Enveda Biosciences
www.envedabio.com

Unlocking the natural world to search for new medicines

Enveda Biosciences combines machine learning and complex naturally-based libraries of compounds to find potential hits and leads for previously undruggable targets and to uncover novel mechanisms of action.

While many drug companies avoid targets deemed 'undruggable', US-based Enveda Biosciences attacks them head on. Founded in 2019, Enveda uses unique libraries and machine-learning technologies to address the toughest problems in biopharma by leveraging solutions found in nature.

"The libraries of molecules screened by most biopharma companies to find new drugs occupy a smaller region of chemical space and are generally made up of synthesized molecules. These molecules fail to represent the full scope of possible solutions, which may limit their chances for success in a clinical trial," said Viswa Colluru, founder and CEO of Enveda. "We are looking in different spaces, at unique molecules in natural mixtures. This rich, chemically diverse space of natural metabolites allows us to find those compounds that interact with undruggable targets that do not respond to synthetic small molecules."

Capturing the opportunity

Between a third and a half of approved small-molecule therapeutics are derived from natural sources, but only a small proportion of the natural compounds have been identified and screened. To access these potential therapeutics, Enveda created a metabolomics and machine-learning discovery platform based on a metabolite library, proprietary screening technologies, and an in silico-prioritization engine (Fig. 1).

Starting with its diverse library of plant metabolites that have a history of therapeutic use, Enveda profiles thousands of complex samples through tandem mass-spectrometry (MS2). Enveda can predict chemical properties and molecular structure from spectra using its deep-learning models. It then annotates each metabolite's function through high-throughput screening methods that link each molecule with bioactivity assays and organ-distribution experiments.

"All proteins in our cells, even 'undruggables', are bound by something, often a small molecule waiting to be discovered," said Colluru. "Traditional approaches to drug screening, which require repeated iterations of extraction and isolation of individual compounds, followed by analysis and database matching, are time consuming and costly. We can interrogate the library and predict which fragment in a mixture is active, without needing to isolate and purify individual molecules. This allows us to carry out drug discovery with multiple compounds in parallel. We have the technology to find the needles, no matter what's in the haystack."

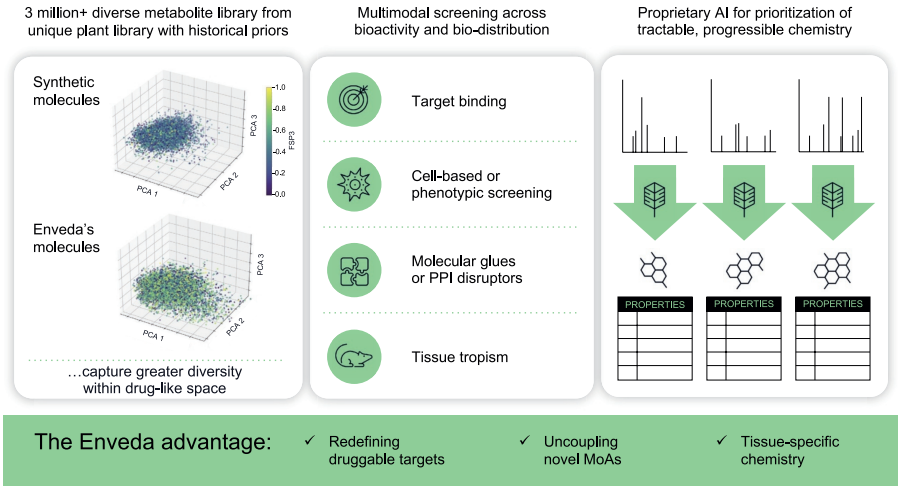

Fig. 1 | Enveda's metabolomics and machine-learning discovery platform. AI, artificial intelligence; MoA, mechanism of action; ppi, protein-protein interactions.

Interrogating the dataset

Enveda has designed its annotated dataset to be searched based on principles of language. Information on the chemical structure of a compound is contained in the patterns of MS2 spectra, where fragments can be interpreted only in the context of other fragments: similar to the way in which the context of a word matters according to where it is placed in a sentence.

"Our large language models look at fragment sequences and predict properties, interrogating the databases in much the way that search engines interrogate the internet," said Colluru.

Users input the features they need from a small molecule to find potential hits and leads. A user might search for the molecule's activity in one bioactivity assay but not in another, its organ bioavailability, and its desired chemical properties. For example, Enveda scientists can search for an inflammasome inhibitor that is free of any toxicity signal and that displays bioavailability in the brain. These queries are executed with the ease of a Google search.

Building a pipeline

Enveda's approach uses differentiated technologies for discovering and developing new therapeutics with a near-term focus on inflammatory, neurosensory, and fibrotic diseases.

Enveda closed a $68 million financing round in December 2022. This will fund the advancement of lead compounds in the pipeline into clinical candidacy across several important targets and pathways, including cytokine-receptor interactions, G protein-coupled receptors (GPCRs), and the inflammasome pathway. It also will allow the company to scale its platform across emerging areas, including protein degradation and stabilization.

Working with partners

Enveda is looking to develop its pipeline in collaboration with pharma partners, as well as to help potential partners populate their own pipelines. The aim is to find the right strategic partner for pipeline programs to maximize the assets' value and access complementary expertize, especially in clinical development and commercialization. Other go-to-market strategies may include creation of joint ventures and portfolio companies.

"We will also seek partners for our platform technology in fields outside our core therapeutic areas, such as neuroinflammation and oncology," said Colluru. "We can work quickly and at scale, and find molecules that have a better chance of working in people. If you have an unknown or undruggable target or interesting biology, we will endeavor to solve your problem."

CONTACT
Vanitha Sekar, CBO
Enveda Biosciences
Boulder, CO, USA
Tel: +1-908-723-0035
Email: vanitha.sekar@envedabio.com