CANADIAN STRENGTH & CONDITIONING ASSOCIATION

BASIC TRAINING TECH FOR ATHLETES

Vicki Bendus, 2021

TRAINING

HEART RATE TRACKING

Many athletes now have **wearables** that track **heart rate** (HR).
The data can be useful for monitoring **training** if an athlete is able to **interpret** it.

Athlete's commonly think higher HR outputs are "better" or indicative of a more productive training session.
This is not the case!

Your HR indicates of **how hard** your cardiovascular system is working.

It is best used during **energy systems** training to provide real-time numbers on how you are handling the work and adapting over time.

Tech Tools of the Trade

- Common wearables brands include Polar, Apple, Fitbit, Garmin, and Whoop.
- Chest-straps tend to be more reliable than wrist-based measurements.
- Wrist-based devices will still provide useable data, however the data is more variable.

Interpreting the Data

You can use your HR data both **during** training and **after** a session.

During a Session

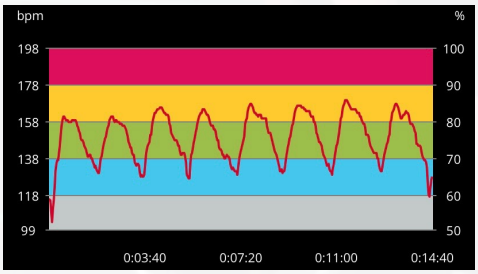
1. ***Heart Rate Recovery***

High-intensity intervals, where periods of HIGH intensity effort are followed by periods of LOW intensity recovery, are commonly used to train energy systems.

During the **work** periods your HR will **spike** and during the **rest** periods it will **drop**. In general, a more fit athlete will see their HR drop more quickly than a less fit athlete.

Sometimes coaches will prescribe a **HR recovery threshold** instead of a time duration for the rest period. For example, instead of a 10s Tempo Run with 50s rest, a coach could have the athlete rest until their HR drops below 60-70% of maximum HR. This allows the recovery duration to be fluid and individualized for each athlete.

Tempo Run Session



Training Goal: Aerobic Capacity
Workload: 8 x 100m Tempo Run, Rest to 130
Average HR: 148
Max HR: 169

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TRAINING

HEART RATE TRACKING

Interpreting the Data

2. *Heart Rate Zones*

For endurance sports such as rowing, cross-country, or cycling, **HR zones** are often used for **prescribing training intensity.**

An athlete's HR training zones can be determined through laboratory or field testing. Alternatively, general training zones, such as those in the table, can also be used.

Sample Heart Rate Training Zones

	Intensity	% of HRmax	RPE (1-10)*	HR Range**
Zone 5	*Maximum*	90-100%	9-10	185-200
Zone 4	*Hard*	80-90%	8-9	170-185
Zone 3	*Moderate*	70-80%	7-8	155-170
Zone 2	*Light*	60-70%	6-7	140-155
Zone 1	*Very Light*	50-60%	5-6	125-140

* Rating of Perceived Exertion – Scale from 1 (Rest) to 10 (Max Effort)
** Calculated from resting HR of 50 & maximum HR of 200.

After a Session

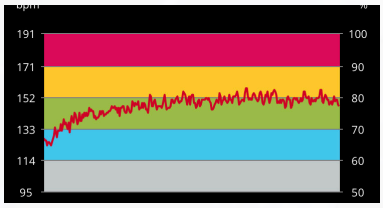
1. *Average & Maximum Heart Rate*

Your **average HR** during a session can be misleading if looked at in isolation. Although it can give an idea of the **average intensity**, it lacks insight on **how** the average was produced.

Different training sessions can produce the **same average HR** but have completely **different training goals**, mechanical demands (i.e. speeds, accelerations, decelerations, changes of direction, etc.), and recovery requirements. Looking at the **maximum HR** reached during the session can add to the picture by providing **peak session intensity.**

In the example below, the two sessions both produced an average HR of 146. The HR traces show that *Session #1* used **steady-state** aerobic training whereas *Session #2* used **interval** training. Despite the same average HR, *Session #2* would have been more physically demanding and likely required more time to recover.

