding the Jet-Lag issue

OCUPATIONNAL HEALTH APPLICATIONS

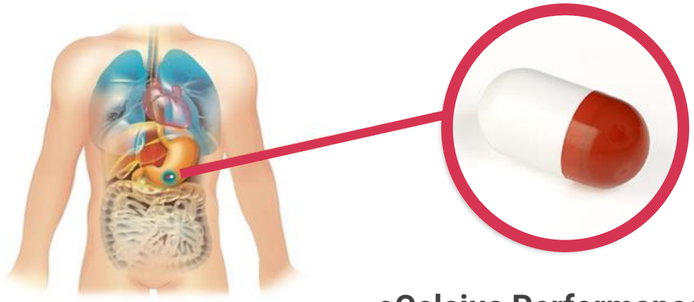
- Temperature monitoring for soldiers
- Temperature control for fireman, rescue divers
- Thermoregulation - Heat stroke prevention

About eCelsius Performance Connect



Introduction

eCelsius Performance Connect: the essentials



eCelsius Performance capsule

RF 433Mhz

ePerf Connect

Activation box to turn on the capsule

ePerf Mobile App

Communication range between capsule and ePerf Connect in real time : 1 to 3m (depending on subject & environment)

About eCelsius Performance Connect

Specifications

eCelsius Performance CAPSULE SPECIFICATION

Capsule cleaning	Standardized cleaning process
Size (Diameter x lenght)	17.7mm x 8.9mm
Weight	1.7g
Temperature accuracy	+/-0.2°C (+/-0.36°F)
Temperature resolution	0.01°C (0.03202°F)
Life duration	20 days
Shef life	2 years
Measurement period available	15s, 30s, 1min, 2min, 5min
Temperature range	25-45°C (77-113°F) below 25°C consult us

Minimum weight 40kg

e-Perf Mobile App: To configure the watch and visualize the data collected & recorded

For Android Smartphone/Tablet (available on Google Play Store)

Equipment

eCelsius Perf ACTIVATOR SPECIFICATION: to turn on the capsule

Size	69mm x 59mm x 31mm
Able to activate a large number of pills	

ePerf Connect SPECIFICATION: to collect and record data

Size	52mm x 25mm x 15mm
Weight	33g
Number of capsule associated	Up to 3 capsules
Storage	150 000 data
Autonomy	2-5 days
Water resistant	5 ATM

Few parameters may impact the performance of the system:

- **The subject morphology**
- **The environment (metal, ...)**
- **Your own protocol**

We can advise & help you to define the best configuration for your study.

eCelsius Performance Connect added value

Technical specifications:

CAPSULE INTERNAL MEMORY

Embedded memory in the capsule allows to continuously store the last 2000 collected data independently of the life duration.

MEASUREMENT PERIOD

Several sampling frequency are available and can be changed all along the monitoring.

SIMPLE WAY OF WORKING

After activation and ingestion, the capsule automatically collects and transmits accurate and reliable temperature data to the ePerf Connect watch.

ACCURATE DATA

eCelsius Performance guarantees you an accuracy of +/- 0.2°C.

Scientific advantages:

NO DATA LOSS

No data loss even if the subject is out of the communication range for a while.

REAL TIME & *A POSTERIORI* DATA RECOVERY

If ePerf Connect is in the communication range of the capsule, you can collect real time data. If not, ePerf Connect will synchronize the missing data as soon as the capsule and ePerf Connect are in the same communication range.

ADAPTABLE MONITORING

During the monitoring, you have the possibility to change the measurement period when you want. In addition to the internal memory, the several sampling frequencies available, allows the system to fit with your protocol.

TIME SAVER

Save time thanks to quick and easy implementation. Full data set available on site through an Android mobile App.

RELIABLE MONITORING

Accurate data with a resolution of 2 digits.

Other:

ADD MARKERS

Markers can be added all along the experiment to highlight a specific event.

