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Opinion

OVERVIEW OF THERAPEUTIC DRUG MONITORING

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INTRODUCTION

Therapeutic drug monitoring (TDM) is a clinical procedure that involves measuring certain medications at predetermined intervals in order to maintain a consistent concentration in a patient's circulation, allowing customised dosing regimens to be optimised. The majority of pharmaceuticals do not require TDM, and it is only used to monitor drugs with limited therapeutic ranges, drugs with high pharmacokinetic variability, medications with difficult target concentrations to monitor, and drugs with documented therapeutic and adverse effects. TDM is based on the notion that there is a defined link between dose and drug concentration in the plasma or blood, as well as between concentration and therapeutic effects [1].

DESCRIPTION

TDM begins with the initial prescription of the drug and includes defining an initial dosage regimen that is appropriate for the clinical condition as well as patient variables such as age,

weight, organ function, and concurrent pharmacological therapy. The sample period in relation to the medication dose, dosing history, patient reaction, and the planned medical targets are all elements to consider when interpreting concentration values. The purpose of TDM is to optimise therapeutic outcomes in patients in a variety of clinical scenarios by using optimal concentrations of difficult-to-manage drugs. TDM necessitates an interdisciplinary approach. Only by working together as a TDM team, which often includes scientists, doctors, nurses, and pharmacists, can accurate and therapeutically meaningful drug concentrations be achieved. To guarantee that best practises in TDM are implemented, team members must communicate effectively. Efficacy, compliance, medication-drug interactions, toxicity avoidance, and therapy cessation monitoring are now among the indications for drug monitoring. Although each indication may not apply equally to every agent, plasma drug concentration measurements may be useful in a variety of situations. However, measuring plasma concentrations can be useful because a low reading indicates either poor recent compliance or undertreatment [2].

If the patient is given a dose that is unlikely to be associated with a detected low concentration or if a previous measurement indicated that the plasma concentration should be higher for the given dose, poor compliance is suspected. The physician may find it useful to assess the plasma drug concentration and customise the dosage to the individual before starting pharmacological therapy. Measuring plasma concentrations again may be useful if the dosage regimen needs to be changed for any reason at a later stage of treatment, such as in patients with renal failure. If a poor clinical response is found, undertreatment of an established illness may be concluded. When the medicine is administered as a prophylactic, however, it is impossible to track the patient's response. As a result, the doctor can choose a dosage that will result in a certain target plasma concentration. This rule applies to lithium in the prevention of manic-depressive episodes, phenytoin in the prevention of fits following neurosurgery or trauma, and cyclosporine in the prevention of transplant rejection [3].

Obtaining and scrutinising plasma concentration measurements during the early phases of treatment allows the physician to avoid dangerous plasma concentrations in all circumstances. Drug toxicity can be detected clinically in many circumstances. For example, acute phenytoin

toxicity is very straightforward to spot, and testing plasma concentrations may not be necessary for diagnosis, but it may be useful in lowering dosage later.

Similarly, clinically, aminoglycoside antibiotic nephrotoxicity might be difficult to distinguish from that induced by a severe widespread infection [4]. As a result, monitoring aminoglycoside plasma concentrations could aid in determining the difference between toxicity and infection [5]. If the possibility of a drug interaction is considered, measuring the plasma levels can help guide dosage adjustments. Examples of medicines that are frequently examined for therapeutic drug monitoring include:

- Antibiotics with aminoglycosides (gentamicin)
- Antiepileptic drugs are drugs that are used to treat epilepsy (such as carbamazepine, phenytoin and valproic acid)
- Lithium citrate, in particular, is a mood stabilizer.
- Antipsychotics are a type of medication that is used to treat (such as pimozide and clozapine)
- Digoxin
- In organ transplant recipients, cyclosporin and tacrolimus are used.

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