



SPECIALTY 08 · ANS

# Sports Medicine

Recovery, HRV, performance and the athlete's sleep.

8 SHEETS

# What NESA modulates (and what it doesn't)

NESA does not treat or cure any of the conditions covered in these sheets. Its non-invasive neuromodulation acts on the **autonomic nervous system (ANS)** to help **relieve the symptoms associated with its dysregulation** —dysautonomia— that accompanies each condition. It does not replace diagnosis, medication or the professional's judgement: it supports them.

## IN PLAIN WORDS, FOR THE PATIENT



### Your body runs on electricity

Every heartbeat, movement and thought travels as a tiny electrical signal along your nerves.



### The ANS is your autopilot

The autonomic nervous system quietly runs your heart, breathing, digestion and sleep — without you thinking about it.



### It has an accelerator and a brake

The "sympathetic" switches you on; the "parasympathetic" calms you down. Health is when they take turns at the right time.

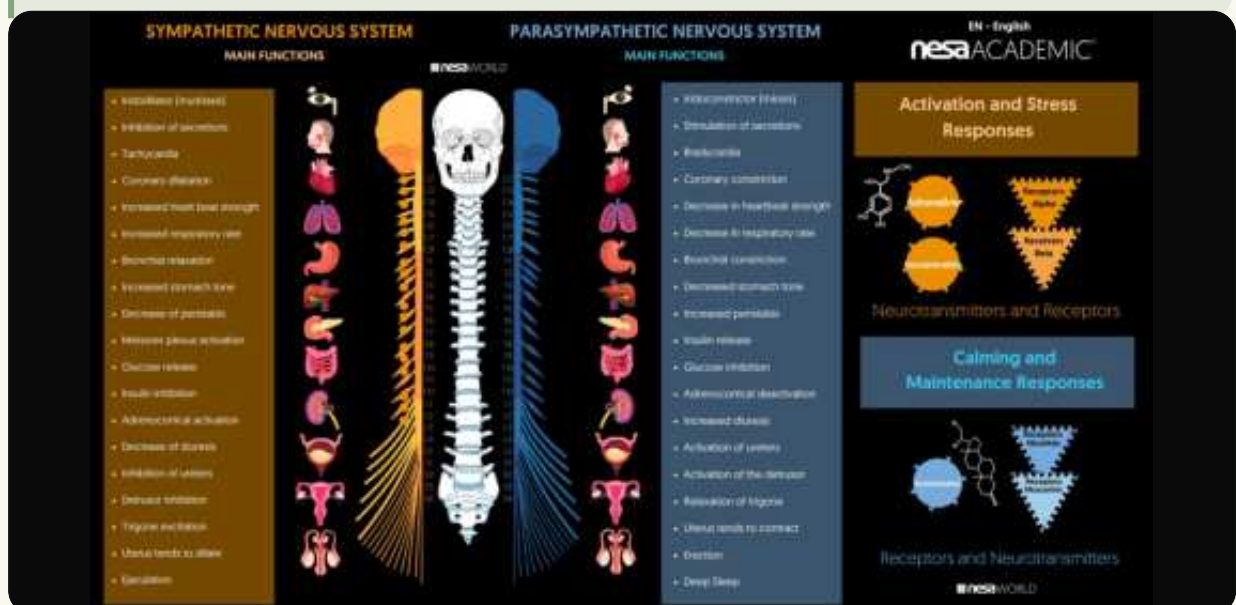


### NESA speaks that language

Very gentle microcurrents through hands and feet help the accelerator and brake find their balance again.



**Safe and imperceptible.** No needles, no heat: the current is so faint it stays below what you can feel. Most people notice nothing during the session.



Main functions of the sympathetic and parasympathetic branches: the physiological ground —the ANS— on which NESA neuromodulation acts.

**REFERENCE** Goldstein DS, Robertson D, Esler M, Straus SE, Eisenhofer G. *Dysautonomias: clinical disorders of the autonomic nervous system*. Ann Intern Med. 2002;137(9):753–763. · Thayer JF, Lane RD. *A model of neurovisceral integration in emotion regulation and dysregulation*. J Affect Disord. 2000;61(3):201–216.



# Recovery and overtraining

When you train hard but don't recover: tiredness, stalled performance and more injuries.

