

# TRAIN CONSISTENTLY BY USING IMPACTFUL RECOVERY STRATEGIES

**Evidence-based sport science and  
medicine guidance for developing athletes**



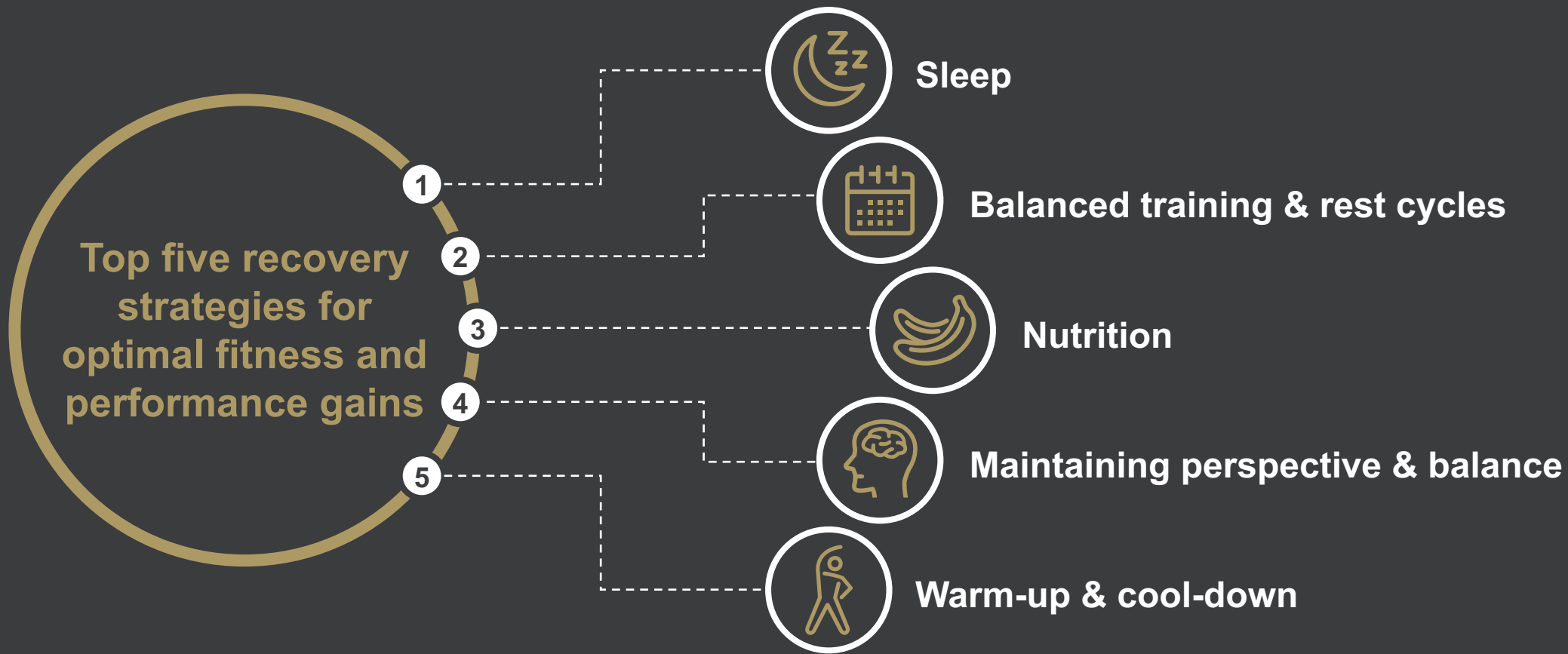
These resources have been compiled by the English Institute of Sport / UK Sport Performance Pathways Team, based on the expertise and experiences of practitioners working with our GB Olympic and Paralympic programmes, together with current literature findings.

The aim is to bring the most appropriate and useful knowledge being applied at the top end of British sports to the athletes, parents and coaches who are currently at an earlier stage of their development journeys.

We are confident that if this guidance is followed from an early age, positive habits will be formed that will actively contribute to an athlete achieving a great deal of success, both in and out of competitive sport.

Editable and presentable versions of these resources are available on a case-by-case basis; if you'd like to request these please email us at [talent.matters@eis2win.co.uk](mailto:talent.matters@eis2win.co.uk).

