

## READING TEST 23

### 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**

##### Battens Disease

The Neuronal Ceroid Lipofuscinoses (NCL's), also known as Battens disease, are a collection of congenital neurodegenerative conditions that span from prenatal life to late adulthood with an incidence of 1:12,500. They comprise of at least 8 autosomal recessive disorders defined by having a mutation in a CLN gene, either coding for an enzyme (CLN1 and CLN2) or a transmembrane protein (CLN3, CLN5, CLN6 and CLN8) with all disorders having common clinical features, including progressive visual loss to blindness, seizures, speech disturbances, motor degeneration and intellectual decline, leading to early death. LINCL has an incidence of 0.36-0.46 per 100,000 with an age of onset of between 2-4 years, and death commonly anticipated in the early teenage years. LINCL is caused by a mutation of the CLN2 gene on chromosome 11p15, of which 98 mutations are known, three of which account for the majority of cases.

## **Text B**

The normal product of CLN2 is tripeptidyl peptidase I (TPP-1), which functions within the lysosome to degrade N-terminal tripeptides from their substrates. Therefore deficiencies lead to an accumulation, in particular of subunit C of mitochondrial ATP synthase causing subsequent neuronal and retinal cell death. This accumulation is seen on UV imaging as autofluorescent storage and on electron microscopy as curvilinear bodies. Gene therapy is an attractive prospect for long-term therapy in LINCL because it is a monogenic disorder. The process involves introducing CLN2 human complementary DNA (cDNA) into the central nervous system under the control of a promoter and in a suitable vector. Adeno-associated viruses are considered the ideal vector as they can transduce postmitotic cells, mediate long-term gene expression and have an excellent safety record. Therefore, these vectors are considered potential delivery vectors for the treatment of LINCL. The challenge is whether using a suitable AAV vector allows sufficient activity, expression and distribution of TPP-1 to destroy existing lysosomal storage protein, prevent its on-going formation and consequently halt the progression of the disease. One way of maximizing enzyme dispensation is through cross-correction using mannose-6-phosphate pathway, this means that CLN2 cDNA does not need not be introduced to the whole of the CNS. The target for gene expression is 1-5% normal expression of the gene product which is sufficient to reverse pathology in other conditions.

## **Text C**

One human trial evaluated the use of AAV2 vector to transfer human cCLN2 cDNA to the CNS of 10 children with LINCL aged between 3 and 10 with five different mutation types. The study was an 18-month follow-up to vector administration with a primary outcome measure being neurological assessment of disease status using the modified Hamburg LINCL scale. Secondary measures were quantitative CNS Magnetic Resonance Imaging assessment of the brain including grey matter and ventricular volume. Control comparisons were made with data from 4 independent untreated LINCL children who had been assessed twice at 1-year intervals. Participants received an average dose of  $2.5 \times 10^{12}$  particles ( $1.8-3.2 \times 10^{12}$ ) of the AAV2Hcln2 vector. The dose was shared equally through 6 burr holes (3 in each hemisphere) of the cranial vault, and 12 cortical

locations were targeted. Assessments were made on days 7 and 14 and at 1, 6, 12 and 18 months after therapy. Adverse effects were assessed at 2 and 3 months.

### **Text D**

While surgery itself recorded no evidence of adverse effects, post-therapy highlighted 60 serious and 94 non-serious complications, the majority occurring within the first 2 weeks after therapy. Serious events, including seizures and myoclonus were considered to be consequences of drug administration, whereas vomiting and thrombocytosis (non-serious examples) were not considered to be caused by the operation or by tolerance to the therapy. Out of the 10 patients, 2 died, one of unknown reasons and the other during the study period from status epilepticus, a known complication of late LINCL. Primary assessments demonstrated that gene therapy had an effect on the progression of disease, with an improved modified Hamburg scale score in treated subjects monitored for >6 months, and a disease progression rate which was significantly slower than in controls. This difference was shown by the mean rate of change of the modified Hamburg scale in the treated and untreated groups ( $P < 0.05$ ). Secondary measures showed that the MRI parameters indicated a decreased rate of decline, comparable with the primary outcomes, however, there was no statistical significance between groups including in the grey matter volume as a percentage of total brain volume with  $-2.6\%$ /year loss of volume compared to  $-2.84\%$ /year in controls ( $p = 0.8$ ).

