大腸桿菌莢膜多醣類對菌株之抗生素感受性及病原性的關係

The effect of capsular polysaccharide synthesis of Escherichia coli on its antibiotic susceptibility and pathogenicity

中文摘要

中文摘要 大腸桿菌莢膜多醣類對菌株之抗
生素感受性及病原性的關係 以 Cefazloin (CEF) 誘導非莢膜多
醣類產生株 (Non-capsular polysaccharide-synthesizing strains)
之產生莢膜多醣類變異株 (CEF-CPS) 及其莢膜多醣類(CPS)等來探討菌
株之莢膜多醣類產生能力與抗生素感受性及病原性的關係及其莢膜多醣類
對菌株生物活性之影響,其結果如下:(1)母株對小白鼠的腹腔致 死劑
量其 LD50 是 33.2mg/Kg 而變異株是 12.0mg/Kg.母株和 CPS 同時或經 CPS
予處
理小白鼠腹腔注射後兩者都會處促使母株對小白鼠之致死能力明顯增加而
具劑量關係.(2).對天竺鼠紅血球凝集反應力價.受培養基種類的影響,即
培養基誘導菌株產生 CPS 與否會影響其凝集力價,若添加 CPS 時亦會處促使
母株之血球凝集力價之增加.(3).In vitro and in vivi 變異株對抗巨噬
細胞能力明顯高於母株;CPS 預處理小白鼠其腹腔細胞會增加細菌抗吞噬能
力,而且其作用則隨劑量增加而加強.(4).變異株較母株對多種抗生素具
較高之耐性限閾,且當細菌懸浮液和 CPS 同時存在時會增加菌株對抗生素之
吸附能力及耐性.(5).試管內 CPS 短期處理 macrophages 會活化細胞對細菌
的吞噬作用及 tetra-zolium 的還原能力, 但長期處理時會抑制
macrophages 對 tetrazolium 的還原能力,同時發現 macrophages 會明顯增
加
lactate dehydrogenase (LDH)的釋放. 故由以上結果顯示大腸桿
菌莢膜多醣類產生能力與菌株對抗生素之感受性,對抗巨噬細胞吞噬能力
及對小白鼠的致死能力等具相當密切相關性.

英文摘要

Key word: capsular
polysaccharide, mouse lethality, hemagglutination,
phagocytosis, antibiotic susceptibility.

Summary The effect on
capsular polysaccharide synthesis of Escherichia coli
on its antibiotic susceptibility and pathogenicity.
By using cefazolin induction in proteose-peptone glycerine salt
medium,we screened a capsular polysaccharide-synthesizing

variant from a noncapsular polysaccharide synthesizing parental strain of Escherichia coli.We used this E. coli variant strain and the purified capsular polysaccharide synthesis on its antibiotic susceptibility and pathogenicity. Theresults were summarized as: (1) The LD50 of parental strain on ICR female micewas 33.2 mg/kg (the wet of E. coli/the body weight of mouse),whereas theLD50 of variant strain was reduced to 12.0 mg/kg. However, if we pretreated the ICR mice with purified capsular polysaccharide and then intraperitoneal injection of parental strain 1h later, or challenged with the mixture of capsular polysaccharide and parental strain, the mouse lethality of parental strain wouldbe enhanced and it had a dose dependent curve. (2).The hemagglutination titeof E. coli with Guinea pig RBC were influence by the bacterial culture media.wefound that the culture media might induced E.coli to synthesize capsular polysa-ccharide and the changed the HA titers. Mixing the purified capsular polysaccharide with the parental strain would also increase its HA titer. (3).The antiph-agocytic activity of variant strain was much higher than that of the parental strain. Purified capsular polysaccharide could enhance the antiphagocytic activi-ty of parental strain, and it also had a dose dependant phenomenon. (4). The resistance threshold of variant strain to many different antibioticswere higher than that of the parental strain.The presenceof capsular polysaccharide might trap the antibiotics, so that it would increase the antibiotic resistance of parental strain, and (5). After treating the macrophages with purified capsular polysaccharide in vitro,the activities of phagocytosis and tetra-zolium reduction were enhanced in early incubation period. However, inhibitionmay be observed after long time treatment with purified capsular polysaccharide,while concomitantly increased of Lactate dehydrogenase activity in culture sup-ernatant. Based on the above results, we demonstrated that the capsular polysaccharide synthesizing ability were closely related to the antibiotics susceptibility, ant--phagocytic activity of E.coli and lethality on ICR mice.