Dr Ben Holliss, PhD (Senior Performance Pathways Scientist)

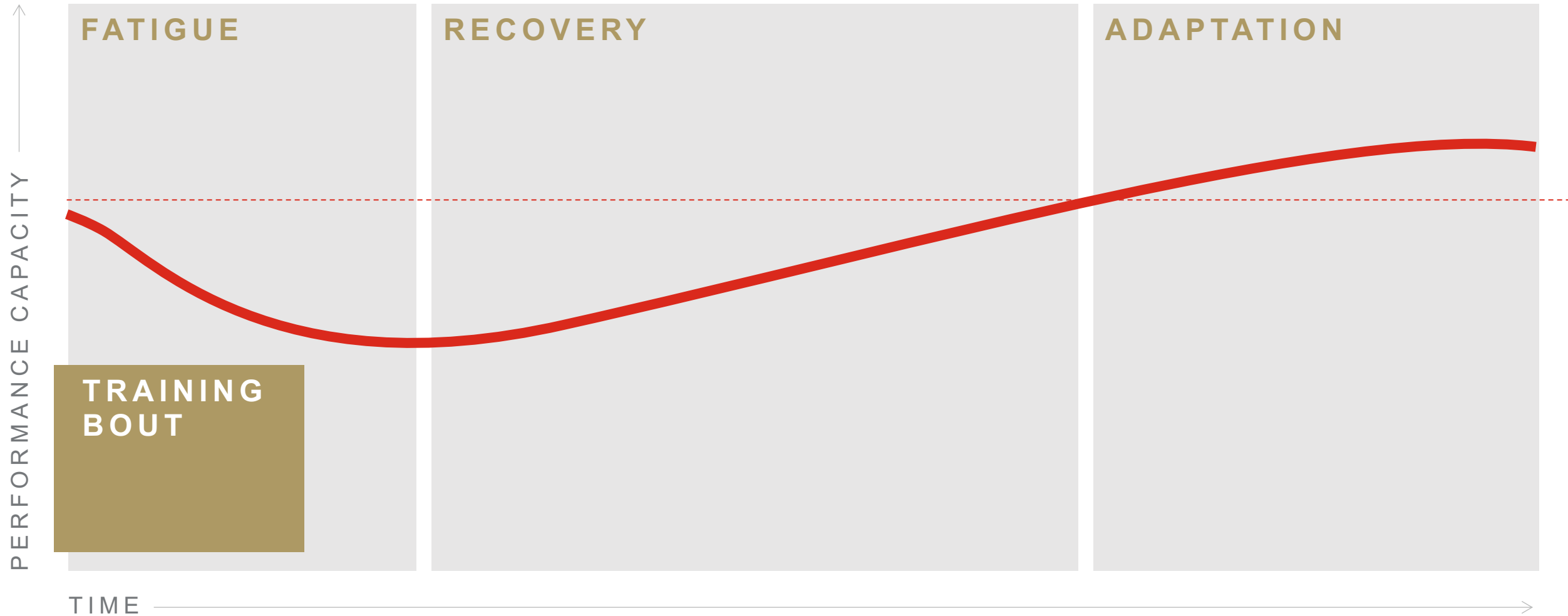


USE SPARINGLY

NOT RECOMMENDED (SOME OF THESE MAY CAUSE HARM)

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Water immersion	Consistent use of painkillers
Compression garments	External pneumatic compression
Massage	High-dose anti-oxidant supplements
	Neuromuscular electrical stimulation
	Oxygen therapy
	Whole-body cryotherapy

