

Kia Ora



New Zealand Local Chapter of the Controlled Release Society (NZCRS)



Manisha Sharma, NZCRS Secretary

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**MEDICAL AND
HEALTH SCIENCES**
SCHOOL OF PHARMACY



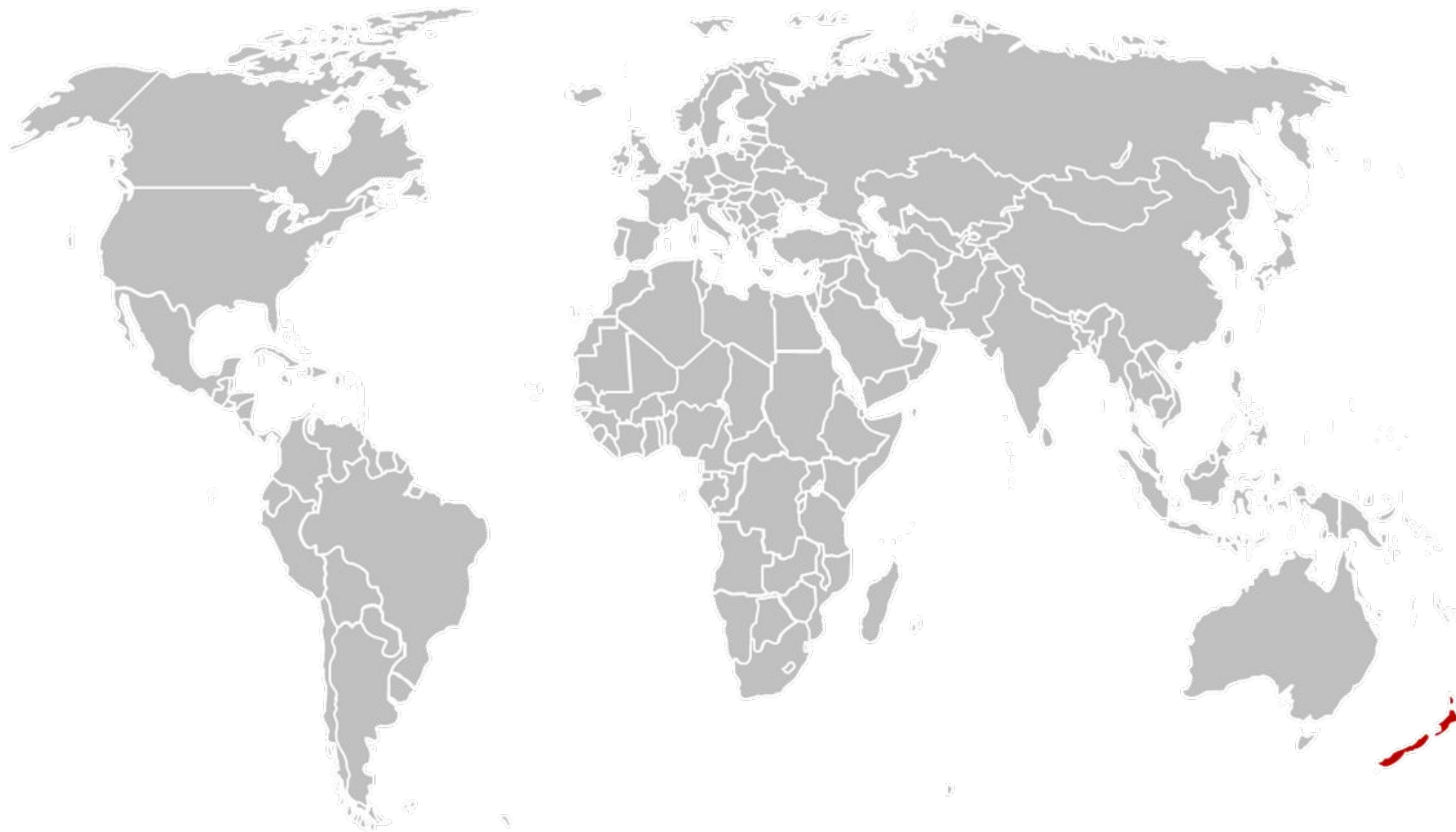
New Zealand Chapter
Established 2001

CONTROLLED RELEASE SOCIETY
CRS 2023 ANNUAL MEETING & EXPOSITION
JULY 24-28, 2023 **Paris Hotel » Las Vegas, NV, USA**

THE FUTURE OF DELIVERY SCIENCE



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THE FUTURE OF DELIVERY SCIENCE

