

TCA 1.1 Muscular-skeletal system

1.1.1 Names of muscles and bones. Understanding of the types of movements during physical activities at the regions/joints

1.1.2 The stretch-shortening cycle, including the different types of contraction/muscular action: isotonic/eccentric, isotonic/concentric and isometric. Application of how movement or stability is produced as a result of these different contractions/muscular actions during physical activity and sporting movements.

1.1.3 The concept of agonist, prime mover, antagonist, fixator, synergist and how a muscle can take on these different roles when providing stability or movement in a variety of physical or sporting situations.

1.1.8 How the muscular and skeletal systems respond, acutely, both structurally and functionally to the stress of warming up and immediate physical or sporting activity.

1.2 Cardio-respiratory system and cardiovascular systems

1.2.1 Knowledge, understanding and application of the anatomy and physiology of the cardiovascular, circulatory and respiratory systems in physical activity. Understanding of how they function individually and in conjunction with each other.

1.2.2 The structure and function of the respiratory system to include the larynx, pharynx, trachea, bronchus, bronchiole, alveoli.

1.2.3 The physiology of the respiratory system as a mechanical process of ventilation (inspiration and expiration). The cause and effect process, including the role of pressure gradients, partial pressure (pp) and diffusion.

1.2.4 Respiratory values and capacities: tidal volume, inspiratory reserve volume, expiratory reserve volume, residual volume, vital capacity, inspiratory capacity, functional residual capacity, total lung capacity.

1.2.5 The anatomical components and structure of the cardio vascular system to include, the heart – atria, ventricles, valves, septum, atrioventricular (AV) and sinoatrial (SA) nodes, myocardia – blood, and blood vessels (arteries, veins, and capillaries).

1.2.6 The physiology of the cardiovascular system with regards to the cardiac cycle, systemic and pulmonary circulation, venous return, vascular shunting, heart rates, (resting, working, maximum, heart rate reserve and recovery), stroke volume, cardiac output, end diastolic and end systolic volumes.

1.2.7 Understanding of bradycardia, why it may be beneficial and how, anatomically and physiologically, it may occur.

1.2.8 The cardiorespiratory and cardiovascular systems and how they respond acutely, both structurally and functionally, to the stress of warming up and immediate physical or sporting activity.

1.2.9 Understanding of what constitutes an unhealthy lifestyle and its effects on the cardiovascular and cardiorespiratory systems.

1.3.8 The chronic adaptations of the cardiorespiratory, cardiovascular, muscular-skeletal systems to training.

MTH Energy systems: fatigue and recovery

1.4.1 Knowledge and understanding of the concepts of energy, with specific reference to physical activity and sport.

1.4.2 Understanding of the forms of energy, processes by which it is regenerated, how depletion occurs and the recovery process.

1.4.3 Forms of energy to include: mechanical, electrical, potential, chemical and kinetic. The role of energy as adenosine triphosphate (ATP) in muscular contraction and the use of phosphocreatine (PC), glycogen and fat as sources for ATP re-synthesis.

1.4.4 The characteristics and physiology of the three energy pathways (ATP-PC, glycolytic and aerobic).

1.4.5 The characteristics of the three pathways with regards to ease and speed of ATP production, the force of contraction that each will support, the intensity and duration of exercise supported by each as the dominant energy provider and the regeneration of ATP for each pathway.

1.4.6 The principle of the energy continuum when based around athletic running events.

1.4.7 Use of the continuum as a medium to support understanding of the joint and collaborative role of the three energy pathways in physical activity.

1.4.8 Positioning of athletic running events on the energy continuum.

1.4.9 The concept of fatigue and factors that contribute to fatigue: energy depletion, dehydration and the build-up of waste products (which should include an exploration of the role of lactic acid in performance).

1.4.10 Stages of recovery and their application to specific physical and sporting contexts.

1.4.11 The fast component of recovery and re-phosphorylation; the speed and rate of phosphogen replenishment.

1.4.12 The slow component of recovery; the oxidation of lactate (removal of lactate and H⁺), replenishment of energy stores and the two hour window of opportunity: re- hydration, physical cooling and thermoregulation; the 48- hour window of opportunity: resaturation of myoglobin, re-synthesis of protein, glycogen and carbohydrate (CHO), exercise induced muscle damage (EIMD) and delayed onset muscular soreness (DOMS).

