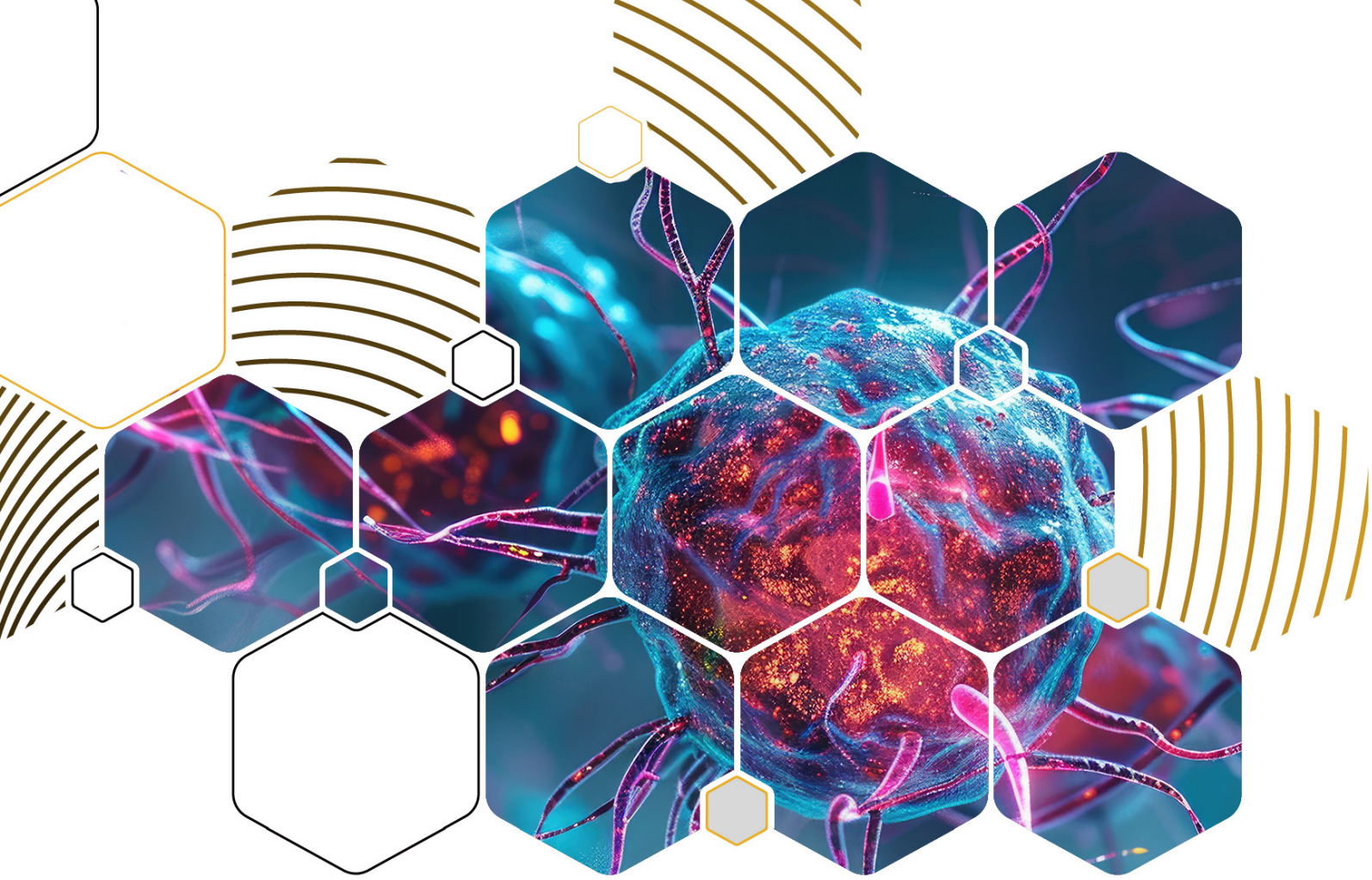

Collaboration Spotlight: iOncologi

How SandboxAQ and iOncologi are Accelerating Cancer Treatment with AI-Driven Drug Discovery for Glioblastoma

SANDBOXAQ

Partner

iOncologi, Inc.

Organization

iOncologi is a clinical-stage biopharmaceutical company developing AI-enabled immunotherapies that combine immune intelligence, precision delivery, and advanced therapeutic design to overcome barriers in treating aggressive tumors like glioblastoma.

Industry

Biopharma

Application Area

Cancer Immunotherapies

The biopharmaceutical industry is in a constant race to discover and develop life-saving therapeutics. For companies like iOncologi this means leveraging cutting-edge technology to tackle some of the most challenging diseases, such as glioblastoma, an aggressive and fatal brain cancer.

SandboxAQ is partnering with iOncologi in a collaboration to significantly accelerate the path to new, more effective mRNA-based therapeutics for glioblastoma, with the goal of advancing a lead candidate to the clinic within 18 months. This lead candidate for glioblastoma will selectively engage tumor-specific antigens and innate immune sensors to condition patients' immune systems for a durable anti-cancer response.

A Devastating Cancer with Limited Options

Glioblastoma is the most common and aggressive malignant brain tumor in adults, accounting for about 15% of all primary brain tumors. With approximately 300,000 new cases and over 200,000 deaths worldwide each year, individuals diagnosed with glioblastoma typically survive less than two years due to limited treatment options. This aggressive cancer's rapid progression and high mortality rate underscore the urgent need for transformative therapies.