Mission: *To promote, encourage and distribute knowledge, research, and development in the field of controlled release of drugs, vaccines and agrochemicals.*



President: A/Prof Darren Svirskis,
The University of Auckland, Auckland



Treasurer: Dr Sara Hanning,
The University of Auckland, Auckland



Past President: A/Prof Greg Walker
University of Otago, Dunedin



Secretary: Dr Manisha Sharma,
The University of Auckland, Auckland



President-elect: A/Prof Shyamal Das
University of Otago, Dunedin



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Established 2001

<http://nzcrs.org.nz/#/home>

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200+ Members

ACADEMIA

INDUSTRY



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AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND



LINCOLN
UNIVERSITY
TE WHARE WĀNAKA O AORAKI



Lonza

Pharma & Biotech



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ACTIVITIES

- Monthly Lunch Time webinars
- Annual Symposium/Workshop
 - Hosted alternatively by the University of Otago and the University of Auckland
 - 2022 NZCRS symposium, 2 days – Focused on “*Controlled Release for Localised Delivery*”
 - 60 + participants
 - 12 invited speakers (4 international speakers)
- Bimonthly committee members meeting



A/Prof Shiew-Fern Ng
University Kebangsaan, Malaysia



Dr Kara Perrow
University of
Wollongong, Australia



HALL OF FAME

- Controlled Release Society (New Zealand Local Chapter) **Travel Grant 2020, 2021, 2023**
- **Favorite On-Demand Talk Award:** Controlled Release Society Annual meeting **2021** - Marvin Mengyang Liu, UoA
- **Best Student Oral Presentation** Prize in Drug Delivery Australia (Australia Local Chapter of Controlled Release Society) 2019 - Marvin Mengyang Liu, UoA

