

101 年特種地方政府公務人員考試試題

等別：三等考試

類科：衛生行政

科目：醫用微生物及免疫學

一、試述細菌之外毒素 (exotoxin) 與內毒素 (endotoxin) 在結構與功能上的差異。列舉 2 種常見之細菌外毒素，並說明其毒性作用機轉。(20 分)

【擬答】

內毒素與外毒素之比較：

性質	外毒素	內毒素 LPS
1. 來源	G(+) and G(-)	G(-)細胞壁
2. 分泌	活菌體分泌	死菌體細胞壁分解
3. 成份	polypeptide	lipopolysaccharide, lipid A 是毒性部位
4. 基因位置	質體或噬菌體或染色體(霍亂毒素)	細菌染色體
5. 毒性	高	低(mg)
6. 代表性疾病	EHEC:shiga toxin. Bacillus cereus 產生之嘔吐毒素或下痢腸毒素.白喉	菌血症
7. 抗原性	可引發抗體	不具免疫性
8. 對熱反應	60°C 加熱破壞. 例如金黃色葡萄球菌腸毒素例外	100°C 60min 安定
9. 疫苗	以福馬林.熱.酸處理可至成類毒素	無
10. 臨床作用	許多不引起發燒	發燒休克
11. 接受器	有	無
12. 作用的型式	許多種 治療可用抗血清例如肉毒桿菌毒素中毒	與血清之 LBP 結合在與 monocyte 之 CD14 以及 Toll like receptor4 引發 NF-kB 活化促進發炎 IL-1,TNF 細胞激素產生引發敗血症或 DIC

疾病：food poisoning(食物中毒)

有兩種症候群 syndrome：

- (1)潛伏期 4hrs：噁心、嘔吐為主，其與 staphylococcus aureus 引起之食物中毒十分類似
- (2)潛伏期 18hrs：下痢(diarrhea)為主

二、培養基試提供細菌生長或分離鑑定菌種的重要工具，可依照其目的或功能將培養基加以分類。試依照培養基的目的或功能，列舉 2 種不同的培養基種類，並列表說明上述培養基在組成成分與適用範圍或用途的差異。(20 分)

【擬答】

(1)血液培養基:看細菌溶血現象

Examples of various types of hemolysis on blood

agar. **A**, *Streptococcus pneumoniae* showing alpha (α)-hemolysis (i.e., greening around colony). **B**, *Staphylococcus aureus* showing beta (β)-hemolysis (i.e., clearing around colony). **C**, *Enterococcus faecalis* showing gamma (γ)-hemolysis (i.e., no hemolysis around colony).

(2)乳糖培養基:可區分乳糖發酵菌與糖類不發酵菌(葡萄糖不發酵或乳糖不發酵菌):

MacConkey agar. **A**, *Escherichia coli*, a lactose fermenter. **B**, *Pseudomonas aeruginosa*, a non-lactose fermenter

Differential capabilities of MacConkey agar as gram-negative bacilli capable of fermenting lactose appear deep purple 深紫色或粉紅色, whereas those not able to ferment lactose appear light pink or relatively colorless 無色.

(3)特殊培養基可用來鑑定細菌例如 BCYE 可用來培養退伍軍人菌

Growth of *Legionella pneumophila* on the enrichment medium buffered charcoal-yeast extract (BCYE) agar, used specifically to grow this bacterial genus.