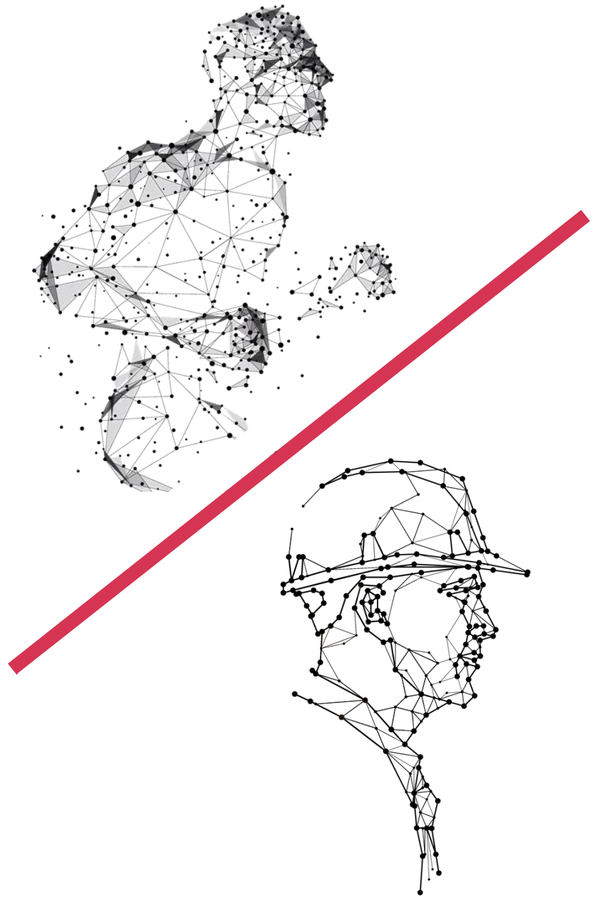
LIGHTWEIGHT & TINY

Capsules are lightweight 1.7g and measure 17.7mm x 8.9mm.

DESIGNED FOR HUMAN SUBJECT

Designed only for human subject with a minimum weight of 40kg.

Examples of research studies



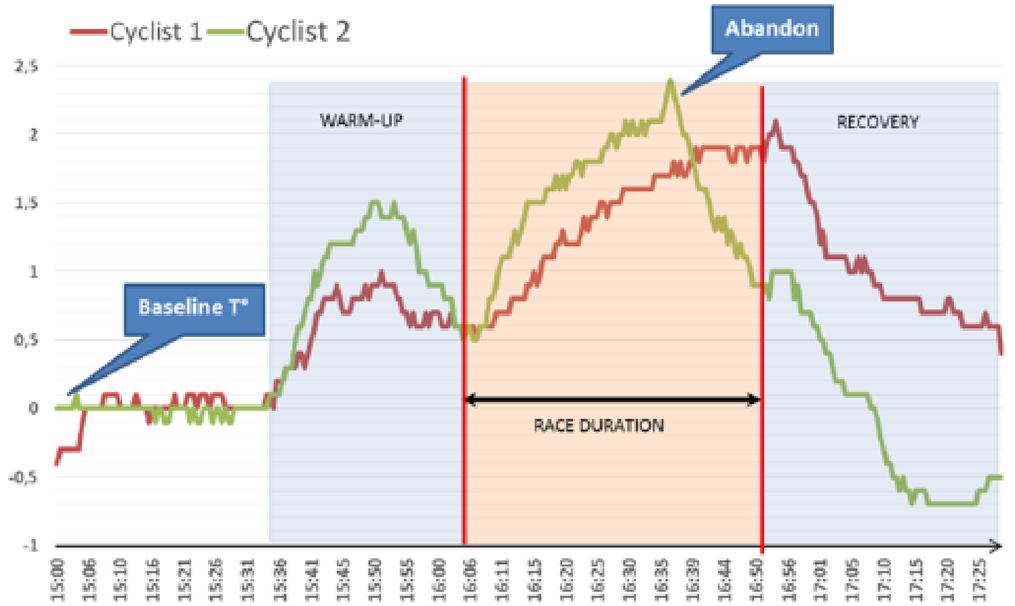
Examples of research studies

Hyperthermia / heat stroke prevention

eCelsius Performance Connect ADDED VALUE

1. **Continuous core temperature control**
2. **Health protection**
3. **Equipment, training/recovery processes assessment**

Long duration exercises performed in the heat induce rise in core temperature that could range from hyperthermia to heat stroke.