## 1 PHASE 1 Does this sound like you?

- ✓ Persistent fatigue
- ✓ Stalled or declining performance
- ✓ Worse sleep
- ✓ More niggles or injuries
- ✓ High resting heart rate
- ✓ Little motivation to train

“ Do you recover worse between sessions than before?

“ Do you feel tired even when you rest?

## 3 PHASE 3 The loop

- 1 Heavy load, little rest.
- 2 The brake doesn't kick in to recover.
- 3 Poor recovery: more fatigue and injury.

↻ AND IT STARTS AGAIN

## 2 PHASE 2 What happens in your nervous system

Picture **a revved-up engine that never cools down between races**. Your nervous system has an “accelerator” and a “brake”, and right now they're out of balance.

### ⚡ Accelerator

Sympathetic · chronically dominant from too much load.

### ⏸ Brake

Parasympathetic · the engine of recovery, never quite kicks in.

If the accelerator never switches off, **there's no repair or adaptation**: training doesn't turn into improvement.



Recovering well is what turns training into improvement.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

~ Helps let the **brake kick in** to “cool the engine” between efforts and consolidate adaptation.

## 5 PHASE 5 With your professional & what you may notice

### ♥ With your S&C coach

NESA **does not replace** your strength & conditioning coach or sports physician: it supports how they plan your load and recovery.

### ✓ What you may notice

- ✓ Recovering sooner
  - ✓ Sleeping better
  - ✓ Less accumulated fatigue
  - ✓ Better training adaptation
- Results vary from person to person.*



# Heart rate variability (HRV)

When your watch gives you an HRV reading each morning and you notice that, when it drops, you perform and recover worse.

## 1 PHASE 1 Does this sound like you?

- ✓ HRV that drops after loaded or stressful days
- ✓ Higher resting heart rate
- ✓ A sense of being "off"
- ✓ Worse sleep
- ✓ Less energy
- ✓ Performance that won't come

“ Does your HRV drop when load or stress build up?

“ Do you notice you perform worse with a low HRV?

## 3 PHASE 3 The loop

- 1 High load or stress.
- 2 Accelerator dominant in the background.
- 3 Low HRV and poor recovery: more fatigue.

↻ AND IT STARTS AGAIN

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

~ Helps give the **brake more weight** to support a recovery that shows up as a more stable HRV.

## 5 PHASE 5 With your professional & what you may notice

### ♥ With your team

NESA **does not replace** your coach or sports physician: it complements how they read your HRV and load, always in context.

### ✓ What you may notice

- ✓ A more stable HRV
  - ✓ Feeling more recovered
  - ✓ Arriving readier to train
- Results vary from person to person.*



A stable HRV reflects that the brake is available.



# Vascularisation and aerobic performance

When you perform and recover better if blood “gets through” to the muscle, and worse when you’re tense or cold.

## 1 PHASE 1 Does this sound like you?

- ✓ “Heavy” or cold legs
- ✓ A sense of poor blood flow
- ✓ Muscle soreness that lasts a long time
- ✓ Slow recovery between sets or days
- ✓ Worse performance when cold or stressed
- ✓ Cold hands and feet

“ Do your legs feel closed-down or cold, with slow recovery?

“ Do you perform worse when you’re tense?

## 3 PHASE 3 The loop

- 1 High accelerator in the background.
- 2 Blood flow closed at rest.
- 3 Less O<sub>2</sub> and poorer clearance: slow recovery.

↻ AND IT STARTS AGAIN

## 2 PHASE 2 What happens in your nervous system

Picture *the roads that carry your blood*: when they’re open, oxygen and supplies get through. Your nervous system decides whether they open or close.

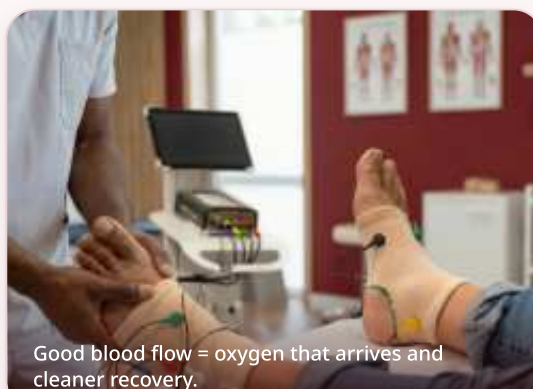
### ⚡ Accelerator

Closes blood flow at rest (vasoconstriction).