Medium	Components/Comments	Primary Purpose
Bile esculin agar (BEA)	Nutrient agar base with ferric citrate. Hydrolysis of esculin by group D streptococci imparts a brown color to medium; sodium desoxycholate inhibits many bacteria	Differential isolation and presumptive identification of group D streptococci and enterococci
Bile esculin azide agar with vancomycin	Contains azide to inhibit gram-negative bacteria, vancomycin to select for resistant gram-positive bacteria, and bile esculin to differentiate enterococci from other vancomycin-resistant bacteria that may grow	Selective and differential for cultivation of vancomycin-resistant enterococci from clinical and surveillance specimens
Blood agar	Trypticase soy agar, <i>Brucella</i> agar, or beef heart infusion with 5% sheep blood	Cultivation of fastidious microorganisms, determination of hemolytic reactions
Bordet-Gengou agar	Potato-glycerol-based medium enriched with 15%-20% defibrinated blood. Contaminants inhibited by methicillin (final concentration of 2.5 µm/mL)	Isolation of <i>Bordetella pertussis</i>
Buffered charcoal-yeast extract agar (BCYE)	Yeast extract, agar, charcoal, and salts supplemented with l-cysteine HCl, ferric pyrophosphate, ACES buffer, and α-ketoglutarate	Enrichment for <i>Legionella</i> spp.
Buffered charcoal-yeast extract (BCYE) agar with antibiotics	BCYE supplemented with polymyxin B, vancomycin, and ansamycin, to inhibit gram-negative bacteria, gram-positive bacteria, and yeast, respectively	Enrichment and selection for <i>Legionella</i> spp.
Campy-blood agar	Contains vancomycin (10 mg/L), trimethoprim (5 mg/L), polymixin B (2500 U/L), amphotericin B (2 mg/L), and cephalothin (15 mg/L) in a <i>Brucella</i> agar base with sheep blood	Selective for <i>Campylobacter</i> spp.
Campylobacter thioglycollate broth	Thioglycollate broth supplemented with increased agar concentration and antibiotics	Selective holding medium for recovery of <i>Campylobacter</i> spp.
Cefoperazone, vancomycin, amphotericin (CVA) medium	Blood-supplemented enrichment medium containing cefoperazone, vancomycin, and amphotericin to inhibit growth of most gram-negative bacteria, gram-positive bacteria, and yeast, respectively	Selective medium for isolation of <i>Campylobacter</i> spp.
Cefsulodin- irgasan-novobiocin (CIN) agar	Peptone base with yeast extract, mannitol, and bile salts. Supplemented with cefsulodin, irgasan, and novobiocin; neutral red and crystal violet indicators	Selective for <i>Yersinia</i> spp.; may be useful for isolation of <i>Aeromonas</i> spp.
Chocolate agar	Peptone base, enriched with solution of 2% hemoglobin or IsoVitalX (BBL)	Cultivation of <i>Haemophilus</i> spp. and pathogenic <i>Neisseria</i> spp.
Columbia colistin-nalidixic acid (CNA) agar	Columbia agar base with 10 mg colistin per liter, 15 mg nalidixic acid per liter, and 5% sheep blood	Selective isolation of gram-positive cocci
Cystine-tellurite blood agar	Infusion agar base with 5% sheep blood. Reduction of potassium tellurite by <i>Corynebacterium diphtheriae</i> produces black colonies	Isolation of <i>C. diphtheriae</i>
Eosin methylene blue (EMB) agar (Levine)	Peptone base with lactose and sucrose. Eosin and methylene blue as indicators	Isolation and differentiation of lactose-fermenting and non-lactose-fermenting enteric bacilli
Gram-negative broth (GN)	Peptone base broth with glucose and mannitol. Sodium citrate and sodium desoxycholate act as inhibitory agents	Selective (enrichment) liquid medium for enteric pathogens
Hektoen enteric (HE) agar	Peptone base agar with bile salts, lactose, sucrose, salicin, and ferric ammonium citrate. Indicators include bromthymol blue and acid fuchsin	Differential, selective medium for the isolation and differentiation of <i>Salmonella</i> and <i>Shigella</i> spp. from other gram-negative enteric bacilli
MacConkey agar	Peptone base with lactose. Gram-positive organisms inhibited by crystal violet and bile salts. Neutral red as indicator	Isolation and differentiation of lactose fermenting and non-lactose-fermenting enteric bacilli
MacConkey sorbitol agar	A modification of MacConkey agar in which lactose has been replaced with d-sorbitol as the primary carbohydrate	For the selection and differentiation of <i>E. coli</i> O157:H7 in stool specimens

三、何謂院內感染 (nosocomial infection) ? 試列舉 3 種常引起院內感染之病原菌, 說明這些病原菌常成為院內感染致病菌的共同特性。並列表說明上述病原菌之特性、感染途徑、臨床重要性與實驗室診斷。(20 分)

