

# 國立成功大學

## 112學年度碩士班招生考試試題

編 號：306

系 所：細胞生物與解剖學研究所

科 目：科學英文

日 期：0207

節 次：第 2 節

備 註：不可使用計算機

※ 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。

The majority of growth and remodeling of the vascular network takes place when blood circulation has already initiated and the endothelium is exposed to flow-derived mechanical forces such as shear stress, circumferential stress and axial stress. Shear stress is the force parallel to the tissue surface that arises due to shear flow of the viscous fluid and depends on the flow rate, viscosity of the blood, as well as on the geometry of the tube. The other two forces are governed by the intraluminal pressure. Circumferential stress is the force peripheral to the vessel wall in the azimuthal direction (around the circumference) and axial stress is the force along the longitudinal (long) axis of the vessel. These three stresses dictate blood vessel mechanics and influence geometrical parameters of vessels, such as the radius, wall thickness, and length. Although the importance of axial stress has long been recognized, its impact on blood vessel morphogenesis is still less well studied. EC behaviors induced by shear stress or circumferential stretch are better studied, particularly during embryonic development. Besides intravascular flow, there is also interstitial (transvascular) flow due to vessel permeability, which generates shear stress that has been shown to influence sprouting angiogenesis and is particularly relevant in the context of tumor vascular biology.

**Based on the short paragraph, please answer the following questions:**

1. What cause **shear stress**? (20%)
2. The **magnitude of shear stress** is affected by? (20%)
3. Please draw a figure to explain three forces discussed here, including **shear stress, circumferential stress, and axial stress**. (30%)
4. What is **interstitial flow**? (15%)
5. Where does the vascular network growth most frequently occur? (15%)