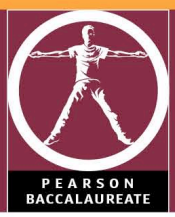

Worksheet 11.1

Fifteen summary facts

1 'Active immunity' is the term used when the body produces its own antibodies. This is accomplished when the immune system is challenged by a foreign antigen and responds by cloning appropriate B-cells to produce antibodies effective against that antigen.

2 Monoclonal antibodies are produced by hybrid cells as a result of the fusion of a specific B-cell with a cancerous myeloma cell. The resulting hybridoma cell is cultured and produces a single type of antibody known as a monoclonal antibody.

3 Monoclonal antibodies are useful in a variety of applications including diagnostic (e.g. pregnancy testing) and treatment applications (e.g. targeting cancer cells with a toxin).

4 Vaccines are created by weakening a pathogen such as a virus and using it to inject the person being vaccinated. Their immune system undergoes a primary immune response which leads to the formation of memory cells which are then ready to respond to any subsequent infection by the same pathogen.

5 The human elbow is an example of a hinge joint. The distal end of the humerus forms a joint with both the radius and ulna of the forearm. The primary antagonistic muscles of the elbow are the biceps (to flex the arm) and the triceps (to extend the arm).

6 Muscles contract when a multitude of alternating actin fibres are pulled centrally by myosin fibres within contracting units called sarcomeres. ATP molecules are used to ready the projecting myosin 'heads' for a power stroke in order to slide the actin fibres.

7 Kidneys filter the blood, keeping the levels of such molecules (e.g. urea), ions and water within a normal homeostatic range. The maintenance of a normal water balance is known as osmoregulation.

8 The filtering units of kidneys are called nephrons. The blood is filtered under pressure in an area of the nephron known as Bowman's capsule. This is called ultrafiltration and results in the removal of a massive amount of water, ions, and glucose from the blood. Many of these molecules must then be reabsorbed back into the blood in the capillary beds surrounding the nephrons.

9 Much of the reabsorption process occurs within the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule of the nephron. A variety of active and passive transport mechanisms are used in the reabsorption process.

10 Much of the water is retained in the filtrate until it enters the collecting ducts of the nephrons. If water needs to be retained by the body, the posterior pituitary gland secretes antidiuretic hormone (ADH). This results in the collecting ducts becoming permeable to water which then exits the collecting duct into the surrounding hypertonic fluid of the medulla region of the kidney. This water is then taken into the surrounding capillary beds.

11 Millions of sperm are produced each day within small tubes called seminiferous tubules in post-puberty male testes. This process is called spermatogenesis and involves mitosis to replace cells and meiosis resulting in haploid cells known as spermatozoa.

12 Ova (in the form of oocytes) begin the process of oogenesis within the ovaries of fetal females. The continuation of meiosis is then delayed until ovulation and fertilization. The final result is the production of a large haploid cell which is fertilized by a very small haploid spermatozoan.

13 A human zygote begins mitotic cell division soon after fertilization and also begins moving down a fallopian tube toward the uterus. On entering the uterus, a human embryo is typically a hollow ball of about 100 cells and is called a blastocyst.

14 A blastocyst embeds itself into the endometrial uterine wall and begins to form an early placenta. When fully formed, a placenta is a highly vascular structure composed of both maternal and fetal blood vessels. The fetus sends deoxygenated, high-waste blood to the placenta through vessels in the umbilical cord; blood returning to the fetus is oxygenated and nutrient rich.

15 Parturition is the name used for the series of events that occur to prepare a woman for childbirth. As part of parturition, progesterone levels typically decline and a hormone called oxytocin is produced. Oxytocin leads to the muscular contractions of the uterus known as labour contractions.