

B.Sc 2nd year

5th unit

Retraining




Key points

- Detraining and Retraining
- Detraining is the cessation of regular physical training.
- Retraining is resuming training after a period of inactivity.
- The greater the training gains achieved, the greater the losses with detraining.
- Detraining results in losses of muscle size, strength, power, endurance, speed, agility, flexibility and cardiovascular endurance.
- Detraining effects can be minimised by training three times a week at 70% $\text{VO}_2 \text{ max}$



RETRAINING

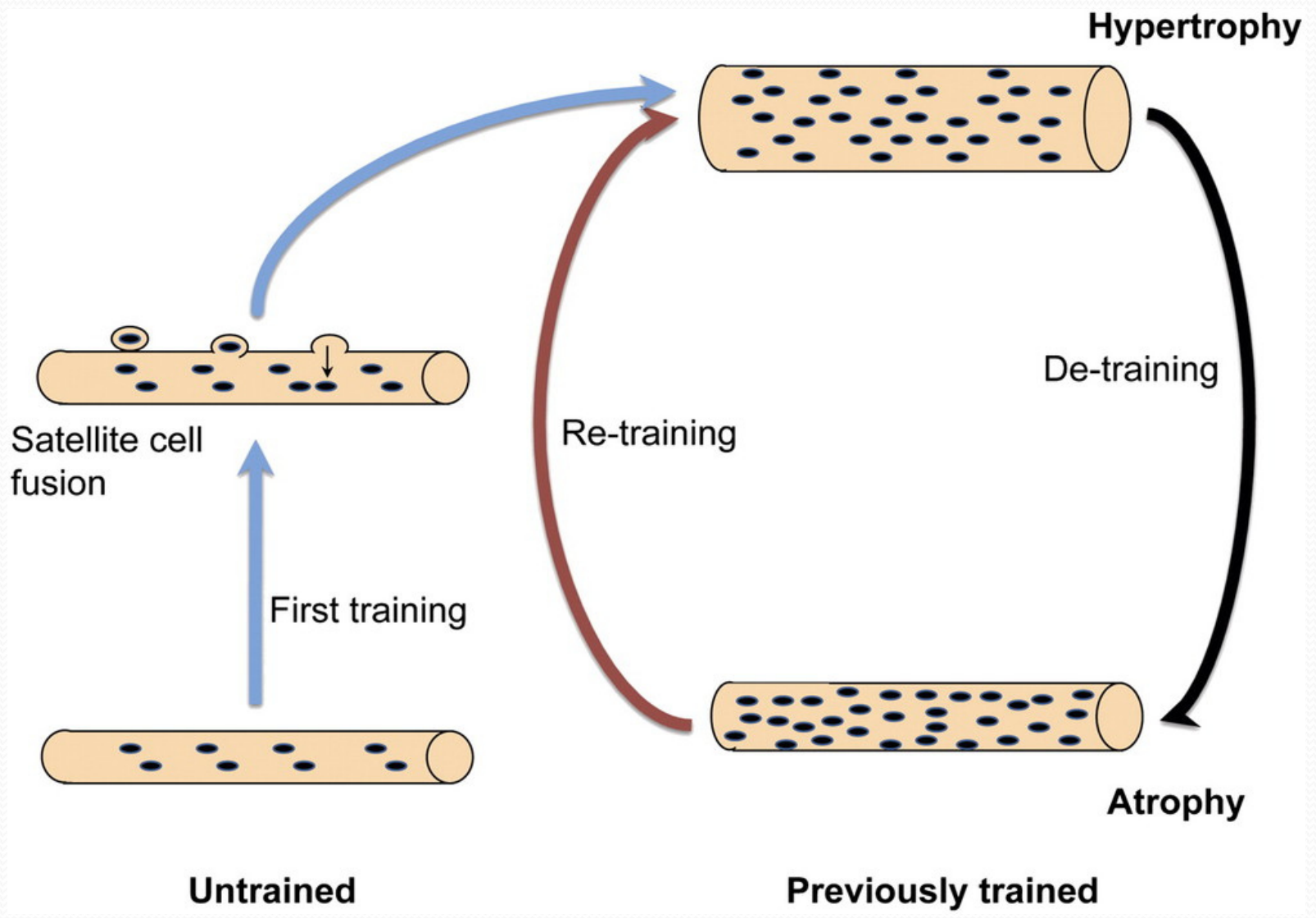
- An athlete, after a period of **detraining** there is usually a period of **retraining**. “**Retraining**” is the set of adaptive responses to resuming **training** after a period of **training** cessation. The more experienced the athlete, the faster the **retraining** period up to performance levels before **detraining**.

