

MEDICAL DEVICES AND HEALTH TECHNOLOGIES

MAPs for PrEP: Dissolving microarray patches (MAPs) for long-acting HIV and pregnancy prevention



Health need

Women and adolescents in low- and middle-income countries are at greatest risk of HIV infection and unintended pregnancy, and are in need of acceptable products that provide long-acting protection against HIV and provide contraception. Microarray patches (MAPs; also known as microneedle patches) are an easy-to-use, discreet delivery technology, which could improve adherence to HIV pre-exposure prophylaxis (PrEP)—an acknowledged challenge for current HIV PrEP regimens—and improve access to long-acting contraceptives.

Technology overview

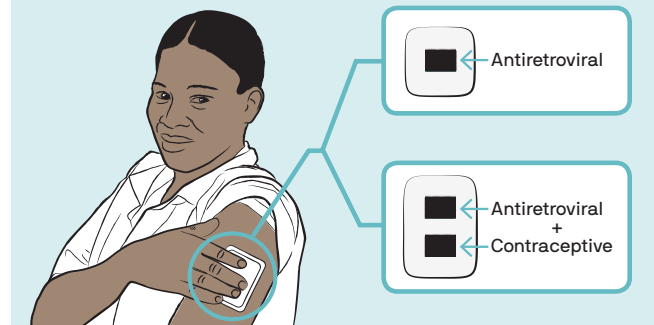
MAPs consist of an array of micron-scale projections that are applied to skin like a bandage and painlessly pierce the *stratum corneum* barrier to achieve intradermal drug delivery. Queen's University Belfast (QUB) has formulated dissolving polymeric MAPs that are capable of delivering high doses of drugs, including long-acting nanoparticle formulations.^{1,2}

Project objective and activities

PATH hypothesizes that a single application of a dissolving polymeric MAP containing either the antiretroviral drug cabotegravir alone or both cabotegravir and a long-acting formulation of a progestin as a multipurpose prevention technology, could provide long-acting (one week to three months) protection against HIV infection and unintended pregnancy. PATH, QUB, ViiV Healthcare, the Population Council, and LTS Lohmann Therapie-Systeme AG will combine their complementary expertise to advance this technology. Activities will include developing a formulation for the MAPs, conducting preclinical research, and mapping a product development pathway in preparation for future clinical trials. PATH will also work with researchers in Kenya, South Africa, and Uganda to engage with women and health care workers to inform the design of a MAP product that will meet users' needs.

MICROARRAY PATCH

User applies patch with adhesive backing to skin. Microarray projections dissolve within the skin, depositing nanoparticles containing the drug. After patch is removed, drug is released slowly over time, maintaining sustained and clinically effective systemic concentrations.



Contact information

Darin Zehrung, project director; dzehrung@path.org
Director, Medical Devices and Health Technologies Program

1. McCrudden MT, Alkilani AZ, McCrudden CM, McAlister E, McCarthy HO, Woolfson AD, Donnelly RF. Design and physicochemical characterization of novel dissolving polymeric microneedle arrays for transdermal delivery of high dose, low molecular weight drugs. *Journal of Controlled Release*. 2014;180:71–80. doi:10.1016/j.jconrel.2014.02.007.

2. Donnelly RF, Larrañeta E. Microarray patches: potentially useful delivery systems for long-acting nanosuspensions. *Drug Discovery Today*. 2017. doi:10.1016/j.drudis.2017.10.013.