Diet and Nutrition

The effects of dehydration on sporting performance

- Lower venous return
- Blood thickening
- Reduced sweating
- Headaches/ Dizziness
- Reduced blood pressure
- Increased heart rate
- Loss of electrolytes
- Muscle fatigue/ cramps

What is dehydration?

→ When the loss of body fluids exceeds the amount that is taken in

Complex Carbohydrates:

- Provides energy for long time - good for long distance runners
- Found in pasta, rice & brown bread

Simple Carbohydrates:

- Provides energy quickly - good for sprinters
- Sugars - found in natural form in fruit and vegetables and refined form in cakes

Carbohydrate Storage

- Stored in liver and muscles as glycogen - converted quickly into glucose to provide energy
- Utilised in glycogen loading leading up to an event

Fats:

- Release energy slowly and insulation, good for marathon runners
- Found in cheese, nuts & avocado
- Omega-3s boost oxygen delivery and reduce inflammation

Saturated fats → Fats which lead to cholesterol build up in arteries. Includes beef, lamb, pork, butter, cream

Trans fats → Type of unsaturated fat which lead to slower cholesterol build up in arteries. Includes avocado, olive oil, nuts, salmon

Proteins:

- Important for growing muscle & repairing damaged tissue - good for weightlifters
- Found in meat, eggs & nuts

Types of Cholesterol

- High Density Lipoprotein (HDL) - Takes cholesterol to the liver to be disposed
- Low Density Lipoprotein (LDL) - Leads to fatty deposits in arteries, contributing to high blood pressure.

Fibre

- Helps the large intestine function normally and keeps us feeling full
- Found in cereal, beans, fruits, vegetables
- Reduces cholesterol, lowering risk of obesity and diabetes

Vitamins:

Vitamin C - Found in citrus foods, regulates absorption of calcium and phosphorus and reduces high blood pressure

Vitamin D- Found in fish and some dairy, maintains healthy bones and teeth

Vitamin B-12 - Found in fish, meat, poultry and eggs. Prevents anaemia, helpsfunctioning of red blood cells

Vitamin B complex - Found in seeds and nuts and prevents anaemia

Minerals:

Sodium - Regulates water content/ electrolyte balance to help nerve and muscle function, found in meat, fish and poultry

Iron - Helps form haemoglobin, found in red meat

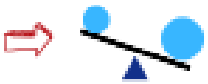
Calcium - Helps grow and maintain strong bones, found in milk

Energy Balance

- Energy balance is calculated using either energy expenditure or metabolic equivalent values
- During weight loss and gain, body composition normally changes
- Many factors affect expenditure, including age, gender, lifestyle and metabolic rate

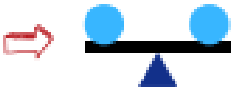
ENERGY INTAKE > ENERGY EXPENDITURE

Weight Gained



ENERGY INTAKE < ENERGY EXPENDITURE

Weight Lost



ENERGY INTAKE = ENERGY EXPENDITURE

Weight Maintained

Diet and Nutrition

Ergogenic Aids

Substances that can be manipulated to improve performance

Nutritional, pharmacological, physiological

Physiological Aids

Blood Doping-

Advantages

- Increases RBC count, oxygen transport and aerobic capacity

Disadvantages

- Increased blood viscosity and risk of blood clots

Intermittent Hypoxia training

Advantages

- Increases RBC count, mitochondria and buffering capacity

Disadvantages

- Benefits quickly lost after method stops

Cooling Aids

Advantages

- Decreased DOMS, dehydration and injury pain
- Increased recovery speed

Disadvantages

- Can be dangerous for hypertensives and risk of ice burns

WORLD ANTI-DOPING AGENCY

play true

The World Anti-Doping Agency (1999)

Has a list of prohibited substances and methods in sport

Pharmacological Aids

Pharmacological Aids	Advantages	Disadvantages
Anabolic Steriods	Increased muscle mass and strength and speed of recovery	Increased mood swings Links to liver damage and heart failure
Peptide Hormones	Increased aerobic capacity	Linked to blood thickening
Human Growth Hormone	Decreased fat mass, increased muscle mass	Increased risk of cancer, abnormal growth and organ enlargement

Nutritional Aids

Nitrates - Advantages

- Controls vascular and metabolic rate
- Reduced blood pressure

Disadvantages

- Linked to cancer

Caffeine -

- Alertness
- Good for sprinters, goalkeepers and boxers

Disadvantages

- May 'crash'

Glycogen Loading Advantages

- Faster release of energy
- Increases power

Disadvantages

- Performer becomes reliant

Creatine - Advantages

- Creates muscle mass/strength

Disadvantages

- Expensive

Sodium Bicarbonate Advantages

- Delays muscle fatigue
- Regulates fluid levels

Disadvantages

- Linked to long term muscle weakness and kidney disease

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Training Methods

Training Zones - the correct training intensity is essential for the desired aerobic adaptations

Intensity too high - Performer fatigues quickly and anaerobic respiration is used

