READING 18

PART A

TIME: 15 minutes

- Look at the four texts, A-D, in the separate Text Booklet.
- For each question, 1-20, look through the texts, A-D, to find the relevant information.
- Write your answers on the spaces provided in this Question Paper.
- Answer all the questions within the 15-minute time limit.
- Your answers should be correctly spelt.

Text A

Clostridium tetani is a toxin producing, anaerobic, gram-positive bacillus. It is a spore forming pathogen with spores found naturally in soil, animal feces, and manure. Typically, spores are introduced into the body via an injury that causes a break in skin structure such as a laceration. Once C. tetani spores are within the body, they convert to their vegetative forms and multiply within the tissues at the site of injury. The anaerobes begin producing toxins, tetanolysin and tetanospasmin. The tetanus toxin targets vesicle-associated membrane protein (VAMP) which is involved in neurotransmitter release from nerve endings. Therefore, a symptom of flaccid torpidity or immobility can be present when the toxin binds and interferes with the release of acetylcholine at the neuromuscular junction. The toxin can be transported in the axons and thereby reach the spinal cord or brainstem. Once within the CNS, the toxin can be taken up by inhibitory GABAergic or glycinergic neurons or both, where the tetanus toxins can cleave VAMP and inhibit release of GABA and glycine. This results in rigidity and spasms of hyperactive muscles. The toxin irreversibly binds to tissues and thereby cannot be neutralized by TIG, once bound.

Text B

Diagnosis

There is no existing laboratory test for tetanus, thus the diagnosis is based purely upon clinical presentation. In 2009, the Council of State and Territorial Epidemiologists published a case definition, which stated: “in the absence of a more likely diagnosis, an acute illness with muscle spasms or hypertonia and diagnosis of tetanus by a health care provider.” Cases are classified as probable provided they are clinically compatible with tetanus presentation and are reported by a healthcare professional. There is no definition for confirmed tetanus. A case suggestive of tetanus should be reviewed for immunization status, history of injury, duration before a patient develops signs and symptoms, patient-specific signs, symptoms and their progression in order to make a diagnosis. Although, not in all the cases it is possible, however, an early intervention before the condition becomes serious can be better understood. Majorly, it is connected more or less to the incubation period.

Text C

Epidemiology

Since 1947 when tetanus became a nationally reportable disease in the United States, the number of cases has got curtailed by > 95% and the number of deaths dwindled by > 70%. Between 2001 and 2008, the Centers for Disease Control received 233 tetanus case reports, with 197 reported patient outcomes. The case - fatality rate for the period analyzed was 13.2%, with an annual incidence of 0.10 per 1 million and 0.23 for those ≥ 65 years of age. Tetanus-toxoid (TT) containing vaccination status was known for 92 patients, of which 37 (40.2%) had received no doses of TT vaccination. Appropriate prophylaxis was not administered in 49 of 51 (96.1%) patients, who were presented with an acute wound.

Text D

Treatment

According to the CDC, tetanus treatment includes the administration of TIG, a tetanus toxoid booster, agents to control muscle spasms (benzodiazepines), and antibiotics (metronidazole). Aggressive wound care measures should also be initiated. TIG confers passive immunity to the toxin produced by the tetanus pathogen, C.tetani, through neutralization of the exotoxin produced by the bacterium. TIG is indicated for prophylaxis in patients whose immunization status against tetanus is incomplete or uncertain. TIG is also indicated as a component of the regimen for treatment of active cases of tetanus. Standard dosing, per the package insert, for routine prophylaxis of adults and children of seven years or older is 250 units of TIG given by deep intramuscular injection. Children below seven years can receive prophylactic doses of either 4 units/kg or the entire contents of the vial 240 units.

Treatment of active cases should be implemented immediately, with the dosage adjusted according to the severity of the infection. Currently, the recommended dosage range is 500 - 6,000 units, with no optimal range clearly defined. A study conducted by Nation et al enrolled 20 patients with active tetanus and treated them each with a single dose of between 3,000-6,000 units.

