

Nospharma

Category:

Best Startup

Company Name:

Nospharma

Turnover and/or Funding:

N/A

Sub-Category:

Biotechnology

Corporate history (creation, key milestones, main funding,...)Information on Condition / Disease and need for solution / product (prevalence, existing treatments / solutions):

Nospharma is a Montreal-based biopharmaceutical startup developing the first-ever therapy for Fragile X Syndrome (FXS). Launched from foundational neuroscience research at McGill University in 2022 by Co-Founders Anmol Nagpal (CEO) and Dr. Derek Bowie (CSO), Nospharma is tackling the leading genetic cause of intellectual disability and autism.

Fragile X Syndrome is a severe, lifelong neurodevelopmental disorder affecting approximately 1 in 6,000 births, with an estimated 80,000 patients in the United States and a similar number in Europe Big 5 countries. Diagnosed in early childhood, patients suffer from significant intellectual disability, severe autism, anxiety, speech and motor impairments, and sleep disorders, requiring life-long and constant care from family and healthcare professionals. Despite its prevalence and severity, there are no approved treatments on the market today. The current standard of care involves a cocktail of medications that only manage individual symptoms, failing to address the underlying pathology of FXS. This leaves a critical unmet medical need for FXS patients.

Nospharma's core innovation is the discovery that FXS symptoms stem from two distinct brain problems: an exaggerated mGluR5 signaling pathway and a complete loss of nitric oxide signaling. Together these biological pathways control brain cell communication and the delivery of blood flow to achieve it. Our lead candidate, NOS-01, is a novel combination therapy designed to correct both of these deficits

simultaneously. NOS-01 uniquely combines a repurposed, FDA-approved drug with a clinically tested (but never before unmarketed) compound, creating a de-risked safety profile and a faster, more cost-effective path to market while conserving competitive barriers. Particularly, NOS-01 is blocked from generic substitution, ensuring strong market exclusivity.

Since its inception, Nospharma has achieved significant milestones:

1. **Funding:** The company is currently raising a \$2M seed round to achieve IND clearance from the FDA within 18–24 months. We have already secured commitments of 50% of the round, including from a Philadelphia-based lead investor, and have obtained an additional \$400k in non-dilutive funding from patient foundations and incubators.
 2. **Intellectual Property:** We have secured robust IP protection, with a method-of-use patent pending at the National Phase in the US, EU, and Canada, and a strategy for expansion into five other major markets.
 3. **Team:** Our leadership team possesses decades of targeted experience. This includes co-founders with deep FXS neuroscience expertise from McGill, a Head of Corporate Development, David Baker, who commercialized blockbuster drugs Adderall XR® and Vyvanse®, and a regulatory head, Dr. Hagit Marchaim, with over 20 years of experience, including in FXS and combination therapies.
 4. **Pipeline Expansion:** Through funded partnerships with the SYNGAP Research Fund and CureGRIN Foundation, we are validating NOS-01 for additional rare brain disorders, demonstrating a clear strategy for life-cycle management.
- Nospharma is poised to transform the therapeutic landscape for FXS and beyond, offering hope to thousands of patients and families awaiting a meaningful treatment.

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History of the development of the solution/product (Intellectual Property, preclinical and clinical datas, development collaborations):

Nospharma is developing NOS-01, a highly promising therapeutic for FXS, the leading genetic cause of intellectual disability and a multi-billion-dollar orphan market with no approved treatments. The company's approach is built on a novel and compelling scientific hypothesis, positioning NOS-01 as a potentially transformative treatment for patients.

The scientific foundation for NOS-01 originates from Dr. Derek Bowie's lab at McGill

University, which identified that FXS involves two distinct biological problems: the well-known exaggerated mGluR5 signaling that impairs cell-to-cell communication, which he identified has implications in new brain regions and cell types important for driving altered behavior in FXS. In addition, Dr. Bowie identified a newly discovered deficit in nitric oxide-mediated neurovascular coupling, identifying reduced blood flow during active cell-cell communication to those same brain regions. These findings served as the basis for NOS-01, our a fixed-dose combination of an mGluR5 inhibitor (mavoglurant) and a PDE5 inhibitor (tadalafil) uniquely designed to correct both of these core deficits simultaneously.

