3A/3B EXERCISE PHYSIOLOGY 2ND Ed.

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PE STUDIES
Revision Seminars

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TEMPERATURE REGULATION

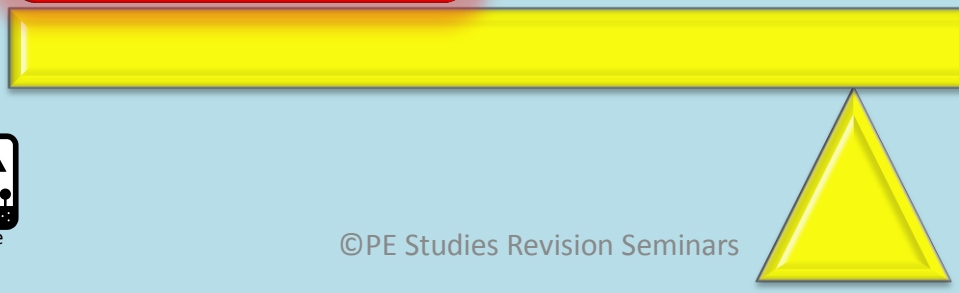
HEAT GAIN

- HORMONES
- ENVIRONMENT
- MUSCULAR ACTIVITY
- BASAL METABOLIC RATE

Core temperature rises when heat gain exceeds heat loss which occurs when exercising, particularly in hot, humid conditions.
The opposite occurs when heat loss exceeds heat production, as experienced in cold conditions.

HEAT LOSS

- RADIATION
- CONDUCTION
- CONVECTION
- EVAPORATION



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EXERCISING IN THE HEAT – EFFECTS OF DEHYDRATION

HEAT EXHAUSTION: dehydration + ineffective circulatory system

Dehydration as a result of exercising in the heat

↓ Plasma Volume

↓ Stroke Volume

↓ Blood Pressure

↑ Heart Rate

Dizziness
Headache
General fatigue
Nausea

Must stop, drink fluid and lie down with feet up!

Children have increased risk heat exhaustion due to following reasons:

- Lower sweating rate than adults
- Higher core temp during exercise
- Less developed sweat glands
- Smaller hearts leading to lower cardiac output

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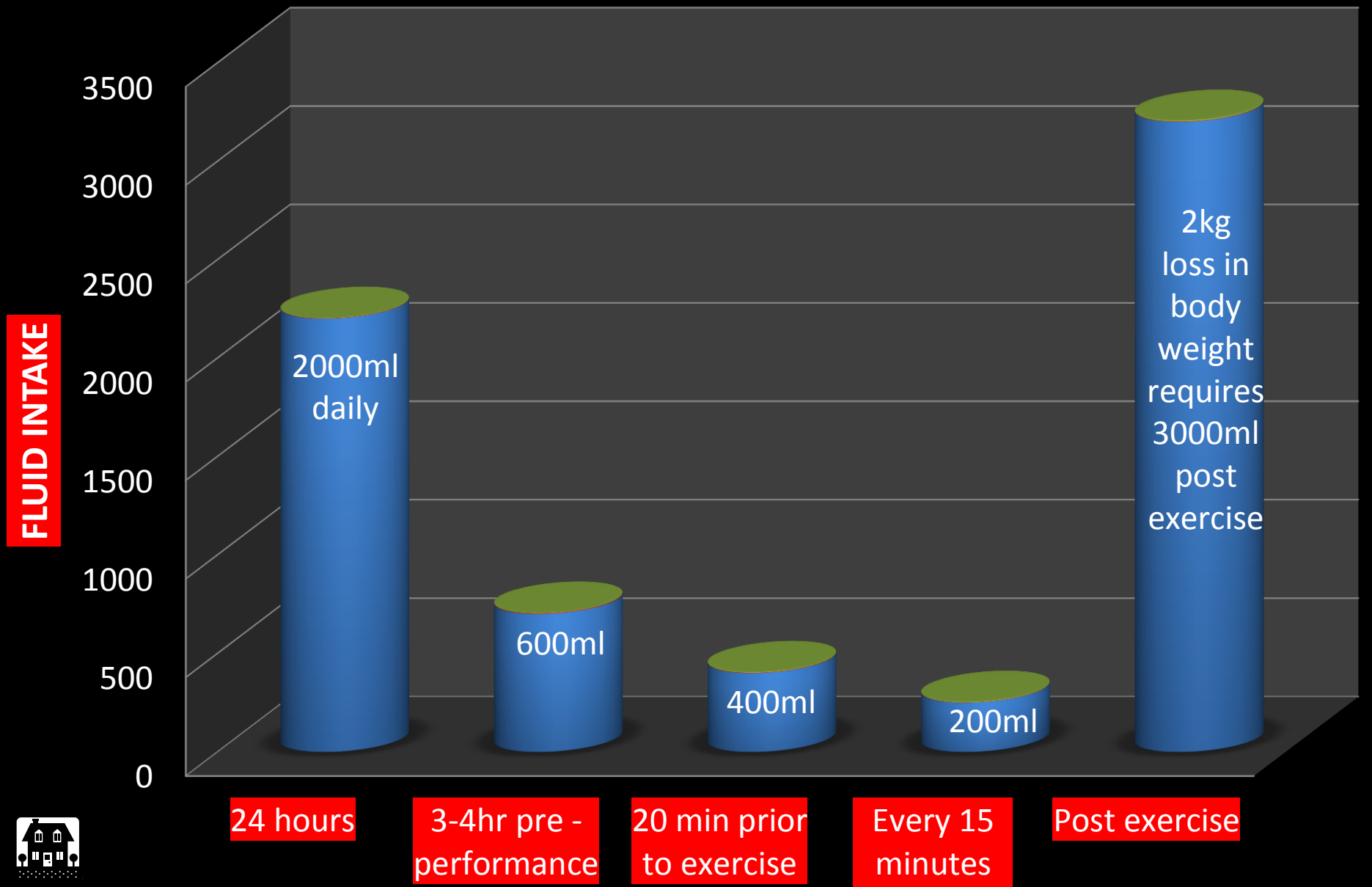
DRINKING GUIDELINES



ALTITUDE – UNDERSTANDING HOW IT AFFECTS PERFORMANCE

- When we inhale, O_2 moves through the lungs and into the alveoli where it diffuses to the blood to be transported to the tissues.
  - Gas exchange takes place due to a pressure difference called a **pressure gradient**. The alveoli is high in O_2 and therefore is high in pressure. The blood is low in oxygen and therefore low in pressure.
  - This pressure differential causes O_2 to move from the lungs into the blood
- At altitude, there is a reduction in the pressure of O_2 entering the lungs. This reduces the pressure difference with the result being less O_2 diffusing from the alveoli into the blood.
  - At sea level, O_2 has a partial pressure of 159mmHg
  - At Mt Everest, O_2 has a partial pressure of 48mmHg
  - In surrounding venous blood, O_2 has a partial pressure of 47mmHg

A reduced pressure difference at altitude causes less O_2 to be transported to the tissues, reducing exercise performance!

ALTITUDE – UNDERSTANDING HOW IT AFFECTS PERFORMANCE

ENDURANCE ATHLETES

Negatively affected due to;

- Less 0_2 uptake (hypoxia) and lower pulmonary diffusion means a reduced ability of the body to provide 0_2 to the muscles via the aerobic pathway. Aerobic metabolism is adversely affected
- Low humidity at altitude – greater risk of dehydration

POWER ATHLETES

Positively affected due to;

- Less drag (friction) due to thinner air causing less resistance
- Decreased gravity effect on objects – objects travel further for any applied force