### **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. It is not currently known to cause disease, but causes a very mild immune response.

Answer \_\_\_\_\_

2. A disorder in which nerve cell activity in the brain is disturbed, causing seizures.

Answer \_\_\_\_\_

3. Not so prevalent disorder that primarily affects the nervous system.

Answer \_\_\_\_\_

4. Degeneration of the neurons.

Answer \_\_\_\_\_

5. Recent studies conducted on evaluation of the disease.

Answer \_\_\_\_\_

6 .After effects of the treatment.

Answer \_\_\_\_\_

7. Affected person may not be in a state to use mental power effectively.

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 the common reason for Battens Disease?

Answer \_\_\_\_\_

9 Which can transduce postmitotic cells?

Answer \_\_\_\_\_

10 Which is a known complication of late LINCL?

Answer \_\_\_\_\_

11 What are the two conditions which are known to arise not out of therapy ?

Answer \_\_\_\_\_

12 What is used to maximize the enzyme dispensation through cross-correction?

Answer \_\_\_\_\_

13 Which is the effective long-term therapy in LINCL?

Answer \_\_\_\_\_

14 What dosage of the AAV2HcIn2 vector did the participants receive?

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. \_\_\_\_\_ can be described as spasmodic jerky contraction of groups of muscles.

16 . The \_\_\_\_\_ gene provides instructions for making an enzyme called tripeptidyl peptidase 1.

17. It is always not required to introduce \_\_\_\_\_ to CNS.

18. \_\_\_\_\_ made it all clear that the therapy can have more positive impact on the disease.

19. Out of all the mutations, \_\_\_\_\_ are considered to be the major causes for the disease to appear in infants and adults.

20 .The \_\_\_\_\_ gene provides instructions for making a protein whose function is not well understood

## 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.

### 1 .What does the notice indicates?

Angina pectoris is common among people.

There is a direct relationship between the functioning of liver and Qi blood of the heart.

Various ailments can lead to angina pectoris.

Angina pectoris

Angina pectoris, whose common type is Qi-blood stagnation type is one of chest congestion in TCM. The main cause of this type of angina is damage due to an excess of seven emotions. The heart governs the mind and blood circulation, liver stores of blood and controls catharsis. There is close relationship between the two. Only if liver function is normal can Qi-blood of the heart can be calm. For elderly individuals, who lack Qi-blood, yin and yang of the heart, spleen and kidney, are of cold invasion, consume an inappropriate diet, have emotional disorders and excessive fatigue, among others, can also lead to blood stasis stagnation, which can consequently cause coronary angina pectoris of Qi-blood stagnation. The ‘Suwen•Yujizhenzang’ theory has described “blockage of vessel, inability of QI to flow freely”, which illustrates that blood stagnation can lead to Qi depression. Therefore, accelerating blood circulation, removing blood stasis and promoting the circulation of Qi are the main therapies.

## 2. The notice gives information about;

two different technologies used in treatment.

ineffectiveness of the SCS.

DRG and SCS comparison.

### Spinal cord stimulation

For many years, Spinal cord stimulation has been used as a salvage treatment for intractable CRPS even though many studies have not proven long-term benefit. In multiple studies published by a European neurosurgical group, there has been great benefit from this technology in the first year but the vast majority of patients experience a return of symptoms by year six. Newer dorsal root ganglion (DRG) stimulation technology may be more promising. In the most recent DRG stimulation trial, patients with CRPS have been shown to decrease pain by fifty percent or greater in 93% of patients with chronic intractable pain at three-month follow-up, versus 72% of patients with an SCS implant. Unfortunately, this product is currently only FDA approved for treatment in the lower extremity.

### 3 .SGB is known;

to be more effective in treatment.

to provide temporary relief from pain.

to be a proven medicine in certain instances.

#### Stellate ganglion blocks (SGB)

Stellate ganglion blocks (SGB) are the most commonly performed interventional procedure for patients with upper extremity CRPS. The stellate ganglion is located anterior to the 7th cervical transverse process on the anterior surface of the longus colli muscle. It lies medial to the vertebral artery and anterolateral to the ipsilateral common carotid artery. This ganglion can be accessed either through fluoroscopy, CT, or ultrasound guidance. In a study published in 2006 by Ackerman and Zhang, 25 subjects underwent SGB at weekly intervals for 3 weeks. At 6 months, 40% of patients had complete symptom relief while 24% of patients had no pain relief. In a second study, published in 2009, three weekly blockades were completed at weekly intervals in 22 patients with CRPS type I of the hand. Pain intensity and range of motion were assessed two weeks after treatment. In this study patients had statistically significant improvement in wrist ROM ( $P > 0.001$ ) and an overall decrease in VAS values from 8 to 1. While most physicians do not believe that SGB alone is effective in curing the disease, we do know that stellate ganglion blocks at least offer temporary benefits that last well beyond the effects of local anesthetic.

