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Molecular polymorphism of human enzymes as the basis of individual sensitivity to drugs. Supercomputer-assisted modeling as a tool for analysis of structural changes and enzymatic activity of proteins

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Abstract

© 2016, Springer Science+Business Media New York. The nature of individual sensitivity to drugs associated with molecular polymorphism of human enzymes is discussed. The influence of molecular polymorphism on the activity of key human esterases, in particular, cholinesterases and carboxylesterase, responsible for hydrolytic metabolism of ester-containing drugs, is analyzed. A method was developed, which involves supercomputer-assisted modeling as a tool for assessment of molecular mechanism of the impact of point mutations on the catalytic activity of enzymes. This work is a part of a study aimed at elaboration of the concept and methods of personalized medicine.

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Keywords

acetylcholinesterase, butyrylcholinesterase, carboxylesterase, high performance computing, individual sensitivity to drugs, molecular dynamics, molecular modeling, molecular polymorphism of enzymes, personalized medicine