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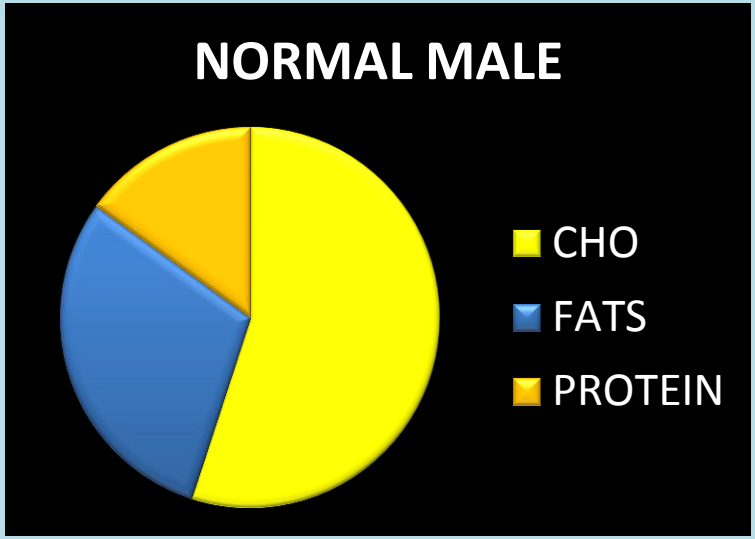