【擬答】

院內感染最常見的長期住院者免疫力不足或老年人感染常見的菌種有

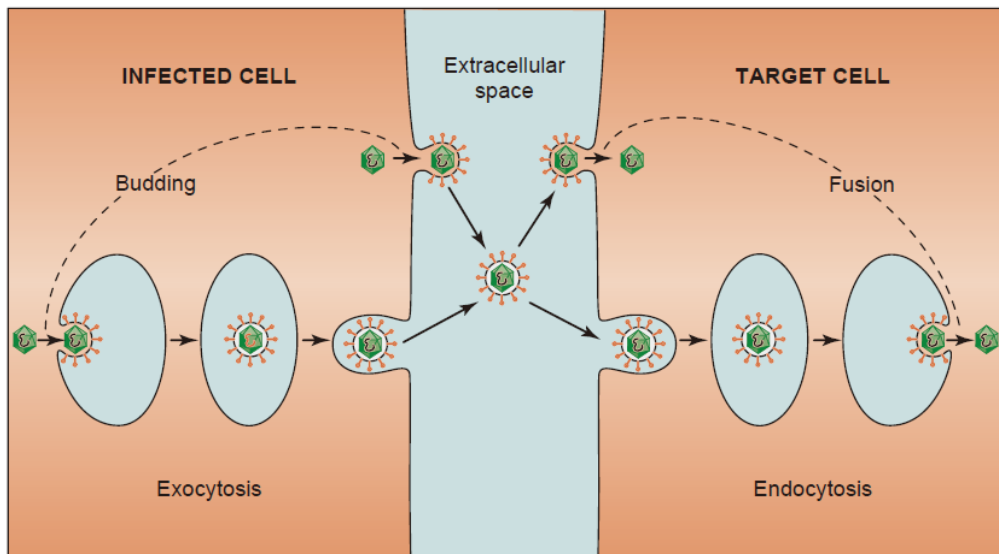
1. 金黃色葡萄球菌最麻煩的是抗藥性之 MRSA
2. 燒燙中心之綠膿桿菌
3. 導尿管常造成泌尿道感染之大腸桿菌

在印度的醫院最怕的是經由手術之後感染 NDM-1 抗藥性之 E.coli

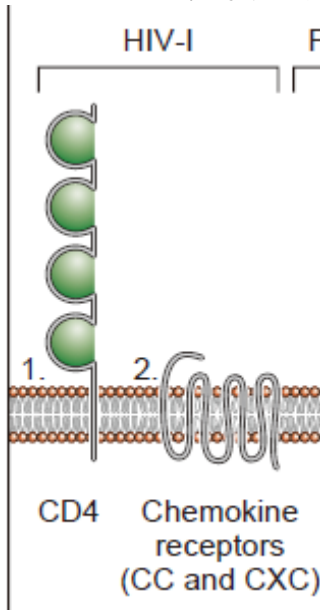
四、病毒可依據其核酸種類、形狀與外套膜 (envelope) 之有無等特性而加以分類, 試說明無外套膜之病毒 (non-enveloped virus) 擁有何種具外套膜病毒 (enveloped virus) 所缺乏的共同特性。並個列舉 1 種無外套膜之 DNA 病毒及 RNA 病毒名稱, 說明其病毒分類科別、基因與構造特性、感染途徑與臨床重要性。(20 分)

【擬答】

(-) 有外套膜之病毒可以細胞融合或內吞蝕方式進細胞造成感染形成新的病毒則可取得宿主細胞之細胞膜得到外套膜例如下圖雙感染方式



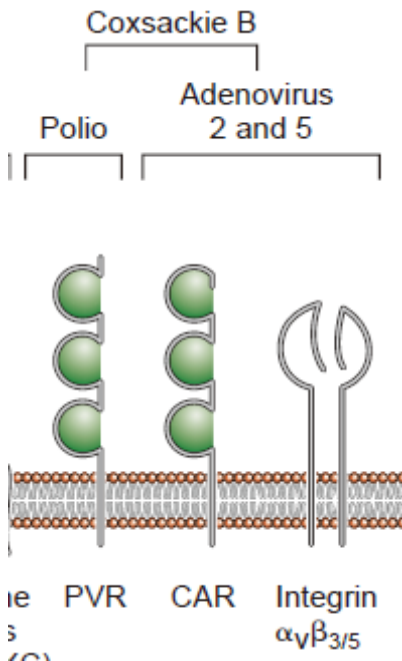
例如 HIV 有外套膜還以其 gp120 與 CD4 and CXCR4 orCCR5 結合造感染 T cell 或 macropgaga