#### 4 .What is correct about metabonomics?

High-throughput metabolomic approach revealed the acupuncture exerting intervention effects.

Metabolomics has seen a surge in popularity in recent scientific research.

The ultimate aim of metabonomics is to detect every small-molecule metabolite.

#### Metabonomics

Metabonomics as an advanced technology of systems biology has made considerable contributions to early diagnosis of serious illness, toxicology and pharmacology. Early, accurate diagnosis of tumours, such as liver cancer and ovarian cancer, is a distinguishing feature and advantage of metabonomics. Valine, saturated lipids, glycine, lactate, inositol, nucleotides, polyunsaturated fatty acids, taurine and other tumour-related metabolic markers can be identified by metabolomics, which makes metabonomics increasingly applicable to diagnosis, therapy and prognostic evaluation. Acupuncture has a therapeutic effect for tumours: it can improve symptoms, prolong the lifespan of patients, improve the quality of life, relieve cancer pain syndrome and, especially, improve the side effects of radiotherapy and chemotherapy, eg, myelosuppression, gastrointestinal reaction, fever etc. Acupuncture treatment of tumour possesses many features and advantages. Applying metabonomics to research investigating acupuncture treatment of tumours both gives play to the sensitive detection advantage of metabonomics for tumour diagnosis, treatment assessment and exploring the mechanism of acupuncture treatment at deeper, more extensive and more dynamic levels. In addition, there are some reports investigating Alzheimer diseases at home and abroad, however, few in research of venereal disease.

5 .What does this notice indicate?

The curative effect of improving disease condition in treatment group is superior to the control group.

two groups differ only by minor values.

total effectiveness of the control group is lesser than treatment group.

Treatment Groups - Recent Analysis

Groups	Cases	excellent	effective	Ineffective	exacerbated	Total effective rate, %
Control	40	19	9	10	2	70.0
Treatment	41	28	9	4	0	90.2*

## 6 .What does the result indicate?

The results indicate that subjects in the two groups improved after treatment.

The laboratory indexes of the treatment group significantly declined.

After treatment, the laboratory indexes of the observation group were also more declined than the control group.

### Disease Treatment Results - Before and After

Index	Control group (n=58)		Observation group (n=59)	
	Before treatment	After treatment	Before treatment	After treatment
FBG, mmol/L	9.85 ± 1.25	8.53 ± 1.42	9.92 ± 1.25	7.21 ± 1.33*
PBG, mmol/L	13.54 ± 2.73	11.32 ± 2.89	14.07 ± 2.32	9.25 ± 1.08*
HbA1c, %	11.02 ± 2.34	10.32 ± 2.53	11.31 ± 1.97	8.79 ± 1.17*
Microalbuminuria, mg/L	81.24 ± 11.93	76.42 ± 12.33*	82.31 ± 10.64	45.22 ± 13.17*

## **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: Hormonal Disorder - Adrenal Insufficiency**

Adrenal insufficiency is an endocrine or hormonal disorder that occurs when the adrenal glands do not produce enough of certain hormones. The adrenal glands are located just above the kidneys. Adrenal insufficiency can be primary or secondary. Primary adrenal insufficiency, also called Addison's disease, occurs when the adrenal glands are damaged and cannot produce enough of the hormone cortisol, and often the hormone aldosterone. Addison's disease affects one to four of every 100,000 people, in all age groups and both sexes. Secondary adrenal insufficiency occurs when the pituitary gland, a bean-sized organ in the brain, fails to produce enough adrenocorticotropin (ACTH), a hormone that stimulates the adrenal glands to produce cortisol. If ACTH output is too low, cortisol production drops. Eventually, the adrenal glands can shrink due to lack of ACTH stimulation. Secondary adrenal insufficiency is much more common than Addison's disease.

