

## Bioavailability of Pharmaceuticals: Implications for Drug Development

Daido Ishii\*

Department of Pharmaceutics, University of Shiraz, Fars Province, Shiraz, Iran

### ABOUT THE STUDY

Bioavailability refers to the extent and rate at which a drug or nutrient can be absorbed and become available for use by the body. In other words, bioavailability is the proportion of an administered substance that reaches the systemic circulation and is able to have an active effect on the body. Bioavailability is a crucial aspect of pharmacology, as it determines the effectiveness and safety of a drug. A drug with low bioavailability may not be effective, while a drug with high bioavailability may have increased potency and potentially lead to adverse effects. The bioavailability of a drug or nutrient depends on several factors, including the route of administration, the physicochemical properties of the substance, and the characteristics of the individual receiving the substance. The most common routes of administration include oral, intravenous, intramuscular, and subcutaneous. Oral administration is the most common route, and it can be further divided into two categories: enteral and oral mucosal.

Enteral administration involves swallowing the drug and allowing it to be absorbed through the gastrointestinal tract. Oral mucosal administration involves placing the drug under the tongue or inside the cheek, allowing it to be absorbed directly into the bloodstream. Intravenous administration involves injecting the drug directly into a vein, resulting in 100% bioavailability. This route is often used in emergency situations or when rapid onset of action is necessary. Intramuscular administration involves injecting the drug into a muscle, while subcutaneous administration involves injecting the drug into the fatty tissue beneath the skin. The physicochemical properties of a substance can also affect its bioavailability. For example, a drug that is highly water-soluble may be more easily absorbed through the gastrointestinal tract than a drug that is poorly water-soluble. Similarly, a drug that is highly lipophilic may be more easily absorbed into fatty tissues. The individual receiving the substance

can also affect its bioavailability. Factors such as age, gender, body weight, and health status can all influence the absorption and distribution of drugs in the body. For example, elderly individuals may have decreased gastric acidity, resulting in decreased absorption of certain drugs. Bioavailability can also be affected by drug interactions. Some drugs may compete with each other for absorption, leading to decreased bioavailability. Other drugs may enhance the absorption of certain substances, leading to increased bioavailability. One important concept in bioavailability is the first-pass effect. When a drug is administered orally, it must first pass through the liver before entering the systemic circulation. During this process, the drug may be metabolized or excreted, resulting in decreased bioavailability. This effect can be circumvented by administering the drug *via* a different route, such as intravenous or sublingual. Another important concept is bioequivalence. When two different formulations of a drug are compared, they are considered bioequivalent if they have similar bioavailability and produce similar effects in the body. This is important for generic drugs, which must be shown to be bioequivalent to the original brand-name drug in order to be approved by regulatory agencies.

### CONCLUSION

Bioavailability is also important in the field of nutrition. Nutrients such as vitamins and minerals must be bioavailable in order to be absorbed and utilized by the body. The bioavailability of nutrients can be affected by factors such as food processing, nutrient interactions, and the presence of certain diseases or conditions. In conclusion, bioavailability is a critical concept in pharmacology and nutrition. It determines the effectiveness and safety of drugs and nutrients, and is influenced by factors such as route of administration, physicochemical properties, and individual characteristics. Understanding the factors that affect bioavailability is essential for optimizing drug and nutrient therapy and ensuring positive health outcomes.

**Correspondence to:** Daido Ishii, Department of Pharmaceutics, University of Shiraz, Fars Province, Shiraz, Iran, E-mail: Ishii5498@gmail.com

**Received:** 06-Mar-2023, Manuscript No. JNBD-23-23307; **Editor assigned:** 08-Mar-2023, PreQC No. JNBD-23-23307 (PQ); **Reviewed:** 28-Mar-2023, QC No. JNBD-23-23307; **Revised:** 06-Apr-2023, Manuscript No. JNBD-23-23307 (R); **Published:** 17-Apr-2023, DOI: 10.4172/2155-983X.23.13.192

**Citation:** Ishii D (2023) Bioavailability of Pharmaceuticals: Implications for Drug Development. J Nanomedicine Biotherapeutic Discov. 13:192.

**Copyright:** © 2023 Ishii D. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.