### ⏸ Brake

Opens vascularisation: O<sub>2</sub>, nutrients and metabolite clearance.

The ANS controls the vessels: if the accelerator never switches off, **blood flow at rest falls short**.



Good blood flow = oxygen that arrives and cleaner recovery.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

~ Helps improve vascular tone and blood flow at rest, the basis of good oxygen supply and cleaner recovery.

## 5 PHASE 5 With your professional & what you may notice

### ♥ With your coach

NESA **does not replace** your strength & conditioning coach or sports physiotherapist: it supports your aerobic and recovery work.

### ✓ What you may notice

- ✓ Better oxygen supply
  - ✓ Cleaner recovery between efforts
  - ✓ “More open” legs
- Results vary from person to person.*



# Injury recovery and return to play

When, after an injury, the area stays swollen or tense, recovery is slow and getting back is hard.

## 1 PHASE 1 Does this sound like you?

- ✓ Swelling that won't go down
- ✓ Heat or tension in the area
- ✓ Slow recovery
- ✓ Stiffness
- ✓ Pain on loading
- ✓ Fear or low confidence about returning

“ Is the area still swollen or tense more than expected?

“ Has your recovery stalled?

## 3 PHASE 3 The loop

- 1 The injury happens.
- 2 Blood flow closed and inflammation held.
- 3 Slow repair: more tension and fear.

🔄 AND IT STARTS AGAIN

## 2 PHASE 2 What happens in your nervous system

Picture **a repair site with the supply road jammed**: materials can't get through, and the work drags on.

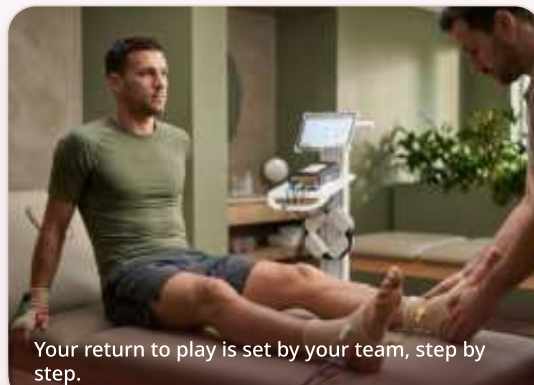
### ⚡ Accelerator

Keeps the area on guard: closes blood flow and holds inflammation.

### 🛑 Brake

Opens blood flow to repair tissue and bring inflammation down.

With the accelerator on guard, **the muscle tenses and the tissue repairs slowly.**



Your return to play is set by your team, step by step.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

🌊 Helps open blood flow and stand the guard down to bring O<sub>2</sub> and nutrients and clear inflammation.

## 5 PHASE 5 With your professional & what you may notice

### 💖 With your physiotherapist

NESA **does not replace** your sports physiotherapist, sports physician or return-to-play team: they decide when you return.

### ✓ What you may notice

- ✓ Less swelling
  - ✓ Smoother recovery
  - ✓ Returning with more confidence
- Results vary from person to person.*



# Pre-competition activation and optimal zone

When you're either too wound up or too flat, and you struggle to find your sweet spot.

## 1 PHASE 1 Does this sound like you?

- ✓ You wind up too much before competing
- ✓ Shaking or nerves
- ✓ You struggle to switch on in training
- ✓ Or you're "flat" and without spark
- ✓ You burn energy before you even start
- ✓ Inconsistent performance

“ Do you struggle to find your sweet spot of activation?

“ Do you arrive at key moments either over-revved or flat?

## 3 PHASE 3 The loop

- 1 Pressure or poor activation.
- 2 Accelerator badly dosed.
- 3 Over-revved or flat: worse performance.

↻ AND IT STARTS AGAIN

## 2 PHASE 2 What happens in your nervous system

Picture **a volume dial**: not too low (flat) and not maxed out (out of control). Your nervous system is that dial.

### ⚡ Accelerator

Performing needs the right dose; too much and you lose control.

### ⏸ Brake

Lets you dial down in time so you don't over-rev.

