OPTIMIZE IMMUNITY FOR BETTER PERFORMANCE OUTCOMES IN SPORT AND LIFE

ABSTRACT

The immune system is essential for keeping you healthy and alive. Your immunity is directly influenced by stress. While stress is necessary, when mis-managed it can have detrimental effects on the function of your immune system. Understanding how stress influences your immune system and more importantly, how to monitor your stress daily is an extremely valuable asset. Research has shown that self-monitoring can provide essential and beneficial insight for managing stress and decreasing your risk of injury and illness. In this paper you will learn a very simple and practical self-monitoring process to help you sustain a high level of performance for sport and life.

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INTRODUCTION

At Eleiko, we have the purposeful core values of **Performance**, **Learning,** and **Kindness**. Collectively, these values enable you to create **Sustainability** – both within yourself as well as in those around you. Through this paper, you will take a journey of self-discovery. On this journey, you will **learn** very practical, yet powerful information that will help you **sustain** a high level of **performance** physically, mentally, and emotionally, which you'll be able to **kindly** pass along to others. That, in and of itself, will begin to help optimize your immunity (Fredrickson et al., 2013). But there's much more.

To start, ask yourself these questions to help you gage where you currently stand.

"On a simple scale of **low**, **moderate**, or **high**, how would you rate your readiness and overall wellbeing to perform at your best today?"

"Looking at your answer, what metrics did you use to arrive at your conclusion, and how accurate is your answer?"

What you did yesterday has directly impacted you today, and what you do today will directly impact you tomorrow. When you are armed with the Eleiko 4 Pillars and the associated scoring system, you will be able to quickly and consistently monitor, score, and track your readiness and wellbeing on a daily basis. This information will direct you to the necessary actions to help ensure you're functioning at your best, day in and day out.

GOAL

The goal of this paper is to show you how the Eleiko 4 Pillars will lead you to better performance outcomes in sport and life.

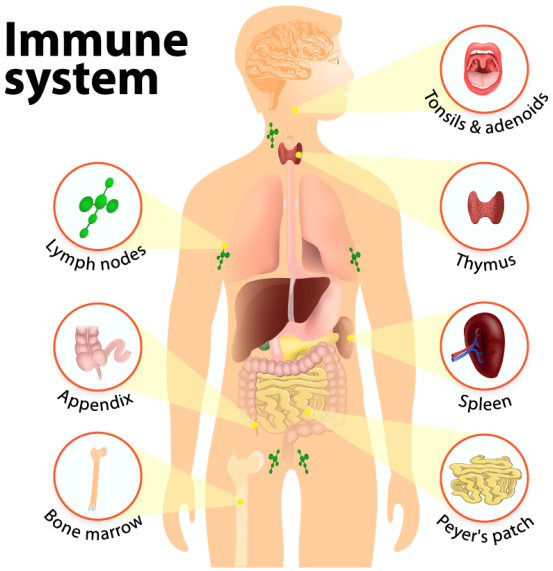
OBJECTIVES

After reading this paper, you will be able to:

1. Link the function of the immune system to stress
2. Describe how stress impacts you and your immune system
3. Describe the Eleiko 4 Pillars
4. Use the Eleiko Readiness and Wellbeing (RAW) scoring system to improve your programming strategies and training outcomes

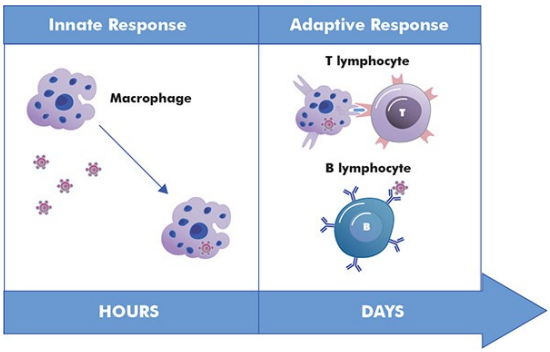
A LOOK AT THE IMMUNE SYSTEM

The immune system is your defense system protecting you against the effects of harmful "**stressors**" – often called pathogens that challenge your resiliency (Methot & Alizon, 2014). The immune system is spread throughout the body involving many types of cells, organs, proteins, and tissues.



In a military fashion, your immune system is designed with multiple lines of defense to attack pathogens in a layered approach. There are two primary lines of defense, **innate immunity** and **adaptive immunity** (Molnar & Gair, 2019).

