

## Immunity and Exercise Webinar Handout

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### Immunity

- Sum total of all responses against antigens (foreign objects).
- Acts on viruses, bacteria and damaged or abnormal cells.
- Response is not always beneficial – allergies, transplants etc.
- Complex network of constituent parts

Two immune responses exist:

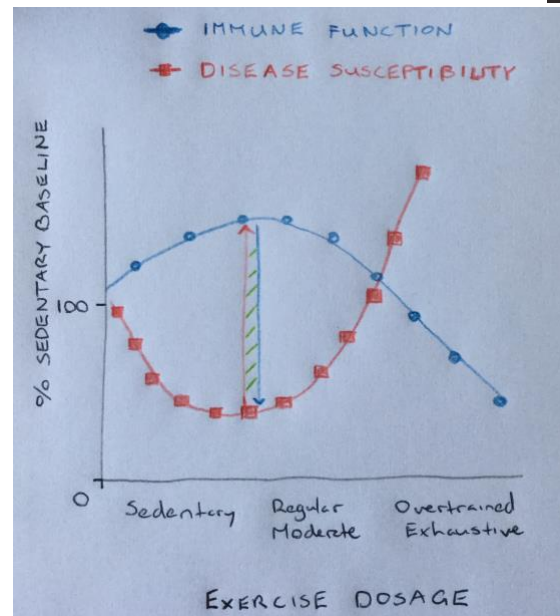
- 1) Non-specific (innate) – initial action against new invaders or unknown antigens
- 2) Specific (adaptive) – controlled by immune cells, acts against known antigens

Innate immunity provides a rapid response with some specificity and no memory. It concerns phagocytes which are “eating” cells, and consume antigens – think of Pac-man.

Adaptive immunity provides a more specific response which is slower to start. It effectively uses antibodies to tag antigens for destruction.

Innate immunity takes effect by the requisite cells identifying surface molecules on invaders. It is greatly aided by external barriers (skin, toxins in sweat, mucous membranes etc.). It causes inflammation and is a focal point of injury.

Adaptive responses may take several days to occur but is a more robust and systematic process. It is more effective in this sense.



### Immunity and Exercise

1. Lymphocytes – during exercise immune cell frequency is increased via multiple means. Upon cessation cell frequency falls below resting levels reaching nadir in 1-2 hours and restoration in 24 hours. Because of homeostasis, other immune mechanisms are being booted up also. This would lead to speculation that function is compromised. However newer research in rats suggest that what is occurring is the body prepares immune system space in the internal organs which are susceptible to illness. The reduction in lymphocytes facilitates this and they are simply moving to your joints to counter the effects of the exercise.
2. Salivary antibodies – this response is confusing due to multiple factors highlighted in the literature that influence the concentration of the antibody. These include circadian rhythms, physiological stress, dehydration, diet and so on.

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Ultimately, it is not a clear-cut measure and many more antimicrobial properties and compounds need to be investigated to determine infection risk post exercise.

3. Observation of infections in athletes - Most of the studies involved mass participation sporting events. In 1982 during the Two Oceans 56km ultra marathon in Cape Town one third of the participants reported upper respiratory tract infections however herein lies the issue. They were at a mass gathering which increased their risk. The higher incidences of illness symptoms in athletes likely coincide with colder months which is often during concentrated training. Most of the studies did not confirm the presence of illness via lab analysis.

To finish, It is misleading to simply suggest exercise causes immuno-suppression. The right amount of exercise may mobilise and improve the immune and for this reason is recommended across the lifespan. This is a complex interaction of exercise physiology, microbiology and immunology and ultimately we have more questions to answer before being definitive. The take-home message is **KEEP EXERCISING**, as it's more likely to help you than hinder.

### Excessive Training

In terms of optimisation of training there are 4 stages in a training “mesocycle” (typically comprises one month in this case).

1. Undertraining
2. Acute Overload
3. Overreaching
4. Overtraining

The “more is better philosophy” will feed this flame. Stage 1 is characterized by minor physiological changes or adaptations with no change in performance. Stage 2 is characterized by positive changes with a minor increase in performance. Stage 3 is characterized by optimal adaptations and meaningful increased performance. Stage 4 is characterized by maladaptation, performance decrements and if it persists the state of overtraining syndrome.

### Mythbusting

- Few athletes are undertrained.
- Athletes are much more likely to be overtrained due to the “more is better” philosophy.
- This constant drive to do more feeds the overtraining flame and the body becomes stressed in a physiological capacity and is unable to cope.
- If you keep stressing it the new normal will eventually be this state and you will succumb to some bad symptoms

### How do I track this?

- You need to know your “normal,” build on it into short bursts of overreaching and recover well in between sessions.
- Deciding this should be completed in conjunction with your coaches

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and trainers, S&C coach, physio, team doctor etc.

- If you need help with it just ask. There are multiple sources of solid information here. Don't assume and MEASURE.

### **PREVENTING ERRORS**

Adhere to the "FITT Principle"

FREQUENCY – sessions per week/day

INTENSITY – measure it simply, distance per time interval, heart rate intensity

TIME - length of session

TYPE – long distance run vs. short and sharp rotational movements

**\*\*\* Only amend or push one letter in the principle \*\*\***

### **Summary**

- Your immune system is going to take a lot of insult to be suppressed. You need to exercise now and should keep up the good efforts.
- Don't overtrain – know your normal and build on it
- Seek help – we're all in the same boat at the minute
- Don't become something else – lean into your specialty
- The negative states need CHRONIC habits to form. Make sure your habits are optimized

### **References**

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