Session #1



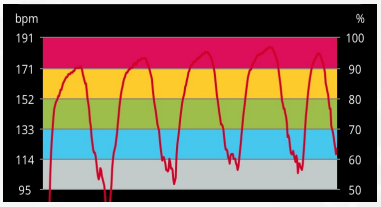
Training Goal: Aerobic Capacity

Workload: 30min @ 75%

Average HR: 146

Max HR: 155

Session #2



Training Goal: Aerobic Power

Workload: 5 x 3min @ Max Effort, 3 min Rest

Average HR: 146

Max HR: 184

2. *Calorie Output*

Calorie output from wearables has **limited use** for an athlete. Many athletes mistakenly look at number of calories burned as an indicator of whether it was a "good" session. Similar to HR, **HIGHER is NOT better**. Additionally, most devices are poor at estimating the amount of calories burned in a session, meaning any use of calorie output is even further limited by the **lack of accuracy**.

If an athlete does look at calorie output, it can be to ensure that the approximate number of calories lost during the session are **replenished** throughout the day (i.e. ~500kcal burned means an additional 500kcal should be consumed throughout the day).

HEART RATE TRACKING

Monitoring Progress

You can use your HR data to help **monitor improvement** in your **energy systems** over time.

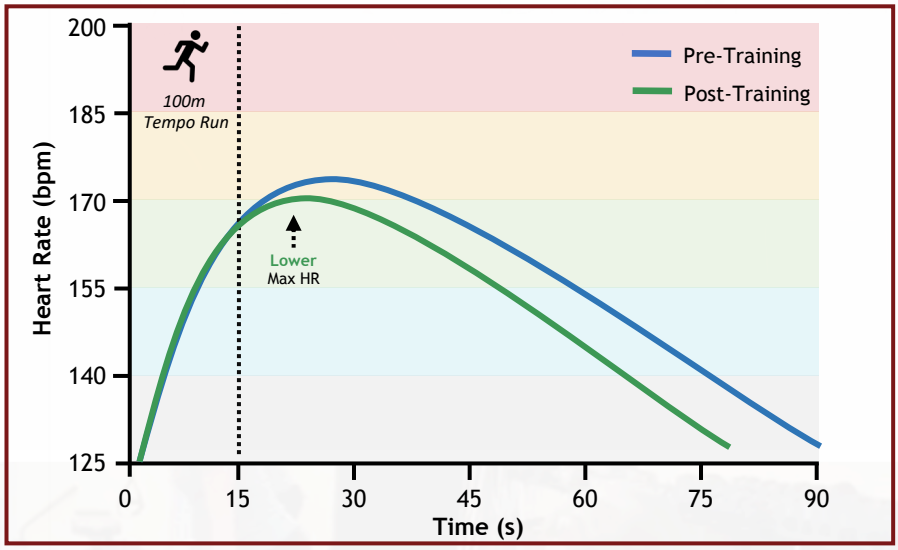
1. *Same Workload, Lower HR*

Improvement can mean that you are able to do the ***same amount of work with less effort.***

At the start of a training program an athlete performs a 100m Tempo Run in 15s and has a MHR of **175** (Pre-Training).

After completing a 4-week training program the athlete's MHR after the same Tempo Run is now only **170** (Post-Training).

The **same** amount of **work** was completed more **easily**.