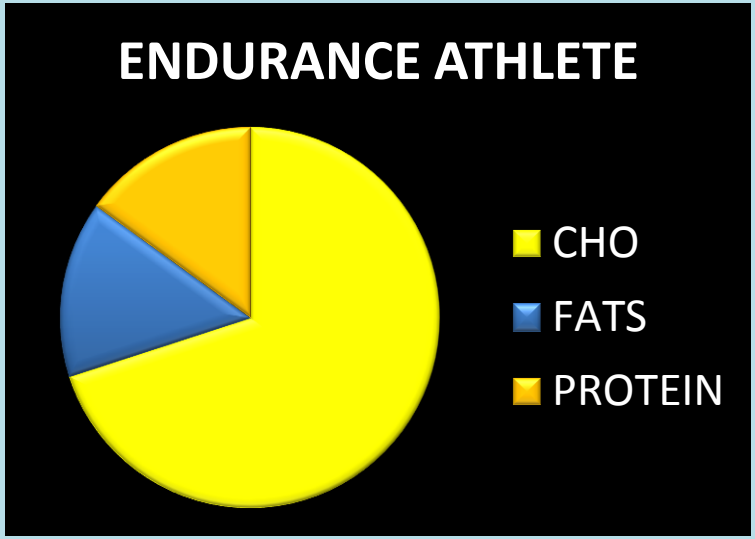
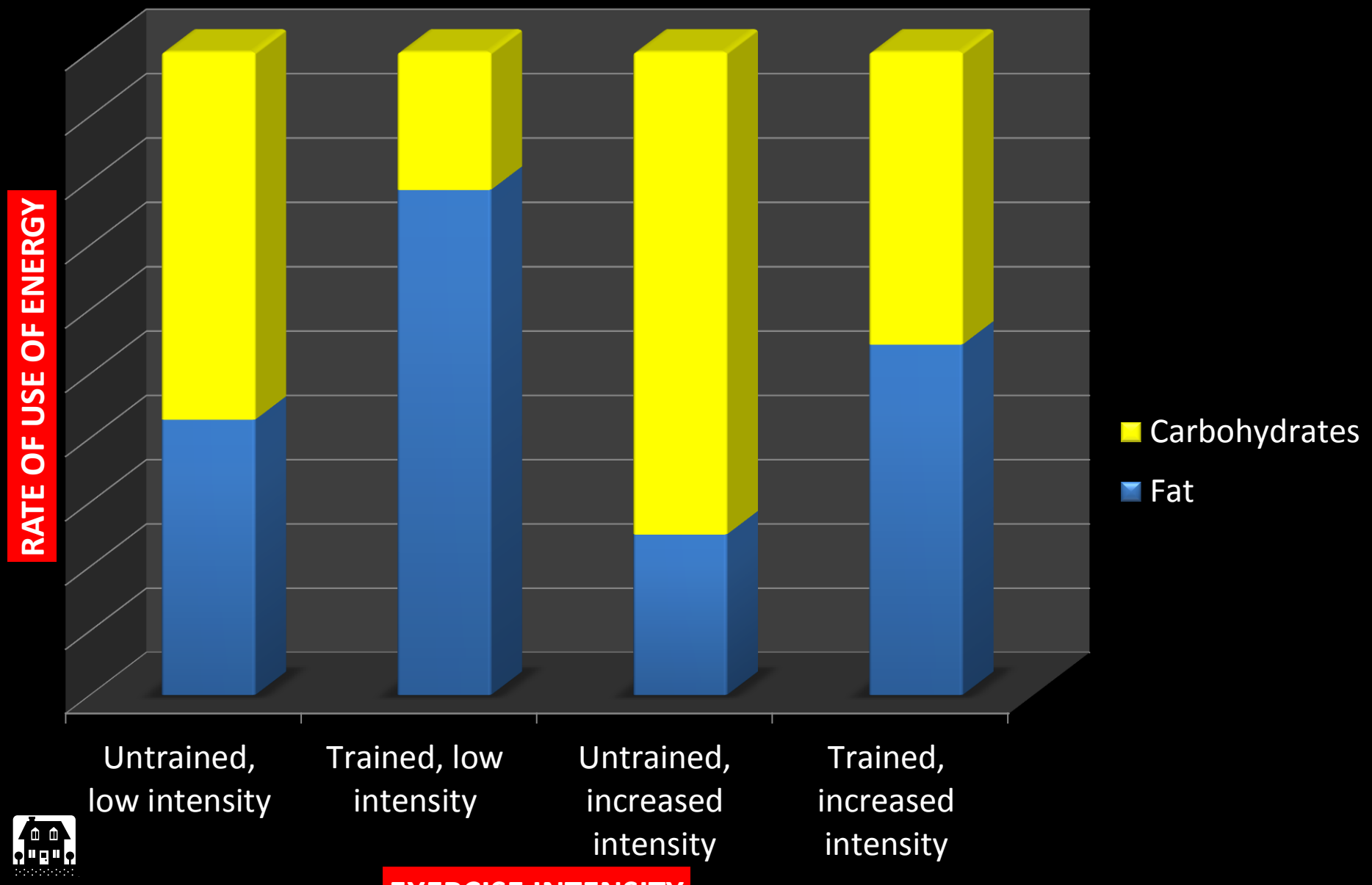
DAILY ENERGY REQUIREMENTS – A BALANCED DIET

