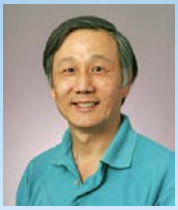
香港浸會大學
HONG KONG BAPTIST UNIVERSITY

School of 中醫藥學院
Chinese Medicine

Nature-Inspired Design of a New Family of Biodegradable Pseudo-Protein-Based Biomaterials: Their Biological Property and Biomedical Applications



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Date	: **16 February 2015 (Monday)**
Time	: **10:00am – 12:30pm**
Venue	: **SCM809**
Language	: **English**
Facilitator	: **Dr. Zhang Ge**

Abstract

Inspired by nature, a new family of functional biodegradable amino acid-based poly(ester amide)s (AA-PEA) has been designed to overcome the shortcomings of absorbable polyesters like polyglycolide, polylactide and their copolymers, such as functionality, bulk degradation mode, moisture sensitivity, and tissue response. AA-PEAs have been designed from 3 building blocks: amino acids, fatty diacids and fatty dialcohols. As a result, the backbone chemical structure of AA-PEAs has both peptide and non-peptide bonds, and hence exhibit both proteins and non-protein properties, named as "pseudo-proteins". AA-PEAs can also be coupled with polysaccharides or synthetic polymers to design and fabricate hybrids for achieving even broader range of property and applications [1]. These AA-PEAs can be engineered into electrospun nanofibrous membranes, melt-spun fibers, micro and nanospheres, 3D microporous hydrogels, micelles and films. Figure 1 shows the images of some these AA-PEA physical forms engineered. The most unique biological property of these AA-PEA pseudo-protein biomaterials are their support of cell adhesion and proliferation, induce muted inflammatory response and blood biocompatible. AA-PEAs have been evaluated for some unique biomedical applications ranging from stent and suture coating, vascular patches, drug delivery vehicles, burn dressing, nonviral gene vectors to synthetic vaccines. In this report, the basic design and synthesis strategies, fabrication/formulation into a variety of physical forms, their unique biological property and biomedical applications will be given.

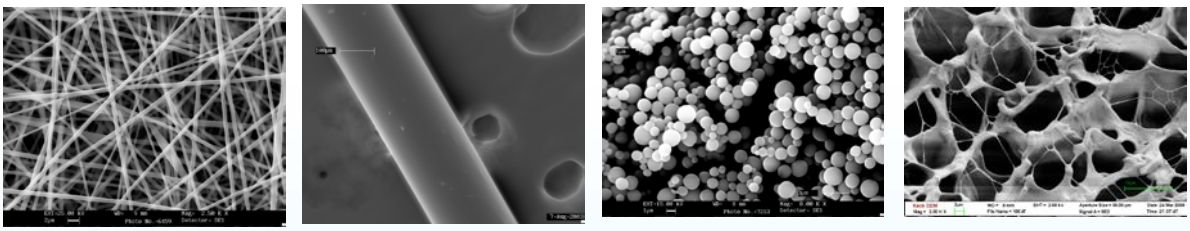

Figure 1. Some physical forms engineered from the amino acid-based poly(ester amide) (AA-PEA) biomaterials.

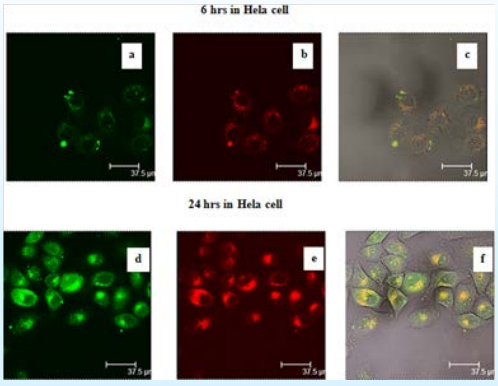

Figure 2. Confocal laser scanning microscopy images of the uptake of the FITC-tagged 4-Lys-4 PEA nanoparticles by Hela cells for 6 hr (a - c, top row) and 24 hrs (d - f, bottom row). The first column (a and d) is the FITC-tagged 4-Lys-4 PEA nanoparticles in green channel, the middle column (b and e) is the Doxorubicin in red channel, and the 3rd column (c and f) is the merged of the first and 2nd columns.

References

1. C. C. Chu, "An Overview of A Novel Family of Nature-Inspired Design of Biodegradable Functional Amino Acid-based Poly(ester amide) Biomaterials: New Development, Property and Biomedical Applications", IN: Biodegradable Polymers: New Developments and Challenges". C. C. Chu (Editor), Nova Science Publisher, New York (In Press).

**** All are welcome ****