> Glioblastoma's rapid progression and high mortality rate make it one of the most devastating cancers in the world. Our collaboration with iOncologi aims to create a new and effective treatment for this challenging condition, pairing the most comprehensive oncology datasets with advanced quantitative AI tools and simulation techniques, greatly accelerating the drug discovery process. —**Jack Hidary**, CEO of SandboxAQ

Leveraging the Immune System Against a Formidable Foe

iOncologi, led by CEO Dr. Edgardo Rodriguez-Lebron, has been a pioneer in developing precision immunotherapies that aim to reprogram the immune system to target tumors previously considered untreatable. Their initial work involved software to predict RNA sequences for therapeutics that will be most immunogenic (Trivedi, Yang, et al., Genome Medicine, 2024). Unlike preventative mRNA therapeutics (like COVID-19 mRNA-lipid nanoparticles), these therapeutics aim to train the body's immune system to attack existing cancer cells. However, developing effective cancer immunotherapies, especially for complex tumors like glioblastoma, presents significant hurdles:

- **Identifying optimal immunogenic targets**
  Pinpointing the specific mRNA sequences within a tumor that will provoke a strong and effective immune response is incredibly challenging and complicated by the fact that cancer originates from the body's own cells, meaning the immune system has difficulty recognizing them as foreign.
- **Addressing tumor heterogeneity and rapid mutation**
  Cancer cells mutate rapidly, leading to highly diverse populations of cells within a single tumor and across different patients. A truly effective therapeutic must be able to target this diverse landscape.
- **Overcoming biological barriers**
  Brain tumors are often shielded by the blood-brain barrier, making drug delivery challenging.
- **Achieving scalability and efficiency**
  Translating a promising prototype into a robust, scalable solution for clinical trials and widespread patient application is a significant undertaking. The original O.R.A.N. pipeline, while groundbreaking, was not designed for rapid iteration.

AQBioSim Powers the Luminos Pipeline

SandboxAQ is collaborating with iOncologi to overcome these challenges by re-engineering and enhancing the core technology. This partnership leverages the AQBioSim platform, which uses Large Quantitative Models (LQMs) grounded in physics, chemistry, and biology to power a new, highly efficient, and modular platform for iOncologi, called Luminos. The new pipeline is a significant advancement that redefines the ability to rapidly iterate and scale in pharmaceutical innovation. Engineered with modularity at its core, it offers unprecedented dial-like functionality. This drastically reduces the time and complexity associated with refining therapeutic designs, empowering researchers to swiftly integrate new insights.

The project is set to redefine mRNA-based therapeutic production for oncology. Instead of costly individualized therapeutics, it identifies common immunogenic mRNA combinations across patient populations. This enables creating off-the-shelf therapeutics that are both highly effective and scalable for specific cancer types.

> Our current efforts focus on glioblastoma, leveraging comprehensive patient datasets from approximately 120 patient samples to represent the typical characteristics of glioblastoma tumors. This approach allows us to develop scalable, 'off-the-shelf' mRNA therapeutics by identifying common therapeutic targets across patient populations.
>
> —**Dr. Jennifer Schreiber,** a contributor to the project from SandboxAQ

The efficiency and predictive power of Luminos translate directly into accelerated preclinical development. iOncologi can now rapidly generate and test promising mRNA cargo combinations, bringing critical therapeutics to patients faster than ever before. This represents a strategic advantage in the race to deliver life-saving treatments.

> iOncologi is reimagining cancer immunotherapy by integrating immune intelligence, mRNA engineering, and drug delivery platforms into universal and adaptable, patient-specific treatment models. By combining this with SandboxAQ's ability to model and rapidly optimize molecules across vast chemical and biological spaces, we are well-positioned to advance a truly transformative therapeutic for glioblastoma, and eventually for other treatment-resistant solid tumors.
>
> —**Dr. Edgardo Rodriguez-Lebron**, CEO of iOncologi

A New Era for Cancer Treatment

The collaboration between SandboxAQ and iOncologi is already yielding impressive results, pushing the boundaries of what's possible in drug discovery. The Luminos pipeline is nearing completion and is poised to deliver its first cargo predictions to iOncologi for in vitro and in vivo testing this year. This rapid turnaround underscores the transformative power of SandboxAQ's advanced computational capabilities.

This accelerated timeline means:

- **Faster progression to clinical trials**
  The joint program aims to deliver a lead therapeutic candidate into the clinic within 18 months, a significantly reduced timeframe compared to traditional drug development.
- **Reduced development costs**
  The efficiency of the Luminos pipeline minimizes the extensive resources typically required for drug discovery and optimization.
- **Broader applicability**
  While initially focused on glioblastoma, the modular nature of Luminos means it can be adapted to analyze data from other tumor types, potentially leading to therapeutics for a wider range of solid tumors.

By combining iOncologi's pioneering biological insights and clinical expertise with SandboxAQ's cutting-edge AI and quantum-inspired computational methods, this collaboration goes beyond just accelerating a single therapeutic. It is establishing a new paradigm for how biopharma companies can leverage deep tech to bring life-saving treatments to patients faster and more efficiently. The partnership between SandboxAQ and iOncologi is a powerful example of how AI-driven drug discovery is reshaping the future of medicine, offering new hope for patients battling aggressive diseases like glioblastoma.