From Code to Cure: Accelerating Oligonucleotide Design with AI

An Advanced AI Platform for Rapid, Precise Engineering of Oligonucleotide Therapeutics

SAN FRANCISCO , CA, UNITED STATES, December 12, 2025 /EINPresswire.com/ -- Ainnocence, a California-based biotechnology company pioneering AI-native drug design is expanding nucleic acid engineering platform built to accelerate the discovery and optimization of mRNA, siRNA, antisense oligonucleotides (ASOs), aptamers and programmable RNA constructs. This next-generation system combines generative AI with large-scale molecular simulation, enabling developers to design safer, more stable and more precisely targeted oligonucleotide therapeutics.

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> *Dr. Lurong Pan, CEO of Ainnocence*

Oligonucleotide engineering has traditionally been slowed by challenges in sequence selection, immunogenicity, durability, manufacturability, and delivery compatibility. Ainnocence's platform addresses these limitations through a sequence-first approach that evaluates millions to billions of candidates in silico, identifying the optimal therapeutic designs long before laboratory testing begins.

"We convert years of discovery into hours of design, creating programmable, sequence-driven therapies for even the most elusive targets" said Lurong Pan, PhD, Founder and CEO of Ainnocence. "SenseAI enables large-scale, rational engineering of oligonucleotide therapeutics with precision, speed and predictive reliability. The result is a path to therapies that once seemed unattainable."

Rewriting the Oligonucleotide Design Process

Ainnocence's nucleic acid platform advances several core areas critical for therapeutic success:

• mRNA optimization that fine-tunes codon usage, UTRs, structural motifs, and expression efficiency to maximize stability and control immune signaling.
• siRNA and ASO design enhanced by off-target minimization, guide-strand tuning, and delivery-ready sequence architecture.

• Aptamer engineering using structural modeling and generative algorithms to identify high-affinity binders with improved stability and specificity.
• Delivery-aware modeling informed by compatibility with lipid nanoparticles and emerging delivery modalities.
• Ultrafast in silico screening that compresses years of trial-and-error sequence exploration into hours.
• A Unified Engine for Scalable, Experiment-Ready RNA and DNA Innovation

The nucleic acid platform is built to bridge computational prediction with real-world therapeutic development. Large-scale generative modeling works hand-in-hand with curated experimental datasets, allowing the system to learn from thousands of sequence–function relationships across mRNA, siRNA, ASOs and aptamers. This framework produces designs that are not only theoretically optimized but also aligned with manufacturability, delivery compatibility, and biological performance. The result is a streamlined path from digital sequence generation to lab-ready constructs that shorten discovery timelines while improving downstream success.

Ainnocence's SenseAI Platform for AI-driven, sequence-based nucleic acid engineering, enabling rapid in silico design, sequence optimization and predictive modeling.

Partner With Ainnocence

Ainnocence invites collaborations with academic laboratories, biopharmaceutical companies, and synthetic biology organizations seeking to accelerate discovery in mRNA, siRNA, ASO, aptamer, and nucleic acid engineering.

For partnership inquiries, email service@ainnocence.com or visit www.ainnocence.com

About Ainnocence

Founded in 2021 and headquartered in California, Ainnocence is a next-generation biotechnology company transforming drug discovery and synthetic biology through AI-native, sequence-first engineering. The company's self-evolving platform evaluates up to 10^{10} molecules spanning proteins, antibodies, small molecules, and nucleic acids within hours, enabling rapid, multi-objective therapeutic design. By reducing R&D timelines and costs while increasing success rates, Ainnocence empowers industry and academic partners to pursue bold innovations across medicine, sustainability, and biotechnology.

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