Northampton School *for Boys*

BTEC SPORT Level 3

National Extended Diploma

(Rugby, Basketball, Netball Specific)

Summer Preparation Work Year 12 Transition

Careers Induction preparation work

- Please use an International Sports fixture from this summer.

Watch the building up and press release around the game and then the highlights.

How many job roles are active in this event?

How does this differ to school level?

How did the logistics change for both these events and how would the planning need to be different?

Discussion point:

From Watching the games, how were the tactics adapted compared to tactics used at school U18 Level?

Complete RFU Tackle Safe Course

Complete HEADCASE course

https://www.englandrugby.com/participation/playing/headcase

Print off certificate and bring with you in September.

Safeguarding for all

https://learn.englandfootball.com/courses/safeguarding/safeguarding-for-all

Sudden Cardiac Arrest eLearning

https://www.ukcoaching.org/our-courses/courses/tksca/

Unit 1 Anatomy and Physiology preparation reading

This will be discussed during your first lessons.

Please see following slides for reading.

Production of ATP

1-The alactic system:

The alactic system is the main supplier of energy for all out efforts of up to 10 seconds (i.e. sprinting), and keeps producing energy for activities up to 30 seconds. ATP is stored in the muscles and enables the muscles to contract. During a physical/muscular activity this chemical compound is broken down into Adenosine Diphosphate which supplies direct energy to the muscles to contract.

ATP → ADP + energy

The ATP stored in the muscles is limited in quantity, but some aiding systems will help to reproduce ATP from the ADP produced. One of these aiding systems is the creatine phosphate or CP and it can reproduce quickly ATP from ADP to maintain storage.

CP + ADP → ATP + creatine

Due to the small amount of ATP and CP stored in the muscles, the alactic system can only be a limited source of energy, but is readily available for fast, powerful all-out physical activities.

Alactic training:

This system is trained through maximal speed-power physical activities, during which an intensity of 95% or more of maximum effort is required. This will include sprints, agility, changes of direction, maximum strength and power conversion development including plyometrics. Rest intervals should be 3 to 5 minutes to allow total restoration of ATP within the muscles prior the next repetition. The frequency of training the alactic system should be 2 or 3 times a week during preparatory phase and 1 to 2 times a week for maintenance during the competition phase.
Suggested total work time per training sessions: 75 to 200 seconds.
Alactic training can be general or specific.

Restoration of ATP to be used to calculate rest interval between repetitions during alactic training is as follows:
50% restored in 30 seconds
100% restores in 3-5 minutes.

2-The lactic acid system also called the anaerobic glycolytic system:

The lactic acid system takes over when the alactic system is not functioning optimally. This occurs when high intensity efforts last more than 10 seconds and will keep providing ATP to the muscles for up to 90 seconds. The lactic acid or lactate anaerobic path is using a chemical compound called glycogen, which is a form of glucose, stored both in the muscles and in the liver. The glycogen can be converted into glucose to assist in the production of ATP. In this reaction, glycogen is combined with ADP to form ATP and lactic acid, which in turn can be metabolized by enzymes to reproduce ATP.

Glycogen + ADP → ATP + lactic acid
And then 2nd phase (during recovery time)
Lactic acid + oxygen + ADP → CO_2 (carbon dioxide) + ATP + H_2O (water)

More ATP is supplied by the lactic acid path than the alactic path. As a result of an increased high intensity effort, lactic acid is produced. This byproduct of the process is the cause of fatigue, and if produced in excess (far more than the body can metabolize to keep physical activities going), players will be exhausted and cessation of activities will be needed for recovery. It is therefore extremely important for players to develop a very strong aerobic base, primarily to cope with the quick removal of the excess lactic acid from the muscles and blood.

Lactic acid training:

Lactic acid training allows coaches to use technical and tactical drills with duration and reflect on what players will be subjected to during the game keeping bouts as close as possible to game reality, usually lasting between 20 and 90 seconds. Sessions can be arranged with circuits, shuttle runs or technical/tactical drills. It is reasonable to develop more lactic acid training in the post-puberty and onward stages, as younger players usually have a limited tolerance for it, and training should be introduced gradually.

The frequency of training the lactic acid system should be two times a week, sometimes three, with a total volume of training of 5 to 7 minutes per session with 2 to 3 minutes rest between bouts. The best time for training is in the late preparatory phase after an anaerobic-endurance phase. Closer to competition time, specific lactic training can involve more game specific technical and tactical drills with rest periods mimicking game reality.

We will give some indications later on in this chapter, but this will be adapted to the general level of game played by the team. The ratio of work to rest is certainly different at an amateur club level then at a professional level. During the season, and depending on the frequency of championship games, maintenance is not entirely necessary as games will provide long lactic sessions. A sound recovery policy is paramount during the competition phase to deal with a player's accumulated fatigue which may lead to more injuries and technical and tactical staleness.

3- The aerobic or oxygen system:

The aerobic path of energy production during physical activity kicks in for longer periods of activity, usually from two minutes to one, two or more hours in extreme sporting events. This path produces a very large amount of ATP by utilizing both the glycogen and the free fatty acids stored in the body.
The breakdown of fats is as follows:

Fats + oxygen + ADP → CO_2 (carbon dioxide) + ATP + H_2O (water)

The aerobic system does not produce lactic acid, and will use fatty acids (fat) once the glycogen stores are exhausted after approximately 25 minutes of continuous activity. Generally, it takes 70 seconds up to 2 minutes for this system to become the major producer of ATP. Delay is caused by the time required for oxygen to be transported through the cardiovascular system and the blood to the working muscles. The supply of ATP via the aerobic system is quasi unlimited, fatigue and exhaustion will occur through other negative factors such as the loss of fluids leading to overheating and muscle malfunction.

As rugby is an intermittent multi-activity sport, mixing high intensity action bouts with period of low activity or complete rest, the anaerobic path of energy production will be primarily used by players during actual ball in play time, with some position-specific differences as we will see later on. We must also consider the fact that the most intense activities will take place where the ball is, or in a very close proximity. Nonetheless, the aerobic path of energy production is of paramount importance to allow optimal recovery and reproduction of ATP during recovery periods. It is during this time that the oxygen brought to the muscles oxidizes and metabolizes the excess lactic acid produced during repeated prolonged high or medium intensity bouts. The more the players can bring oxygen to their muscles in resting periods during the game, the quicker the recovery and the higher storage of ATP for the next action time. In that instance, a high aerobic capacity, also known as VO_2max or the maximum volume of oxygen an athlete can bring to the muscle during efforts or recovery periods, the better the working power in the case of endurance sports and also the better the energy production for the next high intensity effort.

VO_2max is expressed in milliliters of oxygen supplied per kilogram of body weight and per minute (ml/kg/min). The higher the aerobic-endurance of a player, and the better he/she

will be able to cope with the lactic acid accumulation, specifically towards the end of a game, where fatigue kicks in and makes most of the player's technical and tactical actions more approximate. An untrained person will have an average VO_2max of 36 ml/kg/min, whereas professionally trained athletes will have a VO_2max of around 50-52 ml/kg/min, but rugby players, those willing to achieve high performance levels, should have a VO_2max of around 60 ml/kg/min (with some position-specific allowance), which would correspond to covering 3,200 m in the twelve minutes in a Cooper test.

Fitness testing

- Please record your distance for your 12 minute run – Cooper run score.
- This needs to be evidenced using technology Watch Phone etc….
- or … alternatively mapped out using www.mapmyrun.com.