THERAPEUTIC DRUG MONITORING OF TACROLIMUS IN RENAL TRANSPLANT RECIPIENTS

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Introduction. Tacrolimus, the calcineurin inhibitor has been the cornerstone of immunosuppression following renal transplantation for the last 10–15 years. The narrow therapeutic index and large pharmacokinetic interindividual and intraindividual variability makes therapeutic drug monitoring (TDM) of tacrolimus mandatory. The purpose of the study was to focus on tacrolimus pharmacokinetics, pharmacodynamics, and toxicity profiles to highlight the importance of TDM for post-transplant management.
Material and methods. A narrative literature search was performed in the Hinari database with source selection for the last 5 years. Keywords used for the search were: *tacrolimus pharmacokinetics, TDM of tacrolimus, tacrolimus in renal transplantation*. Inclusion criteria were: clinical trials, literature reviews accessible in full-text, articles published in English. Exclusion criteria were: articles without full-text version, studies with irrelevant results, case reports, letters to the editor or articles in languages other than English. Out of 129 articles found, 39 articles were included in the study after reviewing the title, abstract, inclusion and exclusion criteria.
Results: Therapeutic doses of tacrolimus are adjusted by monitoring the morning whole blood trough concentrations. Achieving trough levels of 7–12 ng/mL (preferably to > 7 ng/ml, following the second consensus report in 2019) early post-transplant reduces the risk of acute rejection compared to trough levels of 4–7 ng/mL (2009 European consensus conference), while levels between 5.35 and 7.15 ng/mL manage to balance acute rejection prevention and infection risk. These data highlight the importance of personalized therapeutic drug monitoring (TDM) for optimal transplant outcomes. Pharmacokinetic variability of tacrolimus may be caused by variable absorption, low bioavailability, increased risk of drug interactions, liver and renal function, genetic polymorphisms. The side effects of tacrolimus-nephrotoxicity, neurotoxicity, cardiotoxicity, metabolic disturbances, infections can be prevented by monitoring and adjusting the dose as needed.
Conclusion. Tacrolimus is essential immunosuppressive agents for preventing organ rejection in kidney transplant patients, but its use is associated with significant variability in response that requires careful management, including TDM and pharmacogenomics, avoiding drug interactions, proper dosage regimen. Therapeutic drug monitoring guides healthcare providers to achieve therapeutic efficacy (prevention of graft rejection), and limit potential dose-dependent toxicities.
Key words. tacrolimus pharmacokinetics, TDM of tacrolimus, tacrolimus in renal transplantation.