Applications of physiologically based pharmacokinetic modeling for the optimization of anti-infective therapies

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The pharmacokinetic properties of anti-infective drugs are a determinant part of treatment success. Pathogen replication is inhibited if adequate drug levels are achieved in target sites, whereas excessive drug concentrations linked to toxicity are to be avoided. Anti-infective distribution can be predicted by integrating in vitro drug properties and mathematical descriptions of human anatomy in physiologically based pharmacokinetic models. This method reduces the need for animal and human studies and is used increasingly in drug development and simulation of clinical scenario such as, for instance, drug-drug interactions, dose optimization, novel formulations and pharmacokinetics in special populations.; We have assessed the relevance of physiologically based pharmacokinetic modeling in the anti-infective research field, giving an overview of mechanisms involved in model design and have suggested strategies for future applications of physiologically based pharmacokinetic models.; Physiologically based pharmacokinetic modeling provides a powerful tool in anti-infective optimization, and there is now no doubt that both industry and regulatory bodies have recognized the importance of this technology. It should be acknowledged, however, that major challenges remain to be addressed and that information detailing disease group physiology and anti-infective pharmacodynamics is required if a personalized medicine approach is to be achieved.
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