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Therapeutic drug monitoring strategies and guidelines.

Chatelut Jones*

Department of Pharmaceutical and Pharmacological Sciences, KU Leuven, Leuven, Belgium

Abstract

Therapeutic Drug Monitoring (TDM) is the clinical practice of measuring certain drugs at specified intervals to maintain constant concentrations in a patient's bloodstream, thereby optimizing individual dosing regimens. Primarily to monitor drugs with narrow therapeutic ranges, drugs with highly variable pharmacokinetics, drugs with difficult to monitor target concentrations, and drugs that are therapeutic and known to cause unwanted effects used for The process of TDM is based on the assumption that there is a definable relationship between dose and plasma or blood drug concentration, and between concentration and therapeutic effect. TDM begins with the initial prescription of a drug and involves determining an initial dosing regimen appropriate to clinical status and patient characteristics such as age, weight, organ function, and concomitant medications.

Keywords: Therapeutic drug Monitoring, Pharmacodynamics, Pharmacokinetics, Randomized controlled trials.

Introduction

Therapeutic drug monitoring is a tool for individualizing and optimizing dosing by measuring drug concentrations and adjusting doses to achieve target concentrations or exposures. However, evidence in favor of TDM is often classified as expert opinion. Study design and sample size limitations have prevented definitive conclusions about the potential value addition of TDM [1].

Therapeutic drug monitoring, often referred to as "clinical pharmacokinetics" or "applied pharmacokinetics," is described as the process of using drug concentrations, pharmacokinetic principles, and pharmacodynamic criteria to optimize drug therapy for individual patients. It has been. Certain aspects of pharmacokinetics and pharmacodynamics, as well as consideration and integration of laboratory, clinical and economic realities, are therefore implicit in any discussion of therapeutic drug monitoring. In beginning this discussion, it is worth noting that therapeutic drug monitoring is considered standard medical practice for many classes of drugs and the practice of “applied pharmacokinetics” is gaining increasing acceptance as an intrinsic and essential part of rational drug development. Although this chapter will deal with dose optimisation in individual patients, many of the concepts and issues addressed are equally applicable to the process referred to as “pharmacologically guided dose escalation” wherein pharmacokinetic/pharmacodynamic relationships elucidated in preclinical animal studies are used as a basis to move a drug through phase I clinical trials in the most rational and expeditious fashion [2].

Although the monitoring of drug therapies based on the determination of drug concentrations in biological materials is certainly an important instrument for individualized dosing and dose adjustment with a broad variety of pharmaceuticals, its role is limited by the fact that it does not reflect Pharmacodynamic and toxicodynamic interactions such as those caused by individual and environment-related factors. However, these interactions are important for both the efficacy and the safety of the drug therapy [3]. When interpreting concentration measurements, factors that need to be considered include the sampling time in relation to drug dose, dosage history, patient response, and the desired medicinal targets. The goal of TDM is to use difficult-to-control drugs at appropriate concentrations to optimize clinical outcomes for patients in a variety of clinical settings [4].

The use of TDM requires a multidisciplinary approach that includes pharmaceutical, pharmacokinetic, and pharmacodynamic techniques and analysis. Proper use of TDM requires more than simply measuring a patient's blood drug concentration and comparing it to a target range. Rather, TDM plays an important role in the development of safe and effective therapeutic agents and the individualization of these agents. Additionally, TDM helps identify medication compliance issues in the case of non-compliant patients. Factors such as sampling time *versus* dose, medication history, patient response, and desired clinical goals should be considered when interpreting drug concentration measurements. This information can be used to identify the most appropriate dosing regimen to achieve optimal response with minimal toxicity [5].

***Correspondence to:** Chatelut Jones, Department of Pharmaceutical and Pharmacological Sciences, KU Leuven, Leuven, Belgium, E-mail: Chatelut@Jone.be

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Conclusion

In recent years, there has been a growing interest in personalized drug therapy, reflected in the development and clinical implementation of molecular biomarkers that are direct or surrogate markers of pharmacological effect. Furthermore, this process is being driven by new developments in instrumentation, computational biology/pharmacology, databases and bioinformatics such as mass spectrometry and array technology. This special issue of the journal focuses on the recent achievements and status of PD TDM with different drug classes. This issue of Therapeutic Drug Monitoring provides an important analysis of current TDM practices and their limitations, presents recent promising biomarkers in the field of PD-TDM, and presents preclinical tools to clinical practice to date. We discuss the challenges encountered in translating it into settings, and the establishment of a modeling approach that applies to recent Pharmacokinetic and pharmacogenetic information.

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