中山醫學大學 101 學年度碩博士班甄試入學招生考試試題

醫學研究所博士班 乙組

考試科目：分子生物學 **時間：80 分鐘**

※請注意本試題共(1)張，如發現頁數不足，應當場請求補齊，否則缺頁部份概以零分計算。 第(1)頁

本試題共 6 大題，總分 100 分。

1. 請解釋下列各名詞: (20%)

   (A) microRNA

   (B) siRNA

   (C) shRNA

   (D) mRNA。

2. 請說明下列文章有何發現? (10%)

   Targeting of the Tumor Suppressor GRHL3 by a miR-21-Dependent Proto-Oncogenic Network Results in PTEN Loss and Tumorigenesis

   (Cancer Cell 20: 635–648, 2011)

   Despite its prevalence, the molecular basis of squamous cell carcinoma (SCC) remains poorly understood.Here, we identify the developmental transcription factor Grhl3 as a potent tumor suppressor of SCC in mice, and demonstrate that targeting of Grhl3 by a miR-21-dependent proto-oncogenic network underpins SCC in humans. Deletion of Grhl3 in adult epidermis evokes loss of expression of PTEN, a direct GRHL3 target, resulting in aggressive SCC induced by activation of PI3K/AKT/mTOR signaling. Restoration of Pten expression completely abrogates SCC formation. Reduced levels of GRHL3 and PTEN are evident in human skin, and head and neck SCC, associated with increased expression of miR-21, which targets both tumor suppressors. Our data define the GRHL3-PTEN axis as a critical tumor suppressor pathway in SCC.

3. 何謂 autophagy?舉出一條你知道參與 autophagy 的訊息傳遞路徑。(20%)

4. 請舉出兩種偵測基因表現的方法，並說明其原理。(20%)

5. 請設計實驗證明 A 基因參與細胞凋亡 (apoptosis)。(20%)

6. 請說明 2011 年諾貝爾醫學獎得主及其主要貢獻。(10%)