# The adaptive response

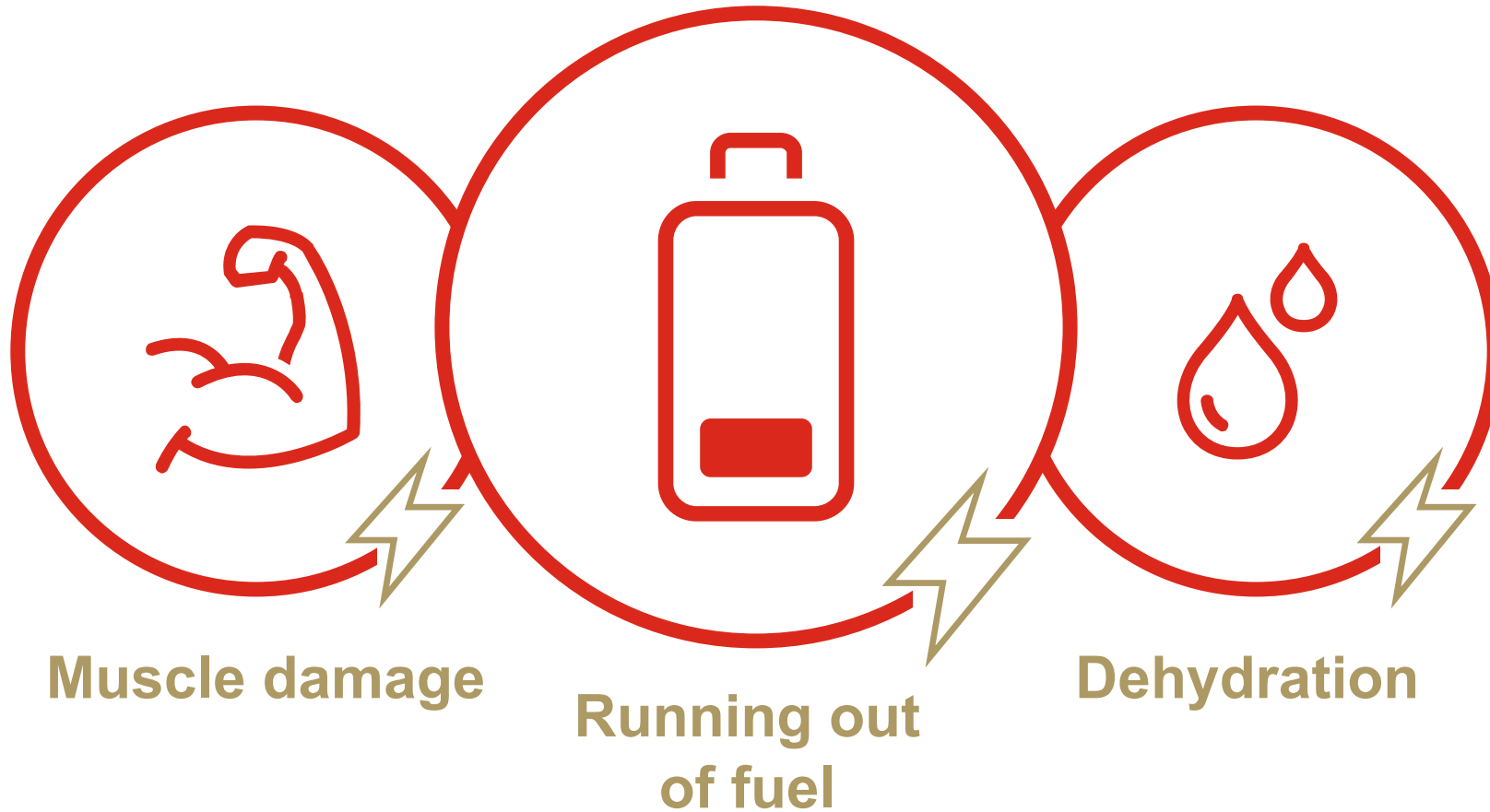


Intensive exercise causes short-term fatigue and often impaired performance, which can feel uncomfortable and tiring, and **takes time to recover from**. However, once this recovery process is complete, **beneficial adaptations** will have happened that make the athlete **fitter**, and so **faster** or **stronger** than they were before.

*(Adapted from Howatson et al, 2016, BASES Expert Statement)*

One crucial but commonly missed action is to first **recognise the specific reasons** for the delayed recovery and performance impairment.

Broadly speaking, it's usually due to a combination of:

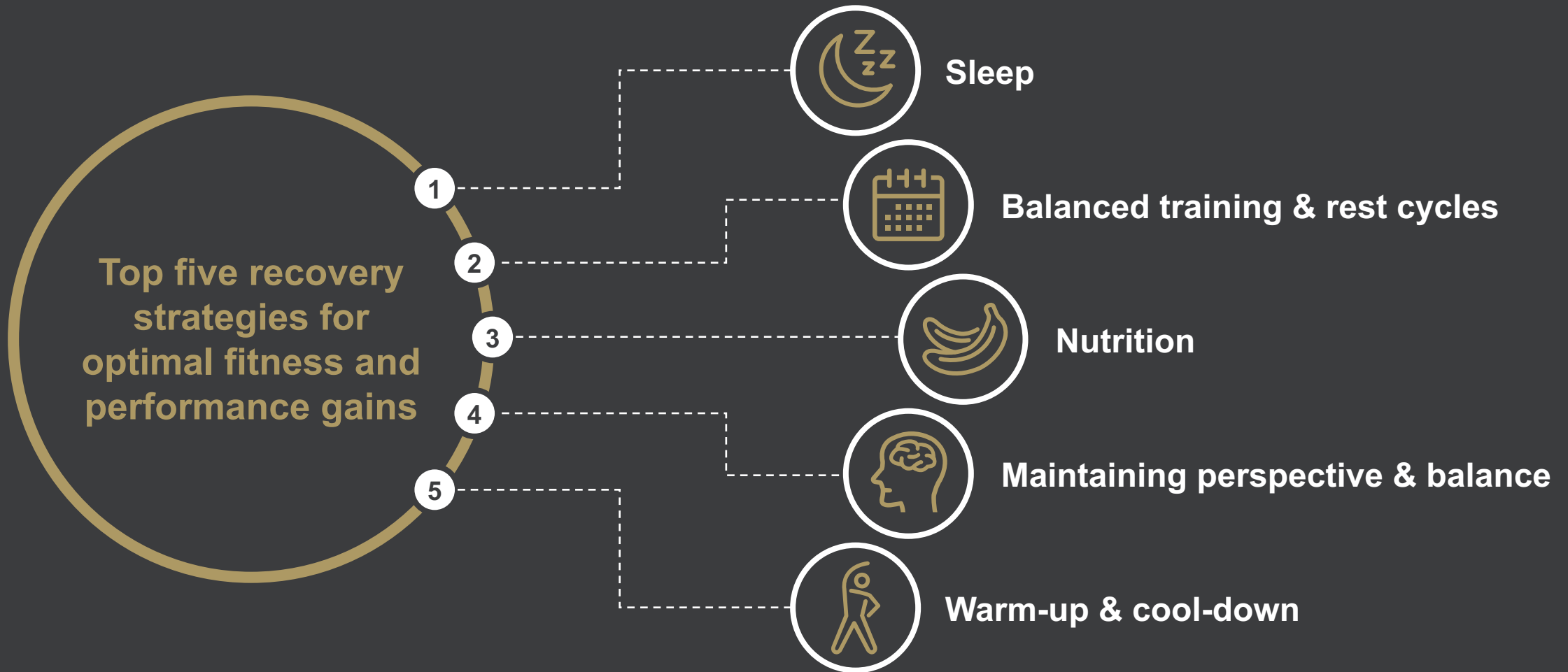


Together with an **awareness of the evidence-base**, this understanding will dictate the recovery strategies that could be used.

The background is a solid dark gray. On the left side, there are several thin, parallel diagonal lines in a light gold or yellow color. One line is solid, while the others are dashed, creating a modern, geometric design element.

# **TOP FIVE RECOVERY STRATEGIES**

There are five clear stand-out strategies that should always be adhered to, whether the athlete is just getting into competitive sport, or is already an Olympic medallist who is trying to keep on winning:



By consistently and comprehensively abiding by these five strategies, adaptations will be optimised, and fitness and performance gains will result.

## Sleep – why is it so important?



Sleep **quality** is just as important as sleep **quantity**, but as a guide: 14-17 y old athletes require **8-10 h per night**, and 18+ y old athletes require **7-9 h per night**. This will vary dependant on the individual and the **overall load** being exerted on them.

1

Sleep is when **body tissues repair**

2

Sleep is when **complex neuromuscular actions** and **skill development** are consolidated into **memory**





## Simple sleep monitoring tips



It can be useful to **regularly monitor sleep quality and quantity**, to improve self-awareness of habits, and to identify any issues. There are lots of APPs and devices available, though many of them are **expensive** and give **inaccurate results**.

In many ways, the most useful method is for an athlete to **each morning** record:

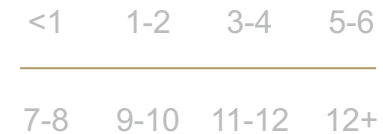
Last night's  
**sleep quality**  
(on a 1-5 scale)



How **rested**  
**they feel**  
(on a 1-5 scale)



The total number  
of **hours asleep**



These three numbers can be recorded in a simple diary or spreadsheet, and the athlete should **periodically look back** over the scores and **discuss** them with their parents and/or coach, as appropriate.

## TOP RECOVERY STRATEGIES

# Signs of sleep deprivation



Sleep deprivation is surprisingly common.

GETTING ILL  
OFTEN

REGULAR  
FOOD AND  
DRINK  
CRAVINGS

FALLING  
ASLEEP  
IMMEDIATELY  
GIVEN THE  
SLIGHTEST  
CHANCE

REGULARLY  
WAKING UP  
FEELING  
EXHAUSTED

MAKING  
LOTS OF  
MISTAKES

BEING  
HIGHLY  
EMOTIONAL

BODY  
WEIGHT  
GAIN

BEING  
UNHAPPY  
WITH BODY  
IMAGE

When you get plenty of **deep sleep**, the body enters an **anabolic state** (muscles repair and build, and memory is consolidated), whereas when **sleep deprived** the body is in a **catabolic state** (muscle repair is blunted, muscles degrade, body fat accumulates, and memory is poor).





