國立政治大學　九十七學年度 4020 碩士班入學考試命題紙

考試科目	生命科學	所別	智慧財產所	考試時間	3 月 16 日星期日第一節

請回答下列問題，每題二十分.

1. Ingale S. Wolfert MA. Gaekwad J. Buskas T. Boons GJ.
Robust immune responses elicited by a fully synthetic three-component vaccine.
Nature Chemical Biology. 3(10):663-7, 2007.

The overexpression of saccharides such as Globo-H, Lewis(Y) and Tn antigen is a common feature of oncogenic transformed cells. Endeavors to exploit this aberrant glycosylation for cancer vaccine development have been complicated by difficulties in eliciting high titers of IgG antibodies against classical conjugates of tumor-associated carbohydrates to carrier proteins. We have designed, chemically synthesized and immunologically evaluated a number of fully synthetic vaccine candidates to establish strategies to overcome the poor immunogenicity of tumor-associated carbohydrates and glycopeptides. We have found that a three-component vaccine composed of a TLR2 agonist, a promiscuous peptide T-helper epitope and a tumor-associated glycopeptide can elicit in mice exceptionally high titers of IgG antibodies that can recognize cancer cells expressing the tumor-associated carbohydrate. The superior properties of the vaccine candidate are attributed to the local production of cytokines, upregulation of co-stimulatory proteins, enhanced uptake by macrophages and dendritic cells and avoidance of epitope suppression.

a. 何謂 Globo-H, Lewis(Y) and Tn antigen.
b. 簡介 glycosylation
c. 何謂 synthetic vaccine ?
d. three-component vaccine 的好處為何 ?

備　　考	試卷隨卷繳交

命題委員 :　　3 月 7 日

國立政治大學　九十七學年度 4201 碩士班入學考試命題

考試科目	生命科學	所別	智慧財產所	考試時間	3 月 16 日星期日第一節

2. Smith PA.　Romesberg FE.
Combating bacteria and drug resistance by inhibiting mechanisms of persistence and adaptation. Nature Chemical Biology. 3(9):549-56, 2007.

Antibiotics have revolutionized the treatment of infectious disease but have also rapidly selected for the emergence of resistant pathogens. Traditional methods of antibiotic discovery have failed to keep pace with the evolution of this resistance, which suggests that new strategies to combat bacterial infections may be required. An improved understanding of bacterial stress responses and evolution suggests that in some circumstances, the ability of bacteria to survive antibiotic therapy either by transiently tolerating antibiotics or by evolving resistance requires specific biochemical processes that may themselves be subject to intervention. Inhibiting these processes may prolong the efficacy of current antibiotics and provide an alternative to escalating the current arms race between antibiotics and bacterial resistance. Though these approaches are not clinically validated and will certainly face their own set of challenges, their potential to protect our ever-shrinking arsenal of antibiotics merits their investigation. This Review summarizes the early efforts toward this goal.

a. 何以 antibiotic discovery 無法跟上細菌的演化？
b. 寫出三種你所知道的 antibiotic.
c. 細菌對抗生素的耐性如何產生.
d. 試述本論文想法的合理性.

備　　考	試卷隨卷繳交

命題委員：　　3 月 7 日

國立政治大學　九十七學年度　碩士班入學考試命題紙

4201

考試科目	生命科學	所別	智慧財產所	考試時間	3 月 16 日星期日第一節

3. Rosebrock TR. Zeng L. Brady JJ. Abramovitch RB. Xiao F. Martin GB. A bacterial E3 ubiquitin ligase targets a host protein kinase to disrupt plant immunity.
Nature. 448(7151):370-4, 2007 Jul 19.

