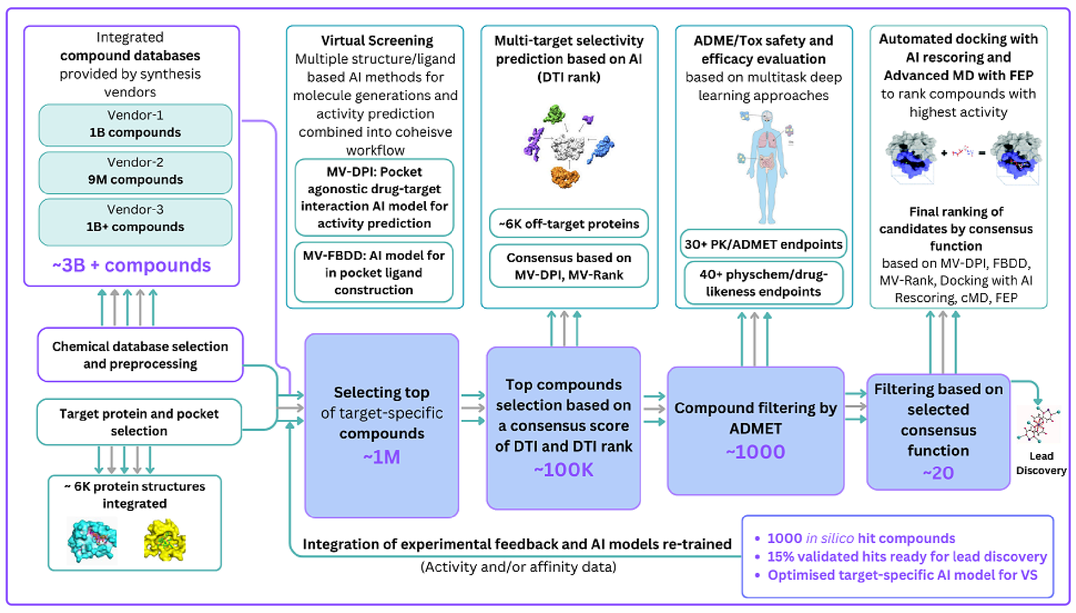
CASE STUDIES: AI & Computational Chemistry for BioPharma R&D

De-novo Drug Discovery

- **Therapeutic Area:** Oncology
- **Context:** Assist in the development of a de-novo molecule in oncology
- **Objective:** Utilize advanced NLP/ML and MD technologies to identify and optimize lead oncology entities targeting a specific regulatory protein, streamlining candidate selection for preclinical development through sophisticated simulations and energy calculations

Method

1. Utilized advanced NLP/ML modules to build a probe for potential binding site
2. Leveraged on advanced MD (molecular dynamics) technology to enhance sampling methods through biased/un-biased equilibrium & non-equilibrium solutions
3. Reparametrized force fields to overcome limitations in current simulation tools
4. Determined binding free-energy through free-energy calculations



Flow

Allosteric Site Characterization

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Generative AI Based FBDD Module

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RL based optimization loop

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Advanced MD Refinements

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Hit Expansion and Lead Optimization