Innate immunity is the first line of defense and attacks pathogens in two manners. The first manner is by inducing **inflammation**. Inflammation is produced as a result of certain immune cells releasing proteins called cytokines into your circulation or tissues. The second manner of innate immunity is **phagocytosis**. Phagocytosis is the process a cell uses to engulf, consume and ultimately eliminate a pathogen (Molnar & Gair, 2019).

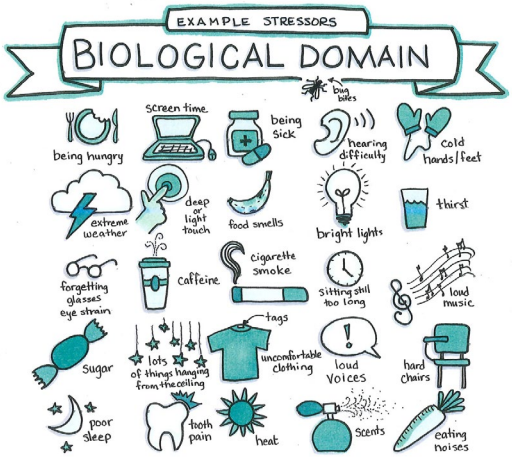


The second line of defense is adaptive immunity, or sometimes referred to as specific immunity. The adaptive immunity response is activated when the invasion of pathogens is too great for, or more complex than the innate immunity response can handle.

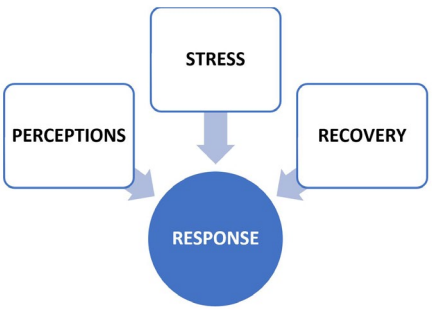
There are three basic components of adaptive Immunity – **cell-mediated immune response**, **humoral immune response**, and **memory**. Activated T cells and B cells that recognize specific structures on the pathogen multiply and attack the invading pathogen. Their attack can kill pathogens directly through the cell-mediated response, which is done by the T cells, or through activation of B cells and the secretion of antibodies that enhance phagocytosis and disrupt the infection. Adaptive immunity also has memory, which can provide long-term protection from reinfection with the same type of pathogen. Should re-exposure to this same stressor occur, this memory will enable you to quickly launch an effective response.

UNDERSTANDING STRESSORS, STRESS AND ITS INFLUENCE

Stress is any challenge placed upon our system whether it is physical, mental, emotional; actual or anticipated. Each individual challenge to your entire system (body and being) is a stressor that affects your immune system.

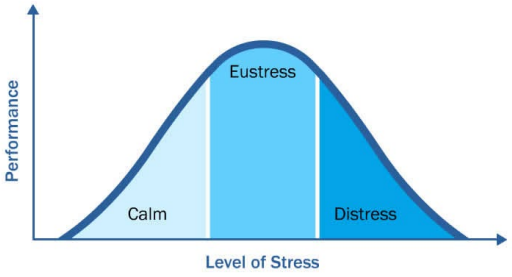


It's important to understand that stress is necessary. It is essential because it produces a hormonal response releasing hormones such as adrenaline and cortisol into your system. Hormones are the chemical messengers within your body that provide instructions helping to initiate and promote change (Molnar & Gair, 2019). Simplistically speaking, our response to stress is determined by the amount of **recovery** from (Gabbett et al 2016) and our **perceptions** of the stressors (Ferve et al., 2006).



There are essentially 2 types of stress – **eustress** and **distress**. Eustress is stress that increases your functional capacity, while distress is stress that

decreases your functional capacity (Seyle 1975). Regardless of the type of stress, it imperative to know that all stress is cumulative (Selye 1975). This means that all incoming stressors, whether biological (physical – germs, training, injury, etc.) or social (mental, emotional, etc.) will all add up. When stress goes beyond our ability to manage and process it, that's when it becomes distress (Selye 1975; Fevre et.al 2006). If this distress is sustained, it ends up becoming a chronic issue, or chronic stress.