RESEARCH HIGHLIGHTS



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Dr Priyanka Agarwal

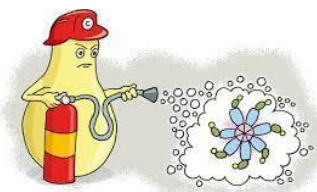


Santosh Bhujbal

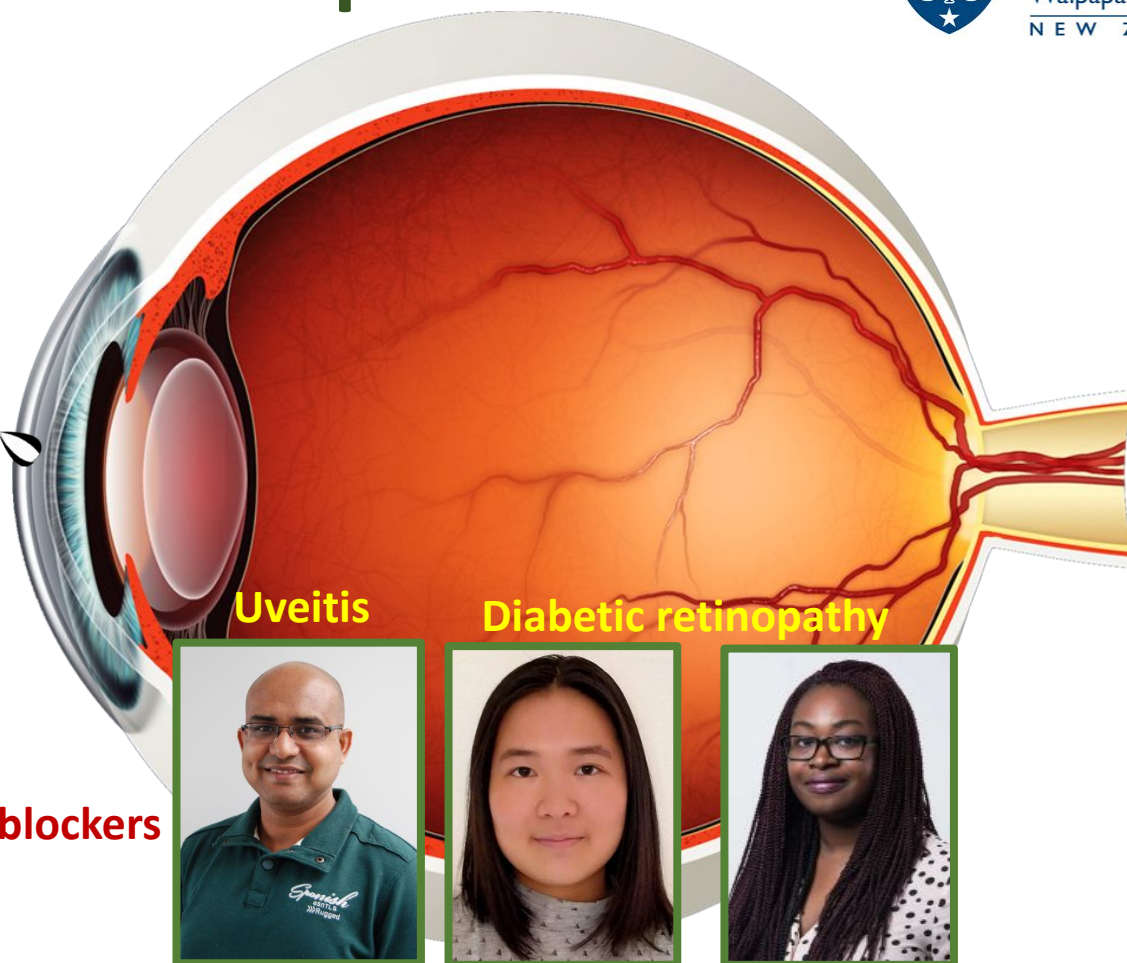


Dr Yosra Agban

Delivery of inflammasome blockers



DED



Avik Shome



Charisse Kuo

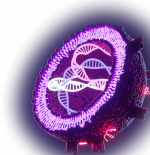


Dr Lola Mugisho

Disease mechanisms/biomarkers



Henry Louie



Extracellular
vesicles



A/Prof Ilva Rupenthal
BOTU Director

Drug Delivery and Bioelectronics



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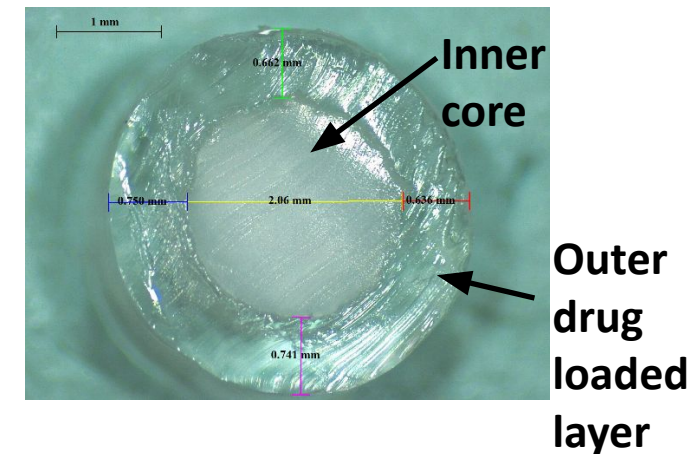
A/Prof Darren Svirskis
d.svirskis@auckland.ac.nz

