利用靜電紡絲製備之幾丁聚醣複合奈米纖維的特性與抗菌應用

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大綱

一、前言

二、幾丁聚醣/銀奈米粒複合奈米纖維的特性與抗菌應用

三、幾丁聚醣添加天然抗菌物質複合奈米纖維的特性與抗菌應用

（一）肉桂醛精油

（二）蠶絲蛋白

四、結論

摘要

靜電紡絲(electrospun, ELSP)是一個簡單的方法，可將天然聚合物溶液製造成各種具有高表面積、高孔隙率，可裝載高容量活性物質的複合奈米纖維，可被應用於藥物載體、生物傷口敷料等方面。幾丁聚醣(chitosan, CTS)具有生物可相容性、生物可降解性、無毒性和抗菌活性。使用 ELSP，可以將幾丁聚醣和其他材料結合，製成複合奈米纖維，其特性有作為抗菌傷口敷料的潛力。本篇報告的目的是將幾丁聚醣加入其他抗菌物質，利用 ELSP 合成複合奈米纖維，探討奈米纖維特性與抗菌活性。CTS/AgNPs 複合奈米纖維以 UV–vis spectra、XRD、TEM、SEM 分析，結果顯示能成功製備出纖維直徑平均、外觀平滑的複合奈米纖維。抗菌試驗結果顯示，對 *P.aeruginosa*、MRSA 有良好抗菌活性，且 AgNPs 含量越高，抗菌效果越顯著。幾丁聚醣和肉桂醛(CA)，加入聚環氧乙烷(poly(ethylene oxide), PEO)作為乳化劑，分別調整 CA 比例為 0, 0.5, 5.0%，以 ELSP 製作 CTS/CA/PEO 複合奈米纖維，CA 含量越高，複合奈米纖維之直徑越細。而 CA 濃度 5.0%、接觸 180 分鐘的組別抗 E. coli 的能力可達 99%以上。幾丁聚醣和蠶絲蛋白(sericin)，以 3 wt%之三氟乙酸(Trifluoroacetic acid, TFA)作為溶劑，分別調整 CTS/sericin 比例為 1/1, 2.5/1, 4/1 和 5/1)，以 ELSP 製備複合奈米纖維，2.5/1 的奈米纖維外觀最平均且平滑，為最佳製備條件。抗菌試驗結果可知，複合奈米纖維濃度越高，抗菌效果越佳，且抗 *E. coli* 能力高於 *B. subtilis*。總體而言，加入其他抗菌物質的奈米複合纖維，抗菌效果都較單純幾丁聚醣奈米纖維佳。

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