

# Massive Bio Publishes Prospective Study on AI-Driven Clinical Trial Matching in 3,804 Cancer Patients

*Neuro-symbolic AI achieves 4x faster trial matching with 17,000+ oncologist-confirmed matches, published in ESMO Real World Data and Digital Oncology.*

BOCA RATON, FL, UNITED STATES, April 9, 2026 /EINPresswire.com/ -- Massive Bio Publishes Peer-Reviewed Prospective Study Demonstrating AI Clinical Trial Matching Four Times Faster Than Conventional Methods

Study in ESMO Real World Data and Digital Oncology validates neuro-symbolic, multi-agent AI platform across 3,804 patients in routine oncology practice

Massive Bio, a global precision oncology company, today announced the publication of a peer-reviewed prospective study in ESMO Real World Data and Digital Oncology demonstrating that its neuro-symbolic, multi-agent AI platform can match cancer patients to clinical trials four times faster than conventional methods, with measurable accuracy, transparency, and equity in routine clinical practice.

The study, "Transforming oncology clinical trial matching through neuro-symbolic, multi-agent AI and an oncology-specific knowledge graph: a prospective evaluation in 3,804 patients," appears in the journal's special issue on Artificial Intelligence in Clinical Oncology.

Prospective, Real-World Evidence

Unlike most published AI clinical trial matching studies, which rely on retrospective chart reviews or simulated cohorts, Massive Bio's evaluation was conducted prospectively across 3,804 patients with metastatic cancer during routine oncology practice in 2024. The system processed



more than 157,000 clinical document pages and generated over 17,000 oncologist-confirmed trial matches.

Key performance metrics:

- 4x reduction in matching time, from approximately 120 minutes to ~30 minutes per patient
- F1 score of 0.82 with sensitivity and specificity both at 0.84, outperforming zero-shot GPT-4, chain-of-thought, and GPT-4o baselines
- 17,000+ oncologist-confirmed matches validated in real-world clinical workflows
- Equity preserved: no demographic or disease subgroup exceeded a 10-point performance gap

## A New Architecture for Oncology AI

The study introduces and validates a three-agent architecture that moves beyond the limitations of standalone large language models. The system combines agentic decomposition, separating extraction, normalization, and reasoning into distinct operations; an oncology-specific knowledge graph for deterministic and auditable logic; and a human-in-the-loop safety layer ensuring clinician oversight at the point of decision.

This neuro-symbolic approach addresses a core challenge: oncology trial eligibility is not a text-generation problem. It requires structured reasoning across temporal constraints, biomarker dependencies, exception logic, and fragmented longitudinal records, precisely the domain where knowledge-graph grounding outperforms probabilistic inference alone.

## Leadership Commentary

"This publication draws a line. We are no longer debating whether AI can work in oncology clinical trial matching. We are demonstrating how it works, at scale, in routine practice, with transparent and auditable results. The architecture matters as much as the outcomes: neuro-symbolic, multi-agent systems grounded in domain-specific knowledge graphs are the infrastructure layer oncology has been missing. This is how we begin to close the gap where only 3-5% of cancer patients access clinical trials."

— [Arturo Loaiza-Bonilla](#), MD, MEd, FACP, Co-Founder and Chief Medical AI Officer, Massive Bio; Systemwide Chief of Hematology and Oncology, St. Luke's University Health Network

"What differentiates this work is its prospective design and the rigor of the validation framework. We evaluated the system against real oncologist decisions, not curated benchmarks. An F1 of 0.82 across more than 17,000 confirmed matches reflects what the platform delivers when embedded in actual clinical operations. Equally important, we designed the evaluation to surface equity gaps before they become entrenched."

— [Selin Kurnaz](#), PhD, Co-Founder and CEO, Massive Bio

"Building AI that performs well in a controlled setting is a solved problem. Building AI that performs reliably across thousands of patients with fragmented, incomplete, and heterogeneous clinical data, that is the engineering challenge this paper addresses. Our three-agent architecture was designed from the ground up to handle the scale, complexity, and safety requirements of real-world oncology. The knowledge graph is not an add-on; it is the backbone that makes the system auditable, deterministic where it must be, and resilient to the noise that defines real clinical data."

— [Çağatay Çulcuoğlu](#), Co-Founder, CTO & COO, Massive Bio

Aligned with ESMO's Framework for AI, Real-World Data, and Equity

The study directly addresses three pillars central to ESMO's framework. On real-world data, the study is grounded in prospective evidence from routine clinical care, not curated datasets or retrospective cohorts. On artificial intelligence, the neuro-symbolic, multi-agent architecture combines LLM-based extraction with knowledge-graph reasoning and clinician oversight, delivering the transparency and auditability ESMO identifies as prerequisites for clinical AI adoption. On equity, the evaluation was explicitly designed to measure performance across demographic and disease subgroups, with a pre-specified threshold that no group could exceed a 10-point performance gap.

Addressing the Clinical Trial Access Gap

Only an estimated 3-5% of adult cancer patients in the United States enroll in therapeutic trials. The primary barrier is not a shortage of available studies, but the operational burden of matching individual patients to trials with increasingly complex eligibility criteria across fragmented health records. Massive Bio's platform functions as clinical infrastructure embedded in oncology workflows, operating at the speed of clinical decision-making. The company has onboarded more than 200,000 cancer patients and matches across 19,000+ active interventional oncology and hematology trials worldwide.

About Massive Bio

Massive Bio, co-founded by Selin Kurnaz, Arturo Loaiza-Bonilla, and Çağatay Çulcuoğlu, transforms the pharmaceutical value chain with AI-driven solutions. As an AI-enabled real-world data company, Massive Bio streamlines patient journeys, improves access to cutting-edge treatments, and optimizes clinical trial operations across 17 countries. A recipient of the DiMe Seal, the Digital Medicine Society's independent quality certification covering clinical evidence, privacy, security, and usability, Massive Bio is listed in the CMS Medicare App Library, connecting its platform to more than 68 million Medicare beneficiaries. A founding member of the CancerX public-private partnership and participant in the White House Cancer Moonshot initiative, the company leads the way in ethical AI and data-driven innovation. For more information, visit [www.massivebio.com](http://www.massivebio.com).

## Publication Reference

Loaiza-Bonilla, A., Yost, C., Kurnaz, S., et al. (2026). Transforming oncology clinical trial matching through neuro-symbolic, multi-agent AI and an oncology-specific knowledge graph: A prospective evaluation in 3,804 patients. *ESMO Real World Data and Digital Oncology. Special Issue: Artificial Intelligence in Clinical Oncology.*

Full text: [https://www.esmorwd.org/article/S2949-8201\(26\)00025-1/fulltext](https://www.esmorwd.org/article/S2949-8201(26)00025-1/fulltext)

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