## TOP RECOVERY STRATEGIES

### Sleep hygiene



Keep a **consistent bed time** and wake time

Reserve the **bedroom for sleep** (keep entertainment, work and food out)

Bedrooms should be **relatively cool** (16-18 °C)

**Avoid too many fluids, heavy meals and sugary foods** from 2 h before bed time, and **avoid caffeine** from 6 h before bed time

Get plenty of **natural daylight** during the day but minimise light in the bedroom (e.g. use black-out blinds)

Try to finish intense exercise by **2 h before bed time**

**Make time** in the day to work through any **worries** (and write them down)

Consider using a form of **meditation** or **breathing exercises** to relax

**The 20 minute rule** (only try getting to sleep for up to 20 minutes, otherwise get up, re-set, write down any worries, and try again)



## Balanced training and rest cycles



TRAINING &  
COMPETITION

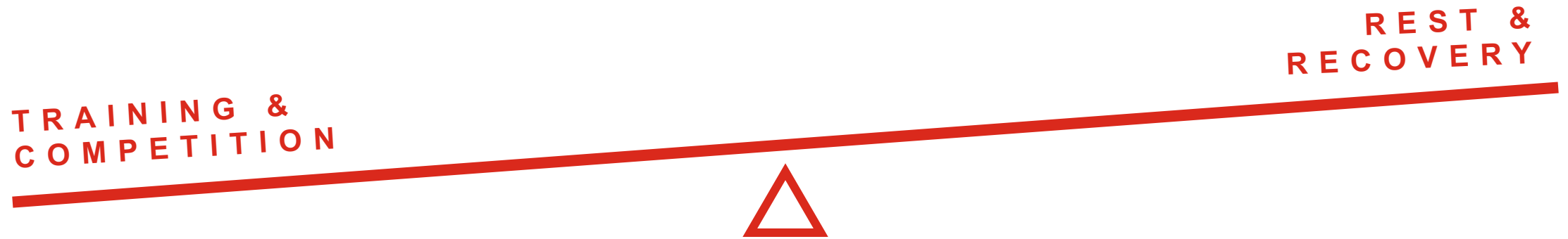
REST &  
RECOVERY



All training phases should include **sufficient rest and recovery** between hard sessions, which will allow individuals to train **maximally when asked to**, and the resulting adaptations will lead to **enhanced performance progression**.

A simple but well thought out weekly training plan is **an absolute non-negotiable** for an athlete of all levels.  
This is **far more important** than a complex 12 month macro-cycle.

## Balanced training and rest cycles



If there is insufficient rest, most athletes will initially be able to tolerate it, but eventually under-performance will result, which could lead to a phase of over-reaching.

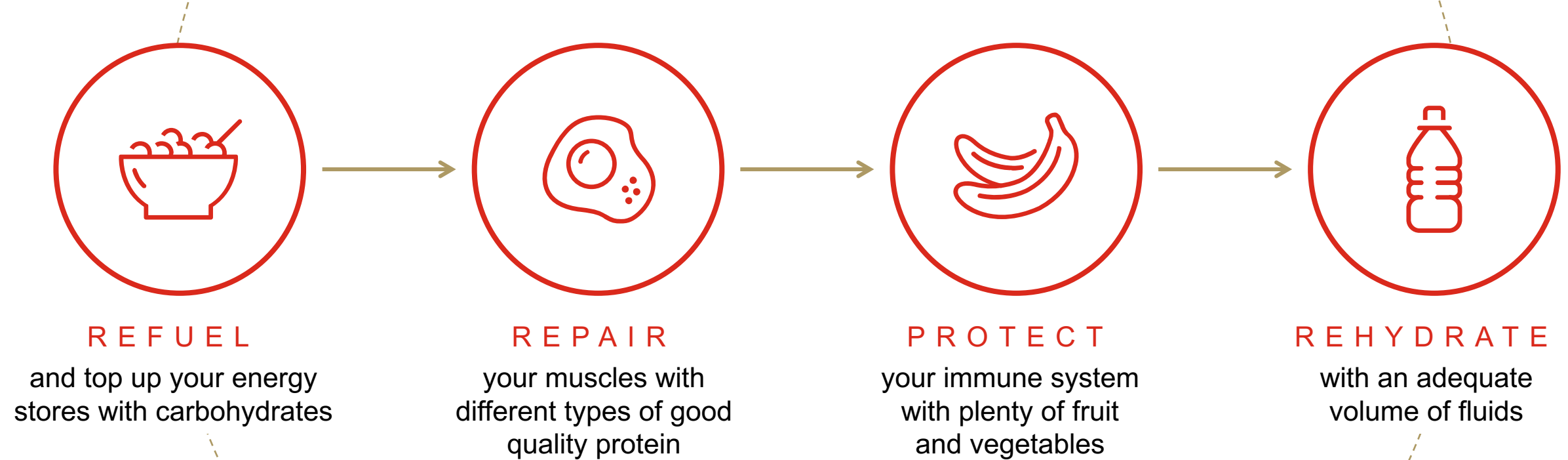
These issues are common when young athletes participate in more than one competitive sport, often with the aim of achieving diverse development via 'sport sampling'. Communication between the relevant coaches, the athlete and the parents is crucial, aiming for an agreed way to organise the training week to ensure sufficient recovery.