Addison's disease symptoms usually develop slowly, often over several months, and may include muscle weakness and fatigue, weight loss and decreased appetite, darkening of skin (hyperpigmentation), low blood pressure (even fainting), salt cravings, low blood sugar (hypoglycemia), nausea, diarrhea or vomiting, muscle or joint pains etc. Sometimes, however, the signs and symptoms of Addison's disease may appear suddenly. In acute adrenal failure (Addisonian crisis), the signs and

symptoms may also include pain in your lower back, abdomen or legs, severe vomiting and diarrhea, leading to dehydration, low blood pressure and loss of consciousness.

Your adrenal glands are composed of two sections: the interior (medulla) produces adrenaline-like hormones; the outer layer (cortex) produces a group of hormones called corticosteroids, which include glucocorticoids, mineralocorticoids and male sex hormones (androgens). Glucocorticoids: These hormones, which include cortisol, influence your body's ability to convert food fuels into energy, play a role in your immune system's inflammatory response and help your body respond to stress. Mineralocorticoids: These hormones, which include aldosterone, maintain your body's balance of sodium and potassium to keep your blood pressure normal. Androgens, male sex hormones, are produced in small amounts by the adrenal glands in both men and women. They cause sexual development in men and influence muscle mass, libido and a sense of well-being in men and women.

Addison's disease occurs when the cortex is damaged and doesn't produce its hormones in adequate quantities. Doctors refer to the condition involving damage to the adrenal glands as primary adrenal insufficiency. The failure of your adrenal glands to produce adrenocortical hormones is most commonly the result of the body attacking itself (autoimmune disease). For unknown reasons, your immune system views the adrenal cortex as foreign, something to attack and destroy. Other causes of adrenal gland failure may include tuberculosis, other infections of the adrenal glands, spreading of cancer to the adrenal glands and bleeding into the adrenal glands. Adrenal insufficiency can also occur if your pituitary gland is diseased. The pituitary gland produces a hormone called adrenocorticotrophic hormone (ACTH), which stimulates the adrenal cortex to produce its hormones. Inadequate production of ACTH can lead to insufficient production of hormones normally produced by your adrenal glands, even though your adrenal glands aren't damaged. Doctors call this condition secondary adrenal insufficiency. Another more common cause of secondary adrenal insufficiency occurs when people who take corticosteroids for treatment of chronic conditions, such as asthma or arthritis, abruptly stop taking the corticosteroids. If you have untreated Addison's disease, an Addisonian crisis may be provoked by physical stress (such as an injury), infection

or illness. All treatment for Addison's disease involves hormone replacement therapy to correct the levels of steroid hormones your body isn't producing. Some options for treatment include oral corticosteroids, corticosteroid injections and androgen replacement therapy.

### **Text 1: Questions 7-14**

#### **7. Addison's disease effects;**

Four of every 1,000 people.

One of every 1,000 people, including all age-groups.

One to four of every 1,000 people, including all age groups.

One to four of every 100,000 people.

#### **8 Secondary adrenal insufficiency occurs due to one of these reasons;**

More production of adrenocorticotropin (ACTH).

More production of cortisol.

Low production of aldosterone.

Low production of ACTH.

#### **9 According to the passage, symptoms of Addison's disease occur;**

Slowly

Suddenly

After a month

Slowly after many months

#### **10 Cortex produces;**

Androgens

Glucocorticoids

Mineralocorticoids

All of the above

11. Aldosterone maintains;

Body balance

Balance of sodium and potassium

High BP

Low BP

12. According to the information given in the passage, the statement that "Androgen influences muscle mass and physical and mental nature of men and women" is;

True

False

Can't say

Not given in the passage(s)

13. Doctors refer to the damage to the cortex of the kidney as;

Primary adrenal insufficiency.

Secondary adrenal insufficiency.

Other fatal infections.

Not given

14 .Secondary adrenal insufficiency also occurs because of;

Asthma

Arthritis

Both asthma and arthritis.

Stopping the use of corticosteroids.

## **Text 2: Carpal Tunnel Syndrome**

Carpal tunnel syndrome is a condition that may be caused by repeatedly performing stressful motions with your hand or holding your hand in the same position for long periods of time. CTS is classified as a cumulative trauma disorder, an ailment that attacks the body's musculoskeletal system. The musculoskeletal system is made up of muscles that pull on tendons and move the bones at joints. The joints are held together by ligaments. Carpal tunnel syndrome specifically affects the sensitive nerves of - and the blood supply that feeds - the hands and wrists.

