

※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

1. 請閱讀下列文獻節錄後，簡述你對鬱血性心臟衰竭患者發生睡眠呼吸中止症可能病理生理機轉的瞭解。(20%)

Congestive heart failure (CHF) may result in fluid retention and deranged autonomic control. Commonly, patients with CHF complain of dyspnea on exertion, then at rest or during sleep, where it is known as orthopnea or paroxysmal nocturnal dyspnea. Fluid retention results in interstitial edema, pleural effusion and alveolar edema. There may also be pedal edema and at times gut wall edema may lead to malabsorption.

Fluid retention can contribute to respiratory sleep disorders (RSD) via several mechanisms. First edema of the upper airway can narrow the lumen (and increase nasal resistance), and possibly the surface tension of the upper airway lining thus predisposing to upper airway collapse (snoring and obstructive apneas and hypopneas). Second, shifting of fluid from lower limbs and abdomen to the thorax can contribute to transient pulmonary edema. This phenomenon is called "rostral fluid shift" and if concentrated to the lungs cause central sleep apnea with a Cheyne Stokes pattern of Respiration (CSA-CSR), or to the upper airway, obstructive sleep apnea (OSA). Given that 50% of the oxygen stores are kept within the lungs, a reduction in size (total lung capacity) or function (altered gas exchange due to interstitial edema) can exacerbate periodic breathing. Third, treatments directed at fluid retention (e.g., diuretics) can alter upper airway surfactant properties (dry mouth) predisposing to upper airway collapse. Also, diuretic induced metabolic alkalosis can occasionally cause a compensatory hypoventilation and respiratory acidosis.

The increased ventilatory response to CO₂, coupled with prolonged lung to brain circulatory delay (low cardiac output) and abnormal lung function (pulmonary edema) leads to a cyclic breathing pattern. Thirty seconds periods of hyperventilation are interspersed with 20-30 s periods of central apnea in a crescendo decrescendo pattern (漸強漸弱模式). CSA is often triggered by an arousal or sudden state change. An arousal occurs at the peak of ventilation. Often there is an absence of hypoxemia. Concurrent periodic limb movements are common. Usually CSA-CSR is worse with transition from wake to stages 1 and 2 non-REM sleep and less so in slow wave and REM sleeps. Of interest, as with OSA, it is more common in the supine position, less in the lateral position and diminished further when the head of the bed is raised.

(以上修改自 Naughton MT. Respiratory sleep disorders in patients with congestive heart failure. J Thorac Dis 2015;7(8):1298-1310.)

見背面

2. 請閱讀下列摘要後，簡述你對睡眠可能導致肥胖和糖尿病相關的看法。(15%)

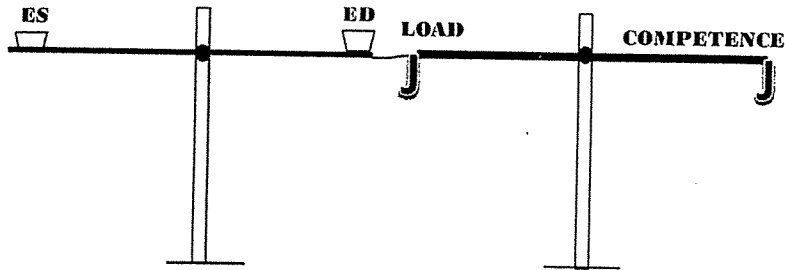
Epidemiological studies suggest that adults and children who are habitual short sleepers tend to have a higher body mass index, fat percentage and abdominal circumference when compared to average-duration sleepers. Reduced or disturbed sleep is also associated with certain predictors of type 2 diabetes, such as glucose intolerance, insulin resistance, reduced insulin response to glucose and a reduction in the disposition index. Current experimental evidence suggests that sleep restriction may lead to increased food intake but does not appear to result in decreased energy expenditure. Furthermore, sleep restriction has been reported to increase evening cortisol levels, which may decrease insulin sensitivity the next morning. This notion was further supported by studies, which noted decreases in the effectiveness of insulin-mediated glucose uptake the following morning. Further evidence suggests that short sleepers have glucose responses that are similar to average-duration sleepers, but at the cost of an increase in insulin release, which may be the result of decreased insulin sensitivity over time. Recent studies also provide evidence that sleep restriction enhances susceptibility to food stimuli, especially for energy-dense, high-carbohydrate foods. In summary, inadequate sleep, in both quality and quantity, should be regarded as a plausible risk factor for the development of obesity and type 2 diabetes. In addition to other health promotion measures, a good night's sleep should be seen as a critical health component by clinicians in the prevention and treatment of obesity and type 2 diabetes.

(以上摘要修改自 McNeil J, Doucet É, Chaput JP. Inadequate sleep as a contributor to obesity and type 2 diabetes. *Can J Diabetes*. 2013;37(2):103-108.)

3. 何謂肺動脈高壓 (pulmonary arterial hypertension) (2%) ? 試述肺動脈高壓患者的物理治療計畫 (8%) 和運動禁忌症 (5%) 。

接次頁

呼吸肌的表現，通常取決於以下四個因素，如下圖顯示：



- a. ES: energy supplies
- b. ED: energy demands
- c. LOAD: load per breath (每口呼吸所須要做的功)
- d. COMPETENCE: neuromuscular competence

四個因素會決定兩個天平的平衡。其中 LOAD 是 ED 一個主要的因素 (但非全部)。

Case description: PT was consulted to treat a patient of severe right diastolic congestive heart failure, with apparent ascites and pulmonary edema. This patient also suffered from electrolyte depletion from medication, and poor nutritional intake due to ascites and dyspnea.

4. 試以圖表示，兩個決定呼吸表現的天平在此患者可能會如何變化？ (5分)
5. 依據天平平衡的變化，試分析此患者呼吸衰竭的可能途徑？ (10分)
6. 依據天平平衡的變化，試分析可以如何改善此患者呼吸肌的表現？ (10分)

Case description: PT was consulted to treat a patient with mechanical ventilator due to an exacerbation (pneumonia) of chronic bronchitis complicated with respiratory failure.

7. 試以圖表示，兩個決定呼吸表現的天平在此患者可能會如何變化？ (5分)
8. 依據天平平衡的變化，試分析此患者呼吸衰竭的可能途徑？ (10分)
9. 針對此患者，最根本可以解決天平平衡的變化的治療方式為？ (10分)

試題隨卷繳回