Delivery of growth factors



**Establishing regenerative
electric fields**

**Stable polymer formulation
with high levels of drug loading**

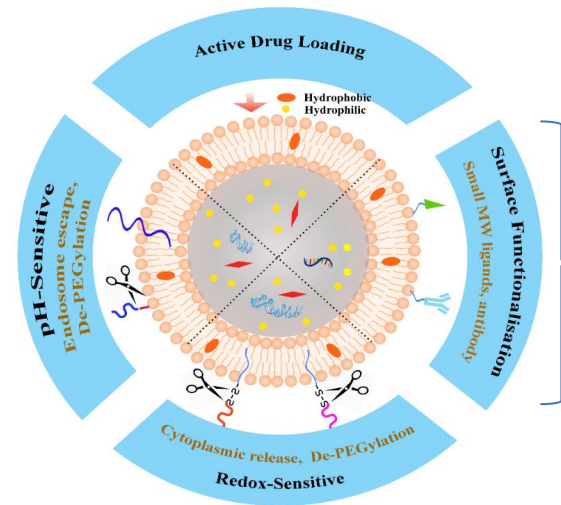




Drug delivery systems

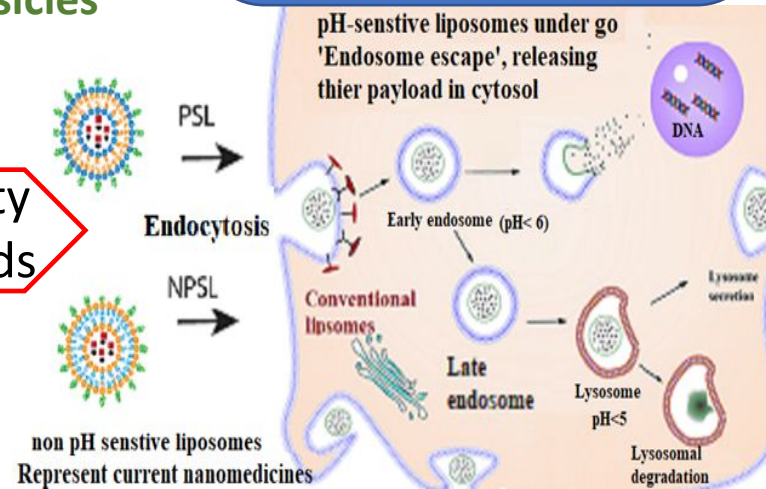
Target

Publications



- Liposome
- Exosome/
- Extracellular vesicles

- Specific site
- Specific cells
- Cytoplasmic delivery /endosome escape



Re-engineering small extracellular vesicles to circumvent endosome entrapment, or brain targeting. Geng et al. IJP 122153, 2022 & Geng et al. Biomater. Adv. 2023

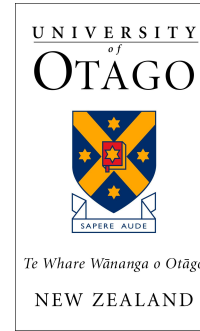
Glutathione conjugation on the transcellular transport process of liposomes across the BBB. Reginald-Opara et al, IJP, 122152. 2022

Nano-cocktail overcome chemoresistance in pancreatic cancer. Tang et al. IJP 2021 & Xu et al Pharm Res 2021 & Tang et al. JCR 2019

Dual-targeting (ligands) liposomes for chemotherapy of osteosarcoma. Feng et al. ACS Appl. Mater. Interfaces 2019 & Chi et al. JCR 2017

- Stimuli (pH, redox)-sensitivity
- Functionalisation with ligands
- Active drug loading (small molecules, proteins, DNA)

Pulmonary/ Respiratory Drug Delivery



Targeting local lung diseases:

- Chronic Obstructive Pulmonary Disease (COPD), asthma, tuberculosis, lung infections, cystic fibrosis, COVID-19, lung cancer

Targeting heart diseases:

- Pulmonary arterial hypertension

Formulation approaches:

- Manipulation of powder surface
- Fixed dose combination by coamorphization and co-crystallization

Powder science :