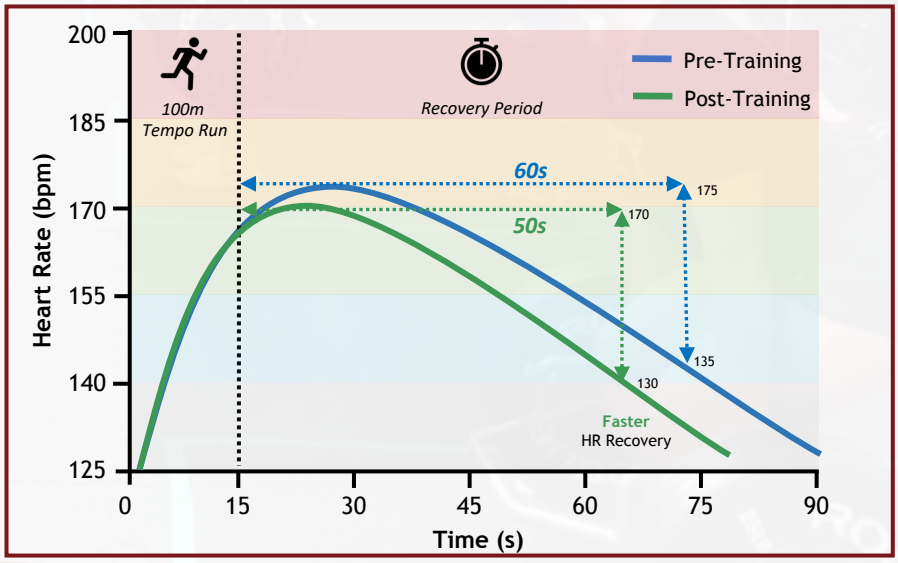
2. *Same Workload, Faster HR Recovery*

Another sign of improvement is seeing a ***faster*** HR recovery after a high-intensity bout.

For example, Pre-Training it took the athlete **60s** to recover 40 beats (175 to 135) following the Tempo Run.

Post-Training it took the athlete **50s** to recover 40 beats (170 to 130) following the Tempo Run.

The body **recovered faster** from the **same workload**.



FINAL NOTES:

*Although HR during **energy systems** training can be helpful, it has minimal use during **resistance** and **speed** training. Progress within **resistance** training can mean heavier **loads**, completing more **reps**, moving a load **faster**, or improving **technical** execution. Progress within **speed** training means **faster** sprint times or improving **technical** execution.*

RECOVERY

CANADIAN STRENGTH & CONDITIONING ASSOCIATION

NUTRITION TRACKING

Tracking **nutrition intake** can help athletes ensure they have enough **energy** to train and **recover** as well as achieve their **body composition** goals.

Athletes typically **UNDER-fuel** for their activity levels.
They must remember they are ATHLETES and need to fuel their body **differently** than their friends, families, and celebrities.
Trendy diets and sweeping claims made in headlines should be **ignored**!

Tracking your nutrition allows you to answer:

- Are you eating **enough**?
- Are you eating optimal proportions of **proteins**, **carbohydrates**, and **fats**?
- Are you getting enough micronutrients (**vitamins** & **minerals**)?
- Are you eating at the right **times**?

Tech Tools of the Trade

MyFitnessPal is **user-friendly** and has a vast database of foods to input. It also allows you to input custom foods that are not in the database. Many athletes have success using the app for tracking total **calories**, **protein**, **carbohydrate**, and **fat**.

Cronometer is another option that has a smaller database and does not allow custom foods. However, it has more detailed breakdowns of **vitamins** and **minerals** and only uses reputable sources for the database versus user-inputs.

myfitnesspal

cronometer

Action Steps

*If you have a **nutritionist** who works with your team, use them!*
If not, you can perform the steps below. Keep in mind calorie counting is difficult to perform accurately. Check out the Bonus Resources for a helpful infographic on the topic.

- **Record** your food intake for 3 days (2 training + 1 rest day)
- Be as **accurate** as possible with serving sizes
- Track what you **actually** eat! Athletes often leave out "unhealthy" foods because they don't want to show their coach. Your coach can only help if they get an accurate picture of your current intake!
- Show your food log to your S&C coach to **answer** the questions in the red box above
- Choose **1-2** areas to **focus** on improving (i.e. eating protein with breakfast, having a snack immediately after training, etc.)

Monitoring Progress

As you make adjustments, you can monitor the following areas as signs of improvement:

- Do I have more **energy** during the day, training, or competition?
- Am I **recovering** faster or less sore?
- Has my **sleep** improved?
- Am I moving toward my individual **body composition** goals?