FDJ pro cycling team, Team Time Trial - World Road Cycling Championship, (Richmond 2015)

Publications:

Racinais et al., (2018)Core temperature up to 41.5ºC during the UCI Road Cycling World Championships in the heat.
Stephenson et al., (2018) High Thermoregulatory Strain During Competitive Paratriathlon Racing in the Heat.
Ioannou et al., (2019) A free software to predict heat strain according to the ISO 79332018.
McGarr et al., (2020) Heat strain in children during unstructured outdoor physical activity in a continental summer climate.

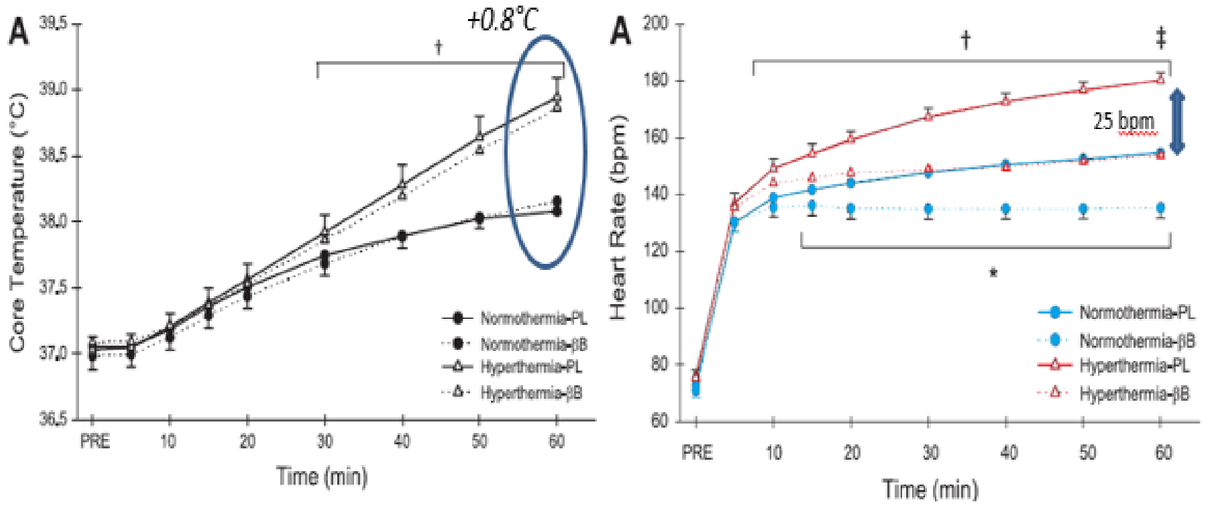
Examples of research studies

Performance optimization

eCelsius Performance Connect ADDED VALUE

1. **Implementation of acclimatization program**
2. **Individual control of acclimation process**
3. **Benefits assessment**

Core hyperthermia is directly correlated to performance decline. The drift of heart rate due to heat exhaustion induces a direct misappropriation of the cardiovascular effort. This loss can be avoided thanks to an individual acclimatization program.



A rise of 0.8°C in core temperature leads to :

- a rise of 25 bpm in submaximal HR
- a significant decrease in stroke volume

Publications:

Roussey et al., (2018) Interactions between perceived exertion and thermal perception in the heat in endurance athletes.

Racinais et al., 2022, Association between thermal responses, medical events, performance, heat acclimation and health status in male and female elite athletes during the 2019 Doha World Athletics Championship

Schmit et al., (2018) Optimizing Heat Acclimation for Endurance Athletes: high versus Low-intensity training..

Stevens et al., (2018) Effect of two-weeks endurance training wearing additional clothing in a temperate outdoor environment on performance and physiology in the heat.