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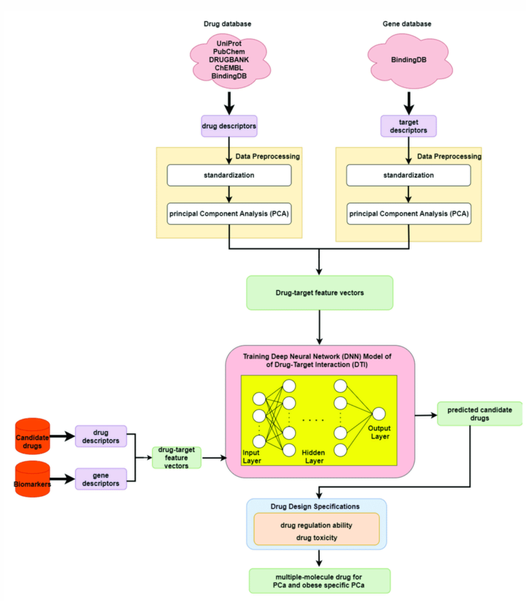
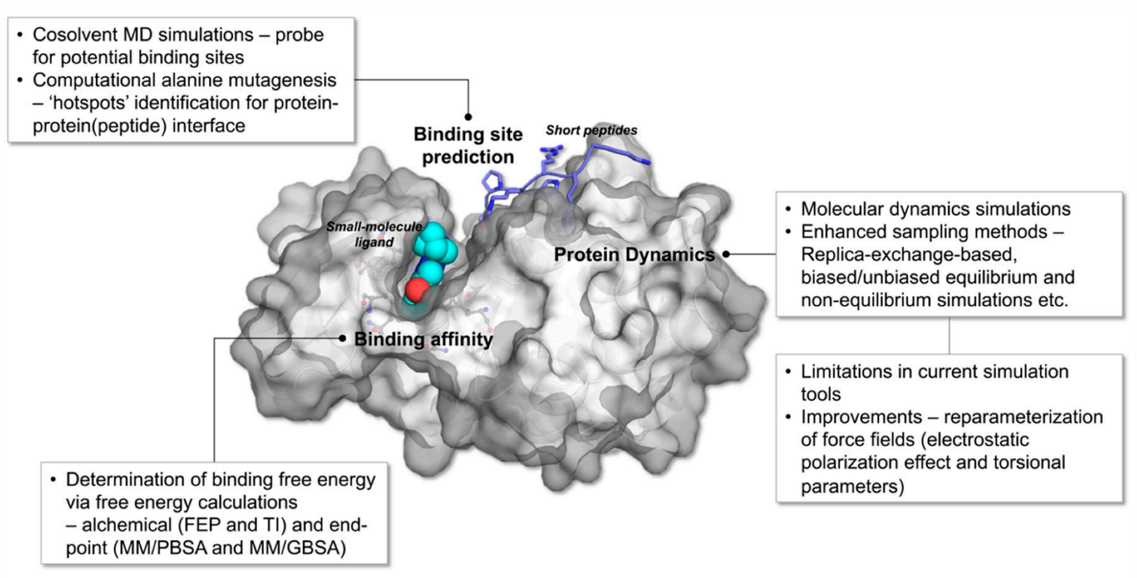
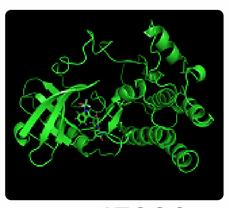
Candidate Selection





Results

- Created a library of novel fragments targeting allosteric sites with high specificity and stitched them into molecules
- Identified lead entities exhibiting optimal interaction with the regulatory protein's binding site of interest
- Streamlined selection of viable candidates ready for preclinical development pathways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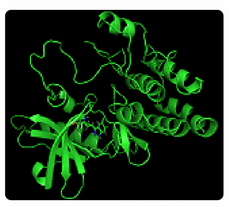
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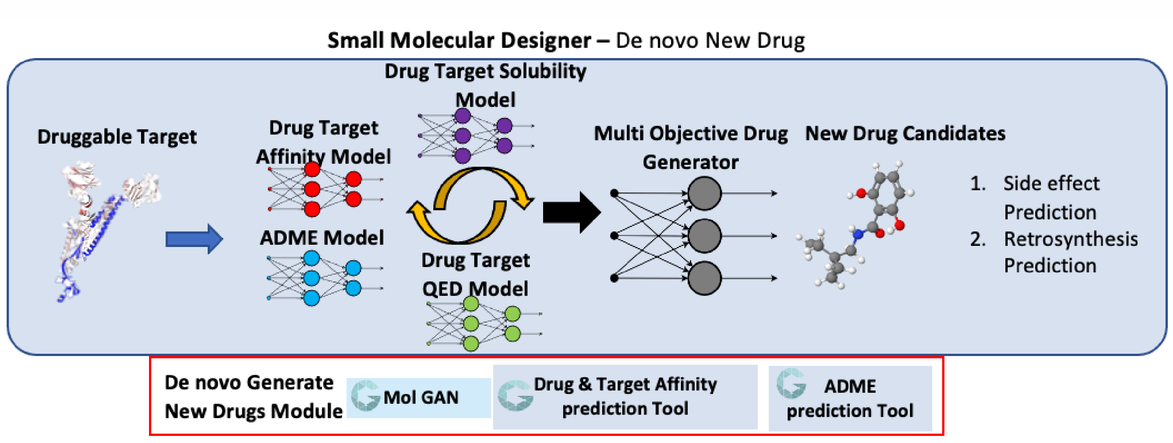

Compounds	FEP Score
Reference Compound	-15.1 kcal/mol
De novo Molecule 1	-14.3 kcal/mol
De novo Molecule 2	-16.5 kcal/mol
De novo Molecule 3	-16.01 kcal/mol