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Novel Strategies for Nanofiber based Controlled Release Drug Delivery Systems

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Abstract

Controlled drug delivery systems have many advantages compared to conventional drug delivery systems such as reduced drug level fluctation and adverse effects, need of fewer drug administration and improved patient complience. Electrospinning method has gained popularity in pharmaceutical area due to its ability to produce nanofiber based drug delivery systems with a wide variety of polymers and drugs. In addition to their unique properties, nanofiber based drug delivery systems have many routes of drug administration. In nanofiber based drug delivery systems, it is possible to provide controlled drug release profiles by using suitable polymer or suitable coating methods. One of these methods is the preparation of effervescent floating drug delivery systems. In the first part of the study, nanofiber formulations containing sodium bicarbonate were prepared and controlled release of the active substance was achieved. Sodium bicarbonate discs were embedded inside the nanofibers and gas bubbles were created in acidic medium. These gas bubbles provided the system to float in the stomach. Simultaneously, the active substance was released from the nanofibers with a controlled release profile. Another method is the coating outside of the nanofibers with a hydrophobic polymer layer to achive controlled release of the active substance. For this purpose, parylene types C and N were used as coating material with two different amounts. It was found that the increasing of coating material decreased the released active substance from the nanofibers. In addition, parylene type C was found more effective in case of delaying the release of active substance. Both of parylene types were found successful for preventing the burst release of active substance from the nanofibers. It is especially important to provide controlled release for the oral and transdermal systems. With the systems developed in this study, it is possible to provide controlled release of the active substance for both drug delivery routes.

Biography:

Serdar Tort has completed his master of science thesis, which is related with development of controlled release tablet of morphine, in 2011 from Gazi University. Then, he received his Ph.D degree in 2016 from the same faculty in the area of nanofiber wound dressings for acute/chronic wound healing. He has completed his postdoctoral studies between 2018-2019 at the University of Cincinnati, developing nanofiber based controlled drug release systems. He also works on nanoparticular controlled drug delivery systems, 3D printing systems and novel dosage forms.

Speaker Publications:

1. Tort, S., Han, D., & Steckl, A. J. (2020). Self-inflating floating nanofiber membranes for controlled drug delivery. International Journal of Pharmaceutics, 579, 119164.

2. Tugcu-Demiröz, F., Saar, S., Tort, S., & Acartürk, F. (2020). Electrospun Metronidazole-Loaded Nanofibers for Vaginal Drug Delivery. Drug Development and Industrial Pharmacy, 1-37.

3. Tort, S., Demiröz, F. T., Cevher, Ş. C., Sarıbaş, S., Ozoğul, C., & Acartürk, F. (2020). The effect of a new wound dressing on wound healing: Biochemical and histopathological evaluation. Burns, 46(1), 143-155.

4. Tort, S., Demiröz, F. T., Yıldız, S., & Acartürk, F. (2019). Effects of UV exposure time on nanofiber wound dressing properties during sterilization. Journal of Pharmaceutical Innovation, 1-8.5.

5. Eskitoros-Togay, S. M., Bulbul, Y. E., Tort, S., Korkmaz, F. D., Acartürk, F., & Dilsiz, N. (2019). Fabrication of doxycycline-loaded electrospun PCL/PEO membranes for a potential drug delivery system. International journal of pharmaceutics, 565, 83-94.

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