Oral bioavailability of chemicals is a very important pharmacokinetic parameter in drug development. To reach the target enzyme in the human body, drugs have to cross barriers by passive diffusion or carrier-mediated uptake. The 1-octanol-water partition coefficient, log P, is well-known as one of the principal parameters to estimate lipophilicity (or solubility in lipids) of chemical compounds and, to a large degree, determines their pharmacokinetic properties. The log P is also used as one of the standard properties identified by Lipinski in the “rule of 5” for druglike molecules [1].

Both coefficients log P and log D are very important parameters in drug development [2] and thus, there is a need to develop new methods to accurately calculate them from chemical structures. Currently, the amount of publicly available experimental log P data comprises tens of thousands of compounds. [3]. These resources stimulated development of a number of programs to calculate it[4][5][6][7][8][9].

There are lot many methods to predict selected physicochemical properties of compounds, particularly Lipophilicity and aqueous solubility. These two properties are supported with the largest experimental datasets collected by industry and publicly available databases, for example, PHYSPROP, ChEMBL, AQUASOL etc.

The QSAR/QSPR methodology being developed forms a solid basis for the creation of a genuine chemical artificial intelligence. Supported by advancements in computer hardware and software technology, it is now realistic for a generation of computational chemists to tackle this scientific challenge. The use of massive parallel processing, together with the QSAR and quantum chemistry-based data mining, and case-based and rule-based reasoning technologies, should enable an effective approach to the so-called reverse problems - the reliable prediction of chemical structures with predetermined chemical, physical, and technical properties[10].
The electrotopological state (E-state) indices were introduced by Hall and Kier[11][12] for the description of molecules. These indices combine together both electronic and topological characteristics of the analyzed molecules. For each atom type in a molecule the E-state indices are summed and can be used in a group contribution manner. Such indices are known as atom-type E-state indices[13]

The current study has witnessed the applicability and power of the quantitative structure-activity relationship approach for the prediction of very diverse technology-related properties of chemical compounds and materials. The substantial progress in the development of new, more adequate molecular descriptors and methods of derivation of multiple linear and nonlinear relationships has altogether made it possible to predict the important properties of chemical compounds more accurately. In many cases, it has been observed that the QSAR/QSPR studies not only represent empirical equations for formal interpolation or extrapolation of missing data but they also allow to impend into the physical interactions and processes determining the properties of substances. At the same time, the ability to use exclusively theoretical molecular descriptors has provided the means to predict the properties for molecular structures that are difficult to measure experimentally or even for those not yet synthesized.

The ALOGPS program[13][14][15] has been developed using the associative neural network (ASNN) method [16][17] The ASNN provides a possibility to include new data into the memory of neural nets without retraining the neural networks themselves in the so-called LIBRARY mode (further LIBRARY).[14] The LIBRARY dramatically improved prediction of the ALOGPS program for the log P prediction using in- house data sets obtained from various online resources.

The current state-of-the-art in aqueous solubility calculations offers a wide range of methods that can predict results close to experimental accuracy. Virtual library creation, virtual screening technique was efficient way to screen large library in search of lead molecules. Still the basic limitation for academic researcher remains with the availability of the relevant Software. ADME intestinal Absorption and ADME Solubility are two important parameters predicted by only commercially available software Discovery studio. The DSA calculator created in present study was found able to predict both of these parameters depending upon use of freely available online Open source tools. Easy to use, user friendly workbench will be effective tools for non IT chemist and biologist for their drug discovery research work.
Conclusion

References:


