

Therapeutic drug monitoring

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Therapeutic drug monitoring (TDM) integrates knowledge of pharmacokinetics (PK) and pharmacodynamics (PD) by measuring drug concentrations in blood in order to optimise and individualise the chosen therapy. This approach has been of great value, particularly when there is a relationship between blood concentration and clinical effect but no simple clinical parameter is available, or where the drug has a narrow therapeutic index, in order to document drug-drug interactions and, not least, to establish drug adherence.

The International Association of Therapeutic Drug Monitoring and Clinical Toxicology defines TDM as the measurement made in the laboratory of a parameter which, with appropriate interpretation, will directly influence prescribing procedures.

At the WorldPharma 2010 Congress, 17–23 July, in Copenhagen, Denmark, Professor Cees Neef stated that TDM is a system of quality assurance of a drug management system, aiming to give the right drug to the right patient in the right dose in order to obtain the right effect [1].

European hospital pharmacies have implemented TDM services giving clinical pharmacists a central role in the appropriate choice of drug and dose for individual patients.

However, over the years, TDM has gradually lost its importance; physicians have been handling drug dosing fairly well without a TDM service and the practical handling of samples, timing and costs have also decreased demand. Moreover, there is often no recommendation to monitor plasma concentrations in drugs new to the market. In some cases, this has been a mistake; for example, it was only after severe side effects appeared that TDM was recommended for abacavir.

Economical restraints have limited PK evaluation so that at present, no dosage recommendations are given by the TDM service. This constitutes a risk that the physician could treat the plasma concentration instead of the patient.

At the WorldPharma 2010 Congress, a case was made to revive TDM, where the 'M' was to stand for 'management' not 'monitoring'. This was to emphasise the importance of a proper analysis of measured plasma concentration in regard to documentation from a population, as well as the factors of importance for inter-individual variation and finally for prediction when changing the dose. Population

methods have the advantage of including a large number of patients to give a mean of patient characteristics. The deviation from the mean can be described as factors of importance for the variation such as age or weight. Bayesian methods allow the identification of single patients from the population. This allows suggestions for precise dosing for patients, taking into account age and kidney function together with plasma concentration at any time during the first dose. Calculation programmes are at hand for a service of this kind for many drugs, and there are also possibilities to build autonomous data banks, including new drugs, for a TDM service.

Individualised pharmacotherapy using TDM can be cost-effective although the evidence is scarce [2].

Management of measured plasma concentration of drugs includes dose history, PK dose advice, interpretation and advice to the treating physician on how to proceed. These data are available and must be used. Assays by robots allow the measurement of large numbers of samples. The methods are validated and show when and how to use the results. This knowledge and technique make the new TDM a most suitable area for hospital pharmacists. Knowledge of pharmacotherapy, bioanalysis and PK should be integrated into daily clinical pharmacy routines and give support and better drug treatment to all patients, using the new concept: therapeutic drug management.

EJHP Science welcomes all TDM studies, e.g. development of bioanalytical methods, PK-PD relationships of drugs suitable for TDM, interpretation of results using simple models or population methods, as well as patient cases where the service has been of value.

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