Karvonen's Principle - Heart rates within the aerobic zone will improve aerobic capacity:

Training HR = resting heart rate + %(MaxHR - restingHR)

Max HR = 220 - age

Intensity too low - no adaptation is made

Aerobic Training

Continuous Training

- Steady training within your aerobic training zone
- No rest periods given
- E.g. running, swimming and cycling

Interval Training/HIIT

- Repeated intervals of high intensity work, followed by rest periods
- Can be used for swimming, cycling and running

Strength Training

Type of Strength

- **Maximum** → Producing maximal force in single muscular contraction
- **Static** → Force applied without any movement (isometric muscle contraction)
- **Dynamic** → Force applied with movement (eccentric or concentric)
- **Endurance** → Sustaining repeated muscular contractions over sustained period without fatigue
- **Explosive** → Produce maximal force in one or series of rapid muscle contractions, using stretch-reflex mechanism

Factors Affecting Strength

- Cross-Sectional Area of a muscle
- Type of fibre

Physiological Adaptations to aerobic training:

1. Cardiovascular
2. Respiratory
3. Muscular
4. Skeletal
5. Metabolic

Physiological Adaptations to strength training

1. Neural Pathways
2. Muscle and Connective Tissue
3. Metabolic

Weight Training

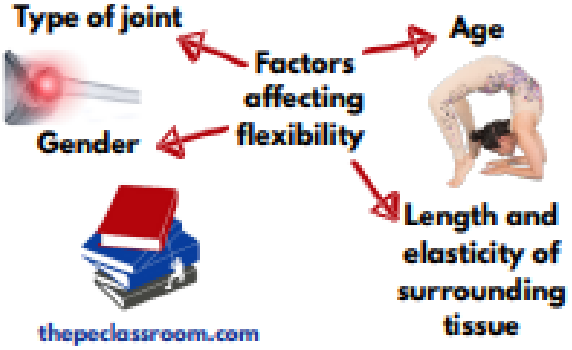
- Working against progressive resistance
- Involves completing a number of sets and reps as part of a training session

Plyometric Training

- High intensity training working on power and explosiveness

Circuit Training

- Involves working on a number of exercises arranged as stations
- Good for muscular endurance, aerobic and anaerobic fitness



Diseases that may affect training:

Cardiovascular System	1. Coronary Heart Disease 2. Atherosclerosis 3. Heart Attack 4. Stroke
Respiratory System	1. Asthma 2. Chronic Obstructive Pulmonary Disease (COPD)

Injury Prevention

Acute Injuries

- **Fractures** - broken or cracked bone
- Due to a specific impact or trauma
- **Blister** - fluid pockets between skin
- **Contusions and haematoma** - ruptured blood vessel and tissue damage
- **Sprain** - damaged ligament
- **Strain** - stretching too far past normal range
- **Abrasion** - scraping against skin
- **Concussion** - direct blow to the head
- **Dislocation** - bone forced out of position

Recognising a concussion -

1. Recognise
2. Remove
3. Refer
4. Rest
5. Recover
6. Return

Chronic Injuries

- **Achilles tendonitis** - pain and inflammation of the Achilles tendon
- **Stress fracture** - area becomes tender and swollen from overuse or too rapid increase in intensity
- **Tennis elbow** - overuse injury in muscles attached to the elbow
- Develop **slowly and persists** for a long time, often from overuse
- **Shin Splints** - repeated overuse of the tibialis anterior and posterior

Injury Prevention - Intrinsic Factors

Include:

- Diet
- Amount of sleep
- Training Effectiveness

PRICE - Treating Minor Injuries

Stage 1 - Protect
Stage 2 - Rest
Stage 3 - Ice
Stage 4 - Compression
Stage 5 - Elevation

- **Massage**
- **Slings**
- **Taping**

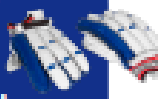
Effective Warm-Up

1. Cardiovascular pulse raiser
2. Mobility using full range
3. Dynamic Movements
4. Stretching (static and dynamic)
5. Specific-Skills Practice

Injury Prevention - Extrinsic Factors

Include:

- Poor technique due to coaching
- Incorrect clothing and equipment
- Intensity and frequency of activity
- Appropriate warm-up and cool-down



SALTAPS - on-field assessment routine

Strength

See

Ask

Passive

Look

Active

Touch

Proprioceptive Training

Re-training and re-strengthening proprioceptors in muscles, joints, tendons e.g. balance boards

Massage

Improve soft-tissue injuries, remove lactic acid and improve elasticity

Injury Rehabilitation Methods

Anti-inflammatory Drugs

Inhibit chemical release leading to inflammation, reduces pain signals and temperature e.g. ibuprofen

Hot, Cold as Contrasting Therapies

Cold - Vasoconstriction to reduce swelling
Heat - Vasodiation to deliver oxygen and reduce pain

Surgery

Following serious injuries, include keyhole and open

Physiotherapy

Sport-specific treatment of musculoskeletal injuries to repair and stimulate tissues