- Powder engineering
- Surface characterization
- Solid state characterization
- Optimization of lung delivery
- Dissolution in the lung
- Storage stability of powders
- Safety study using cell lines
- Microbial efficacy study
- Pharmacokinetic study in rats

A/Prof Shyamal Das

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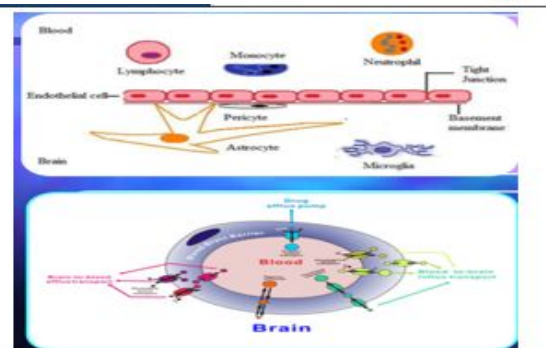
A/Prof Jingyuan Wen
j.wen@auckland.ac.nz

Barrier intensity

★★★★★ 4.0

TEER Values:

Brain (*in vivo*): 5900 $\Omega \cdot \text{cm}^2$



GIT barrier

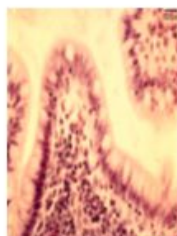
Barrier intensity

★★★★★ 3.5

TEER Values:

Colon (*in vivo*): 1350 $\Omega \cdot \text{cm}^2$

Caco-2 cell line: 350 $\Omega \cdot \text{cm}^2$



Blood Brain Barrier (BBB)

Barrier intensity

★★★★★ 5.0

TEER Values:

Full skin (*in vivo*): >16 k $\Omega \cdot \text{cm}^2$



Skin barrier



<https://www.mdpi.com/books/book/7326>



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THE FUTURE OF DELIVERY SCIENCE

Novel Delivery and Encapsulation Systems for Biomedical, Industrial and Environmental Applications



A/Prof Ali Seyfoddin
ali.Seyfoddin@aut.ac.nz



- Micro- and nano-encapsulation approaches for human and veterinary medicine
- Formulation of animal/veterinary nutritional products
- 3D printed drug delivery systems
- Medicinal cannabis (extraction and formulation)

Drug Delivery Research Group (www.drugdelivery.aut.ac.nz)



Precision Antimicrobials: Targeted Therapeutics for Food and Companion Animal Infections



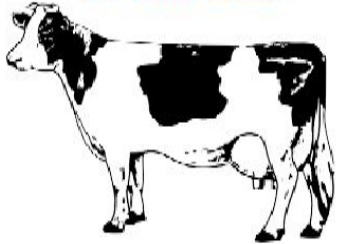
A/Prof Greg Walker
greg.walker@otago.ac.nz

Precision Antimicrobials

Protecting Critical Human Medicine by Developing Animal Only Therapeutics

Lead Therapeutics Already Developed, and Validated *in vitro*
PCT Patent 62/608,141 (full patent filed on 20/12/18)

Food Animal Infections
(e.g. Bovine Mastitis)



Novel Animal-only Therapeutics
New Mechanism of Action
Sustained Productivity
Animal Welfare Protected

Mastitis control

Targets

Companion Animal / Veterinary Infections
(e.g. complicated soft tissue infection, and
complicated skin infections)

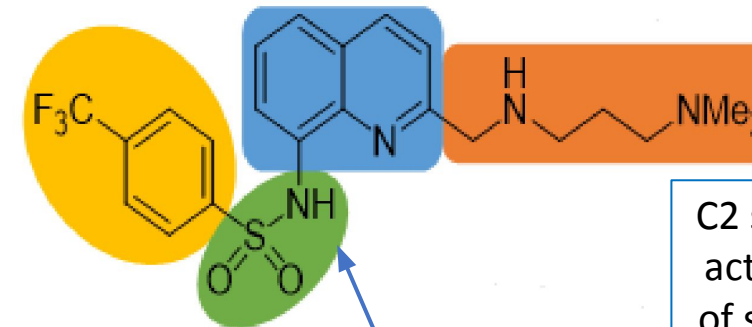


Improved Antimicrobial Stewardship
Reduce Resistance Reservoir
Adjuvant to Fight Resistant Infections