This dual-mechanism approach is supported by a robust preclinical data package in the gold-standard FXS mouse model. In electrophysiology studies, the combination therapy demonstrated clear synergy, achieving a full rescue of synaptic plasticity-an effect that neither drug component could achieve on its own. Furthermore, the treatment successfully rescued deficits in neurovascular coupling, restoring blood flow response, and normalized key disease-relevant behaviors, including sensorimotor gating and hyperactivity.

The clinical development path for NOS-01 is significantly de-risked from a safety and capital perspective. Both of its components have extensive prior human safety data. Tadalafil is an FDA-approved drug with a well-documented safety profile in pediatric populations at doses higher than those proposed for NOS-01. Mavoglurant, while unmarketed, was found to be well-tolerated in previous large-scale FXS trials involving children, even at doses eight times higher than planned for NOS-01. Further, though not found effective in treating FXS as a monotherapy, long-term open-label extension studies indicated signals of effectiveness in patients. This established safety profile of both drugs in human populations allows for a faster and more capital-efficient development timeline, with an estimated cost of \$2 million to reach a Phase 2 trial, compared to \$15 million for a new chemical entity.

Nospharma has established a formidable competitive moat. Its intellectual property strategy includes a pending method-of-use patent and a planned fixed-dose combination patent, projecting market exclusivity until 2040. Critically, the inclusion of mavoglurant, an unmarketed compound, creates a powerful structural barrier that prevents generic substitution. Any competitor would be forced to undertake a full, high-cost development program rather than simply combining generic drugs off-label. This unique combination of innovative science, compelling preclinical results, a de-risked clinical path, and strong barriers to entry positions NOS-01 as a leading candidate to address the significant unmet need in the FXS community.

Why this drug or device is innovative, the broad implications for future research, and/or how it will improve the human condition:

Nospharma's NOS-01 represents a landmark innovation in the treatment of Fragile X

Syndrome (FXS), the leading genetic cause of intellectual disability and a primary monogenic cause of autism. For a community with no approved therapies, NOS-01 offers more than just a new treatment candidate; it provides a new understanding of the disease itself, with the potential to dramatically improve the lives of thousands of patients and their families.

The core innovation of NOS-01 stems from a scientific breakthrough that solved a long-standing puzzle in FXS research. For years, the field focused on the "mGluR theory," which correctly identified exaggerated synaptic signalling as a key problem but led to a string of clinical trial failures with mono therapies. The discovery underpinning NOS-01 revealed this was only half the story. The team in Dr. Derek Bowie's Lab were the first to identify a second, critical deficit in Fragile X: a failure in neurovascular coupling between the NMDA receptor and nitric oxide signalling, meaning the brain's neurons are starved of the blood flow and nutrients needed to function during the cell-cell communication that drives normal human behavior.

NOS-01 is the first therapeutic rationally designed to address this newly understood "dual deficit." It combines an mGluR5 inhibitor (mavoglurant) to correct synaptic communication with a PDE5 inhibitor (tadalafil) to restore vital blood flow, elegantly reframing prior failures as evidence for the necessity of this dual-mechanism approach. This synergistic strategy is validated by the aforementioned and compelling preclinical data.

The success of NOS-01 would have profound implications beyond FXS. It would establish a new research blueprint for other complex neurodevelopmental disorders like SynGAP1 and GRIN disorders, encouraging drug companies and scientists to investigate the interplay between neuronal signalling and vascular health, and push them to more readily consider dual-mechanism approaches to treating complex neurodevelopmental conditions.

Ultimately, the promise of NOS-01 is measured by its potential to improve the human condition. For individuals with FXS, a successful therapy means more than managing symptoms; it means the possibility of enhanced learning, improved communication, reduced anxiety, and greater social engagement. It offers the potential for children to form meaningful friendships and for adults to achieve greater independence. By targeting the newly identified biological basis of FXS, NOS-01 stands as a beacon of hope, built on a foundation of brilliant science, with the potential to deliver a transformative improvement in quality of life for patients and their families.

Please provide appropriate references (PubMed, Abstract, Website):

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