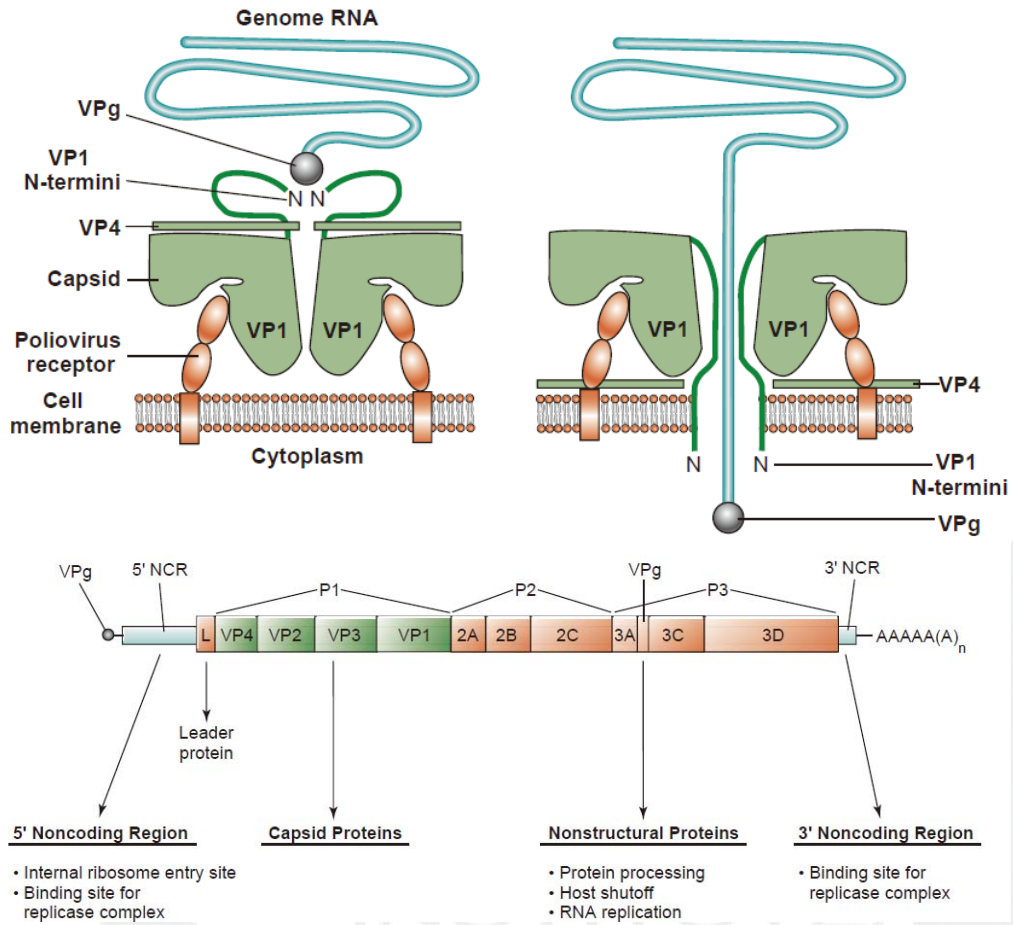
(二)無外膜之病毒

DNA 病毒腺病毒(Adenovirus)

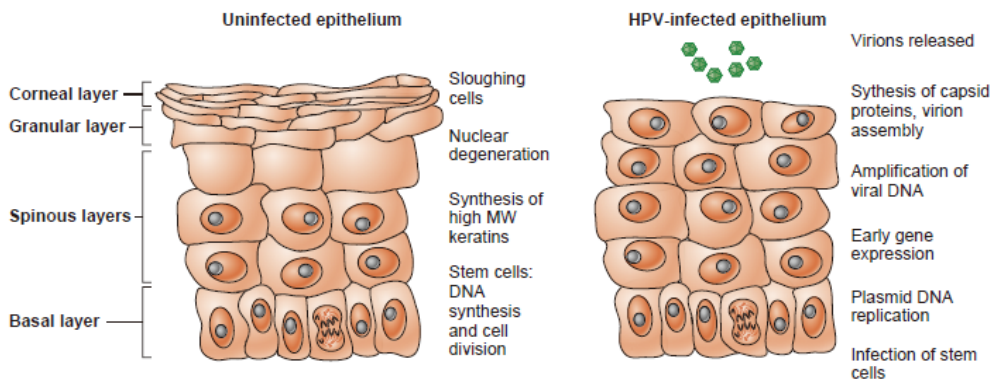
RNA 病毒 picornavidae 腸病毒 71.小兒麻痺病毒及與細胞之接受器感染如下圖