- The amount of energy we consume each day is dependant on a number of factors. These include;
  1. The age of the individual
  2. The sex of the individual
  3. Their level of physical activity
  4. Periods of growth
- To meet the body's energy demands, it is important that we adjust our diet accordingly.
  - For a normal male, approximately;
    - 55-60% Carbohydrates
    - 25-30% fats
    - 10-15% proteins
  - For athletes involved in heavy endurance training, approximately;
    - 70% Carbohydrates
    - 15% fats
    - 15% protein(this may increase to up to 30% for body builders)





FUELLING ENERGY SYSTEMS



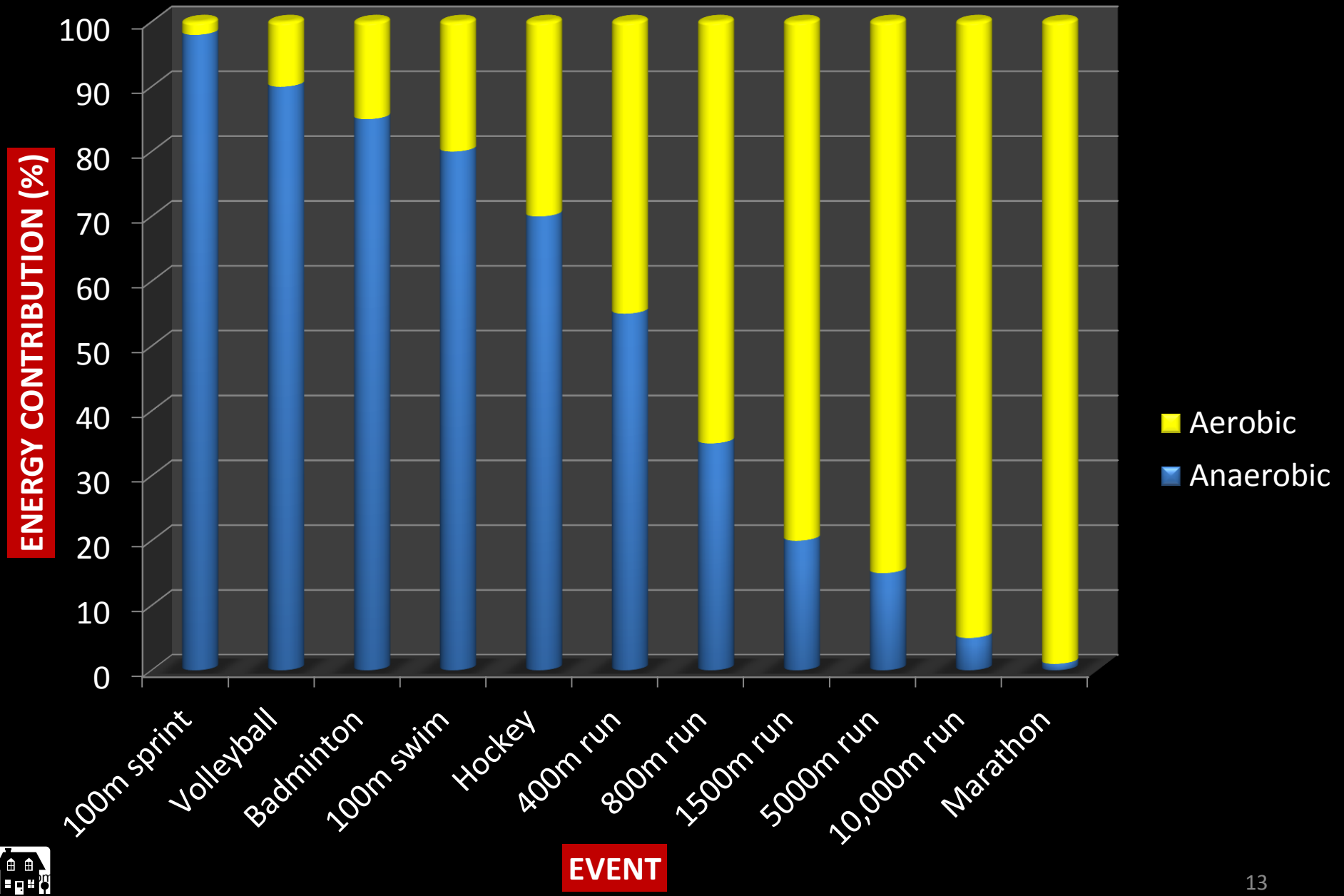
ILLEGAL ERGOGENIC AIDS

Diuretics

- Increases volume of urine secreted and is used by performers trying to make weight e.g. boxing and sports requiring athletes to be in a certain weight range
- May also be used as a masking agent by diluting the concentration of illegal substances in urine
- Possible side effects include;
  - Weakness or dizziness
  - Muscle cramps
  - Diarrhoea
  - Joint pain

http://commons.wikimedia.org/wiki/File:Ouch-boxing-footwork.jpg

ENERGY SYSTEM INTERPLAY



PERIODISATION OF PHYSICAL SKILLS TRAINING

Periodisation is the planning, well in advance, of training variables to achieve optimal performance at the most crucial times.

