



PHARMSOL NEWS

TRANSDERMAL DRUG DELIVERY SYSTEM (TDDS)

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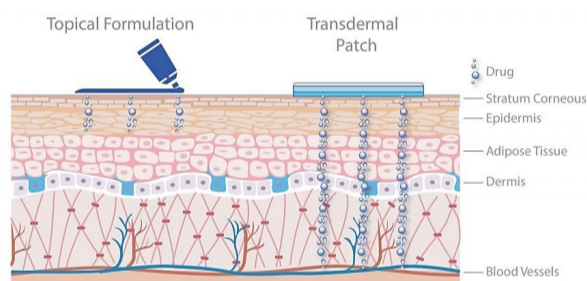
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Transdermal drug delivery system (TDDS) are dosage forms designed to deliver a therapeutically effective amount of drug across the patient's skin. They are defined as discrete dosage forms which when applied on the intact skin, deliver the drugs, through skin at a controlled rate into systemic circulation. Transdermal drug delivery system is a one in which drug is delivered via the skin portal to systemic circulation at a predetermined rate, at a maintained clinically effective concentrations and over prolonged period of time. The delivery rate is controlled by the skin or membrane in the delivery system. Based on Drug substance, therapeutic category it belongs to, every drug cannot be formulated in to a transdermal patch and it is case specific.

Technology:

Transdermal Patch technology may comprise of 5 constituents- (a) Liner, which is a protection of patch during storage & is removed prior to application of patch (b) drug reservoir (c) drug release membrane, which controls release of drug from drug reservoir, (d) Contact adhesives, aids to adhere patch on skin surface (e) Clear backing, which protects patch from outside contamination. TDDS is suitable for chronic clinical conditions, where prolonged duration of drug administration is recommended. One such example is FDA approved Donepezil transdermal technology (ADLARITY), which is once a week patch to continuously deliver, constant doses of donepezil through skin. This has two benefits, avoids major GI side effects of drug and achieving higher degree patient compliance in Alzheimer. Transdermal patch technology has been utilized since 1979, when FDA approved first TDDS, which administered Scopolamine. Other examples of TDDS in the recent time includes, Estrogen, Nitro glycerine, Lidocaine.



There are 2 basic types of transdermal dosing systems

- Those that control rate of drug delivery through skin
- Those that allow the skin to control the rate of drug absorption.

The basic components of transdermal devices include:

- Drug Penetration Enhancers
- Other Excipients
- Adhesive/Packaging

The TDDS in the form of a patch provides a controlled release of the medication into the patient, usually through either a porous membrane covering a reservoir of medication or through body heat melting thin layers of medication embedded in the adhesive. A wide variety of pharmaceuticals are now available in transdermal patch form

A transdermal patch



TDDS formulation design can be subdivided majorly into three categories (i) Single / Multi-layer- drug in adhesive patch, where drug is directly stored in adhesive (ii) with separated drug chamber (iii) Matrix type transdermal patches, drug layer embedded in semisolid matrix with drug solution or suspension

An illustration of Formulation Plan is

Material	Category
API	Drug
HPMC K100	Polymer
PEG 600	Plasticizer
Ethanol	Solvent
Water	Vehicle

- Transdermal patches are generally prepared by solvent evaporation technology. In this technology, mixture of polymer and drug solution are spread as a film on a suitable support and solvent is allowed to evaporate in an appropriate time period. After evaporation of solvent, patch containing drug trapped in the matrix of polymer.

Advantage

Delivery via the transdermal route is an interesting option because transdermal route is convenient and safe. The positive features of delivery drugs across the skin to achieve systemic effects are:

- Avoidance of first pass metabolism
- Avoidance of gastro intestinal incompatibility.
- Predictable and extended duration of activity.
- Minimizing undesirable side effects
- Provides utilization of drugs with short biological half-life, narrow therapeutic window.
- Substitutes for oral administration of medication when that route is unsuitable, as in the instances a vomiting and diarrhoea.
- Provides suitability for self-administration
- Flexibility of terminating drug administration by simply removing the patch from the skin.

Recent Advances in Transdermal Technology

In last decade microneedle based transdermal products have been extensively researched, where microneedles deliver hundreds of micrograms of drug rapidly through stratum corneum into epidermal tissues. Few names include Micro-Trans, Nanoject, Micronjet etc.

“The drug can be administered via matrix type transdermal drug delivery system, which provides controlled release that aids in reducing the frequency of oral/parenteral administration of drug in patients. Hence this non-invasive, compatible patch with ease of application and removal that may find increase in patient compliance.”

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