

Key Facts About Detraining



WHAT IS DETRAINING?

- Partial/complete decrement in performance; loss of physiological adaptations following reduction in frequency, volume and/or intensity of training¹

RECOGNIZING DETRAINING IN YOUR ATHLETES

- Impairments in strength, power, speed, endurance flexibility, and other performance measures
- Decreases in muscle size and girth⁴
- Higher heart rates during rest, submaximal or maximal exercise⁵
- Reduced blood volume and stroke volume⁵
- Higher mean and systolic blood pressures⁵
- Lowered maximal ventilation and ventilator volume⁵
- Increases in waist circumference, body weight, and fat mass⁶

STRATEGIES TO COMBAT DETRAINING IN YOUR ATHLETES

1. Coaches, athletic directors and school administrators consult with athletic trainers, certified strength and conditioning professionals when establishing plan back to physical activity⁷
 - Sports medicine staff have authority to cancel/modify workouts for health/safety⁷
2. Set goals, but be patient. Physiological adaptations take time to develop following periods of detraining
 - First seven days of any new conditioning cycle is high-risk for catastrophic injuries⁷
3. Be positive. Detraining's physiological consequences aren't permanent
4. Come up with structured, weekly plan for full return to peak performance
 - Low-volume/impact, high-intensity training once/twice weekly as retraining begins
 - Perform cross-training in initial periods following detraining to distribute physical stressors throughout the body, which may help prevent injury. Cross-train at intensities and durations similar to original sport^{1,8}
 - Gradually increase (approx. 15 days) duration, intensity, sport-specificity of exercise activities
 - Remember to incorporate rest days to allow recovery
5. Consume high-protein and nutrient-dense foods
6. Consider using technology (e.g., heart rate monitors and fitness trackers) to keep track of your fitness goals and training loads
 - Refer to rate of perceived exhaustion scale, if no access to devices⁹

In response to the COVID-19 pandemic, the NATA International Committee has compiled a list of key considerations in returning athletes back to physical activity.

HOW QUICKLY DOES DETRAINING HAPPEN?

- Maximal oxygen uptake declines rapidly (approx. 8%) in first 12 days; up to 20% after 12 weeks²
- Four weeks of detraining may result in faster time to exhaustion.³
- In highly trained athletes, inactivity more than 4 weeks can lead to reduction in eccentric force, sport-specific power, recently acquired isokinetic strength⁴

References:

1. Haff GG, Triplett NT. Essentials of Strength Training and Conditioning. 4th Edition. Human Kinetics; 2015.
2. Powers SK, Howley ET. Exercise Physiology: Theory and Application to Fitness and Performance. 10th Edition. McGraw-Hill Education
3. Madsen K, Pedersen PK, Djurhuus MS, Klitgaard NA. Effects of detraining on endurance capacity and metabolic changes during prolonged exhaustive exercise. J Appl Physiol. 1993;75(4):1444-1451.
4. Mujika I, Padilla S. Muscular characteristics of detraining in humans. Med Sci Sports Exerc. 2001;33(8):1297-1303.
5. Mujika I, Padilla S. Cardiorespiratory and metabolic characteristics of detraining in humans. Med Sci Sports Exerc. 2001;33(3):413-421.
6. Ormsbee MJ, Arciero PJ. Detraining increases body fat and weight and decreases VO₂peak and metabolic rate. J Strength Cond Res. 2012;26(8):2087-2095.
7. Parsons JT, Anderson SA, Casa DJ, Hainline B. Preventing Catastrophic Injury and Death in Collegiate Athletes: Interassociation Recommendations Endorsed by 13 Medical and Sports Medicine Organisations. J Athl Train. 2019;54(8):843-851.
8. Mujika I, Padilla S. Detraining: loss of training-induced physiological and performance adaptations. Part II: Long term insufficient training stimulus. Sports Med Auckl NZ. 2000;30(3):145-154.
9. Borg GA. Psychophysical bases of perceived exertion. Med Sci Sports Exerc. 1982;14(5):377-381.



Key Facts About Detraining

In response to the COVID-19 pandemic, the NATA International Committee has compiled a list of key considerations in returning athletes back to physical activity.

WHAT IS DETRAINING?