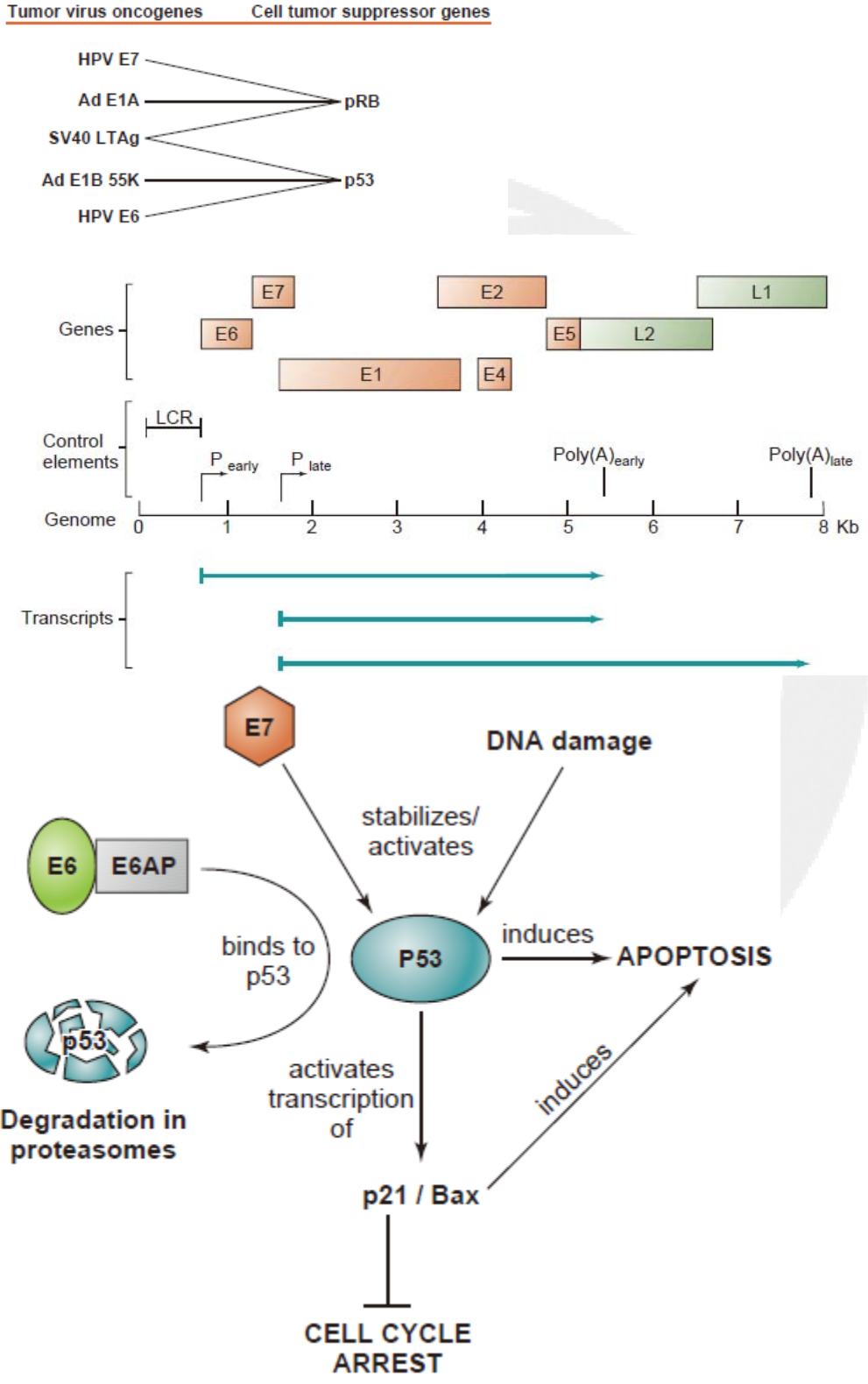


小兒麻痺病毒



HPV 無套膜 DNA 病毒 HPV16 and 18 造成子宮頸癌





五、試說明人體免疫系統具有辨識外來抗原能力之分子種類、結構與特性。(20分)

【擬答】

Monocyte:利用 mannose receptor. Toll like receptor

B cell : BCR: antibody

T cell: TCR. MHC

