1. 請說明心衰竭的最新分類標準（5 分），及慢性心衰竭患者運動耐力受限的病理生理因素（10 分）。

2. 請說明血脂肪參數(lipid profile)（5 分），並簡述脂蛋白運輸與回收的路徑（10 分）。

3. 請閱讀下列節錄文章後，說明女性荷爾蒙保護心血管系統的可能機制（20 分）。

Although cardiovascular disease (CVD) remains the primary cause of death in both men and women, epidemiological studies indicate that premenopausal women are more protected against the development of CVD compared to age-matched men. Such advantages have alluded to the involvement of sex hormones in mediating the cardioprotective effects in premenopausal women. 17beta-estradiol (E2) is the most common form of circulating estrogen as well as the major female sex hormone. As such, most of the data regarding estrogen signaling refers to E2. Indeed, E2 levels are inversely associated with CVD events in post-menopausal women. Thus, E2 signaling is believed to play a significant role in CVD pathophysiology.

E2 exerts its effects through both genomic and non-genomic actions. E2 binds to the classical estrogen receptors (ERs), estrogen receptor alpha (ERα) and estrogen receptor beta (ERβ) in the cytosol. The E2-bound ER complexes undergo conformational changes to dimerize, translocate to the nucleus, and either directly bind to DNA sequences known as estrogen response elements (EREs) or indirectly bind to DNA through other transcription factors to differentially regulate gene transcription. Traditionally, E2 has been known to exert its cardioprotective effects by binding to the nuclear receptors ERα and ERβ. However, G protein–coupled receptor GPR30 (G protein–coupled estrogen receptor 1 or GPER) has also gained increased research attention over the past decade. GPR30 is localized in the endoplasmic reticulum and plasma membrane, and is known to be expressed in cardiomyocytes. E2 binds to GPR30 to exert rapid non-genomic events, triggering intracellular signaling cascades that alter gene expression downstream. A wide array of studies have highlighted several beneficial effects of E2 treatment on the cardiovascular system. Such effects are associated with reduced fibrosis, reduced oxidative stress, improved mitochondrial function, attenuation of cardiac hypertrophy, and stimulation of angiogenesis and vasodilation. Although a significant number of studies have been published on the biological effects of E2 action in cardiovascular function,

見背面

the selectivity of each ER in the regulation of the E2-mediated effects remains poorly understood. Thus, understanding the mechanisms of action for E2 is important in order to devise more effective therapeutic strategies to prevent cardiovascular events.(以上摘要修改自 Aryan L, et al. The role of estrogen receptors in cardiovascular disease. Int J Mol Sci. 202;21(12):4314.)

請依下列個案回答問題 4 至 7

陳女士是一位 72 歲診斷為晚期慢性阻塞性肺病（COPD）患者，有 50 年的抽菸史(每天 1 包)，已戒菸 2 年。近 6 個月來的門診追蹤，陳女士表示她最近感覺病情惡化了很多。一個月前的肺活量測試顯示她的第一秒鐘用力吐氣量（FEV_1）為 600 mL。她目前長期居家使用氧氣。陳女士表示即使在她感覺最好的時候，她也只能爬一層樓（約 17 個階梯）就必須停下來喘氣。過去幾周，情況惡化到她每次只能爬 6-7 個階梯。

陳女士最近經常出現明顯的喘鳴聲（wheezing）和"胸悶"的感覺增加。這些症狀在使用吸入式支氣管擴張劑後會得到緩解。陳女士在進行運動測試時，她表示有"無法大口呼吸"的感覺，隨著運動強度增加，這種感覺很變得很嚴重，並以"需要空氣"，或"空氣饑渴"（air hunger）來形容呼吸困難的狀況。

4. 若無氧氣支持，陳女士在休息狀態會有明顯呼吸困難（dyspnea）的感覺，請分析造成此種感覺的可能病生理（pathophysiology）機制為何。(10 分)
5. 分析造成陳女士最近爬樓梯困難的可能原因。(10 分)
6. 請問吸入式支氣管擴張劑針對此患者可以緩解呼吸困難的機制為何？（10 分）
7. 請分析陳女士在運動測試過程中，發生呼吸困難惡化及的心肺適能嚴重受限的可能病生理（pathophysiology）機制。(20 分)

試題隨卷繳回