

Role of Drug Delivery Systems in Therapeutic Action

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DESCRIPTION

Drug delivery system is defined as the process of transporting therapeutic substances to the site of action. Systemic delivery refers to the administration of a medication systemically within the patient's body including intravenously, subcutaneously and orally or through the lungs. Some medications can be delivered locally rather than systemically, which has an impact on the entire body. This can avoid side effects and drug toxicity while maximizing the effectiveness of a treatment [1]. These include cyclodextrins, prodrugs, gels, microspheres, liposomes, proliposomes, and others.

There are various types of drug delivery systems which are as follows.

Buccal drug delivery

The process of delivering a drug through the buccal mucosa is known as buccal drug delivery (lining of the cheek). It is only possible with small molecule medications with lipophilic qualities because they can easily penetrate the membrane. It avoids first-pass effects (rapid drug uptake and conversion into inert chemicals by the liver). Formulations that can adhere to the mucosa are often preferred, since the buccal route is frequently employed for extended-release drug delivery (where the drug is given in a controlled manner over an extended time period). Pills, gels, lozenges, and patches are some of the medications which are used in buccal drug delivery.

Nasal drug delivery

Nasal drug delivery refers to the administration of medication through the nasal passages. Typically, drugs administered by nasal spray are used to treat upper respiratory tract local illnesses (e.g., nasal congestion, allergic rhinitis). The thin nasal mucosa is highly vascularized, allowing quick transport to the systemic blood circulation [2]. It also avoids the first-pass metabolism. For nasal medication delivery, liquid and powder formulations (less frequently) can be utilized.

Oral drug delivery

Due to its non-invasiveness, usability, cost-effectiveness and the extremely absorbent qualities of the Gastrointestinal (GI) tract, oral drug delivery is so far the most popular and frequently preferred route of drug administration.

Pulmonary drug delivery

Medication administration through oral inhalation into the airways is known as pulmonary drug delivery. Local lung disorders can be effectively treated with inhaled medicines [3]. Due to the large absorptive surface area and highly permeable membrane of the alveolar region, pulmonary drug delivery has also been considered as a potential route of administration for systemic disorders.

Sublingual drug delivery

The process of providing a medication under the tongue so that it can be absorbed into the bloodstream *via* the ventral surface of the tongue is known as sublingual drug delivery.

Transdermal drug delivery

Transdermal drug delivery system involves application of a formulation to healthy skin systematically. The medication first enters the stratum corneum, then moves into the deeper epidermis and dermis and eventually enters the bloodstream through the dermal microcirculation [4]. Two major benefits are it is non-invasive and appropriate for individuals who are unconscious.

Vaginal/anal drug delivery

When compared to the oral route, vaginal/anal drug delivery routes have a fast onset of action and higher bioavailability. Rectal drugs may have local (such as laxative effects) or systemic effects (e.g., analgesics when other routes are contraindicated). The administration of hormones through the vaginal route is frequently considered for health issues related to women.

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Targeted drug delivery

Targeted drug delivery systems are those which allow concentrated drug delivery to the intended target, enhancing efficacy and minimizing off-target effects.

CONCLUSION

Only the target tissue would get drug administration *via* the ideal drug delivery system, where the drug would remain a therapeutic concentration for a predetermined amount of time. Additionally, the new technologies would enhance drug therapy by encouraging patient compliance. The medicine gets safer and more comfortable for patients to use as drug delivery technology in advance. In the past seven decades, drug delivery methods have advanced dramatically. Systems for long-term distribution for months or years, localized delivery and tailored delivery are only a few examples. Nanomedicine is the latest drug delivery

method. The drug delivery industry should devote time and resources to more transferrable research concepts in order to advance both short-term and long-term in the future.

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