Questions 1-7

For each question, 1-7, decide which text (A, B, C or D) the information comes from. You may use any letter more than once.

In which text can you find information about;

1. Constant decrease in number of deaths due to the bacteria.
Answer_____.

2. Need to evaluate the conditions and adhering to proper medical regime.
Answer_____.

3. Increased tightness of muscle tone and reduced capacity of the muscle to stretch.
Answer_____.

4. Help decrease the bacterial invasion.
Answer_____.

5. Bacteria is adept at cutting or tearing down the skin surface.
Answer_____.

6 .Need of identifying and providing vaccines.
Answer_____.

7. A sign of weak paralysis.
Answer_____.

Questions 8-14

Answer each of the questions, 8-14, with a word or short phrase from one of the texts. Each answer may include words, numbers or both.

8. What is known to affect molecular assembly?
Answer_____.

9 .Where toxin eventually will lead to?
Answer_____.

10 .What is the duration for the tetanus disease to become severe?
Answer_____.

11. What is reported as not executed among patients?
Answer_____.

12. What is acceptable medication for small children?
Answer_____.

13. What does the tetanus toxoid booster confers?
Answer_____.

14. What symptoms can be present when the toxin binds and interferes with the release of acetylcholine at the neuromuscular junction?
Answer_____.

Questions 15-20

Complete each of the sentences, 15-20, with a word or short phrase from one of the texts. Each answer may include words, numbers or both.

15. TIG cannot neutralize the toxin once it_____ .

16. The spores convert to their _____ as they enter the body.

17 ._____ is reported to be the actual rate by which the death occurred.

18. _____ in appropriate ranges can be given for the children who are 7 years of age.

19. Reports showed that it can be possible to effectively deal with the disease with _____.

20. With the presence of the _____, the severity of the disease reaches to its highest degree.

PART B

In this part of the test, there are six short extracts relating to the work of health professionals. For questions 1-6, choose the answer (A, B or C), which you think fits best according to the text.

Questions 1-6

1 What information does this notice give?

A How the splenectomy shall be performed for better results?

B What does the operation involve?

C Spleen and Splenectomy

Laparoscopic splenectomy

Laparoscopic splenectomy involves making four or more small (5 ± 10 mm) incisions on the abdomen. Carbon dioxide gas is then pumped into the abdominal cavity to provide a space to operate in. A fiber-optic telescope and long instruments are then inserted into the abdomen and the spleen is separated from the stomach, kidney and colon. The blood supply of the spleen is stapled across with a special device that secures the blood vessels. The spleen is then placed in a bag inside the abdomen. One of the small incisions is enlarged in order to deliver the spleen out of the abdomen in this bag.

2 The manual talks about;

A Assessment as per the protocols.

B Functionality of the Powerheart AED.

C STAR Biphasic Energy Protocols for Powerheart G3 AED.

The STAR Biphasic defibrillation waveform will deliver variable escalating energy that is customized to each patient's needs based upon a patient's thoracic impedance. This customization adjusts for the unique physical differences between patients. The Powerheart G3 AED comes equipped with five different FDA cleared biphasic energy protocols. The operator, with guidance, direction, and implementation from the designated AED program Medical Director, may select from one of the protocols when placing the Powerheart G3 AED into service. The Powerheart G3 AED's factory default energy protocol is 200-300-300 Joule (J) escalating Variable Energy (VE). The first shock is delivered within the range of 126J-260J. Subsequent shocks are delivered within a range of 170J351J

3 The table gives more information about;

A Natural history and outcomes of NASH.

B Common causes of deaths.

C Mortality rate - a comparison.

Patients with NASH

There is growing evidence that the patients with histological NASH, especially those with some degree of fibrosis, are at higher risk for adverse outcomes such as cirrhosis and liver-related mortality. Patients with NASH have increased overall mortality compared to matched control populations without NASH. The most common cause of death in patients with NAFLD is the cardiovascular disease (CVD), independent of other metabolic comorbidities. Although liver-related mortality is the 12th leading cause of death in the general population, it is the second or third cause of death among patients with NASH. Cancer-related mortality is among the top three causes of death in subjects with NASH. Patients with histological NASH have an increased liver-related mortality rate.

