

Beyond the century of the Michaelis-Menten equation

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ABSTRACT

Examining enzyme kinetics is critical for understanding cellular systems and for using enzymes in industry. The Michaelis-Menten equation has been widely used for over a century to estimate the enzyme kinetic parameters. However, this canonical approach works in limited conditions, such as when there is a large excess of substrate over enzyme. To overcome such limitations of the canonical approach, here we use an equation derived with the total quasi-steady-state approximation. In contrast to the canonical approach, estimates obtained with this proposed approach exhibit little bias for any combination of enzyme and substrate concentration. Importantly, this new approach provides much more accurate estimation of drug clearance rate in human liver than the canonical approach.