# TOP RECOVERY STRATEGIES

## Nutrition



The adaptive response will be maximised by consuming nutrient rich food and drink immediately after exercise:



**A 'food first' approach is recommended**

(you can get everything that you need to recover after exercise from food, at a fraction of the cost of a supplement, and with far less risk of an anti-doping violation)

## Nutrition



A general guideline is to consume a carbohydrate and protein rich snack and plenty of fluids **as soon as possible** after intense or prolonged exercise, then followed by a **full meal shortly after** (always within 2 hours).

1

**Intense or  
prolonged  
exercise**

2

**Carbohydrate and  
protein rich snack,  
and plenty of fluids**  
(e.g. milk and a banana)



1 h

3

**Full healthy meal,  
within 2 h**  
(e.g. salmon, rice & broccoli,  
or a multi-coloured stir fry, etc.)



2 h

## Nutrition (hydration)

Your urine should be plentiful and its colour should be in the well hydrated zone.  
If not, start drinking immediately.



WELL HYDRATED ← ————— → DEHYDRATED

### Why?

Fluid losses as low as 2% of body weight can have a significant impact on exercise performance. Negative effects of dehydration include:

- Fatigue
- Reduced concentration & reaction times
- Compromised immune system
- Reduced adaptation to training

### When?

Start each training session fully hydrated. Check the colour of your morning urine for a quick indication. If your urine colour is greater than 7 on the above chart, you are probably dehydrated and need to increase your fluid intake immediately. If your urine is often dark, make sure you increase your fluid intake in future.

Rehydration is more effective when fluids are drunk over several hours, rather than immediately after exercise all at once.

### How much?

Fluid requirements will be different for each athlete.

Weigh yourself (ideally wearing underwear only, to avoid confusion from sweat soaked clothes) before and after training sessions; for each 1 kg lost in body weight replace with 1.5 kg of fluid.

This is even more important when training or competing in hot and humid environments.

### What to drink?

Water is good, but not always the best choice for athletes.

Look for drinks which contain sodium (salt), the major electrolyte, as this helps the body retain the fluid you drink, thereby assisting hydration. These are often called ‘isotonic’ sports drinks, and are usually effective for rehydration.

If in doubt, seek the advice of a qualified and experienced sports nutritionist.

Weight loss (kg)	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
Volume to drink (ml)	375	750	1125	1500	1875	2250	2625	3000



## Maintaining perspective and balance



The sporting environment is highly demanding, and can often feel all-encompassing. Without adequate recovery, optimal performance is unattainable, so it is crucial that athletes find ways to 'switch off'. Consider the following six suggestions to reduce emotional stress, improve self-awareness, and help deal with performance challenges, allowing athletes to keep their sport in balance:

1

### PLAN DO REVIEW

Having a clear process for planning and reviewing training and competitions enables athletes to understand how and why they performed at their best, which ultimately **improves performance consistency**.

- What went well? Why?
- What didn't go so well? Why?
- What did you learn? How can you use this to help with future plans?

2

### UNDERSTAND YOUR PURPOSE

Understanding why it is that they're pursuing their sporting goals could, in the long-term, pay dividends for their **athletic performance** and their **health and well-being**.

Particularly in times of adversity, realising a sense of purpose that is bigger than any immediate sporting goals can be hugely powerful.

3

### MONITOR STRESS AND RECOVERY

Athletes that monitor their recovery and stress have a far better understanding of what is more likely to place them under greater demand.

They are able to forward plan an appropriate training schedule with their coach, and can ensure they have adequate recovery and self-care strategies in place.



4

## EMBRACE CHALLENGE AND FAIL SMART

By its very nature, competitive sport has its ups and downs. An athlete cannot control if they win or they lose, and will often experience performances that do not go to plan.

