Kansas State University Research Foundation
TECHNOLOGY LICENSING PROFILE

Biopharmaceutical Transdermal Microneedle Patch: Vaccine & Drug Delivery with Desired Drug Release Profile

Inventor: Seong-o Choi, Min Jung Kim

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Description: Researchers at Kansas State University are developing transdermal vaccine & drug delivery microneedle patches with potential improved biopharmaceutical stability and enhanced scalability.

K-State researchers used the spray deposition process to fabricate multilayered microneedles to modulate the rate of drug release in the body. In addition, multi-section microneedle arrays were fabricated, which could deliver multiple drugs simultaneously or in a controlled manner using proper combinations of materials and drugs. In a proof of principle biopharmaceutical model, the researchers used bovine serum albumin in a microneedle patch. The results demonstrated that the proposed spray-based process improved the retention of the secondary and tertiary structure of encapsulated proteins compared to conventional microneedle fabrication methods.

Vaccination using this system could potentially reduce the number of vaccinations required by allowing both bolus & sustained vaccine release. This would especially be advantageous in livestock production.

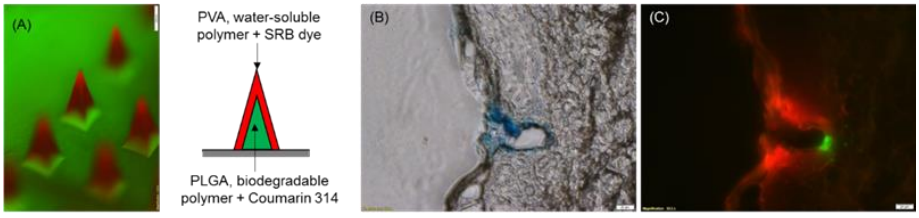

Figure 1. Characterization for diffusion behavior of model drugs (fluorescence dyes) encapsulated in the vertically layered microneedle. (A) fluorescence image (left) and diagram (right) of the device composed of PVA and PLGA, (B) optical micrograph of a cross section of the pig skin after insertion and (C) the corresponding fluorescence image showing the release of fluorescent dyes in the skin.

Advantages:

- Fewer vaccinations, especially important in livestock production
- Does not require painful needle injections or trained health personnel
- No hypodermic needle biohazardous waste

Applications: Vaccine & drug delivery platform for animal health and human medicine

Patent Status: Patent Pending

2005 Research Park Circle, Manhattan, KS 66502
785.532.3924
bretford@ksu.edu

Bret Ford
Director of Business Development, Animal Sector