

Microneedle Patch for Wound Oxygenation and Biofilm Eradication

Dissolvable microneedle array that delivers oxygen/antibiotics to wounds while eradicating biofilms.

Purdue University researchers have developed a flexible microneedle array on a polyethylene terephthalate (PET) support that can puncture biofilms and provide oxygen and antibiotics to the wound site. Biofilms are strong, bacterial films that form on open wounds, causing hypoxia and inflammation of the wound site, leading to complications or even interruption of the healing process. Additionally, removing biofilms can be ineffective and very painful for the patient. The microneedle array developed by Purdue researchers dissolves upon contact with the wound's biological fluid, avoiding the pain associated with removing biofilms or using hypodermic needles. The microneedle array is also effective for decontamination and increasing the healing process of wounds. Specifically, it increased the wound's oxygen content by 50 percent, killed all gram-positive bacteria within 24 hours, and killed all gram-negative bacteria within 12 hours. Finally, the array is nontoxic; it preserved 90 percent of skin cells over six days of testing. The novel microneedle array developed by Purdue researchers paves the way for a better wound treatment and patient care, along with reducing complications during the wound healing process.

Technology Validation: The microneedle array developed by Purdue researchers dissolves upon contact with the wound's biological fluid, avoiding the pain associated with removing biofilms or using hypodermic needles. The microneedle array is also effective; when tested, it increased the wound's oxygen content by 50 percent, killed all gram-positive bacteria within 24 hours, and killed all gram-negative bacteria within 12 hours. Finally, the array is nontoxic; it preserved 90 percent of skin cells over 6 days of testing.

Advantages

- Nontoxic

Technology ID

2021-RAHI-69535

Category

Pharmaceuticals/Pharmaceutical
Packaging & Delivery Systems
Digital Health &
Medtech/Implantable Medical
Devices

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- Better patient care (Less Painful)
- Versatile applications
- Effective for wound treatments

Applications

- Human or animal wound treatment

TRL: 6

Intellectual Property:

Provisional-Patent, 2021-09-14, United States

PCT-Patent, 2022-09-14, WO

NATL-Patent, 2024-03-12, United States

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