國立政治大學　101　學年度研究所 碩士班招生考試試題

4201

考試科目	生命科學	所別	智慧財產所	考試時間	2 月 26 日星期日第一節

請回答下列問題　（每大題二十五分，共計四大題，每大題有五小題）

1. Stability of food allergens to digestion in vitro.

An integral part of the safety assessment of genetically modified plants is consideration of possible human health effects, especially food allergy. Prospective testing for allergenicity of proteins obtained from sources with no prior history of causing allergy has been difficult because of the absence of valid methods and models. Food allergens may share physicochemical properties that distinguish them from nonallergens, properties that may be used as a tool to predict the inherent allergenicity of proteins newly introduced into the food supply by genetic engineering. One candidate property is stability to digestion. We have systematically evaluated the stability of food allergens that are active via the gastrointestinal tract in a simple model of gastric digestion, emphasizing the major allergens of plant-derived foods such as legumes (peanuts and soybean). Important food allergens were stable to digestion in the gastric model (simulated gastric fluid). For example, soybean beta-conglycinin was stable for 60 min. In contrast, nonallergenic food proteins, such as spinach ribulose bis-phosphate carboxylase/oxygenase, were digested in simulated gastric fluid within 15 sec. The data are consistent with the hypothesis that food allergens must exhibit sufficient gastric stability to reach the intestinal mucosa where absorption and sensitization (development of atopy 特異體質) can occur. Thus, the stability to digestion is a significant and valid parameter that distinguishes food allergens from nonallergens.

(a)以遺傳工程改造的植物為何無法預期是否具有 allergenicity？

(b)一個蛋白質無法被我們的胃液消化，它可能具有哪些特性 ？

(c)由上述文章中，我們可以得到一個結論 ：不能被我們胃液消化的食品一定具有 allergenicity. 請說明之.

(d)food allergens 如何在腸道引起 atopy？

(e)你覺得白鳳豆容不容易消化 ？它有什麼成份可能對生体產生作用 ？假如你根據你的生化基礎否定它的效用，也請說明你的理由 ？

備　考	試卷隨卷繳交

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2. Immunotherapeutic potential of antibodies produced in plants.

Plants are capable of synthesizing and assembling virtually every kind of antibod molecule, ranging from the smallest antigen-binding domains and fragments, to full-leng and even multimeric, antibodies. A number of plant hosts can be used, and because this a versatile expression system that can be scaled-up to agricultural proportions, a cheap and plentiful supply of antibodies could be made available. Immunotherapy is one of the many potential uses for bulk quantities of antibody. In particular, passive immunotherap of mucosal surfaces may be possible, because functional secretory antibodies can be engineered in plants.

a.舉例說明人類在何種情況下需要使用抗体？
b.一般而言，取自人体的抗体會有何種問題產生？
c.由動物來的抗体又有何問題？
d.以植物產生抗体有何好處？其問題點又是什麼？
e. 植物中含有我們需要的抗体，我們吃了它就可以得到所要的免疫力？

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3. Targeting glycosylation as a therapeutic approach.

N- and O-glycosylation of glycoproteins make up 1–2% of the human genome. In the case of N-linked GLYCANS, more than 30 enzymes, located in the cytosol, the ENDOPLASMIC RETICULUM (ER) and the GOLGI APPARATUS, are required to generate, attach and process the oligosaccharides. Many functions have been described for protein glycosylation, including promoting protein folding in the ER1, stabilizing cell-surface glycoproteins, and providing recognition epitopes that activate the innate immune system. It is therefore not surprising that genetic mutations that decrease or eliminate the activity of GLYCOSYLTRANSFERASES and GLYCOSIDASES can lead to serious physiological disorders and can be lethal in animals as well as in humans.

Increased understanding of the role of protein- and lipid-linked carbohydrates in a wide range of biological processes has led to interest in drugs that target the enzymes involved in glycosylation. But given the importance of carbohydrates in fundamental cellular processes such as protein folding, therapeutic strategies that modulate, rather than ablate, the activity of enzymes involved in glycosylation are likely to be a necessity. Two such approaches that use imino sugars to affect glycosylation enzymes now show considerable promise in the treatment of viral infections, such as hepatitis B, and glucosphingolipid storage disorders, such as Gaucher disease.

a. 何謂 protein glycosylation ?

b. protein glycosylation 會提供細胞什麼功能 ?

c. glycosylation inhibitors 將來臨床尚有何用途 ?

d. glycosylation 的研究方法可能有那些 ?

e. 真核細胞和原核細胞的 glycosylation 有差異嗎 ? 請說明之.

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4. Resveratrol improves mitochondrial function and protects against metabolic disease by activating SIRT1 and PGC-1alpha.

Diminished mitochondrial oxidative phosphorylation and aerobic capacity are associated with reduced longevity. We tested whether resveratrol (RSV), which is known to extend lifespan, impacts mitochondrial function and metabolic homeostasis. Treatment of mice with RSV significantly increased their aerobic capacity, as evidenced by their increased running time and consumption of oxygen in muscle fibers. RSV's effects were associated with an induction of genes for oxidative phosphorylation and mitochondrial biogenesis and were largely explained by an RSV-mediated decrease in PGC-1alpha acetylation and an increase in PGC-1alpha activity. This mechanism is consistent with RSV being a known activator of the protein deacetylase, SIRT1, and by the lack of effect of RSV in SIRT1(-/-) MEFs. Importantly, RSV treatment protected mice against diet-induced-obesity (肥胖) and insulin resistance. These pharmacological effects of RSV combined with the association of three Sirt1 SNPs and energy homeostasis in Finnish subjects implicates SIRT1 as a key regulator of energy and metabolic homeostasis.

1. 請說明 mitochondrial oxidative phosphorylation and aerobic capacity.
2. Resveratrol 為紅葡萄酒的成分, 請說明此一成分具有的特性與在心臟病預防的關聯性.
3. 請說明與 mitochondrial biogenesis 相關基因及其 pathway.
4. 請說明本文認為 Resveratrol 可以 against diet-induced-obesity (肥胖) and insulin resistance 的主要機轉.
5. 請說明你所知道老化的可能機轉.

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