Without a brake that kicks in on time, **you overshoot (out of control) or fall short (flat).**



Your optimal zone: neither over-revved nor flat.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

~ Helps move **better between accelerator and brake** to find your optimal zone and return to calm when needed.

## 5 PHASE 5 With your professional & what you may notice

### ♥ With your coach

NESA **does not replace** your coach or sport psychologist: it complements your activation and sport-psychology work.

### ✓ What you may notice

- ✓ Entering your optimal zone more easily
  - ✓ Managing nerves better
  - ✓ Returning to calm when needed
- Results vary from person to person.*



# Sleep and overnight recovery

When you sleep little or badly, especially after a hard session or before competing, and you pay for it the next day.

## 1 PHASE 1 Does this sound like you?

- ✓ Hard to fall asleep after heavy load
- ✓ You wake a lot during the night
- ✓ Light sleep
- ✓ Waking up tired
- ✓ High resting heart rate at night
- ✓ Irritability

“ Do you sleep worse the harder you train or compete?

“ Do you wake without feeling recovered?

## 3 PHASE 3 The loop

- 1 High accelerator at night.
- 2 Light sleep, not deep.
- 3 Less repair and adaptation: more fatigue.

↻ AND IT STARTS AGAIN

## 2 PHASE 2 What happens in your nervous system

It's like **a light in your body that won't switch off at night**, just when it's time to recharge. Your nervous system should flick the switch down.



### Accelerator

Stays high at night: sleep turns light.



### Brake

Should lead for deep sleep (repair mode).

If the brake doesn't kick in at night, **recovery falls short** and you pay for it the next day.



At night the body recharges: sleep is recovery.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

~ Helps **switch the brake on** for more restorative rest, the basis of recovery and supercompensation.

## 5 PHASE 5 With your professional & what you may notice

### ♥ With your sports physician

NESA **does not replace** your sports physician or coach: it supports their sleep-hygiene and recovery guidance.

### ✓ What you may notice

- ✓ Sleeping a little better
  - ✓ Waking more recovered
  - ✓ Better response to training
- Results vary from person to person.*



# Muscle tension, cramp and stiffness

When your muscles are always loaded, cramp or knots keep coming back and some areas never let go.

## 1 PHASE 1 Does this sound like you?

- ✓ Muscles hard to the touch
- ✓ Frequent cramp
- ✓ Knots that come back
- ✓ A "knotted" feeling
- ✓ Reduced range of movement
- ✓ Tension that worsens with stress or fatigue

“ Do the same knots keep coming back, again and again?

“ Do some areas never let go, even when you stretch?

## 2 PHASE 2 What happens in your nervous system

It's like *a rope that's always taut and never quite loosens*. Your nervous system is holding that extra tone.

### ⚡ Accelerator

High tone: keeps the muscle tense and worsens its blood flow.

### ⏸ Brake

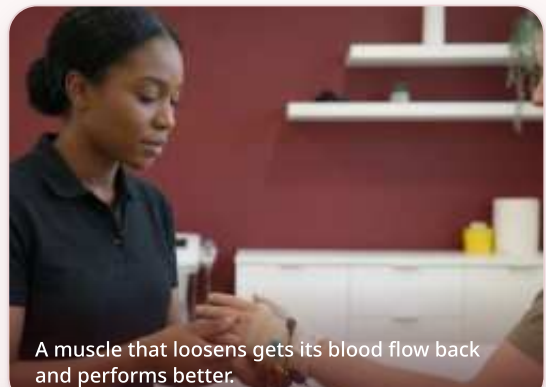
Lets the muscle loosen and get its blood flow back.

On top of that high tone come **cramp, knots and stiffness**.

## 3 PHASE 3 The loop

- 1 High muscle tone.
- 2 Tension and poor blood flow.
- 3 Cramp, knots and stiffness: more tone.

🔄 AND IT STARTS AGAIN



A muscle that loosens gets its blood flow back and performs better.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

🌊 Helps bring that tone down so the muscle loosens and gets its blood flow back, breaking the loop.

## 5 PHASE 5 With your professional & what you may notice

### 🤝 With your physiotherapist

NESA **does not replace** your sports physiotherapist or coach: it boosts your stretching, manual therapy and unloading work.

