Binding Free Energy Redefined: Accurate, Fast and Scalable

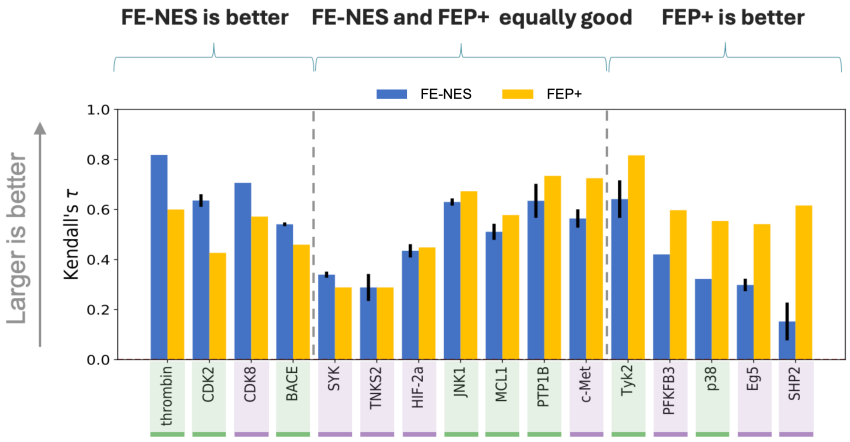
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Summary:

- OpenEye's Free Energy Non-Equilibrium Switching (FE-NES) accurately ranks ligands by their relative binding free energies to accelerate lead optimization.
- Calculate hundreds to thousands of compounds in a few hours with cloud-scale parallelization.
- Maximize throughput and speed with efficient simulations.

Product Keywords: Orion®, MD, Free Energy Non-Equilibrium Switching (FE-NES)



FE-NES delivers best in class speed and best in class scale while rank-ordering molecules to provide decision support that is competitive with any other physics-based affinity prediction tool. Data sets originally curated in [1, 2].

Computational estimation of ligand-protein binding free energies is essential in the lead optimization phase of drug discovery for both industry and academia. Industry scientists have reported that OpenEye's Free Energy Non-Equilibrium Switching (FE-NES) offers accurate ranking while delivering better speed and scale compared to traditional methods like free energy perturbation and thermodynamic integration, which typically require extensive sampling near equilibrium.

FE-NES implementation on the Orion® molecular design cloud platform provides a ready-to-use solution. This enables automated calculations, from hundreds to thousands of compounds, in just a few hours. It is an ideal tool for daily lead optimization tasks.

To evaluate free energy prediction accuracy, we use the Kendall's tau rank-order correlation coefficient, which measures how closely predicted results align with experimental data. FE-NES delivers accuracy on par with industry-leading solutions.

Users can adjust FE-NES switches to balance accuracy and throughput, optimizing hundreds to thousands of molecules in real time to meet tight drug discovery project timelines. With various map types (OELOMAP, multi-star map, etc.) and an interactive interface, users can leverage their expertise to make confident design decisions without the typical computational bottleneck.

[1] Wang et al., 2015, *J. Am. Chem. Soc.*, 137: 2695
[2] Schindler et al., 2020, *J. Chem. Inf. Model.*, 60: 5457

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