- A partial or complete decrement in performance and loss of accumulated physiological adaptations following a reduction in the frequency, volume and/or intensity of training.¹
- Maximal oxygen uptake declines rapidly (approximately 8 percent) in the first 12 days and up to 20 percent after 12 weeks,²
- Four weeks of detraining may result in faster time to exhaustion.³
- In highly trained athletes, inactivity of more than 4 weeks can lead to reduction in eccentric force and sport-specific power and recently acquired isokinetic strength.⁴

RECOGNIZING DETRAINING IN YOUR ATHLETES

- Impairments in strength, power, speed, endurance (i.e., maximal oxygen uptake and time to exhaustion), flexibility and other performance measures.
- Decreases in muscle size and girth.⁴
- Higher heart rates during rest, submaximal and maximal exercise.⁵
- Reduced blood volume and stroke volume.⁵
- Higher mean and systolic blood pressures.⁵
- Lowered maximal ventilation and ventilator volume.⁵
- Increases in waist circumference, body weight and fat mass.⁶

STRATEGIES TO COMBAT DETRAINING IN YOUR ATHLETES

1. Coaches should consult with athletic trainers and certified strength and conditioning professionals when establishing a resumption plan back to organized physical activity.⁷
 - Sports medicine staff should have unchallengeable authority to cancel or modify the workout for health and safety reasons.⁷
2. Set goals but be patient. Physiological adaptations take time to develop following periods of detraining.
 - The first seven days of any new conditioning cycle is a high-risk period for catastrophic injuries.⁷
3. Be positive. Detraining's physiological consequences aren't permanent.
4. Come up with a structured, weekly plan for full return to peak performance.
 - Perform low-volume/impact, high-intensity training one to two times a week as retraining begins.
 - Perform cross-training in initial periods following detraining to distribute physical stressors throughout the body, which may help prevent injury. Attempt to cross-train at intensities and durations similar to original sport. ^{1,8}
 - Gradually increase (approximately 15 days) the duration, intensity and sport-specificity of exercise activities.
 - Remember to incorporate rest days to allow recovery.
5. Consume high-protein and nutrient-dense foods.
6. Consider using technology (e.g., heart rate monitors and fitness trackers) to keep track of your fitness goals and training loads.
 - You may also refer to rate of perceived exhaustion scale, if you do not have access to devices.⁹

References:

1. Haff GG, Triplett NT. *Essentials of Strength Training and Conditioning*. 4th Edition. Human Kinetics; 2015.
2. Powers SK, Howley ET. *Exercise Physiology: Theory and Application to Fitness and Performance*. 10th Edition. McGraw-Hill Education
3. Madsen K, Pedersen PK, Djurhuus MS, Klitgaard NA. Effects of detraining on endurance capacity and metabolic changes during prolonged exhaustive exercise. *J Appl Physiol*. 1993;75(4):1444-1451.
4. Mujika I, Padilla S. Muscular characteristics of detraining in humans. *Med Sci Sports Exerc*. 2001;33(8):1297-1303.
5. Mujika I, Padilla S. Cardiorespiratory and metabolic characteristics of detraining in humans. *Med Sci Sports Exerc*. 2001;33(3):413-421.
6. Ormsbee MJ, Arciero PJ. Detraining increases body fat and weight and decreases VO₂peak and metabolic rate. *J Strength Cond Res*. 2012;26(8):2087-2095.
7. Parsons JT, Anderson SA, Casa DJ, Hainline B. Preventing Catastrophic Injury and Death in Collegiate Athletes: Interassociation Recommendations Endorsed by 13 Medical and Sports Medicine Organisations. *J Athl Train*. 2019;54(8):843-851.
8. Mujika I, Padilla S. Detraining: loss of training-induced physiological and performance adaptations. Part II: Long term insufficient training stimulus. *Sports Med Auckl NZ*. 2000;30(3):145-154.
9. Borg GA. Psychophysical bases of perceived exertion. *Med Sci Sports Exerc*. 1982;14(5):377-381.

This resource has been created by NATA committee members for the purposes of assisting the general membership-at-large. While we have attempted to provide a resource that is both accurate and reflective of the information available at the time of creation, NATA makes no express or implied representation or warranty as to the information contained herein. NATA and the respective authors shall not be liable nor responsible to any person or entity with respect to any loss or damage arising from its use. Athletic trainers should consult and act consistent with all applicable laws, including local and state practice acts, and other rules and policies.