# Mini review: Transdermal Drug Delivery System

Ajay Kumar, University Institute of Pharmacy, CSJM University
Shashi Kiran Misra, University Institute of Pharmacy, CSJM University, Kanpur

## Abstract:

A proven technology that has made a substantial contribution to pharmaceutical treatment globally is transdermal medication delivery. Significantly, a new chemical entity was recently produced and licenced for transdermal administration without having first been administered as an injectable or oral dosage form. Since 1980, this industry has shown whopping progress with numerous commercial victories. The current paper discusses the choice of drug candidates and polymers suitable for formulation as a transdermal system, as well as the current status of transdermal and benefits and drawbacks of transdermal drug delivery system.

**Key world: Transdermal drug delivery system, advantage, disadvantage.**

## Introduction:

The phrase "drug delivery system" (DDS) refers to a group of physicochemical techniques that can regulate the distribution and release of pharmacologically active compounds into cells, tissues, and organsto ensure that they have the greatest possible impact. In order to maximise therapeutic efficacy while minimising side effects, DDS addresses the methods of administration and drug formulations that effectively transport the medicine. There are many different administration methods, including as oral administration, transdermal administration, lung inhalation, mucosal administration, and intravenous injection, depending on the delivery route. Among them, the transdermal drug delivery system (TDDS) stands out as a desirable tactic.In contrast to the commonly utilised direct administration routes, which involve injections with needles, TDDS has emerged as one of the most extensively researched methods of non-invasive drug delivery into the body through the skin. The distribution of numerous therapeutic substances has been greatly impacted by TDDS, particularly in the treatment of disorders of the cardiovascular and central nervous systems, hormone therapy, and pain management. Since TDDS does not enter the digestive tract, first-pass metabolism is not lost, and drugs can be delivered without being impeded by pH, enzymes, or intestinal flora.Additionally, TDDS can be utilised to regulate medication release in accordance with consumption limitations, which adds to the high persistence of this approach.The most significant benefit of TDDS is that it is a painless and convenient way to provide medications to patients, especially those who are old or children.4

### The Present State of Transdermal Drug Delivery

### Barrier Function of Skin:

In the past 30 years, significant progress has been made in our understanding of the skin's barrier function. The architecture of the stratum corneum (SC), the main barrier to drug transport, has been identified, and the intercellular lipid structure of the SC has been directly linked to both its biophysical characteristics and its function as a barrier. Simple methods to predict skin permeability have been developed as a result of this research, allowing researchers to examine the physicochemical viability of transdermal drug administration before performing any experiments.1

### Transdermally Delivered Drugs:

There are a number of well-known benefits to transdermal administration. Because pre-systemic metabolism is prevented, smaller daily doses can be given. Longer pharmacological action times and fewer doses are required when blood or plasma levels of the drug are maintained within the therapeutic window. As a result, patient compliance and acceptance are increased, and inter- and intra-patient variability is decreased. Lastly, by removing the patch, medication input can be halted.1

### Enhancement of Transdermal Drug Delivery:

The SC barrier effectively prevents the passive delivery of charged medicines or molecules with molecular weights greater than 1,000 Da. An improvement technique is needed to get beyond this blockade. The available options can be divided into three categories:3

• Physical action on the medication itself, such as iontophoresis;
• Formulations include a chemical penetration enhancer; and
• Mechanical and/or physical energy that is applied to the barrier, such as thermal poration, microneedles, and ultrasound.

**Local and "Subcutaneous" Drug Delivery:**

The challenges faced while administering medications transdermally to the skin for the treatment of dermatological illnesses and to the tissues immediately beneath the epidermis for the treatment of local inflammation are plainly similar. Both goals have been inadequately addressed up to this point, with the market being dominated by formulas that are obviously ineffective. Therefore, there are genuine prospects to significantly enhance pharmacological therapy in these areas.3

## Advantages:

1. They can prevent problems with drug absorption in the gastrointestinal tract brought on by changes in gastrointestinal ph, enzyme activity, and drug interactions with food, drink, and other orally taken medications.
2. They can replace oral drug administration when it is inappropriate, such as when there is vomiting or diarrhoea.
3. They prevent the first-pass effect, which is when a drug substance "s" passes through the systemic and portal circulation for the first time after being absorbed in the gastrointestinal tract, potentially avoiding the deactivation of the drug by digestive and liver enzymes.2

## Disadvantages:

1. Due to the impermeability of the skin and the inherent restrictions on drug entrance imposed by it, only reasonably powerful medications are appropriate candidates for transdermal delivery.
2. In certain patients, one or more system components cause contact dermatitis at the application site, requiring cessation.
3. Drugs needing high blood levels cannot be administered using the delivery mechanism.
4. Transdermal delivery may not be cost-effective.2

## Conclusion

Despite the fact that the rate at which new candidates for conventional, passive administration are developed is unlikely to vary significantly, it is realistic to predict that transdermal delivery will continue to be successful. Additionally, large growth areas can be predicted. For instance, even if iontophoresis hasn't yet achieved a "home run" in terms of commercial success, the technology's maturity suggests that it is ready to be used once the perfect opportunity is found. There are a number of intriguing "fits" between active and technology that are already being thoroughly investigated, and it is likely that the variety of minimally invasive techniques will have some effect on macromolecular medication delivery. Finally, there is no doubt that new methods to carry medications into and beneath the skin, where significant potential areas of exploitation are readily obvious, will profit from the advancements on which the transdermal sector has evolved.

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