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# Drug delivery: current efforts

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Drug delivery refers to approaches, formulations, manufacturing techniques, storage systems, and technologies involved in transporting a pharmaceutical compound to its target site to realize a desired therapeutic effect. Principles associated with drug preparation, route of administration, site-specific targeting, metabolism, and toxicity are wont to optimize efficacy and safety, and to enhance patient convenience and compliance. Drug delivery is aimed toward altering a drug's pharmacokinetics and specificity by formulating it with different excipients, drug carriers, and medical devices. There's additional emphasis on increasing the bioavailability and duration of action of a drug to enhance therapeutic outcomes. Some research has also been focused on improving safety for the person administering the medication. for instance, several sorts of microneedle patches are developed for administering vaccines and other medications to scale back the danger of needlestick injury.

Drug delivery may be a concept heavily integrated with dosage form and route of administration, the latter sometimes being considered a part of the definition. While route of administration is usually used interchangeably with drug delivery, the 2 are separate concepts. Route of administration refers to the trail a drug takes to enter the body, whereas drug delivery also encompasses the engineering of delivery systems and may include different dose forms and devices wont to deliver a drug through an equivalent route. Common routes of administration include oral, parenteral (injected), sublingual, topical, transdermal, inhaled, rectal, and vaginal, however drug delivery isn't limited to those routes and there could also be several ways to deliver medications through each route.

Since the approval of the primary controlled-release formulation within the 1950's, research into new delivery systems has been progressing, as against new drug development which has been declining. Several factors could also be contributing to the present shift focused . one among the driving factors is that the high cost of developing new drugs. A 2013 review found the value of developing a delivery system was only 10% of the value of developing a placement pharmaceutical. A newer study found the median cost of bringing a replacement drug to plug was $985 million in 2020, but didn't check out the value of developing drug delivery systems. Other factors that have potentially influenced the rise in drug delivery system development may include the increasing prevalence of both chronic and infectious diseases, also as a general increased understanding of the pharmacology, pharmacokinetics, and pharmacodynamics of the many drugs.

## Current efforts

Current efforts in drug delivery are vast and include topics such as controlled-release formulations, targeted delivery, nanomedicine, drug carriers, 3D printing, and the delivery of biologic drugs.

## Targeted delivery

Targeted drug delivery is that the delivery of a drug to its target site without having an



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impact on other tissues. Interest in targeted drug delivery has grown drastically thanks to its potential implications within the treatment of cancers and other chronic diseases. So as to realize efficient targeted delivery, the designed system must avoid the host's defense mechanisms and circulate to its intended site of action. variety of drug carriers are studied to effectively target specific tissues, including liposomes, nanogels, and other nanotechnologies.

## Controlled-release formulations

Controlled or modified-release formulations alter the speed and timing at which a drug is liberated, so as to supply adequate or sustained drug concentrations. the primary controlled-release (CR) formulation that was developed was Dexedrine within the 1950's. this era of your time saw more drugs being formulated as CR, also because the introduction of transdermal patches to permit drugs to slowly absorb through the skin. Since then, countless other CR products are developed to account for the physiochemical properties of various drugs, like depot injections for antipsychotics and sex hormones that need dosing once every few months.

Since the late 1990's, most of the research around CR formulations has been focused on implementing nanoparticles to decrease the speed of drug clearance.

## Delivery of biologic drugs

Pharmaceutical preparations containing peptides, proteins, antibodies, genes, or other biologic components often face absorption issues thanks to their large sizes or electrostatic charges, and should be vulnerable to enzymatic degradation once they need entered the body. For these reasons, recent efforts in drug delivery are focused on methods to avoid these issues through the utilization of liposomes, nanoparticles, fusion proteins, and lots of others.