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- **Detraining:** The Loss of Training-Induced Adaptations in the Short Term. ... This principle is broadly defined by stopping or markedly reducing physical training leading to an induction and a partial or complete reversal of adaptations earned from training.
 - **Detraining** results in a decrease in fatty acid oxidation capacity in muscle, liver, and adipose tissue , and increases body weight and fat mass



What happens when an athlete stops training?

- When we **stop** exercising, many physiological changes occur. we begin to lose the cardiovascular gains we have made, such as our heart's ability to pump blood more efficiently, our body's improved capability to use carbohydrates for fuel, and our muscles' enhanced capacity to process oxygen.





Muscular endurance and muscular strength

The ability of the muscles to repeat a movement many times or hold a position for an extended period of time without stopping to rest.

Muscular endurance is the ability of a **muscle** or group of **muscles** to sustain repeated contractions against a resistance for an extended period of time. It is one of the components of **muscular fitness**, along with **muscular strength** and **power**.

The ability of the muscle to push pull or strike with total force.

MUSCLE STRENGTH vs ENDURANCE

Muscle Strength

- Force production
- Voluntary exertion in one maximal effect
- Results in isotonic or isometric contractions
- Gross indicator of functional ability



All Yoga Positions

Muscle Endurance

- Repeated contractions
- Maintenance of isometric contraction



Measuring muscular strength & endurance

- Muscular strength –
- One rep max – heaviest weight you can successfully lift one time without sacrificing form
- Alternatives: 3 RM, 10 RM
- Muscular endurance–
- Callisthenic tests – e.g., how many push-ups/sit-ups can you do in 1 minute?

Benefits of muscular strength and endurance

- Increased bone density
- Increased energy
- Increased lean body mass
- Reduced body fat
- Reduced stress
- Increased mood
- Increased strength
- Reduced risk of injury
- Increased stability
- Improves all physiological characteristics.

Comparison between muscular strength and muscular endurance

1. Uses muscles
2. Makes one stronger
3. Faster tempo
4. Low number of repetition (4-8)
5. We used to use more or all of our strength
6. Difficult weight / resistance - 70-85 %
1rep per max

1. Uses muscles
2. Makes one stronger
3. Slower tempo
4. High number of repetition (8-15)
5. We use some of our strength
6. Easier weight / resistance - 50- 70 %
1rep per max

Difference between MS & ME

- Muscular Strength-
 - 1 repetition max.
 - Ex. Bench, squat, cleans, etc.
 - High intensity
- Muscular Endurance-
 - Many reps over time
 - Ex. Push-ups, pull ups, weight training
 - Low to medium intensity





Muscle Strength

What it is:

The ability of the body's circulatory and respiratory systems to supply fuel during physical activity.

What it does:

- Burns calories
- Increases energy
- Promotes healthy aging

How to improve:

Exercise using free weights and resistance bands (or use your own body as resistance by adding sit-ups and push-ups to your routine) Always warm up and stretch before exercising.



Muscle Endurance

What it is:

The ability of the body's muscles to contract for extended periods of time.

What it does:

- Increases metabolism
- Reduces fatigue
- Improves posture
- Reduces injuries

How to Improve:

Plan full-body workouts that include all of the muscle groups. Change your strength-training routine every month to continually increase endurance.

