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Journal of Applied Pharmacy

Short Communication

The Role of Prodrugs in Pharmaceuticals

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ABOUT THE STUDY

Prodrugs are bio reversible drug molecules that go through an enzymatic and/or chemical transition in the body to release the active parent drug, which then has the intended pharmacological effect. Prodrugs have become a well-established method for increasing the physicochemical, biological, and pharmacokinetic characteristics of pharmacologically active compounds in both drug discovery and development. Prodrugs account for around 5-7% of all drugs licensed globally, and using a prodrug method in the early phases of drug development is becoming more common. A prodrug is a pharmaceutical or chemical that is metabolized (that is, transformed within the body) into a pharmacologically active drug after delivery. To improve how a medication is absorbed, transported, metabolized, and eliminated, a comparable prodrug can be employed instead of the drug itself. When a medicine is poorly absorbed through the gastrointestinal system, prodrugs are frequently used to increase bioavailability. A prodrug can help a drug engage more selectively with cells or processes that aren't its original target. This helps to limit a drug's negative or unanticipated effects, which is especially crucial in treatments like chemotherapy, which can have serious unwanted and unpleasant side effects [1].

Based on how the body transforms the prodrug into the final active drug form, prodrugs may be divided into two categories: Inside the cells, type I prodrugs are bioactivated (intracellularly). Antiviral nucleoside analogues that must be phosphorylated and lipid-lowering statins are two examples. Type II prodrugs are bioactivated outside of cells (extracellularly), mainly in digestive fluids or the circulatory system, especially in the blood. Salicin (mentioned above) and various antibody-, gene-, or virus-directed enzyme prodrugs used in chemotherapy or immunotherapy are examples of Type II prodrugs. Both primary kinds can be divided into subtypes based on criteria such as whether the intracellular bioactivation site is also the site of therapeutic action (Type I), or if bioactivation happens in the gastrointestinal fluids or the circulatory system [2].

The advancement of prodrugs, chemically altered variants of the pharmacologically active agent that must be transformed *in vivo* to release the active drug, is now well established as a strategy for improving the physicochemical, biopharmaceutical, or pharmacokinetic properties of pharmacologically potent compounds, and thus increasing the developability and usefulness of a potential drug. Prodrugs, for example, can help overcome issues like low water solubility, chemical instability, insufficient oral absorption, fast pre-systemic metabolism, insufficient brain penetration, toxicity, and local irritation when it comes to drug formulation and administration. Prodrugs can also help with drug targeting, and the creation of a better-behaving prodrug of an existing drug could be a good way to control the medication's life cycle [3].

Prodrugs are often simple chemical derivatives that only require one to two chemical or enzymatic transformation steps to produce the active parent medication. Co-drugs are variants of prodrugs that consist of two pharmacologically active drugs that are bonded together in a single molecule such that one drug works as a promoiety for the other. Prodrugs have also been called reversible or bioreversible derivatives, latentiated drugs, or biolabile drug-carrier conjugates, but the word prodrug has now become the industry standard. A bioprecursor prodrug is one that doesn't have a carrier or promoiety and instead comes from a molecular alteration of the active ingredient. This change (for example, oxidation or reduction) produces a new compound that can be metabolically or chemically converted, with the active agent being the resultant product (it can also be referred to as an active metabolite). Finally, soft medicines, which are sometimes mistaken with prodrugs, can be employed to target specific tissues. Soft medicines, on the other hand, are active pharmaceuticals that, after attaining their therapeutic effect, are designed to undergo a predictable and regulated deactivation or metabolism *in vivo* [4-8].

Functional groupings susceptible to the development of prodrugs design of an acceptable prodrug structure should ideally be explored early in preclinical research. However, those prodrugs may affect the parent drug's tissue distribution, effectiveness, and toxicity. When creating a prodrug structure, several critical variables should be considered, including.

- The functional groups of the parent medication are susceptible to chemical prodrug derivatization.
- Ideally, this should be non-toxic and removed quickly from the body. The illness status, dosage, and length of therapy should all be taken into account while selecting a promoiety.

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Received: 04-Mar-2022, Manuscript No. JAP-22-16858; **Editor assigned:** 07- Mar-2022, PreQC No. JAP-22-16858 (PQ); **Reviewed:** 21-Mar -2022, QC No. JAP-22-16858; **Revised:** 24- Mar -2022, Manuscript No. JAP-22-16858; **Published:** 12-Apr-2022, DOI: 10.35248/ 2168-9784.22.S1.002.

Citation: Bassett T (2022) The Role of Prodrugs in Pharmaceuticals. J Appl Pharm. S1: 002.

- Absorption, Distribution, Metabolism, Excretion (ADME) and pharmacokinetic features of the parent and prodrug must be thoroughly characterized.

Degradation by-products: They can have a negative impact on chemical and physical stability, as well as contribute to the development of additional degradation products.

CONCLUSION

In conclusion, as seen by the growing number of authorised prodrugs and patents, prodrugs have become an important aspect of the drug development and delivery process. We believe that increased use of rational prodrug approaches by multidisciplinary teams of medicinal chemists, pharmaceutical chemists, and drug metabolism and pharmacokinetic scientists at the early stages of the drug discovery process will lead to the development of compounds with better drug-like properties.

REFRENCES

1. Rautio J, Meanwell NA, Di L, Hageman MJ. The expanding role of prodrugs in contemporary drug design and development. Nature Reviews, Drug Discovery. 2018;17(8):559-587.
2. Wu KM. A New Classification of Prodrugs: Regulatory Perspectives. Pharmaceuticals. 2009;2(3):77-81.
3. Stella VJ, Addae NKW. Prodrug strategies to overcome poor water solubility. Adv Drug Deliv Rev. 2007;59:677-694.
4. Kiptoo PK, Hamad MO, Crooks PA, Stinchcomb AL. Enhancement of transdermal delivery of 6-b-naltrexol *via* a codrug linked to hydroxybupropion. J Control Release. 2006;113(2):
   137-145.
5. Leppanen J, Huuskonen J, Nevalainen T, Gynther J, Taipale H, Järvinen T. Design and synthesis of a novel l-DOPA-entacapone codrug. J Med Chem. 2002;45(6):1379-1382.
6. Bodor N, Buchwald P. Drug targeting *via* retrometabolic approaches. Pharmacol Ther. 1997;76(3):1-27.
7. Bodor N, Buchwald P. Soft drug design: General principles and recent applications. Med Res Rev. 2000;20(1):58-101.
8. Thorsteinsson T, Loftsson T, Masson M. Soft antibacterial agents. Curr Med Chem. 2003;10(3):1129-1136.