1. 依據你對代謝症候群的瞭解，若你要進行『High versus Moderate Intensity Running Exercise to Impact Cardiometabolic Risk Factors: The Randomized Controlled Trial』的研究計劃，請說明你的研究設計，包括受試者選取標準(6分)，評估項目(12分)，以及運動介入內容(12分)。(共30分)
2. 請閱讀下列文獻摘要後，簡述你對代謝症候群增加乳癌發生機率的的可能機轉。(共20分)【以上摘要修改自 Vona-Davis L, Howard-McNatt M, Rose DP. Adiposity, type 2 diabetes and the metabolic syndrome in breast cancer. Obes Rev 2007;8:395-408】

Upper body obesity and the related metabolic disorder type 2 diabetes have been identified as risk factors for breast cancer, and associated with late-stage disease and a poor prognosis. Components of the metabolic syndrome, with or without clinically manifest diabetes mellitus, have all been related to increased breast cancer risk. The biochemical mechanisms include extraglandular oestrogen production, reduced sex hormone-binding globulin with consequent elevation of the bioactive plasma free oestradiol and increased insulin biosynthesis, all of which exert mitogenic effects on both untransformed and neoplastic breast epithelial cells. Obesity, type 2 diabetes and the metabolic syndrome also have in common an increased production of leptin and a decreased production of adiponectin by adipose tissue, with consequent elevations and reductions, respectively, in the circulating levels of these two adipokines. These changes in plasma leptin and adiponectin, acting through endocrine and paracrine mechanisms, have been associated in several studies with an increase in breast cancer risk and, perhaps, to more aggressive tumours; studies in vitro showed that leptin stimulates, and adiponectin inhibits, tumour cell proliferation and the microvessel angiogenesis which is essential for breast cancer development and progression.

閱讀完以下文章片段，請回答下列3-5題。【文章摘自 Leech M1, Bissett B, Kot M, Ntoumenopoulos G.Lung Ultrasound for Critical Care Physiotherapists: A Narrative Review. Physiother Res Int. 2014 Dec 29. doi: 10.1002/pri.1607.】

There is increasing high level evidence to support the use of diagnostic lung ultrasound (LUS), as practised by bedside medical staff, to either supplement or as an alternative to CXR within critical care. This shift is due to the emerging evidence of the superior diagnostic accuracy of LUS to differentiate between pleural, alveolar and interstitial pathologies and provide information on diaphragmatic movement at the bedside, in real time and with no ionising radiation exposure. Critical care physiotherapists need to rapidly determine whether pathology is amenable to physiotherapy intervention (e.g. lung collapse) and whether physiotherapy interventions have been effective (e.g. hyperinflation techniques). Until now,

見背面

physiotherapy assessment has relied on tools, including auscultation and CXRs. Bedsides, LUS is a portable, accurate, non-invasive adjunct to physiotherapy assessment, facilitating timely diagnosis and treatment evaluation without exposure to ionising radiation. To our knowledge, LUS is not yet commonly used by physiotherapists, but its utility outside of medicine warrants further exploration. The aim of this review is to appraise the diagnostic performances of auscultation, CXR and LUS on parenchymal and pleural pathologies and to explore the issues surrounding the implementation of LUS into physiotherapy practice.

The application of ultrasound to the lung is relatively new within the medical profession. It was previously thought that air, which cannot be visualized by ultrasound, was an obstacle to the attainment of meaningful images. It is now widely accepted that the artefacts, which are produced by the intimate relationship between air and water in the tissues, pleural spaces and lung itself are consistent and interpretable (Lichtenstein, 2007; Volpicelli, 2013). Comprehensive descriptions of these artefacts (or 'signs') and the pathology they represent are available elsewhere (Lichtenstein, 2007; Nalos et al., 2010).

In the case of more than one pathology being present, for example, collapse with concomitant pleural effusion, the physiotherapist could use LUS to evaluate whether lung recruitment techniques or patient mobilization is effective in re-expanding the collapsed lung despite the presence of the pleural effusion. This immediate visual feedback would steer the physiotherapist towards ongoing treatment if the collapsed segment is recruitable. Conversely, if the physiotherapist is unable to see lung recruitment in this instance, treatment of the collapse could be suspended and treatment redirected to the patient's other amenable problems, thereby increasing the efficiency of the physiotherapy session. With such a powerful diagnostic and monitoring tool influencing treatment, perhaps physiotherapy will be more influential on some of the key lung pathologies and then may be seen to impact on major patient outcomes such as mortality, time on mechanical ventilation or ICU length of stay.

3. 請問 LUS 的優勢為和？(共 10 分)
4. 簡述 LUS 的使用原理？(共 10 分)
5. 以文章所提的例子，一位同時有右下肺塌陷合併右側肋膜積水的患者，PT 一般的評估會包含哪些？加入 LUS，可以如何進一步協助 PT 有關進行胸腔物理治療計畫的擬定？(共 15 分)
6. 一般胸腔物理治療中有關 lung recruitment 常用的技術有哪些？(共 15 分)

試題隨卷繳回