

Our goal with the TrueYou transdermal birth control patch is to minimize and to rid the market of the many issues that users face with current non-invasive contraceptive options on market today. Transdermal birth control patches have been found to cause contact dermatitis, come in a single exclusive skin tone, are easily lost to dirtying from basic daily tasks, and have been reported to cause blood clotting in some users with higher BMIs. Vaginal rings are inherently distrusted by many consumers first seeking non-invasive options and have increased risks of liver disease. Birth control pills are the industry standard, but with efficacy drop offs when not taken timely each day, it lacks benefitting many of the busy consumers within the market. When deciding on the modality of contraceptives, users should not have to consider these side effects, complications, and overall confusion. This is where TrueYou comes in.

The final project concept of the TrueYou transdermal birth control patch is constructed of three specific layers. Each layer serves a different purpose in assisting the end user. The layers include: the patch backing (top layer) made of a dyeable, hemp fabric; the dissolving microneedle array and matrix (middle layer) made of PLGA microneedles, norelgestromin (NGMN) and ethinylestradiol (EE); a stability layer to protect the microneedles from any force applied to the packaging caused by shipping. These layers will be constructed then a layer of hypoallergenic adhesive will be applied to hold the patch to the user's skin for the recommended duration of six hours to dissolve.

The dissolving microneedle array and matrix will be loaded with NGMN and EE in order to prevent pregnancy. However, the TrueYou patch will utilize the microneedle array in order to puncture through the epidermis and allow for NGMN and EE to be more readily available. By puncturing the epidermis, the TrueYou patch removes the need to overload the patch with extra NGMN and EE. This allows the TrueYou patch to address the concern that transdermal patches require drug overloading which can increase the user risk of blood clotting and liver disease. Another use of the dissolving microneedles is to decrease overall wear time. Once the patch has been applied to the skin, the microneedles will begin dissolving, which will allow the user to remove the patch after the needles have fully dissolved. The use of PLGA for the microneedles was formulated due to similar properties to the tested prototypes that were composed of a hyaluronic acid.

The last design consideration was directed towards the ability to apply and remove the TrueYou patch. The addition of a small 1 cm² circle to the corner of the patch was considered in order to give the user a piece of the patch that would be specifically used for application and removal without having to fear touching the microneedles. By adding this tab to the edge of the patch backing layer, the user would have an easily accessible part of the patch to assist them.

Following our experimental findings, the concept of dissolving microneedles to corner the birth control market as a cost effective and user friendly alternative to current on market competitors remains a point of great excitement.