BONUS RESOURCES

- Fuelling for High Performance. [Webinar] *Brittany Raftis*
- Create the perfect meal with this simple 5-step guide. [Infographic] *Dr. John Berardi*
- The surprising problem with calorie counting. [Infographic] *Dr. John Berardi*

RECOVERY

SLEEP TRACKING

Improving **sleep** amount and quality can help athletes:

- Have more **energy**
- **Recover** faster
- Improve **mood** & general **well-being**
- Establish better daily **habits** and **routines**

Athletes typically don't sleep **ENOUGH**. Hectic schedules that include training, travel, school, work, and social commitments can make it challenging to establish a strong **routine** around sleep.

Monitoring sleep can help you change your **habits** around sleep. Creating **consistency** around evening and morning routines is one of the most powerful ways to improve sleep.

Tech Tools of the Trade

- Common sleep tracking tools include Fitbit, Whoop, OURA, Garmin, and various phone apps.
- Sleep wearables and apps are **reasonable** at measuring **sleep duration** but **poor** at measuring **stages** of sleep.
- Use sleep trackers to get a **baseline** of your average sleep **duration** and **sleep/wake time** across a week.

Sleep Basics

Sleep Duration

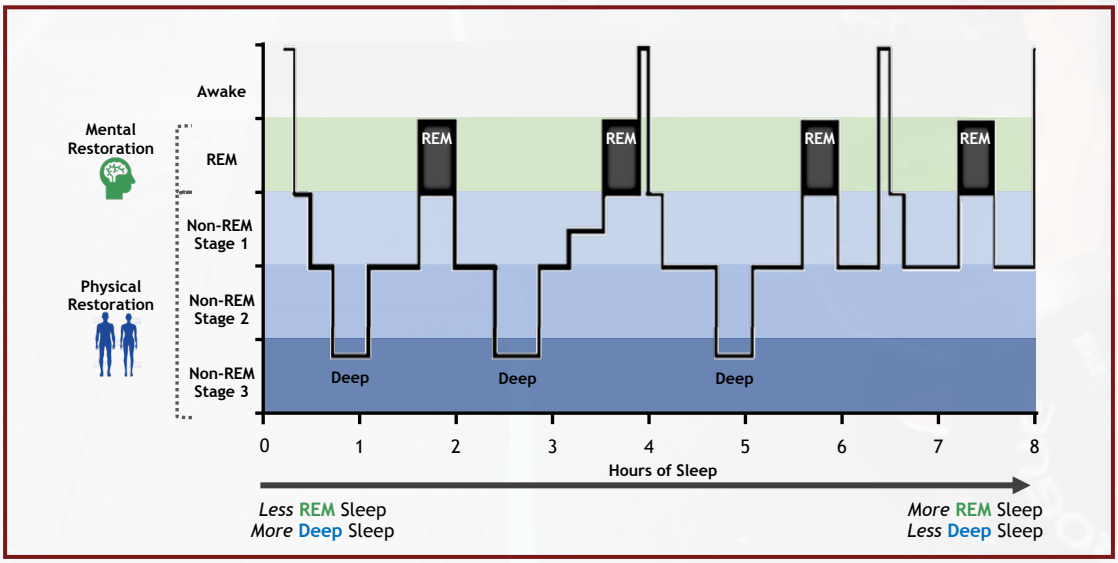
Total amount of light, deep, and REM sleep

REM Sleep

Rapid-eye-movement sleep, most of dreaming occurs here, vital for **MENTAL** restoration

Deep Sleep

More occurs earlier in the night, vital for **PHYSICAL** restoration

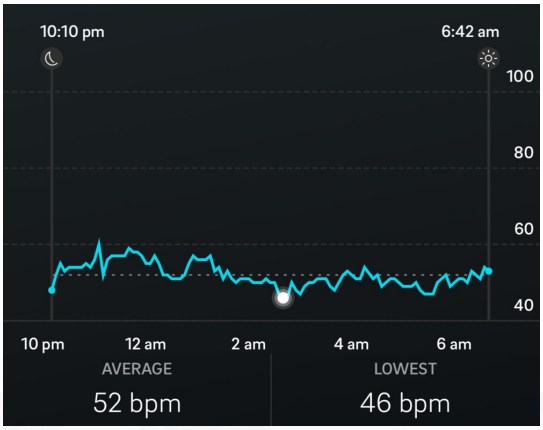


RECOVERY

SLEEP TRACKING

Heart Rate During Sleep

Resting Heart Rate



Resting HR (RHR) is affected by several factors. It can provide insight into how your system is handling training, stress, and nutrition:

- ***Recovery*** – A RHR 5-10 beats over normal may suggest you are **under-recovered** or coming down with an **illness**
- ***Mental Stress*** – High levels of mental **stress** may create a **higher** than normal RHR (i.e. exams)
- ***Nutrition*** – Eating **late** in the evening, **unhealthy** food, or food you are **unaccustomed** to can **raise** your RHR because the body is working to digest while you sleep
- ***General Aerobic Fitness*** – Higher levels of **aerobic fitness** elicit **lower RHR**. As your aerobic fitness improves your RHR my go down over time.

Heart Rate Variability

Heart Rate Variability (HRV) is the **variation** in time **between** heart beats.

The heart does not beat like a metronome but instead has constant variation between beats.

HRV represents the **tone** of your autonomic nervous system (ANS). It indicates the balance between your **parasympathetic** (rest & digest) and **sympathetic** (fight or flight) ANS branches.

Higher HRV → Higher **parasympathetic** tone, good recovery

Lower HRV → Higher **sympathetic** tone, potentially under-recovered. Low HRV can also be caused by mental stress, poor nutrition, poor sleep, illness, or any other sources of stress.

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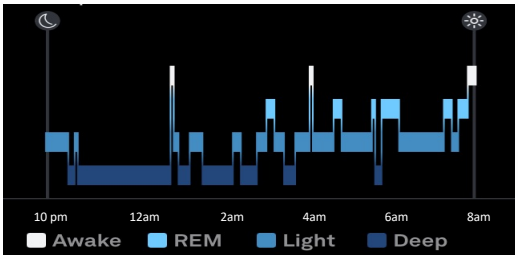
RECOVERY

SLEEP TRACKING

Track the ZZZ's

Use a wearable or a sleep app on your phone to track your sleep during a **normal** training week. **Avoid** high-stress weeks such as exams or competitions.



Questions to ask yourself:

Are you sleeping **enough**?

- ✓ 8hrs is a good rule of thumb, but many athletes need **more**
- ✓ When sleep is compromised because of uncontrollable factors (i.e. travel, events, etc.) sleeping **longer** on days where your schedule allows will **reduce** accumulated **sleep dept**

Do you have a strong sleep **routine**?

- ✓ If you have **inconsistent** sleep/wake times it can **compromise** your sleep **quality** and **duration**. Improving consistency can help **sync** your body into a stronger sleep pattern.
- ✓ It takes **~14 days** for the body to **adjust** to a new routine so be patient if your sleep doesn't improve right away!

Prime the Environment

- Blue-light blocking **glasses** after 9pm
- Blue-light blocking software programs on all **screens** (Night Shift for Apple, Night Mode for Android, f.lux, etc.)
- Room as **dark** as possible (black out blinds, curtains shuts, screens off)
- Sleep mask to block light if room is not dark enough
- Ear plugs if you're a light sleeper
- **Cool** temperature (67°F / 20°C)
- Phone away from your bed with ALL **notification** sounds **OFF**
- **Avoid** lazing around in bed during the day or in the hours before sleep. Train your body to associate being in bed with sleeping.
- **Avoid** scrolling social apps be the last thing you do before sleep. Get off your phone MINIMUM 15min before bed. Read fiction, foam roll, stretch, or do anything that will help YOU wind down mentally and physically.

f.lux™

BONUS RESOURCES

- Sleep - The Only True "Fixall" for Health and Performance. [Webinar]
  Brandon Marcello (2019)
- Why We Sleep: Unlocking the Power of Sleep and Dreams. [Book]
  Matthew Walker (2017)
- The power of sleep. [Infographic]
  Brian St. Pierre

PRODUCTIVITY

STAYING ORGANIZED

Athletes have many **demands** on their **time** including training, competing, school, jobs, families, and social commitments.