4 What is right about stem cells?

A They create, recreate cells, replenish cell supply.

B Develop and produce different kinds of cells. C

Generate organs.

Stem cells are homogenous biological cells those cells can distinguish into specialized cells and can split to produce more stem cells and it's found into multicellular organisms. In mammals, mostly there are two types; one is embryonic stem cells, which are isolated from the inner cell mass of blastocysts, and adult stem cells, which are located in various tissues. And the other one is adult stem cells and progenitor cells act as a repair system for the body, replenishing adult tissues. In a developing embryo, stem cells distinguish into all specified cells, ectoderm, endoderm and mesoderm but also uphold and recover the regenerative organs, such as blood, skin, or intestinal tissues.

The three sources of autologous adult stem cells in humans are Bone marrow, Adipose tissue and Blood. Stem cells can also be taken from umbilical cord blood just after birth. Embryonic cell lines and autologous embryonic stem cells created through somatic cell nuclear transfer or dedifferentiation have also been proposed as assuring candidates for future therapies. Embryonic cell lines and autologous embryonic stem cells spawned through somatic cell nuclear transfer or dedifferentiation have also been intended as promising candidates for future therapies.

5 What is correct as per the given notice?

A The number of DM patients increased from 2011-12.

B Exercise can be the best antidote for DM.

C Deaths by DM increased from 2011-2014.

DM - Overview

An estimated 23.4 million adults have diagnosed diabetes mellitus (DM), 7.6 million have undiagnosed DM, and 81.6 million have prediabetes.

Analyses of high school±aged blood donors in 2011 to 2012 reported that 10% had prediabetes hemoglobin A1c levels and an additional 0.6% had hemoglobin A1c ≥6.5%, the threshold endorsed to diagnose DM.

A recent analysis of randomized controlled trials showed that exercise may exert its favorable effects by significantly improving glucose tolerance and insulin resistance. The benefits of exercise were further supported by a large intervention project that showed that higher fitness was associated with a lower risk of incident DM regardless of demographic characteristics and baseline risk factors.

In 2014, there were 76488 DM-related deaths

6 The notice gives information about;

A The proposal to fund dementia studies.

B A move by the Australian Government.

C Achievements of National Institute of Dementia Research.

The Federal Government is providing an additional $200 million for dementia research over the next five years. This will significantly boost funding for Australia's dementia research sector to over $60 million per annum. As part of the Federal Government's commitment to dementia research, the National Health and Medical Research Council's National Institute of Dementia Research was established to ensure priority research in dementia is coordinated, funded and communicated. The Institute collaborates with Australia's best researchers while also drawing on the expertise of consumers, health professionals, industry and policy makers to translate evidence into policy and practice that works towards achieving a five-year delay in the onset of dementia by 2025. One of the pressing issues is to build capacity in the dementia research sector by supporting students and early career dementia researchers.

PART C

In this part of the test, there are two texts about different aspects of healthcare. For questions 7-22, choose the answer (A, B, C or D), which you think fits best according to the text.

Text 1: Defending Mechanisms in the Human Body

The surface defences of the vertebrate body are very effective but are occasionally breached, allowing invaders to enter the body. At this point, the body uses a host of a nonspecific cellular and chemical devices to defend itself. We refer to this as the second line of defence. These devices all have one property in common: they respond to any microbial infection without pausing to determine the invader's identity. Although these cells and chemicals of the nonspecific immune response roam through the body, there is a central location for the collection and distribution of the cells of the immune system, called the lymphatic system. The lymphatic system consists of a network of lymphatic capillaries, ducts, nodes and lymphatic organs and, although it has other functions involved with circulation, it also stores cells and other agents used in the immune response. These cells are distributed throughout the body to fight infections, and also stored in the lymph nodes where foreign invaders can be eliminated as body fluids pass through.