Components of muscular strength work (Guide line)

- 2 to 4 sets
- 4 to 8 repetitions
- 70-85 %
- 60-90 seconds rest time
- 2-0-2 tempo
- Tempo in weight training is the rhythm at which you move a weight, including the rest time at the top of the lift and at the return of the weight to the starting position. For example, some training might involve explosive lifting at a rapid rate, while others may have a slower pace.
- Craig Ballantyne: **2-0-2 tempo** simply means **2** is – the first number is the eccentric or lowering phase of the **exercise**. So, in the squat, two seconds on the way down. And then zero, no pause, and then two seconds on the way back up. And that's the standard way of lifting in my programs.

speed



- Speed is the ability to move quickly across the ground or move limbs rapidly to grab or throw. Movement speed requires good strength and power, but also too much body weight and air resistance can act to slow the person down.
- Speed can be described as the ability for stimulus or signal to respond as quickly as possible and/or perform movements at low resistance with the highest speed.



Training to improve speed

- Building speed involves the understanding of stride length and frequency. In simple terms, it is how far each leg movement and how quickly that can occur.
- Stride length is often improved by strengthening the leg muscles, increasing strength endurance and improving the overall running technique. Developing one's speed is highly individual and can affect the linear speed, quickness and agility of an athlete/sportsperson.
- **Resisted Training** — increasing running resistance by dragging a tire or using elastic tie ropes.

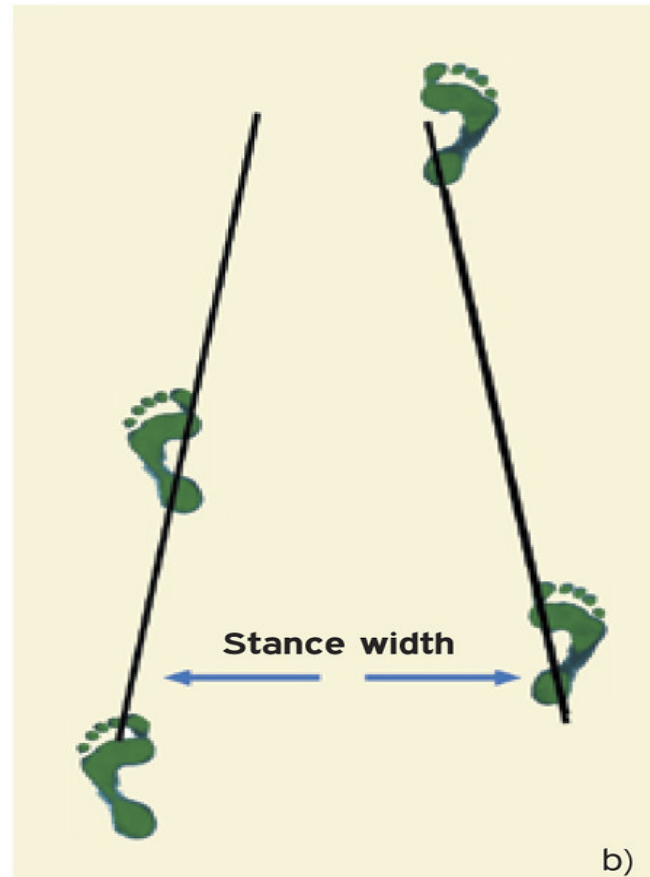
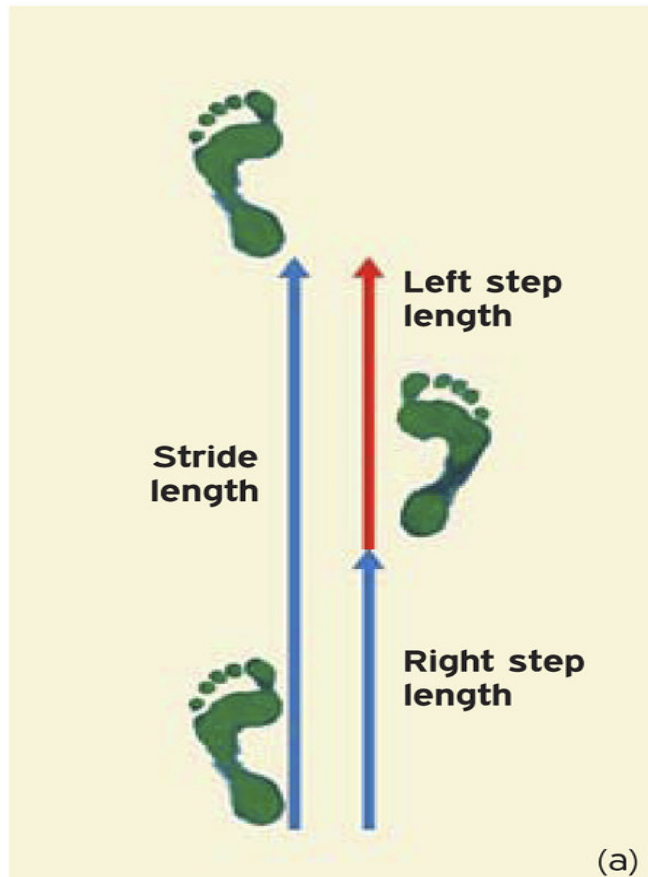