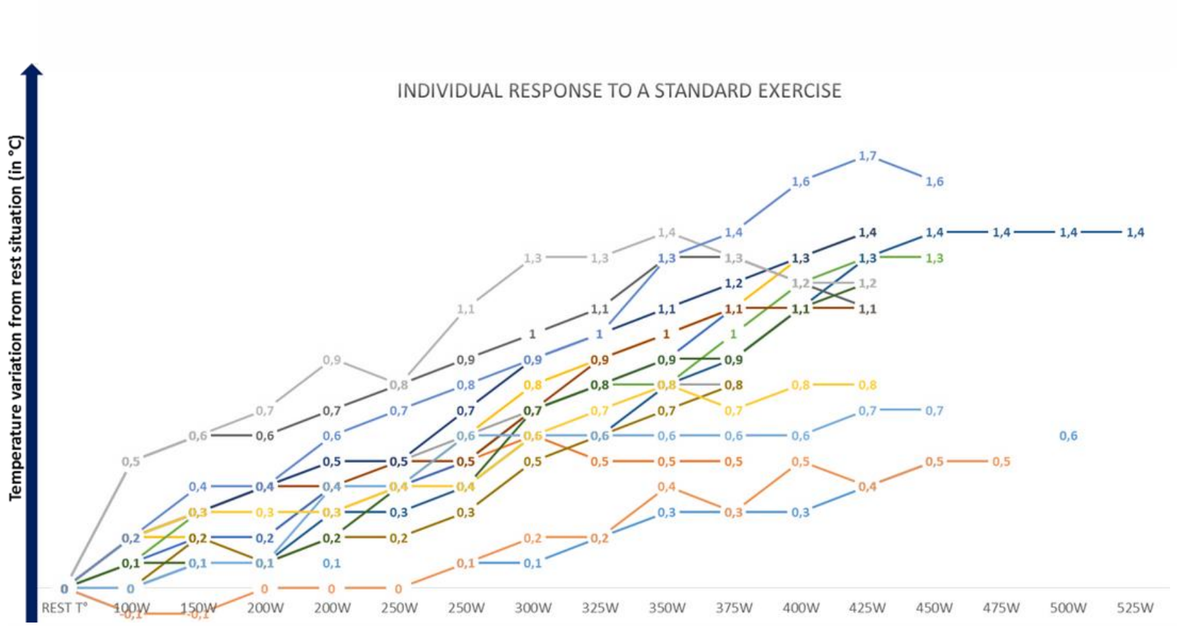
Examples of research studies

Assessment of thermoregulation efficiency

eCelsius Performance Connect ADDED VALUE

1. **Define individual thermoregulatory profile**
2. **Implementation of individual acclimatization program**
3. **Individual control of the acclimation process**
4. **Benefits assessment**

Thermoregulatory responses are very different among elite athletes. This takes the form of differences in thermoregulatory profiles, adaptations and acute physiological responses (Heart-Rate drift, …).



Preseason test event with a pro cycling team (2017).

Publications:

Xu et al., (2021), Effects of Hot and Humid Environments on Thermoregulation and Aerobic Endurance Capacity of Laser Sailors

Roussey et al., 2021, Heat acclimation training with intermittent and self-regulated intensity may be used as an alternative to traditional steady state and power-regulated intensity in endurance cyclists

Roussey et al., (2018), Interactions between perceived exertion and thermal perception in the heat in endurance athletes.

Schmit et al., (2018), Optimizing Heat Acclimation for Endurance Athletes: high versus Low-intensity training.

Alhammoud et al.,(2020), Thermoregulation and shivering responses in elite alpine skiers.