1.4.13 EPOC (excessive post-oxygen consumption), and the stages of recovery.

1.4.14 Understanding of how the energy systems respond acutely, to the stress of warming up/priming exercise.

Preparation and training methods in relation to maintaining and improving physical activity and performance

2.2.1 Knowledge and understanding of preparation and training methods in relation to maintaining and improving physical activity and performance.

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2.2.2 Fitness tests: functional thresholds, lactate threshold/anaerobic threshold/maximum steady state, gas analysis, multi-stage fitness test, step tests, yo-yo test, Cooper minute run, Wingatetest, maximum accumulated oxygen deficit (MAOD), RAST (repeat anaerobic sprint test), Cunningham and Faulkner, jump tests, Margaria-Kalaman, strength tests, agility tests, sprint tests < 100m.

2.2.3 Interpret, calculate and present data (tables and graphs) based on fitness test results.

2.2.4 Determinants of movement/running performance and their application to sprint, endurance and intermittent activities.

2.2.5 Components of fitness: localised muscular endurance, vO₂ max, anaerobic capacity, maximal strength, strength, power, speed, agility, coordination, reaction time, balance, flexibility, exercise economy, maximal and submaximal aerobic fitness.

2.2.6 Principles of training: individual needs, specificity, progressive overload, Frequency Intensity Time and Type (FITT), overtraining, reversibility.

2.2.7 Different ways of measuring and calculating intensity: percentage of functional intensity, percentage of one repetition maximum (RM), Rate of Perceived Exertion (RPE), percentage of functional threshold, target HR, work to rest ratios.

2.2.8 Target heart rate: understanding and use of Karvonen's theory.

2.2.9 Contemporary technologies used by the performer and coach to monitor fitness and performance.

2.2.10 Periodisation: Macro, Meso and Micro Cycles Knowledge and understanding of the preparation phase (general and specific), competition phase and transition phase.

2.2.11 Methods of training and their appropriateness for different activities: interval, circuits, cross, continuous, fartlek, flexibility (static, ballistic and proprioceptive neuromuscular facilitation (PNF)), weights (free weights and machines), resistance (including pulleys, parachutes), assisted (including bungees, downhill), plyometrics, speed agility quickness (SAQ) and functional stability. Advantages and disadvantages of each method of training.

2.2.12 Preparation for performance at altitude

TMI Injury prevention and the rehabilitation of injury

2.3.1 Knowledge and understanding of the different classifications of common sporting injuries.

2.3.2 Acute injuries: cruciate ligament injury; soft tissue damage, sprain, Achilles tendon injury, fracture, dislocation.

2.3.3 Overuse injuries: strain, shin splints (periostitis), tendonitis (including tennis elbow and golfer's elbow), stress fractures.

2.3.4 Prevention of injuries Conditioning, muscle balance, technique, protective equipment, managing risks.

2.3.5 Rehabilitation from injuries Contemporary recovery methods and timescales for return to play for injuries in 11.3.1, e.g. ultrasounds, physiotherapy, hyperbaric chambers, oxygen tents, compression garments, ice baths, nutrition, climate chambers, cryotherapy. POLICE – Protection, Optimal Loading, Ice, Compression, Elevation. RICE – Rest, Ice, Compression, Elevation. Advantages and disadvantages of rehabilitation Strategies.

Coach and performer

3.1.1 Coaching styles to improve the performance of learners: command, reciprocal, guided discovery and problem solving.

3.1.2 The development of tactics and strategies in a competition or performance to optimise outcome.

3.1.3 Dissection of a skill in order to identify technical elements: preparation, execution and recovery phases leading to the correct result or outcome. Exploration of how to analyse a skill in order to identify any technical strengths and weaknesses. How to compare to higher-level performers.