Macrophages ("big eaters") are large, irregularly shaped cells that kill microbes by ingesting them through phagocytosis, much as an amoeba ingests a food particle. Within the macrophage, the membrane-bound vacuole containing the bacterium fuses with a lysosome. Fusion activates lysosomal enzymes that kill the microbe by liberating large quantities of oxygen free-radicals. Macrophages also engulf viruses, cellular debris, and dust particles in the lungs. Macrophages circulate continuously in the extracellular fluid, and their phagocytic actions supplement those of the specialized phagocytic cells that are part of the structure of the liver, spleen, and bone marrow. In response to an infection, monocytes (an undifferentiated leukocyte) found in the blood squeeze through capillaries to enter

the connective tissues. There, at the site of the infection, the monocytes are transformed into additional macrophages.

Neutrophils are leukocytes that, like macrophages, ingest and kill bacteria by phagocytosis. In addition, neutrophils release chemicals (some of which are identical to household bleach) that kill other bacteria in the neighbourhood as well as neutrophils themselves. On the other hand, natural killer cells do not attack swarming microbes directly. Instead, they kill cells of the body that have been infected with viruses. They kill not by phagocytosis, but rather by creating a hole in the plasma membrane of the target cell. Proteins, called perforins, are released from the natural killer cells and insert into the membrane of the target cell, forming a pore. This pore allows water to permeate into the target cell, which then swells and bursts. Natural killer cells also attack cancer cells, often before the cancer cells have had a chance to develop into a detectable tumour. The vigilant surveillance by natural killer cells is one of the body's most potent defences against cancer.

The cellular defences of vertebrates are enhanced by a very effective chemical defence called the complement system. This system consists of approximately 20 different proteins that circulate freely in the blood plasma. When they encounter a bacterial or fungal cell wall, these proteins aggregate to form a membrane attack complex that inserts itself into the foreign cell's plasma membrane, forming a pore-like that produced by natural killer cells. Water enters the foreign cell through this pore, causing the cell to swell and burst. Aggregation of the complement proteins is also triggered by the binding of antibodies to invading microbes. The proteins of the complement system can augment the effects of other body defences. Some amplify the inflammatory response by stimulating histamine release; others attract phagocytes to the area of infection; and still others coat invading microbes, roughening the microbes' surfaces so that phagocytes may attach to them more readily.

There are three major categories of interferons: alpha, beta, and gamma. Almost all cells in the body make alpha and beta interferons. These polypeptides act as messengers that protect normal cells in the vicinity of infected cells from becoming infected. Though viruses are still able to penetrate the neighbouring cells, the alpha

and beta interferons prevent viral replication and protein assembly in these cells. Gamma interferon is produced only by particular lymphocytes and natural killer cells. The secretion of gamma interferon by these cells is part of the immunological defence against infection and cancer, as we will describe later.

Text 2: Evolution of Ophthalmic Surgery

One of the advantages that ophthalmologists enjoy is that they are able to directly view the pathological processes of the eye. Medical observers have been able to document the two most common causes of blindness, cataract and corneal scarring, since records began. Perhaps it was the chance of observation that the spontaneous dislocation of a mature cataract from the visual axis gave some restoration of sight that prompted the technique of 'couching', a form of cataract operation first described in Sanskrit manuscripts 2000 years ago (however, there are also other theories which show a different picture, so this particular theory is a bit 'touch-and-go'). With the aid of a sharp instrument to penetrate the eye and dislocate the lens, the navigational vision could be restored in an otherwise blind eye.

Effective treatment of a corneal scarring was more elusive, since complete removal of a diseased cornea required its replacement with similar transparent tissue if the integrity of the globe is to be preserved. Although the Greek physician Galen (AD 130±200) documented removal of corneal scars by superficial keratectomy, it was not until 1837 that the first successful transplantation of a cornea was recorded by an Irish physician, Bigger. He had been held captive by some Bedouin in the Sahara, during which time he managed to restore the sight of a pet gazelle with a homograft from another animal. It was perhaps inevitable that the earliest corneal transplants attempted in humans were xenografts. Transient success was claimed by Kissam in the U.S., who performed a graft with porcine tissue in 1838. The first successful full-thickness corneal allograft was performed in 1905 by a surgeon named Zirm working near Prague, who restored the sight of a 45-year old man with bilateral corneal scarring from lime burns. This early success was a spur to further experimentation, but it would not be for another 50 years that corneal transplantation became a reproducible procedure.