Maintaining the belief that ability can change, and that learning and improvement come from effort, will enable athletes to take risks and keep perspective when things don't work first time.

5

## SELF-CARE

The way an athlete lives their life has big impacts on their health, well-being, and how well or poorly they balance the demands of sport with other lifestyle factors. Consider the behaviours that you tend to adopt when under stress. Which help and which do not?

See our [MAINTAINING POSITIVE MENTAL HEALTH](#) resource for some practical self-care guidance.

6

## KEEPING PERSPECTIVE

One of the most critical things that any athlete can do to recover from the demands of their sport is to develop a **sense of perspective**.

[Maintaining an identity outside of sport](#) has certainly been shown to help with this, and it often means having interests, commitments and social networks away from the main competitive sporting career.

**These factors should not be underestimated** – they are often more impactful than any physical aspect of recovery and adaptation.

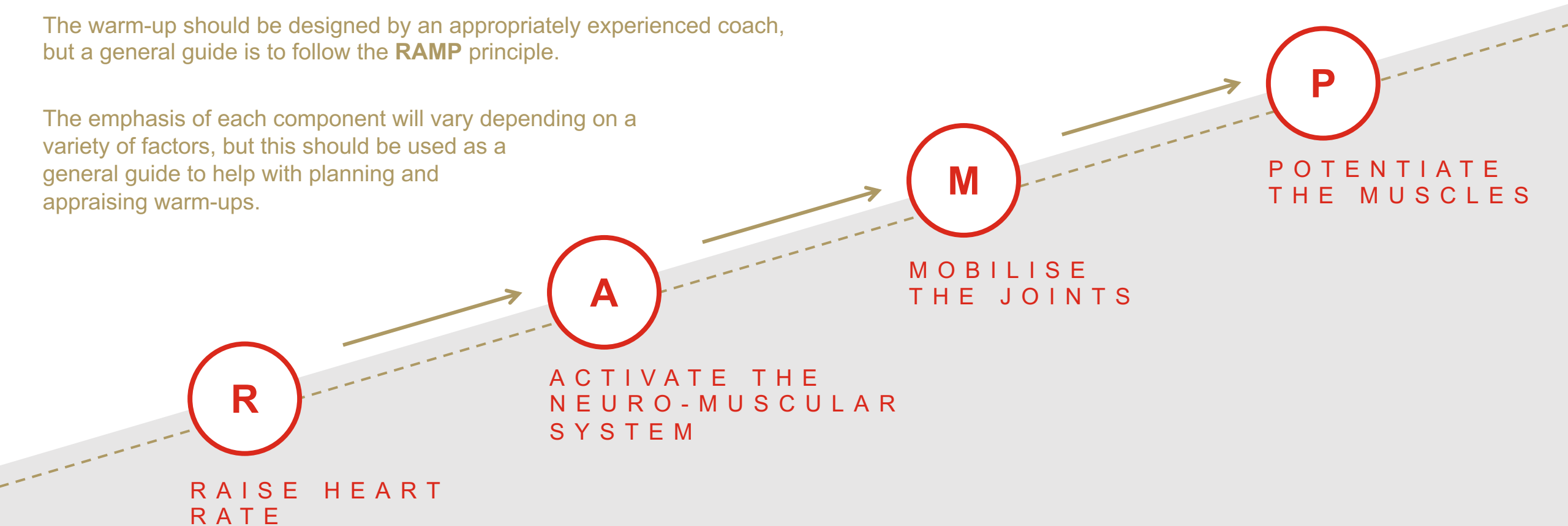
## Session warm-up...



A thorough warm-up is usually used to **enhance subsequent performance**, but there is also evidence that it can **enhance recovery afterwards**.

The warm-up should be designed by an appropriately experienced coach, but a general guide is to follow the **RAMP** principle.

The emphasis of each component will vary depending on a variety of factors, but this should be used as a general guide to help with planning and appraising warm-ups.



## ...and cool-down

After any intense training or competition, an **active-cool down** usually enhances recovery.

Athletes should develop a way of **self-assessing their range of motion** in the important muscle groups for their main event. If this range has reduced below what is required, **active flexibility / mobility exercises** should be included in the cool-down, and usually elsewhere in the training week. **The aim is to reduce stiffness and re-establish the normal range of motion.**



The cool down should not counteract the other fundamental recovery strategies (e.g. it should not excessively delay recovery nutrition or sleep).



ACTIVE  
COOL DOWN



SELF-  
ASSESSING  
RANGE OF  
MOTION



REDUCE  
STIFFNESS



MENTAL  
RELAXATION



# USE SPARINGLY AND WITH EXPERT GUIDANCE

If all five of the fundamental recovery strategies are being followed comprehensively and consistently, depending on the circumstance, there are a small number of other strategies that may aid optimal recovery and adaptation.