Chronic stress has numerous negative effects on the body that all lead to increased risk of illness or injury. These include:

1. Suppressed immune system function, sensitivity and inability to down-regulate inflammation (Cohen 2012; Miller 2002)
2. Decreased recruitment of type I muscle fibers (Venhoff 2012; Handschin 2009)
3. Decreased heart rate variability (Kim et al., 2018)
4. Dehydrates connective tissue decreasing the ability to maintain stiffness and transfer force from muscle to bones/joints (Schleip 2012; Schleip 2003)

STRESS, EXERCISE, AND IMMUNE RESPONSE

We are bombarded by countless stressors (pathogens) all day long, every day. **ALL** of these stressors will influence your immune system. Looking back at the Immune System section above, your immune system is comprised of numerous cells that each have specific functions. Many immune cells have **receptors** that respond to neurotransmitters and hormones like adrenaline & cortisol that circulate through your blood and lymphatic system (Molnar & Gair, 2019).

When these cells come in contact with the neurotransmitters and hormones, they are able to mobilize and direct other immune cells to specific locations and purposes. Immune cells can also **change their responsiveness** to these neurotransmitters and hormones during periods of stress (i.e. to cause a **pro-inflammatory** response).

The above information is important because exercise **IS** stress. And as such, exercise will influence your immune system. Remember from the Stress section above that stress causes the body to release hormones – specifically adrenaline and cortisol. When you exercise, you're releasing these hormones into your body to which the immune system responds (Campbell & Turner, 2018).

A PREVIOUS AND MORE TRADITIONAL VIEW ON EXERCISE AND IMMUNITY

In the late part of the 20th century, research was conducted looking at the difference in onset of illness (specifically, upper respiratory tract infection) between moderate and high intensity aerobic training. It was demonstrated that there seemingly was a greater correlation of illness to high intensity training versus moderate intensity training (Nieman 1998). This led to the conclusion that the response of the immune system to exercise is correlated with the intensity and duration of physical activity, also known as the J-curve". (Athanasiou et al., 2019; Campbell & Turner, 2018).

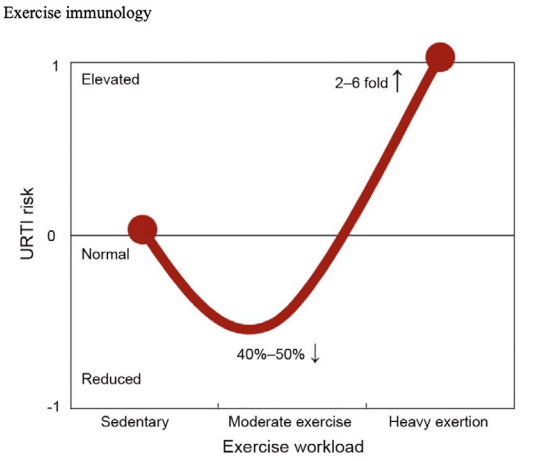


Fig. 5. J-curve model of the relationship between the exercise workload continuum and risk for upper respiratory tract infection (URTI). Other factors such as travel, pathogen exposure, sleep disruption, mental stress, and dietary patterns may influence this relationship. This figure was adapted from Nieman.[95]

(Image from Nieman & Wentz, 2019)

The "J-curve" specifically graphs the risk of infection relative to the level of exercise intensity. As seen in the graph, it shows that people who are sedentary have an average risk of infection, people who exercise moderately have a decreased risk of infection, and those that exercise with high intensity have an increased risk of infection.

This further led to what has been termed the "open window" theory, which suggests that there is an immune suppression response following high intensity, longer duration exercise. This implies that if the immune system is suppressed and not functioning in an optimal state, the risk for infection/illness would be greater (Kakanis et al., 2010).

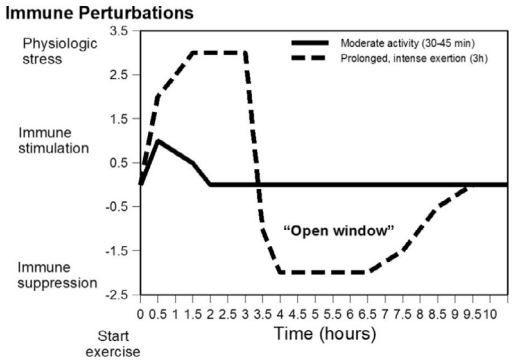


Figure 1. The "open window theory". Moderate exercise causes mild immune changes; in contrast, prolonged, intensive exercise (90 min or longer) leads to a downturn in immunosurveillance that increases the likelihood for opportunistic upper respiratory tract infections.