Many bacterial pathogens of plants and animals use a type III secretion system to deliver diverse virulence-associated 'effector' proteins into the host cell. The mechanisms by which these effectors act are mostly unknown; however, they often promote disease by suppressing host immunity. One type III effector, AvrPtoB, expressed by the plant pathogen Pseudomonas syringae pv. tomato, has a carboxy-terminal domain that is an E3 ubiquitin ligase. Deletion of this domain allows an amino-terminal region of AvrPtoB (AvrPtoB(1-387)) to be detected by certain tomato varieties leading to immunity-associated programmed cell death. Here we show that a host kinase, Fen, physically interacts with AvrPtoB(1-387) and is responsible for activating the plant immune response. The AvrPtoB E3 ligase specifically ubiquitinates Fen and promotes its degradation in a proteasome-dependent manner. This degradation leads to disease susceptibility in Fen-expressing tomato lines. Various wild species of tomato were found to exhibit immunity in response to AvrPtoB(1-387)and not to full-length AvrPtoB. Thus, by acquiring an E3 ligase domain, AvrPtoB has thwarted a highly conserved host resistance mechanism.

a. 簡述 plant immunity.
b. 說明 AvrPtoB 的作用.
c. 說明 Fen 的角色.
d. 簡述 proteasome.

備　　考	試卷隨卷繳交

命題委員：　　3 月 7 日

國立政治大學　九十七學年度 ⑤01　碩士班入學考試命題紙

考試科目	生命科學	所別	智慧財產所	考試時間	3 月 16 日星期日第一節

4. Peer D. Park EJ. Morishita Y. Carman CV. Shimaoka M.
Science. 319(5863):627-30, 2008.

Cyclin D1 (CyD1) is a pivotal cell cycle-regulatory molecule and a well-studied therapeutic target for cancer. Although CyD1 is also strongly up-regulated at sites of inflammation, its exact roles in this context remain uncharacterized. To address this question, we developed a strategy for selectively silencing CyD1 in leukocytes in vivo. Targeted stabilized nanoparticles (tsNPs) were loaded with CyD1-small interfering RNA (siRNA). Antibodies to beta(7) integrin (beta(7) I) were then used to target specific leukocyte subsets involved in gut inflammation. Systemic application of beta(7) I-tsNPs silenced CyD1 in leukocytes and reversed experimentally induced colitis in mice by suppressing leukocyte proliferation and T helper cell 1 cytokine expression. This study reveals CyD1 to be a potential anti-inflammatory target, and suggests that the application of similar modes of targeting by siRNA may be feasible in other therapeutic settings.

a. 簡介 siRNA.
b. Nanoparticles 扮演的角色為何 ?
c. CyD1 為何被認為是 anti-inflammatory target ?
d. 請試著幫本論文摘要取一個題目.

備　　考	試卷隨卷繳交

命題委員 :　　3 月 7 日

國立政治大學 九十七學年度 碩士班暨碩士在職專班招生考試

4201

考試科目	生命科學	所別	智慧財產所	考試時間	3 月 16 日星期日第一節

5. Roberts JN. Buck CB. Thompson CD. Kines R. Bernardo M. Choyke PL. LowyDR. Schiller JT. Genital transmission of HPV in a mouse model is potentiated by nonoxynol-9 and inhibited by carrageenan.
Nature Medicine. 13(7):857-61, 2007.

Genital human papillomavirus (HPV) infection is the most common sexually transmitted infection, and virtually all cases of cervical cancer are attributable to infection by a subset of HPVs. Despite the high incidence of HPV infection and the recent development of a prophylactic vaccine that confers protection against some HPV types, many features of HPV infection are poorly understood. It remains worthwhile to consider other interventions against genital HPVs, particularly those that target infections not prevented by the current vaccine. However, productive papillomavirus infection is species- and tissue-restricted, and traditional models use animal papillomaviruses that infect the skin or oral mucosa. Here we report the development of a mouse model of cervicovaginal infection with HPV16 that recapitulates the establishment phase of papillomavirus infection. Transduction of a reporter gene by an HPV16 pseudovirus was characterized by histology and quantified by whole-organ, multispectral imaging. Disruption of the integrity of the stratified or columnar genital epithelium was required for infection, which occurred after deposition of the virus on the basement membrane underlying basal keratinocytes. A widely used vaginal spermicide, nonoxynol-9 (N-9), greatly increased susceptibility to infection. In contrast, carrageenan, a polysaccharide present in some vaginal lubricants, prevented infection even in the presence of N-9, suggesting that carrageenan might serve as an effective topical HPV microbicide.

a. 簡介 HPV.
b. 何謂 species- and tissue-restricted ?
c. 如何建立 HPV 的 animal model ?
d. 可以用來抑制 HPV 的藥物機轉為何 ?

備　　考	試卷隨卷繳交

命題委員 :　　97 年 3 月 7 日