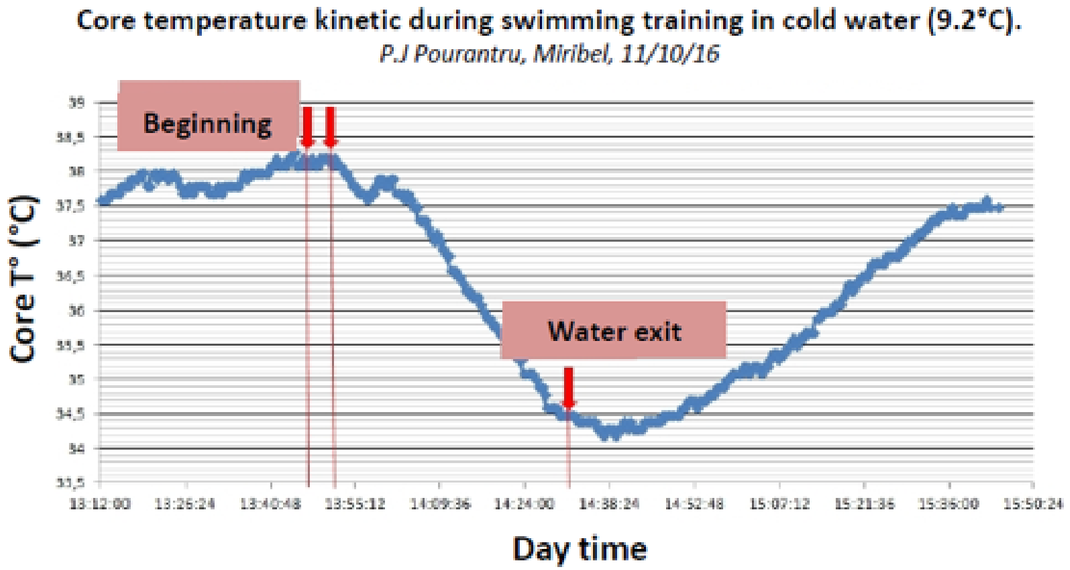
Examples of research studies

Hypothermia prevention

eCelsius Performance Connect ADDED VALUE

1. **Health protection**
2. **Equipment assessment**
3. **Assessment of individual resistance to cold temperatures**

The monitoring of core temperature in all harsh sport environments which are likely to involve thermal risks (Cold/heat/humidity), allows to study individual coping skills in critical environment.



Publications:

Melau et al., (2020), Impact of a 10km cold water swim on Norwegian Naval Special Forces recruits.
Deng et al., (2020), Effects of local heating on thermal comfort of standing people in extremely cold environments.
Øivind Høiseth et al., (2021), Core Temperature during Cold-Water Triathlon Swimming
Drigny et al., (2021) Risk Factors and Predictors of Hypothermia and Dropouts During Open-Water Swimming Competitions

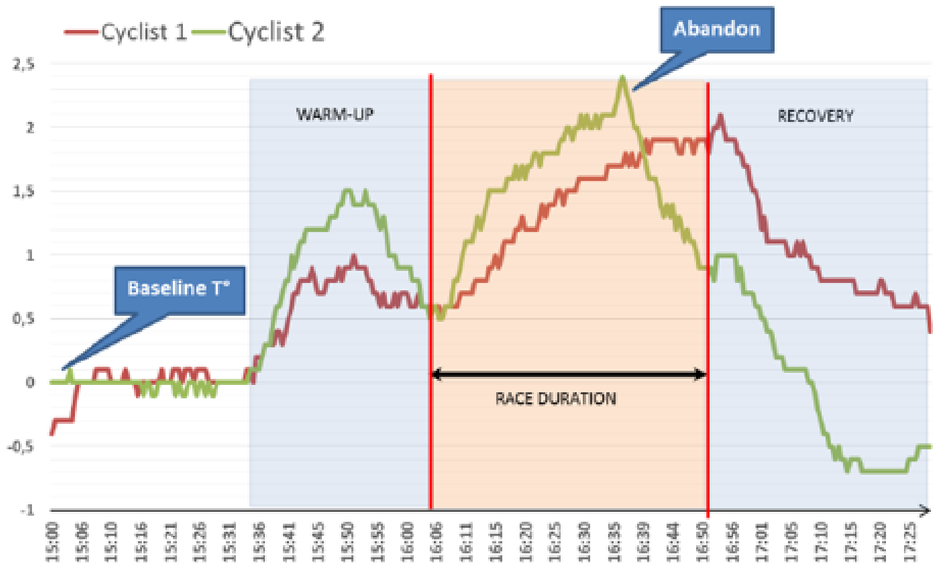
Examples of research studies

Warm-up optimization

eCelsius Performance Connect ADDED VALUE

1. **Warm-up process assessment**
2. **Individualization of warm-up**
3. **Performance optimization**

Core temperature increasing during warm up process must be controlled. Limitation of core temperature rise during warm-up process allows to delay the discomfort and exhaustion associated to hyperthermia.



FDJ pro cycling team, Team Time Trial - World Road Cycling Championship, (Richmond 2015)

Publications:

Taylor et al., (2019), An ice vest limits the rise in core temperature during a Rugby Sevens warm-up.
Keller et al., (2020) Comparison of two different cooling systems in alleviating thermal and physiological strain during prolonged exercise in the heat.

