Keywords: cancer hormone therapy, diethylstilbestrol, targeted delivery, reactive oxygen species

Acknowledgements

The authors acknowledge financial support from the Czech Ministry of Health (#16-30544A) and of Education, Youth and Sports (# KONTAKT LH14292, 7F14009, LM2015064; #POLYMAT LO1507) and the Czech Grant Foundation (#13-08336S).

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doi:10.1016/j.jconrel.2017.03.047

Fabrication and characteration of coaxial electrospun multicomponent fibrous graft for vascular tissue engineering

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Grafts loading with heparin have been demonstrated to possess antithrombotic performance. However, the heparin released too fast which did not match the endothelialization rate, resulting in graft occlusion ultimately. Fabrication of core-shell fibrous vascular graft which heparin was encapsulated into the inside of the fibers via coaxial electrospinning became a great choice, and the early research showed partial improvement has been achieved [1, 2]. In our recent study, heparin as a core could be encapsulated into multicomponent fibrous graft (including collagen, chitosan and poly (L-lactide-ε-caplacton) (PLCL)) through coaxial electrospinning (Fig. 1A). With three different compositions as shell, heparin could be greatly scattered inside of three different fibers. The results showed that heparin could be sustained released over 45 days, as well as lower initial burst release compared to early reports (Fig. 1B) [1]. This kind of graft could keep releasing heparin sustainedly, partially because of the different degradation rates of collagen, chitosan and PLCL. Moreover, these three blend components probably improved efficiency of heparin encapsulation during electrospinning procedure, which contributed to a low initial burst release. Therefore, this kind of graft has great potential for vascular tissue engineering.

Keywords: coaxial electrospinning, sustained release, heparin, vascular tissue engineering

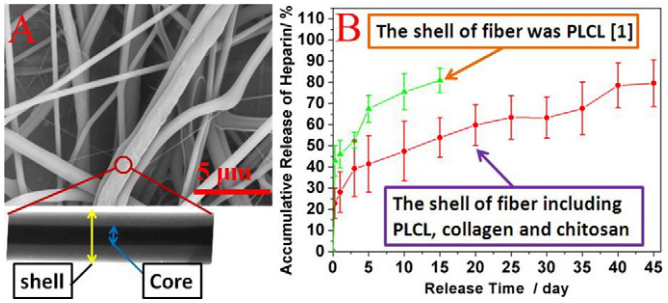

Fig. 1. (A) SEM and TEM of coaxial electrospun fibers with heparin loaded. (B) Accumulative release of heparin from different grafts.

Acknowledgements

The authors are grateful for the financial support from the National Natural Science Foundation of China (31500784), China Postdoctoral Science Foundation Funded Project (2015M580790), and Program of Introducing Talents of Discipline to Universities (B16033).

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doi:10.1016/j.jconrel.2017.03.048

Photon-triggered polymersome rupture under temporal, spatial and spectral control

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Polymersomes are robust self-assembled vesicular structures that are widely studied in a variety of domains from nanomedicine to artificial cell design [1]. Control over their membrane diffusion properties and structural integrity is crucial for their future development [2]. In particular, a high level of control is mandatory in drug delivery applications where species have to be released at the right place and time. Here, we present a high precision method allowing programmed vesicle rupture with full control in time, space and excitation wavelength for selective cargo-release.

We designed an easy and tunable protocol for light-driven specific polymersome rupture controlled in time and space, which combines the advantages of utilizing light as a trigger and the fast release of components from bursting vesicles. Our system is based on laser excitation of hydrophilic dyes loaded in the lumen of distinct giant poly(butadiene)-*b*-poly(ethylene oxide) polymersomes. Upon excitation,