Figure 2: (a) Defining stride and step length: 1 stride length = sum of left and right step lengths. (b) The effect of acceleration on stance width is a gradual reduction as the player gets upright and into their stride




agility

- is an ability to move quickly and easily.

Training to improve agility:

- Lateral Plyometric Jumps. Lateral plyometric jumps help build explosive power, balance, and coordination by using our natural body weight.
- Forward Running, High-Knee Drills.
- Lateral Running, Side-to-Side Drills.
- Dot Drills.
- Jump Box Drills.
- L Drills.
- Plyometric Agility Drill.
- Shuttle Runs.

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- Flexibility is specific to a particular movement or joints, and the degree of flexibility can vary around the body.
 - Training to improve agility:
 - there are four methods to increase and maintain flexibility: (1) static stretching; (2) ballistic (or dynamic) stretching; (3) contract-relax stretching (also called PNF, proprioceptive neuromuscular facilitation); and (4) passive stretching.




Cardiovascular endurance

- *Cardiovascular endurance is the body's ability to deliver oxygen to muscles while they are working.*
- In other words it is all about the heart and lungs ability to supply and carry enough oxygen/energy to the body-parts that are in motion, without to much tiredness or fatigue.

Training to improve cardiovascular endurance

- There are many ways to train for improved aerobic endurance. The duration, frequency, and intensity of each type of training vary. Focusing on slightly different energy systems and skills will result in a well-rounded program that promotes a variety of physical adaptations.
- Running or cycling, for example, increase heart and lung capacity, while resistance exercises build physical strength. Combining different types of workouts in your training program can help you to maximize your endurance. Some of the most well-known endurance training programs include:
- **Long, slow distance training** is the most common type of endurance training and the foundation for marathon runners, long-distance cyclists, and other sports that demand long, sustained steady energy outputs. It is also the easiest form of endurance training for new or novice exercisers.
- **Pace/tempo training** consists of training at a steady, but fairly high intensity just slightly higher than "race pace" for a shorter duration, usually 20 to 30 minutes at a steady pace.

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- **Interval training** consists of short, repeated, but intense physical efforts (3 to 5 minutes followed by short rest periods). Interval training is a great opportunity to mix in resistance activities, such as calisthenics along with short bursts of cardio.
 - **Circuit training** consists of a series of specific exercises performed for a short duration and rotated through in quick succession with little or no rest in between. Traditional circuit training routines include both strength training and endurance exercise and can be customized to meet any athlete's training goals.
 - **Fartlek training** combines some or all of the other training methods during a long, moderate training session. During the workout the athlete adds short bursts of higher intensity work with no set plan, it's up to how the athlete feels.
 - **Strength training** sessions performed once a week can help to improve endurance. Aim to include 30 to 40 minutes of resistance exercises each week.



THANK YOU