

This review article, "Multi-Parameter Optimization: Identifying high quality compounds with a *balance*

of properties" was published in Current Pharmaceutical Design (2012)

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(9) pp. 1292--1310. In it, we survey the range of methods used for MPO in drug discovery, compare their strengths and weaknesses and present some example applications.

### Abstract

A successful, efficacious and safe drug must have a balance of properties, including potency against its intended target, appropriate absorption, distribution, metabolism, and elimination (ADME) properties and an acceptable safety profile. Achieving this balance of, often conflicting, requirements is a major challenge in drug discovery. Approaches to simultaneously optimizing many factors in a design are broadly described under the term 'multi-parameter optimization' (MPO). In this review, we will describe how MPO can be applied to efficiently design and select high quality compounds and describe the range of methods that have been employed in drug discovery, including; simple 'rules of thumb' such as Lipinski's rule; desirability functions; Pareto optimization; and probabilistic approaches that take into consideration the uncertainty in all drug discovery data due to predictive error and experimental variability. We will explore how these methods have been applied to predicted and experimental data to reduce attrition and improve the productivity of the drug discovery process.

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