

BioSpect

the business of Bio

24 years of leveraging the business of Bio
www.biospectrumindia.co

Harnessing AI for Drug Discovery: Positioning Indian Pharma as Global Innovation Powerhouse

08 May 2026 | Views | By Vipul Kashyap, Advisor IAIRO and CEO MedHive.AI and Dr. Amit Sheth, Founding Director, IAIRO

For India, the technology is ready and the talent is available



India's pharmaceutical sector stands at a defining crossroads. The country supplies 20% of global generic drug demand and ranks as the third-largest exporter by volume. This is a remarkable achievement for a nation that built its pharmaceutical backbone on cost-efficient manufacturing. Yet, volume leadership has not translated into commensurate value: India ranks only 11th globally in export value. That gap tells the real story. To close it, India must move from being the world's pharmacy to becoming the world's pharmaceutical innovator. It demands a structural reset, one that repositions India higher in the global pharmaceutical value chain, from molecule synthesis to drug discovery itself - and artificial intelligence-based ecosystem is the engine that can drive that transition.

From Volume to Value: The Agentic AI Ecosystem Dividend

The economics of drug development have long been daunting. Traditional pipelines span 10 to 15 years and consume enormous R&D budgets, with much of that time and money lost to sequential, siloed workflows. AI and automation are already beginning to compress those timelines to 9 to 13 years, while R&D-to-launch costs have declined from the 20–30% range to 15–25% as AI frees research teams from routine analytical tasks.

The deeper transformation, however, is architectural and systemic. AI enables a shift from linear handoffs where discovery, chemistry, manufacturing and controls (CMC), and clinical workstreams pass the baton one at a time to integrated platforms. These disciplines can run in a hub and spoke model based on self-organizing agentic architectures. Teams can self-organize in a dynamic manner around specific business and scientific goals, e.g., novel targets and molecules, new market launch, regulatory approvals, etc.

There is a need for building a collaborative ecosystem where multiple pharma companies contribute based on pre-determined incentive structures to minimize risk for the individual organization and improve the chances of success at the systemic or national level. The ability to develop and share AI-based assets such as Small Language Models (SLMs), Knowledge Graph (KGs), Agentic Skills and Agents in a collaborative architecture is key to the success of this effort.

Precision Assets for Drug Discovery: SLMs, KGs, Agentic Skills and Agents

For the specific, high-stakes demands of drug discovery, Small Language Models (SLMs) combined with Knowledge Graphs (KGs) represent a far more precise and practical toolkit. SLMs are trained on curated, drug-discovery specific datasets making them better calibrated for scientific and clinical contexts. Knowledge Graphs complement SLMs by providing structured, query-able representations of biological and chemical relationships. They can be bootstrapped from publicly available ontologies and taxonomies, then iteratively enriched with proprietary institutional data.

When SLMs reason over KGs, the combination delivers explainable outputs grounded in enterprise-specific knowledge — dramatically reducing the hallucinations that make general-purpose AI unsuitable for regulated scientific environments.

The ability to encapsulate common drug discovery related tasks and capabilities into agentic skills and agents enable the ability for multiple pharma organizations to collaborate with each other by leveraging an agentic architecture. This will enable the Indian pharma ecosystem to come together to collaborate and share assets with each other to de-risk and increase the chances of success.

The CQuRATE Framework: Six Pillars for Global Leadership

Technology alone does not build global leadership. India's path to becoming a biopharmaceutical powerhouse requires coordinated action across six strategic pillars, captured in the CQuRATE framework.

Collaborative Ecosystem is critical to for Indian pharma to assume risk and make progress in becoming the drug discovery destination. An agent-based collaborative ecosystem will enable creation of cross-organizational dynamic teams – leading to risk reduction and increasing the chances of success.

Quality remains the foundation. India has made measurable progress — the share of US-FDA inspections resulting in Official Action Indicated (OAI) findings fell from 19% in 2013 to 9% in 2023. Closing the remaining gap with the global average of 4% will require AI-assisted quality management systems that catch deviations before they become violations.

Regulation is the next frontier. AI can significantly accelerate regulatory authoring, helping Indian companies reduce submission timelines and navigate complex multi-market requirements with greater consistency.

Access must remain central to India's pharma identity. Innovations that are affordable, scalable, and patient-centric are not only a moral imperative — they are a competitive differentiator in high-growth emerging markets.

Talent is perhaps India's most under appreciated asset in this context. With over 2.5 million STEM graduates annually, the country has the raw human capital to lead AI-driven R&D. The priority now is directing that talent pipeline toward pharmaceutical science and AI applications.

Entrepreneurial Innovation must be institutionalised through sustained policy support. Schemes like Biopharma Shakti, with a Rs 10,000 crore outlay, and the Production-linked Research and Innovation Program (PRIP) signal the right intent.

The Moment to Act

The ultimate value of SLM, KGs, Agentic Skills and Agents does not lie in replacing scientific and clinical judgment. It lies in augmenting it by improving workflow efficiency, safety adherence and the cross-pollination of ideas across research disciplines and organizations. For India, the technology is ready. The talent is available. The policy architecture is forming. What remains is the will to move beyond experimentation to cross-organisational collaboration and industrial-scale AI deployment and in doing so, claim a far larger share of the global pharmaceutical value pie.

Vipul Kashyap, Advisor, Indian AI Research Organization (IAIRO) and CEO MedHive.AI and Dr Amit Sheth, Founding Director, IAIRO