UTILISATION OF POPULATION PHARMACOKINETIC-PHARMACODYNAMIC MODELLING IN DOSING INDIVIDUALISATION: THE EXAMPLE OF RADIOACTIVE IODINE ^{131}I IN THE TREATMENT OF BENIGN THYROID DISEASES

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In the emerging digital era in health systems, there is a striving to implement modern pharmacometric approaches to dosing individualisation into routine clinical practice with the aim of rational pharmacotherapy and improving patients' health care. These approaches take into account prior knowledge of the patient-disease-drug system, variability in that system and therapeutic drug or biomarker monitoring data, and an integral term prevailing in literature to describe them is model-informed precision dosing (MIPD). Among other pharmacometric models, MIPD uses population pharmacokinetic-pharmacodynamic models, as they enable identifying and quantifying sources of variability in different populations and subpopulations of patients, which is the basis for individualisation of therapy. Therefore, this paper aims to present the possibilities of applying population models in improving dosing individualisation on the example of the population biokinetic and dynamic model of ^{131}I in the treatment of benign thyroid diseases (1, 2). Since ^{131}I exhibits significant interindividual variability in pharmacokinetics and pharmacodynamics, the application of population models in the individualisation of dosing can significantly contribute to the improvement of the safety and efficacy of the therapy. The development of the MIPD concept applicable in routine clinical practice requires joint efforts of the scientific and professional community, educational institutions and regulatory bodies, given that it is necessary to overcome numerous obstacles of a conceptual and practical nature in order to move from model development to its wide clinical application, including model qualification, as well as the integration of application tools for clinicians into electronic health systems.

References

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PRIMJENA POPULACIONOG FARMAKOKINETIČKO-FARMAKODINAMIČKOG MODELOVANJA U INDIVIDUALIZACIJI DOZIRANJA: PRIMJER RADIOAKTIVNOG JODA ^{131}I U TERAPIJI BENIGNIH OBOLJENJA ŠTITASTE ŽLIJEZDE

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U nastupajućoj digitalnoj eri u zdravstvenim sistemima teži se ka implementaciji savremenih farmakometrijskih pristupa individualizaciji doziranja u rutinsku kliničku praksu sa ciljem racionalne farmakoterapije i unaprijeđenja zdravstvene zaštite pacijenta. Ovi pristupi uzimaju u obzir prethodno znanje o sistemu pacijent-bolest-lijek, zatim varijabilnost prisutnu u tom sistemu, kao i podatke o terapijskom praćenju lijeka ili biomarkera, a integralni termin koji preovladava u literaturi za njihovo opisivanje je precizno doziranje zasnovano na modelu – *model-informed precision dosing* (MIPD). Pored ostalih farmakometrijskih modela, u MIPD-u se koriste populacioni farmakokinetičko-farmakodinamički modeli, budući da oni omogućavaju identifikaciju i kvantifikaciju izvora varijabilnosti u različitim populacijama i subpopulacijama pacijenata, što predstavlja osnovu individualizacije terapije. Cilj ovog rada je stoga da prikaže mogućnosti primjene populacionih modela u unapređenju individualizacije doziranja na primjeru biokinetičkog i dinamičkog modela ^{131}I u terapiji benignih oboljenja štitaste žlijezde (1, 2). Budući da ^{131}I ispoljava značajnu interindividualnu varijabilnost u farmakokinetici i farmakodinamici, primjena populacionih modela u individualizaciji doziranja može značajno da doprinese unapređenju bezbjednosti i efikasnosti ove terapije. Za razvoj koncepta MIPD koji je primjenjiv u rutinskoj kliničkoj praksi neophodni su udruženi napori naučne i stručne zajednice, obrazovnih institucija i regulatornih tijela, s obzirom na to da je potrebno da se savladaju brojne prepreke konceptualne i praktične prirode da bi se prešao put od razvoja modela do njegove široke kliničke primjene, uključujući kvalifikaciju modela, kao i integrisanje alata za kliničare u elektronske zdravstvene sisteme.

Literatura

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