Having a place to act as your "**external brain**" can take a huge load off your actual brain! Constantly trying to remember things that come up during the day can tax your brain even if you don't realize it.

Create a system to where it is easy to keep track of:

- Things you need to get done **short-** & **long-term**
- Things you need to **remember**

There are **LOTS** of different ways of staying organized and athletes need to find what works for them.

Tech Tools of the Trade

- Take advantage of **software** that **connect** your Calendar, Notes, and email. Using apps that **integrate** across devices (phone, iPad, laptop, etc.) can also save time.
- Ex Microsoft: Outlook Inbox >> Outlook Calendar >> OneNote or Evernote
- Ex Google: Gmail >> Google Calendar >> Google Keep or Evernote
- **Evernote** is a fantastic choice for **storing** information for later use and **integrating** across devices.

Calendar

Place to have all things currently in your schedule:

- Training, Practices, & Competitions/Games
- Therapy & Health Appointments
- Class, Work, & Meetings
- Social Activities
- Anything else that can be added!

To-Do List

Place to list the things you need to get done:

- Short-Term – Today
- Moderate-Term – Week
- Long-Term – 2-3+ Weeks, at this point the calendar can also house this information until it turns into a Moderate or Short-Term task

Rapid Notes

Place to quickly record things you need to remember that pop up during the day:

- Return a missed call
- Pick up something at the store
- Reply to an email
- Etc.

***Have a system to check your rapid notes and either complete those tasks or transfer them to your Calendar/To-Do list for later*

Long-Term Notes

Place to store large amounts of information you will need later including:

- Class notes
- Meeting notes
- Book summaries

PRODUCTIVITY

CANADIAN STRENGTH & CONDITIONING ASSOCIATION

GET STUFF DONE

Athletes have **limited time** and need **strategies** to **maximize** the windows of opportunity to get things done. Being productive means getting MORE done with LESS effort & time.

Technology & software companies design their products to be **addictive**. This creates constant **distractions**, reduced focus, and impacts mental well-being. Awareness is key to allow athletes to **optimize** their devices and apps for productivity.

Having **strategies** in place to maximize your **productivity** should centre around having a **plan** and managing your **environment**.

Have a Game Plan

WHEN?

Schedule your work periods IN your **calendar**! Having start and end times increase the likelihood you will work during that time and not **procrastinate**.
Some find they do better work in the **morning** while others work better **later** in the day.
Know when **YOU** do your **best** work and schedule your work periods in those windows.

WHAT?

Know **EXACTLY what** you want to accomplish during that work period (i.e. a single chapter summary, four questions of an assignment, etc.).

HOW?

Try some of the **strategies** below to **structure** your work period and **reduce** distractions:

WHERE?

Work **environment** has a POWERFUL impact on productivity. Some useful strategies:

- Have an **area** of the house for **work**. Train your brain to know when you are sitting at your work area, it's time to get things done!
- Clear **clutter** off your desk. A cluttered environment can cause a cluttered brain.
- Some find coffee shops effective places because of the **background noise**.
- Reserve a private room at the **library** or find a quiet corner away from the main areas.
- Be **cautious** of working with groups of friends. Although it may be more fun, chances are your productivity will take a nosedive.

Pomodoro Technique

Just like with training where you use **work** and **rest intervals**, do the same with tasks.

Many free Pomodoro apps are available to time the intervals.

Airplane Mode

Put your phone or watch on **Airplane Mode**.

Disconnecting from the network can help reduce your desire to check it during the work period.

Turn off Notifications(**)

The endless buzzing & pop ups from push notifications are designed to grab your attention and keep you looking at your device.

Aside from calls and text messages, turn them OFF! Check social apps when YOU choose to, not when the notifications suck you into the app.

NOTE: This strategy is for ALL times not just work periods

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