Treating Pyoderma

Zinc Ionophores

Quinoline Core (Molecular Platform)



Sulfonamide group-
(ionizable, key to metal
chelation)

C2 side chain - (Confers
activity in the absence
of supplementary Zinc)

Ultrasound in Drug Delivery and Therapeutics



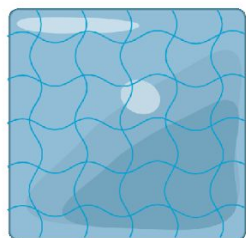
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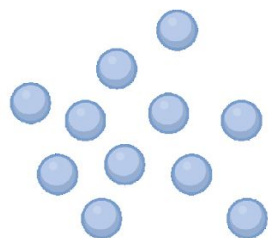
Dr Sachin Thakur

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Ultrasound-
responsive
formulations

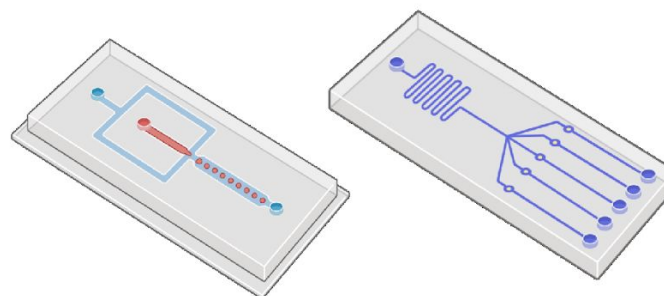


Hydrogels



Microbubbles

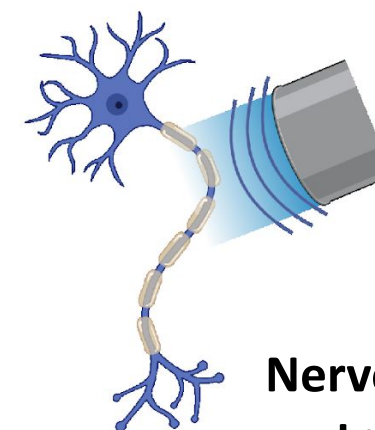
High throughput
preparation
techniques



Crude bulk production techniques

Upscaling precision-controlled microfluidics

Therapeutic
ultrasound *in
vitro*



Nerve repair following
traumatic injury



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Translational Research - Development of Clinically Useful Formulations and Diagnostic Methods



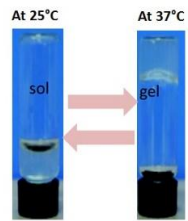
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Sustained/Controlled Drug Delivery

1. Injectable In-situ Gels



Please visit
Poster No: 618

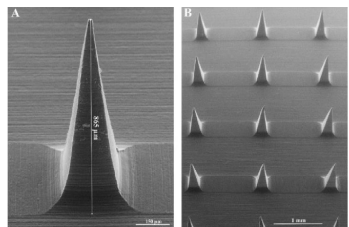
2. Nanocarriers: Nose-to-brain Delivery



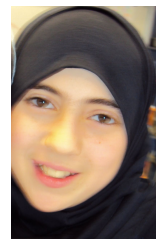
Harpinder Brar



3. Microneedles (Dissolvable)



Celine Chong



Ola Abughazala

Diagnostic Method

Non-transferrin bound iron (NTBI) - Biomarker for iron overload conditions



Dr Mahsa Motesakeri

- Electrode modification
- Electrochemical techniques



Barbara Angoro



Auckland Medical
Research Foundation
est. 1955

Whakatauki:

E Tu Kahikatea – Stand Tall like a Kahikatea (Pine tree) tree

Ngā mihi maioha – Thank you with appreciation

Kia pai tō koutou rā – Have a nice day