The introduction of cocaine anesthesia in 1884 by ophthalmologist Karl Koller in Vienna, inspired by his colleague in neurology Sigmund Freud, was a potent stimulus to the development of ophthalmic surgery. Other doctors across the globe collaborated for the development of a great surgical process. Safe and adequate anesthesia for corneal and other anterior segment procedures could now be readily achieved, and cataract extraction through a 180° corneal incision became a standard procedure. Iridectomy and other glaucoma drainage procedures were also to become commonplace within a few years. The chief technical problem with early corneal grafting was that of fastening the transplanted tissue in place. Although sharp trephines and scissors could be manufactured to excise the diseased central cornea and to prepare the donor tissue, sutures at that time were not suitable for such fine work, particularly when a watertight wound closure was required. The tissue was held in place by ‘stay’ sutures across the surface of the eye, which was kept closed with padding while the patient rested in bed for many days until the wound closure was established.

The main causes of corneal failure worldwide are trachoma, vitamin A deficiency, herpes simplex and other types of infectious keratitis. These diseases destroy the optical function of the cornea by scarring and opacification, and by stromal melting and thinning that cause surface topographic irregularity. Although the effect of an external keratitis on vision may be profound, on the corneal endothelial function it is often minimal. When grafting is carried out in these conditions, it is necessary to replace only the diseased superficial stromal layers to restore normal corneal clarity and optical function. By avoiding penetration of the globe, lamellar keratoplasty gives freedom from many of the complications of a penetrating graft.

Many small incremental advances in instrumentation and surgical technique were to make a substantial impact on graft outcome. Although surgeons had used magnifying loupes from the outset of corneal transplantation, the introduction of the operating microscope gave a new dimension to the accuracy of the technique. Improved microsurgical instrumentation reduced tissue damage during surgery. The introduction of nylon monofilament as a suture material, enabling perfect corneal wound closure with negligible tissue reaction, was a major step forward. Corneal wound healing is slow, and a suture may need to be left in situ for as long

as 12 to 18 months before adequate wound strength is attained, if the healing process has been inhibited by steroid treatment. Another advancement has been the introduction of the viscoelastic substance sodium hyaluronate, which provides ophthalmic surgeons with a method of handling delicate eye tissues with virtually no trauma during intraocular surgery.

Text 2: Questions 15-22

15 The most appropriate heading for paragraph 1 is;

A Cataract and corneal scarring.

B The evolution of surgical eye processes.

C Cataract surgery.

D An ancient technique of sight restoration.

16 The word â€œtouch-and-goâ€• in paragraph 1 may mean;

A not true.

B difficult.

C not completely certain.

D completely certain.

17 The most appropriate heading for paragraph 2 is;

A Corneal surgery.

B How corneal scarring can be treated.

C A short history of corneal scarring.

D A history of eye surgical attempts in humans.

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D A history of eye surgical attempts in humans.

18 According to paragraph 2, the first successful attempt of corneal surgery was made in the year â€¦â€¦.

A 1837

B 1838

C 1905

D 1955

19 Paragraph 3 talks more about;

A Early surgical experiences.

B The use of anesthesia.

C Glaucoma

D Collaborative experiments by doctors across the globe.

20 According to paragraph 3, one of the major problems was;

A Making the tissue soft.

B Removing the deceased cornea.

C Enhancing the donor issue.

D Transferring the tissue in the right place.

21 The most appropriate heading for paragraph 4 is;

A How to perform grafting.

B Corneal surgery and grafting.

C Indications for grafting.

D Causes of cornea failure.

22 In paragraph 5, the word â€œin situâ€• may mean;

A In the original place

B Certainly

C Without disturbing

D Without covering