Smart Anti-Infective Antisense Strategy and Molecules

INFECTIOUS DISEASES, ANIMAL ANTIMICROBIALS

McGill

Provisional patent
Filing Q1 2026

TRL 2

Research funds raised
Pending results in March 2026

Pre-clinical stage
In vivo efficacy, delivery validation, safety, scalability in progress

Performance
Antisense PNAs shown to downregulate toxin-related genes in vitro

Business Opportunity:
Licensing and Co-development

Market Opportunity:
Global market: $30.8 billion USD in 2025 for Necrotic enteritis
CAGR: 7.2% for Necrotic enteritis

TIMELINE →	Q4 2025	Q1 2026	Q1 2027
Fundamental in vitro principles demonstrated	Completion of final prototype & validation	Filing of Provisional Patent Application	In vivo efficacy & safety data
Antisense PNAs shown to downregulate toxin-related genes			
Clear biological rationale and differentiated mechanism			

THE PROBLEM

Necrotic enteritis (NE), caused by Clostridium perfringens, remains a major economic and animal-health burden in the global poultry industry, with annual losses estimated at US$5–6B.

Historically controlled through antibiotics, NE management is increasingly constrained by regulatory restrictions and antimicrobial resistance (AMR) concerns, while existing alternatives (vaccines, probiotics, feed additives) show variable efficacy.

There is a strong unmet need for non-antibiotic, targeted anti-infective strategies that reduce bacterial virulence while preserving host microbiota and limiting resistance development.

OUR SOLUTION

An antisense peptide nucleic acid (PNA) platform designed to suppress Clostridium perfringens virulence by selectively inhibiting genes involved in toxin production, without impacting bacterial viability.

The technology consists of CPP-conjugated antisense PNAs targeting key regulatory genes at the mRNA level, blocking toxin expression while preserving bacterial growth.

Key elements:

1. PNA antisense oligonucleotides targeting toxin-related mRNAs
2. Cell-penetrating peptide (CPP) conjugation to enhance bacterial uptake
3. Selective inhibition of virulence without bactericidal effect
4. In vitro proof-of-concept demonstrating reduced infectivity with preserved viability

MARKET

Target users include:
- Animal health companies
- Nutrition companies and
- Veterinary pharmaceuticals

Market application:
- Veterinary therapeutics for necrotic enteritis (poultry)
- Antibiotic-alternative solutions for animal health
- Anti-virulence strategies in livestock production
- Longer-term potential extension to other bacterial pathogens (animal or human health)

The innovation developed by Prof. Zhao's team targets the animal antimicrobial market (USD 678.5 million in 2022, 3.6% CAGR). More specifically, the necrotic enteritis treatment market is estimated at USD 30.8 billion in 2025 and is projected to reach USD 61.6 billion by 2035 (7.2% CAGR), with annual poultry industry losses of USD 5–6 billion.

TEAM

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