

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Please read the following abstract and answer questions (A) and (B).

(A) Please describe the aim and conclusion of the abstract of article. (15%)

(B) Based on the results and conclusion of this article, what will be the next question that you are interested to investigate and what are the experiment(s) that you will design for answering this question? (15%)

**Title:** Unilateral renal ischemia in rats induces a rapid secretion of inflammatory markers to renal lymph and increased peritubular capillary permeability.

**Authors:** Bivol LM, Iversen BM, Hultström M, Wallace PW, Reed RK, Wiig H, Tenstad O.

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**Abstract:**

A better understanding of the inflammatory process associated with renal ischemia-reperfusion (IR) injury may be clinically important. In this study we examined the role of the kidney in production of inflammatory mediators by analysing renal lymph after 30 min unilateral occlusion of renal artery followed by 120 min reperfusion, as well as the effect of IR on size selectivity for proteins in both glomerular and peritubular capillaries. All measured mediators increased dramatically in renal hilar lymph, whereas plasma and renal cortical tissue samples returned to control levels after 120 min reperfusion. The responses were differentiated; Interleukin-1 $\beta$ , monocyte chemoattractant protein-1 and leptin were markedly increased in plasma before reperfusion, reflecting an extrarenal response possibly induced by afferent renal nerve activity from the ischemic kidney. Tumour necrosis factor- $\alpha$  was the only mediator showing elevated lymph to plasma ratio following 30 min reperfusion, indicating that most cytokines were released directly into the bloodstream. The IR induced rise in cytokine levels was paralleled by a significant increase in high molecular weight plasma proteins in both lymph

and urine. The latter was shown as a 14-166 fold increase in glomerular sieving coefficient of plasma proteins assessed by a novel proteomic approach, and indicated a temporarily reduced size selectivity of both glomerular and peritubular capillaries. Collectively, our data suggest that cytokines from the ischemic kidney explain most of the rise in plasma concentration, and that the locally produced substances enter the systemic circulation through transport directly to plasma and not via the interstitium to lymph.

2. After a young man arrived the top of Mount Everest (8,848 meters in height), he was suffered from difficult breathing first and recovered several days later. Please explain how his body was adapted to the hypoxic environment at the top of mountain. (20%)
  
3. Blood pressure and heart rate are two important cardiovascular responses.
  - (1) Do the sympathetic nervous system and the parasympathetic nervous system affect blood pressure and heart rate? (5%) \_\_\_\_\_ Yes; \_\_\_\_\_ No
  - (2) Please explain how the sympathetic nervous system and parasympathetic nervous system affect blood pressure and heart rate. (20%)
  
4. "Physiology is a subject to describe the homeostasis."
  - (1) Do you agree this statement? (5%) \_\_\_\_\_ Yes; \_\_\_\_\_ No
  - (2) Please give an example and explain your opinion. (20%)