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**RECENT INNOVATIONS IN THE FIELD OF DRUG DELIVERY:
DRUG-LOADED IMPLANTS**

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The oral route is an acknowledged and convenient method of drug delivery. However, it has some crucial drawbacks such as imprecise drug concentration due to first pass metabolism, adverse side effects resulting from drug toxic effects on the entire body, and high dependence on patient compliance.

Drug-loaded implant is an advanced and innovative type of pharmaceutical product that occurs to be an ideal alternative to traditional drug delivery methods. Implantable drug delivery systems are small, biocompatible devices that are implanted into the body through surgical intervention, not only providing mechanical support, but also releasing drugs into the surrounding tissue.

Drug-eluting implants demonstrate a number of advantages, which are listed below. Firstly, these systems allow for local drug delivery into the target tissue and may accomplish a therapeutic effect with decreased concentrations of medication. As a result, they minimize potential side effects of therapy through the controlled release of active pharmaceutical ingredients at the site of application. Drug-loaded implants also make it possible to deliver drugs which are unsuitable orally, because, being placed right into the target site, the devices avoid first pass metabolism and chemical degradation in the gastrointestinal tract, providing increased bioavailability.

Another benefit of medical drug-loaded implants is that they are less invasive compared to regular injections or surgical re-interventions performed due to complications caused by traditional implants, so they reduce the risk of discomfort and infection. Additionally, drug-eluting implants are designed to maintain the desired drug concentration within a narrow therapeutic window, allowing for greater control of drug levels in the body. Furthermore, drug-loaded implants are also beneficial for patient compliance. By having the controlled drug release over a long period of time, patients are not required to take their medication by themselves, reducing the risk of forgetting to take the drug and receiving the full benefit of the medication.

One of the main drawbacks of implants is the surgical procedures, that can result in inflammation, hypersensitivity reactions, and rejection of implants. Furthermore, drug-loaded implants are expensive, so they may not be affordable to average people. Moreover, they may not be able to be used in certain populations, such as children or elderly patients.

Depending on the used polymers, drug-loaded implants are classified as biodegradable and non-biodegradable. Biodegradable implants do not need to be removed due to self-sustaining decomposition, so they occur to be the most convenient option for drug delivery. In contrast, non-biodegradable implants require surgical intervention twice as they don't break down in human body and should be removed.

Drug-loaded implants are used to treat a variety of chronic diseases, including cancer (Exner AA, & Saidel GM., 2008), cardiovascular diseases (Adhami M, Martin NK, Maguire C, Courtenay AJ, Donnelly RF, Domínguez-Robles J, & Larrañeta E., 2023), orthopedic and dental disorders (Alshimaysawee S, Fadhel Obaid R, Al-Gazally ME, Alexis Ramírez-Coronel A, & Bathaei MS, 2023). They can also be used to deliver antibiotics and hormones for long-term treatment (Smith KA, Kingdom TT, Gray ST, Poetker DM, & Orlandi RR, 2020).

In conclusion, drug-loaded implants offer a number of advantages over traditional methods of drug administration. By allowing for the slow and long-term delivery of drugs, these implants can improve safety, efficacy, and patient compliance. As such, they are becoming increasingly popular in the field of pharmacy and are likely to continue to gain in popularity in the years to come.