

## Opportunity

To accelerate the development of SNAPP anti-bacterial technology through licensing or direct investment, contact:

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# Star-shaped Polypeptides

## An antibiotic or an adjuvant for drug-resistant bacteria

### The technology

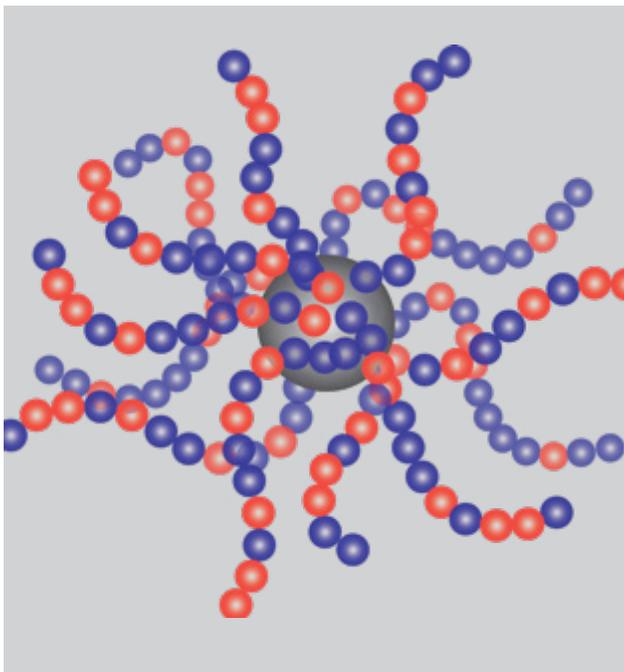
- Star-shaped polypeptides - Structurally Nanoengineered Antimicrobial Peptide Polymers, or SNAPPs - with anti-bacterial properties, including against MDR bacteria, have been created by University of Melbourne researchers. SNAPPs also have adjuvant activity, improving the efficiency of existing antibiotics.

### Market need

- Multi-drug resistant (MDR) bacteria are a threat to human health. The development of novel anti-bacterial therapies is a global health priority.

### Technology status

- Proof-of-concept has been obtained using various in vitro microscopy and bioassay studies, that show SNAPPs' antimicrobial activity, mode of action and low toxicity.



Star-shaped polypeptides, or SNAPPs, could be more effective than existing antibiotics. Picture: UoM Commercial

## Solution

SNAPPs are a class of synthetic polypeptides that show promise as low-cost and effective antimicrobial agents, especially as antibiotic adjuvants against MDR bacteria.

In vitro, SNAPPs enhance the action of conventional antibiotics (such as  $\beta$ -lactams and tetracyclines) up to 16-fold. They also have broad-spectrum efficacy against clinically relevant non-MDR and MDR gram-negative pathogens (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*).

Unlike antimicrobial peptides, SNAPPs show low toxicity to mammalian cells. SNAPPs' modes of action include: destabilising the outer membrane of Gram negative bacteria; enabling unregulated ion movement across the cytoplasmic membrane; and inducing an apoptosis-like death pathway.

There has been no observed acquisition of resistance by two MDR bacterial species to SNAPPs, which may be due to SNAPPs' multiple modes of action.

<b>Tech name and number:</b>	2016-043 SNAPP antibiotic synergy
<b>Researchers:</b>	Professor Greg Qiao, Associate Professor Neil O'Brien-Simpson
<b>Publications:</b>	Lam SJ, O'Brien-Simpson NM, Pantarat N, Sulistio A, Wong EHH, Chen YY, Lenzo JC, Holden JA, Blencowe A, Reynolds EC, Qiao GG. 2016. Combating multidrug-resistant Gram-negative bacteria with structurally nanoengineered antimicrobial peptide polymers. <i>Nature Microbiology</i> 16162
<b>Patents:</b>	PCT/AU2017/051206 Filed on 2 November 2017.
<b>Keywords:</b>	antibiotics, antimicrobial resistance, nanoparticles, polypeptides

## Market need

Multi-drug resistant (MDR) bacteria are spreading globally and becoming resistant to drugs of last resort, jeopardising our ability to treat common infections. The World Health Organization recognises that without effective antimicrobials, medical procedures such as cancer chemotherapy, diabetes management and surgeries become high risk.

There is a need to develop new antimicrobial agents - including adjuvants that enhance the action of existing antimicrobial agents - to treat MDR bacterial infections, and to reduce emergence of further bacterial resistance.

Antimicrobial agents and adjuvants that employ multiple modes of action are needed to maximise effect and minimise likelihood of bacterial resistance.

## Technology and IP status

Proof of concept has been obtained using various in vitro microscopy and bioassay studies, showing SNAPPs' antimicrobial activity, modes of action and low toxicity.

This opportunity is at an early stage, with further investigation required (such as host cell toxicity studies, optimisation studies and in vivo studies).

A patent application was filed on 2 November 2017, which claims a composition for the synergistic action of SNAPPs.