These should never disrupt or be prioritised over the previously detailed top five recovery strategies.



# USE SPARINGLY AND WITH EXPERT GUIDANCE

## Cold water immersion



This can reduce the **PERCEPTION** of soreness

### HOWEVER

Beneficial effects on muscle function recovery are un-proven, and there is some evidence that fitness adaptations can be blunted after cold water immersion



If an athlete feels that cold water immersion helps them to recover, it can be used sparingly during intense phases of competition, but not at the expense of the other more impactful strategies

## Compression garments



Again, they can reduce the **PERCEPTION** of soreness

### HOWEVER

There are questionable effects on muscle function recovery



If an athlete is going to use a compression garment, ensure it is a close fit (possibly custom shaped) and wear it sparingly to maintain elasticity

## Massage



These can improve the **PERCEPTION** of recovery

### HOWEVER

It is unlikely to improve muscle function and if poorly timed could disrupt some of the other more impactful recovery strategies



Massage can improve one's emotional state, and the "placebo" effect can be powerful, but if using massage, do so sparingly





# **NOT RECOMMENDED**

## **(SOME OF THESE MAY CAUSE HARM)**

There are also interventions branded as “recovery strategies”, but which either require expert guidance from a sport science and medicine team, or more often simply are lacking any credible evidence.

In addition, there are often complications and risks associated with these, as well as some of them costing a lot of money, so we do not recommend using them.



Top five recovery strategies for optimal fitness and performance gains

1



Sleep

2



Balanced training & rest cycles

3



Nutrition

4



Maintaining perspective & balance

5



Warm-up & cool-down

USE SPARINGLY

NOT RECOMMENDED (SOME OF THESE MAY CAUSE HARM)

Water immersion

Compression garments

Massage

Consistent use of painkillers

External pneumatic compression

High-dose anti-oxidant supplements

Neuromuscular electrical stimulation

Oxygen therapy

Whole-body cryotherapy

NOT RECOMMENDED (SOME OF THESE MAY CAUSE HARM)

**Consistent use  
of painkillers**



**External pneumatic  
compression**



**High dose anti-oxidant  
supplements**



**Neuromuscular electrical  
stimulation**



**Oxygen  
therapy**



**Whole body  
cryotherapy**



**No evidence to support these strategies so we do not advocate their use**

## FURTHER INFORMATION

### RECOVERY STRATEGIES

[BASES expert statement - athletic recovery strategies](#)

[Get Set Think Real - guidance to teenagers on recovery, nutrition and healthy habits](#)

[Review article - sleep and athletic performance](#)

[Review article - psychological well-being and resilience](#)

[i-resilience - a thought provoking resilience self-assessment tool](#)

[Cochrane review - whole-body cryotherapy \(extreme cold air exposure\) for preventing and treating muscle soreness after exercise in adults](#)

[Cochrane review - antioxidants for preventing and reducing muscle soreness after exercise](#)

[Cochrane review - hyperbaric oxygen therapy for delayed onset muscle soreness and closed soft tissue injury](#)

[Cochrane review - cold-water immersion \(cryotherapy\) for preventing and treating muscle soreness after exercise](#)

[Cochrane review - stretching to prevent or reduce muscle soreness after exercise](#)

[Systematic review - contrast water therapy and exercise induced muscle damage](#)

### ANTI-DOPING

[UK Anti-Doping - 100% me](#)

Supports and educates athletes by providing anti-doping advice and guidance, encompassing five key values: hard work, determination, passion, respect and integrity.

[BASES expert statement - inadvertent doping in sport](#)

Outlines the most common ways that athletes and support personnel inadvertently commit anti-doping rule violations, including contaminated supplements and foods, and gives suggestions to minimise these risks.

[Informed-Sport](#)

A global quality assurance program for sports nutrition products. Every batch of a supplement product and/or raw material that bears the Informed-Sport logo has been tested for banned substances. Athletes are advised to use the search function and cross reference the tested batches listed on the product pages with the batches they are consuming.

[Global Drug Reference Online \(Global DRO\)](#)

Provides athletes and support personnel with information about the prohibited status of specific medications based on the current World Anti-Doping Agency Prohibited List. Global DRO does not contain information on, or that applies to, any dietary supplements, and can only be used for specific information on products sold in the UK, Canada, the US, Japan, Australia and Switzerland.

# Evidence-based sport science and medicine guidance for developing athletes