The classification and transfer of skills

3.2.1 Knowledge and understanding of skill classifications. Classification continuums as gross/fine, internally paced/externally paced, discrete/serial/continuous. The open/closed continuum in relation to the sporting environment, decision making and practice structure.

3.2.2 The uses of transfer of skills. Transfer as positive/negative, proactive/retroactive, bilateral and zero. Transfer as the effect of one skill on another as a result of practice/experience.

TCA Learning theories

3.3.1 The associative theories (classical and operant conditioning). Reinforcement – positive, negative, punishment, stimulus– response (S-R) bond – and its use in skill learning.

3.3.2 Thorndike's three laws in relation to learning as effect, exercise and readiness and their application to practical situations.

3.3.3 Fitts and Posner's three stages of learning (cognitive, associative and autonomous). The characteristics and coaching requirements at each stage. The type and role of different types of feedback at each stage.

3.4 Practices 3.4.1 Knowledge and understanding of practice methods and structure as a coach and for a performer and their impact on performance.

3.4.2 Practice methods as part, progressive part, whole, whole-part- whole. Practice structure as in massed, distributed, fixed and variable. Measuring effectiveness – quality and quantity.

3.4.3 The role and effectiveness of mental practice and how it can enhance performance.

3.5 Guidance 3.5.1 The types, purpose and effectiveness of guidance methods: visual, verbal, manual and mechanical. Visual guidance in the form of demonstration and visual Materials. Verbal guidance in the form of knowledge of direct, indirect and Prompting. Manual and mechanical guidance in the form of physical support and aids, restrictions and forced responses.

3.5.2 Uses of technology to underpin guidance methods in order to optimise performance, e.g. to measure, monitor and evaluate performance.

3.6 Feedback 3.6.1 The types, purposes and effectiveness of feedback as motivation, reinforcement and detection and correction of errors.

3.6.2 Types of feedback as in positive/negative, knowledge of performance, knowledge of results, concurrent/terminal, intrinsic/extrinsic.

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3.6.3 Uses of technology to support types of feedback in order to optimise performance.

3.6.4 Open and closed loop control Open loop models to include input, executive system, effector system and output. Closed loop control models – input, executive system, effector system, output and feedback. Application of when each loop could be used.

MTH Memory models

3.7.1 Information processing. Components of information processing, including: input, stimulus identification, perception and selective attention, response selection, response programming, output – based on the models of Welford and Whiting. Detection, comparison and recognition (DCR) phases.

3.7.2 The three memory systems as short-term sensory store (STSS), short-term memory (STM) and long-term memory (LTM).

3.7.3 STM and STSS: capacity, duration, encoding, chunking, selective attention.

3.7.4 LTM: capacity, duration, encoding, recall, multi-store memory.

3.7.5 Link between STSS, STM and LTM in terms of retrieval and rehearsal and how this affects output.

3.7.6 Measuring reaction and response times using appropriate technology.

Hick's Law, simple/choice reaction time. Plotting, interpreting and analysing data generated from

reaction and response times. Psychological refractory period. Implications to a coach and performer in optimising performance.

3.7.7 Understanding that schema theory is an organised package of information stored in LTM that updates and modifies motor programmes. Recall schema as in information about producing the movement. Recognition schema as in judging the movement. Schemas based on knowledge of the initial conditions, response specifications, sensory consequences and movement outcomes. Implications of schema theory to a coach and performer in optimising performance.

MTH Ethics and deviance in sport

5.4.1 Knowledge and understanding of ethics and deviance in sport. The pressures on sports performers and spectators to behave in a deviant way.

5.4.2 The impact of commercialisation on the sportsmanship ethic and the growth of gamesmanship in the UK.

5.4.3 Deviance in sport: use of performance enhancing drugs, (early conception of drug use up to the modern day); blood doping and transfusions; diuretics and pain relief; simulation; bribery; 'bungs'; match fixing, betting syndicates and other contemporary forms of deviance.

5.4.4 Different responses of national and international governing bodies, governments and the law to combat deviance in sport, including the utilisation of technology.

5.4.5 The reasons for the establishment of the World Anti- Doping Agency (WADA) and its effectiveness