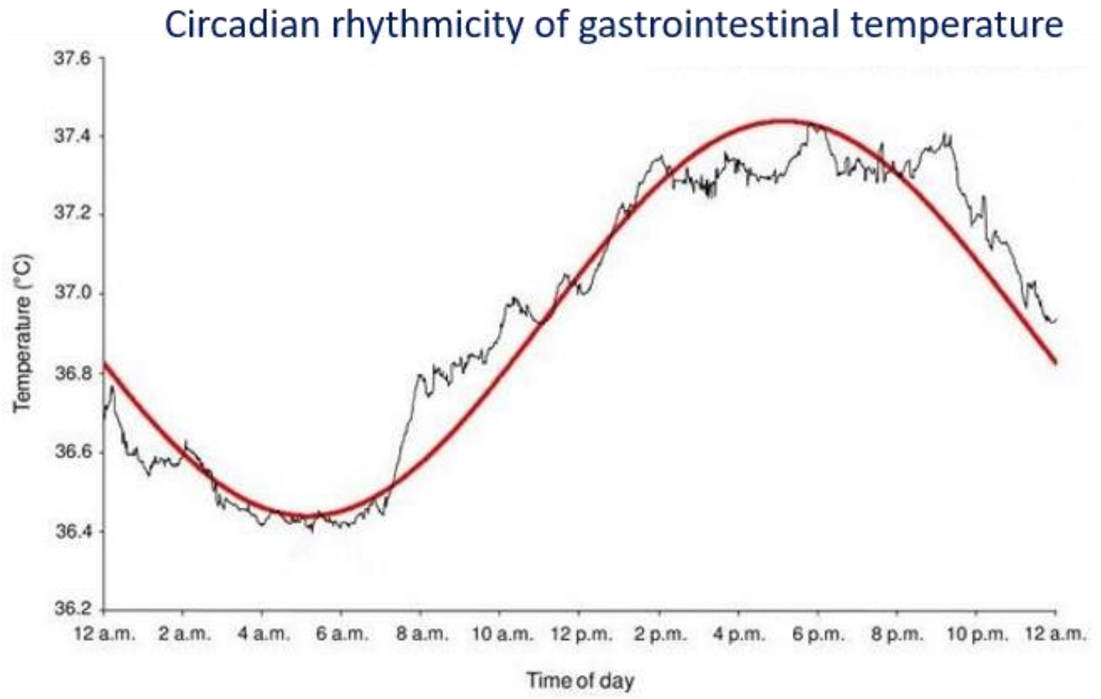
Examples of research studies

Circadian rhythm characterization

eCelsius Performance Connect ADDED VALUE

1. **Assessment of individual CBT rhythm**
2. **Individual jet lag resynchronization**
3. **Performance optimization**

Circadian synchronization is of main importance for elite athletes. Core temperature is one of the main marker of the individual circadian rhythm. Measuring and monitoring this parameter will be a key element for improving performance and recovery.



Publications:

Huang et al., (2021), Telemonitored Human Circadian Temperature Dynamics During Daily Routine

Komarzynski et al., (2019), Predictability of individual circadian phase during daily routine for medical applications of circadian clocks.

De Blasiis et al., (2019), Photoperiod impact on a sailors =sleep wake rhythm and core body temperature in polar environment.

Dominiak et al., (2020), The effect of a short burst of exercise during the night on subsequent sleep.

Chavineau et al., (2021), Effect of the Depth of Cold after Immersion on Sleep Architecture and Recovery Among Well-Trained Male Endurance Runners

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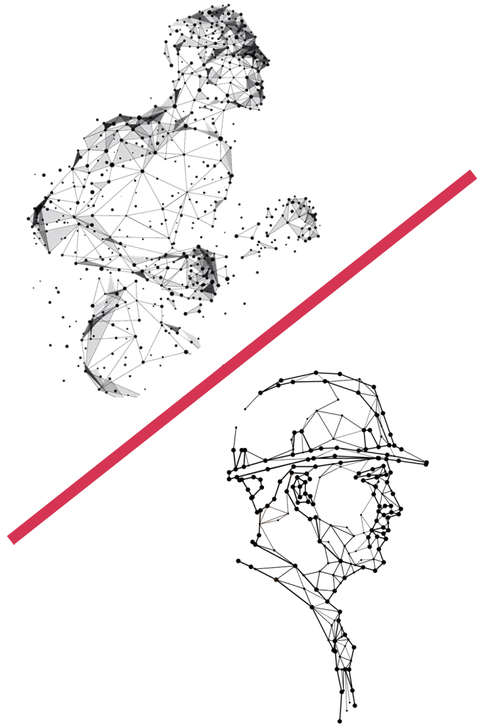

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