### ✓ What you may notice

- ✓ Less loaded muscles
  - ✓ Less cramp and fewer knots
  - ✓ More range of movement
- Results vary from person to person.*



# Competitive stress and performance anxiety

When you freeze at key moments, your heart races and you perform below what you're capable of.

## 1 PHASE 1 Does this sound like you?

- ✓ Racing heart at key moments
- ✓ Heavy legs or shaking moments
- ✓ Blank mind or racing thoughts
- ✓ Performing below your level
- ✓ A sense of freezing up
- ✓ Poor sleep before competing

“ Do you freeze up at the moments that matter?

“ Do you perform below what you know you can under pressure?

## 3 PHASE 3 The loop

- 1 Pressure arrives.
- 2 Accelerator spikes.
- 3 Freezing and low performance: more pressure.

↻ AND IT STARTS AGAIN

## 2 PHASE 2 What happens in your nervous system

It's like **an alarm that goes off at the worst moment** and leaves you frozen. Your nervous system is reacting to the pressure.

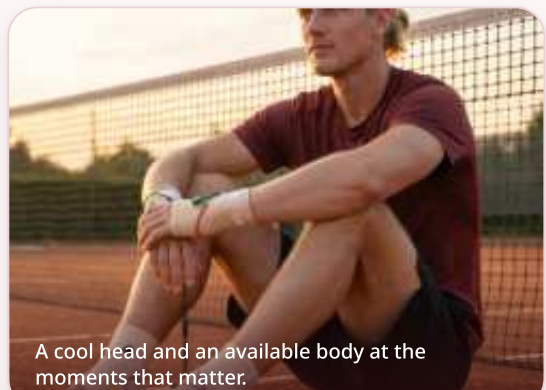
### ⚡ Accelerator

Under pressure it spikes: heart, tension and alertness.

### ⏸ Brake

If it doesn't kick in to regulate, you freeze (“choke”).

When the accelerator spikes with no brake, **mind and body freeze up.**



A cool head and an available body at the moments that matter.

## 4 PHASE 4 How NESA fits in

Non-invasive, painless microcurrents, with electrodes on the hands and feet, help your nervous system rebalance the **accelerator** and the **brake**.

~ Helps **regulate that spike and let the brake through** to keep a cool head and an available body.

## 5 PHASE 5 With your professional & what you may notice

### ♥ With your sport psychologist

NESA **does not replace** your sport psychologist or coach: the mental tools (routines, breathing, focus) are at the centre.

### ✓ What you may notice

- ✓ Less freezing at key moments
  - ✓ More control over nerves
  - ✓ Performing closer to your level
- Results vary from person to person.*

# Scientific bibliography

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A selection of literature documenting the involvement of the **autonomic nervous system**—vagal tone, heart-rate variability (HRV) and the cholinergic anti-inflammatory reflex—in the symptoms of the conditions addressed. It supports the physiological rationale of the approach; it does not represent a claim of NESA's clinical efficacy for each indication. Ordered by specialty.

## ● Foundations • ANS, HRV & the anti-inflammatory reflex

1. Thayer JF, Lane RD. *A model of neurovisceral integration in emotion regulation and dysregulation*. J Affect Disord. 2000;61(3):201–216.
2. Thayer JF, Åhs F, Fredrikson M, Sollers JJ, Wager TD. *A meta-analysis of heart rate variability and neuroimaging studies*. Neurosci Biobehav Rev. 2012;36(2):747–756.
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## ● Sports medicine

1. Plews DJ, Laursen PB, Stanley J, Kilding AE, Buchheit M. *Training adaptation and heart rate variability in elite endurance athletes*. Sports Med. 2013;43(9):773–781.
2. Buchheit M. *Monitoring training status with HR measures: do all roads lead to Rome?* Front Physiol. 2014;5:73.
3. Bellenger CR, Fuller JT, Thomson RL, et al. *Monitoring athletic training status through autonomic HR regulation: a systematic review and meta-analysis*. Sports Med. 2016;46(10):1461–1486.

The references support the physiological relationship between the autonomic nervous system and the symptoms described. Use of NESA under professional supervision; it does not replace treatment or medication.



***We modulate the autonomic nervous system.  
Everything else follows.***

Non-invasive neuromodulation of the autonomic nervous system. One root,  
many clinical expressions.

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