- It involves varying the volume and intensity of training and if done properly, it will;
  - Help to avoid staleness, overtraining and burnout
  - Promote higher levels of enthusiasm in the player group.
  - Ensures proper application of the principal of progressive overload in the physical conditioning of the players.
  - Minimises likelihood of injuries
  - Improves the psychological, physiological, technical and tactical levels of the players.
  - Plans for the athlete to 'peak' at the right time
  - Plans for rest / recovery periods

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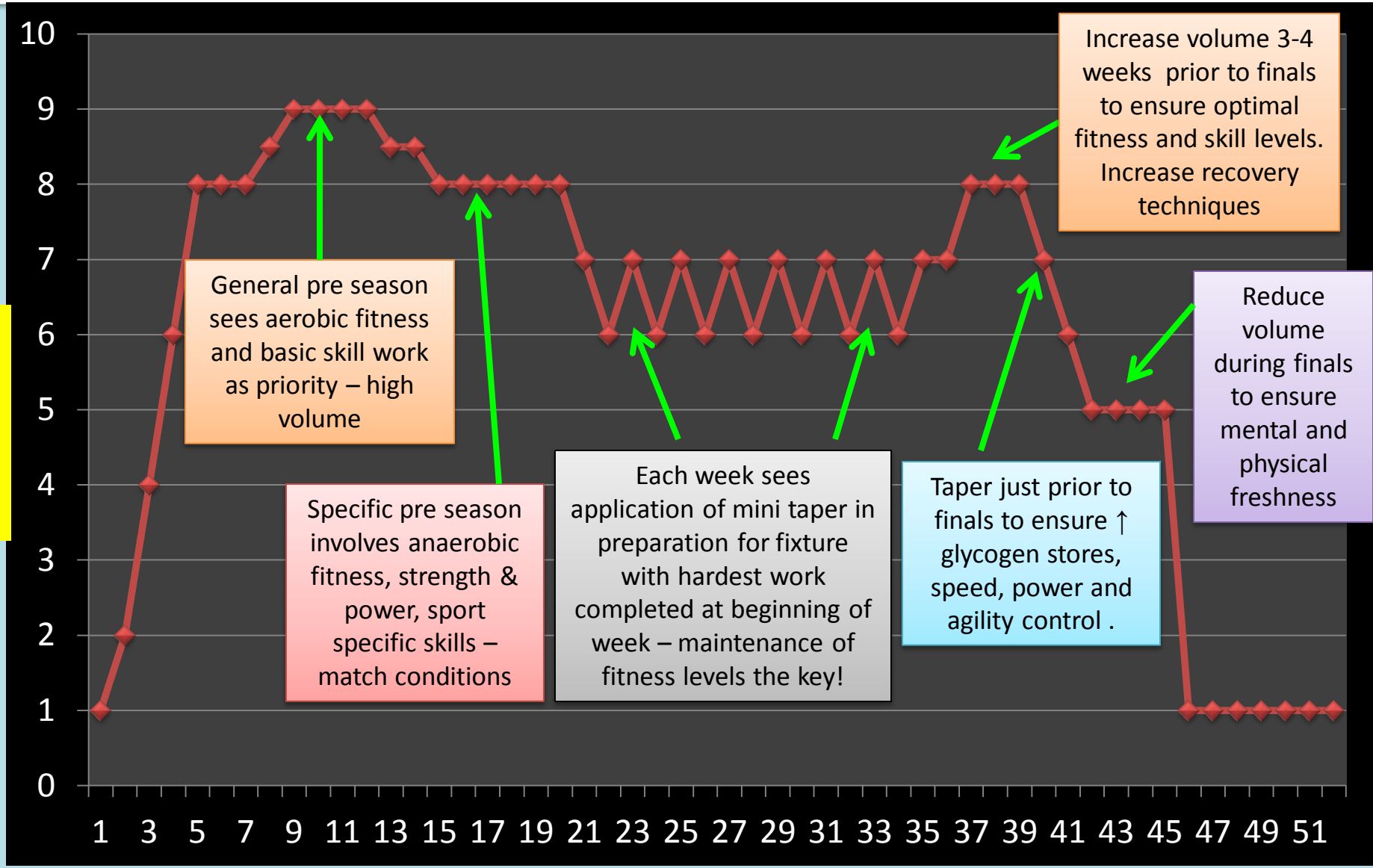
THE TRAINING WAVE



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