Carpal tunnel syndrome has been around for a long time; meatpackers began complaining of pain and loss of hand function in the 1860s. Back then, these complaints were largely attributed to poor circulation. The nature of work has changed over the years; today, more jobs are highly specialized and require use of only a small number of muscles repeatedly. With the growing numbers of people using computers and keyboards, plus the focus on better healthcare for workers, carpal tunnel syndrome is of real concern to both employers and health-care professionals. Recent studies have shown that carpal tunnel syndrome, like all other cumulative trauma disorders, is on the rise while other workplace injuries have leveled off. Many companies are turning to physical therapists for help with designing and implementing health promotion and injury prevention programs to protect their employees from CTS.

People with CTS usually experience feelings of numbness, weakness, tingling, and burning in their fingers and hands. If not treated, the symptoms may escalate into acute, persistent pain. CTS can become so crippling that people can no longer do their work or even perform simple tasks at home. At its most extreme, carpal tunnel syndrome forces people to undergo surgery and miss many days of work, or prevents them from working at all because their hand functions are permanently impaired. Carpal tunnel syndrome occurs in men and women of all ages, and is often found in workers whose tasks require repeating the same motion in the fingers and hand for long periods of time. CTS has surfaced among meat packers, assembly line workers, jackhammer operators, and employees who spend hours working at a computer or typewriter. Carpal tunnel syndrome shows up in athletes as well as homemakers.

The U.S. Department of Labor has cited carpal tunnel syndrome, as well as other cumulative trauma disorders, as the cause of 48 percent of all industrial workplace illnesses. The disease affects more than five million Americans. CTS's impact on American businesses is devastating. It shows up in the workplace in the form of fatigue, poor work performance, discomfort and pain, and poor employer/employee relations. The high cost of treatment for an employee with CTS, plus the lost productivity when that employee is absent for a long period of time, strains the company's ability to operate efficiently and can lead to morale problems when other employees have to take over the absent workers' responsibilities. Physical therapists with specialized training in cumulative trauma disorders have been working in industrial and corporate settings for many years to meet the health-care needs of America's workforce. They work closely with employers to educate employees about CTS—what causes it and how to avoid it through proper use of the musculoskeletal system.

Physical therapists can target and correct poor work habits and improper work designs, such as tools, furniture, equipment, and workspace. They can also assess the potential risks of an individual and determine if that person is physically unsuited to a particular job. Among their many responsibilities, physical therapists teach health awareness and job safety. A typical education program includes exercises employees can do at work and at home, adjustments to the overall work

environment and individual workstations, plus early detection of symptoms to avoid painful and costly surgery. Physical therapists also work with employers and their engineering departments to design and modify the work environment, helping to remove the causal factors of CTS. If anyone has symptoms of carpal tunnel syndrome, then consulting a physical therapist or other qualified healthcare practitioners for an evaluation and individualized treatment is always recommended.

### **Text 2: Questions 15-22**

**15. According to the passage, CTS;**

Is a cumulative trauma disorder.

Is caused due to weakness in musculoskeletal system.

Occurs due to weakness in ligaments between joints.

All of the above

**16. According to the information given, CTS is;**

On the rise.

On the rise without any other cumulative trauma disorders.

One of the common cumulative trauma disorders that are increasing.

On the rise with many other cumulative trauma disorders.

**17. "In CTS, \_\_\_\_\_ may become permanently impaired."**

Carpels

Hands

Feet

Wrists

18 .CTS often occurs in;

Men

Women

Men and women of all ages

Only men of all ages

19 \_\_\_\_ complained of pain and loss of hand function in the 1860s;

Meat packers

Assembly line workers

Jackhammer operators

Employees who spend hours at a computer

20 CTS accounts for \_\_\_\_ of all industrial workplace illnesses;

50%

48%

84%

60%

21 Physical therapists teach employees about;

Proper use of the musculoskeletal system.

How to avoid CTS.

How to increase efficiency at work.

Health-care needs.

**22 CTS educational program includes;**

Only detection of CTS symptoms in employees.

Explanation to employees on how to avoid CTS.

Exercises that employees can do to avoid CTS.

Discussion of cost involved in surgery.