(Image from Nieman & Bishop, 2006))

HERE IS AN UPDATED VIEW ON EXERCISE AND IMMUNITY

Recent research has updated the above mentioned "j-curve" and "open window" lines of thought (Jones & Davidson, 2019; Campbell & Turner, 2018). For example, the following are now better understood (Campbell & Turner, 2018; Walsh et al., 2011):

- There are as many research studies showing a decrease risk of infection/illness as there are an increase risk with high intensity, longer duration exercise
- Many of the previous studies showing an increased risk of infection were based on self-reported data and not clinically tested and confirmed
- Many of these infections were more than likely the result of an accumulation of other causative factors such as allergies, asthma, **psychological stress**, **nutritional factors**, and poor **sleep**

Instead of experiencing immune suppression following high intensity exercise, it is now widely proposed that the immune system is in a heightened state of immune surveillance and regulation. This means that the immune system redeploys immune cells to peripheral tissues like the lining of the nose, mouth, eyes, gut, lungs, and even bone marrow to identify and eradicate other cells infected with pathogens. This immune surveillance and regulation response has been termed the **Acute Stress/Exercise Immune-Enhancement Hypothesis** (Campbell & Turner, 2018).

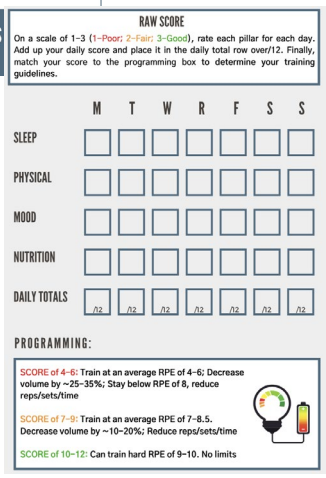
MANAGING STRESS

As briefly alluded to above, recent literature has validated that other factors such as **sleep**, **nutrition**, **psychological**, and other **physical** factors contribute to a compromised immune system (Athanasiou et al., 2019; Jones & Davidson, 2019; Campbell & Turner, 2018; Hills & Rogerson, 2018; Walsh, 2018; Saw et al., 2016). This being the case, it is essential to be aware of your stressors and be able to quickly assess them.

Research validates using self-reported questionnaires to monitor "life stressors" beyond just monitoring the physical work loads for yourself and/or your clients/athletes. By doing so, you will truly gain valuable information about total stress, recovery status and potential performance.

On this basis, Eleiko has developed a simple self-reporting questionnaire, called Readiness and Wellbeing (RAW) scoring system to monitor your stressors and help ensure better performance outcomes for sport and life while helping to decrease your chance of injury and/or illness. Each pillar coincides with a known and validated life stressor. The Eleiko 4 Pillars include:

1. **SLEEP**
2. **PHYSICAL**
3. **MOOD**
4. **NUTRITION**



USING THE RAW SCORING SYSTEM

Use of the RAW scoring system is simple. Start by rating each pillar on a scale from 1-3 (1=Poor, 2=Fair, 3=Good) every day. To obtain your **RAW** score for each day, add up the total of all 4 pillars.

Your **RAW** score will provide you with an indication of your stress level and can potentially give you a rough insight into how well your immune health is stacking up. To best manage your stress as well

promote good immune health and decrease your risk of injury or illness, use your **RAW** score to adjust your training session for that day.

There are 3 possible levels of stress that your RAW score will indicate for you each day.

1. **4-6 – RED light!** This means you're pretty stressed out. If you fall into this range, it means you should focus on training at an average RPE of 4-6 (on a 0-10 scale). You will want to decrease the volume of your training by ~25-35%. Try to stay below an RPE of 8, but if you do get a little intense, just minimize how long you stay there. You can control your volume of training by reducing the number of reps, sets, load and/or length of your training session.
2. **7-9 – CAUTION light.** This means your somewhat stress and will want to tone it down just a bit. If you fall into this range, it means you should focus on training at an average RPE of 7-8.5 (on a scale of 0-10). You should decrease the volume of your training by ~10-20% by reducing the number of reps, sets, load and/or length of your training session.
3. **10-12 – GREEN light.** This means you're good to go. Feel free to train hard, but train smart.

CONCLUSION

Your immunity is intimately connected to your stress. Having the ability to monitor and track your stress helps you to better manage your stress. The Eleiko RAW scoring system provides you with a simple, practical and effective tool to help ensure you achieve better performance outcomes for sport and life while helping to decrease your chance of injury and/or illness.

EDUCATION RESOURCES

Find additional Eleiko Papers on a range of topics on the resource section of our website.

Eleiko Papers: https://www.eleiko.com/en/education/resources-q-f-eleikopaper#gs.3l780e

Watch Eleiko webinars, including our recent series on optimizing your immunity, training and performance, by following the link below.

Strength Talks and Webinars: https://www.gotostage.com/channel/eleikoeducation

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