

MEDiRoller: Revolutionizing Low-Cost Vaccine & Drug Delivery in Low-Resource Settings



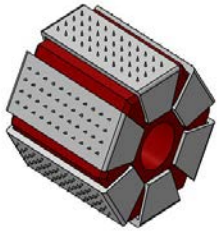
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A **Simple, Safe, Low-cost** Vaccination Device

Millions of lives are lost to vaccine-preventable disease **each year**, an inequality largely fueled by technical challenges. *MEDiRoller* is a **novel, low-cost** vaccine device that **eliminates the need** for trained medical personnel and blood-borne disease transfer. Our 3D printed microneedle roller **transforms** mass immunization into a **painless, safe, and adaptable** process for patients and providers.

1

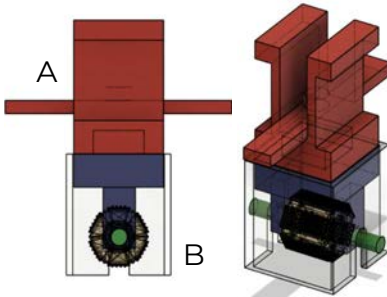


Our team developed novel microneedles configured on a hexagonal drum that creates micron-size pores in the skin. This then allows for diffusion of antigens into the rich immunological environmental of the subcutaneous space.

Micron-scale of the needles:

- Makes the procedure painless for patients
- Increases patient compliance
- Protects patients/providers against accidental sharps exposure and disease transmission.

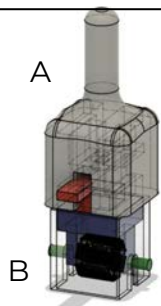
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The developed prototype consists of a novel handheld applicator (**A**) with a patient-contactless **reusable mechanism** that controls the movement of a **single-use, cylindrical roller (B)**.

- A force-controlled spring (A) ensures complete needle insertion
- Encapsulating the roller (B) within a plastic shield:
 - Eliminates sharps risk
 - Allows use by minimally trained personnel.

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Completed prototype consists of (A) reusable handheld applicator & single-use roller (B)

Results:

- *MEDiRoller* achieved **complete** needle insertion in mice skin during experimentation
- **Notable diffusion** occurred in ex vivo skin models when a topical dye was applied
- Envisioned clinical process is **validated**

Immunization Process

- 1| Load single-use roller in handle
- 2| Remove cap from single roller
- 3| Place over skin & release lever for force controlled needle insertion
- 4| Roll device back & forth on skin
- 5| Apply topical vaccine over microneedle-treated skin
- 6| Replace cap, remove single-use roller, dispose

Immunization Achieved

REPEAT FOR NEXT PATIENT!

