

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



CRS 2023 ANNUAL MEETING & EXPOSITION

JULY 24-28, 2023 **Paris Hotel** » **Las Vegas, NV, USA**

THE FUTURE OF DELIVERY SCIENCE



CONTROLLED RELEASE SOCIETY

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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



New Zealand Chapter
Established 2001

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



200+ Members

ACADEMIA

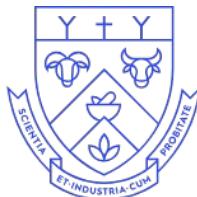
INDUSTRY



UNIVERSITY OF
AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

AUT
UNIVERSITY
TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

UC
UNIVERSITY OF
CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND



LINCOLN
UNIVERSITY

TE WHARE WĀNAKA O AORAKI

UNIVERSITY
of
OTAGO
SAPERE AUDA
Te Whare Wānanga o Otago
NEW ZEALAND

douglas
improving lives

DEC
INTERNATIONAL

agresearch
āta mātai, mātai whetū

Ancare

Lonza

Pharma & Biotech

argentā

BLIS
Technologies

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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 Shiow-Fern Ng
University Kebangsaan, Malaysia



Dr Kara Perrow
University of
Wollongong, Australia



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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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Buchanan Ocular Therapeutics Unit



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Dr Priyanka Agarwal



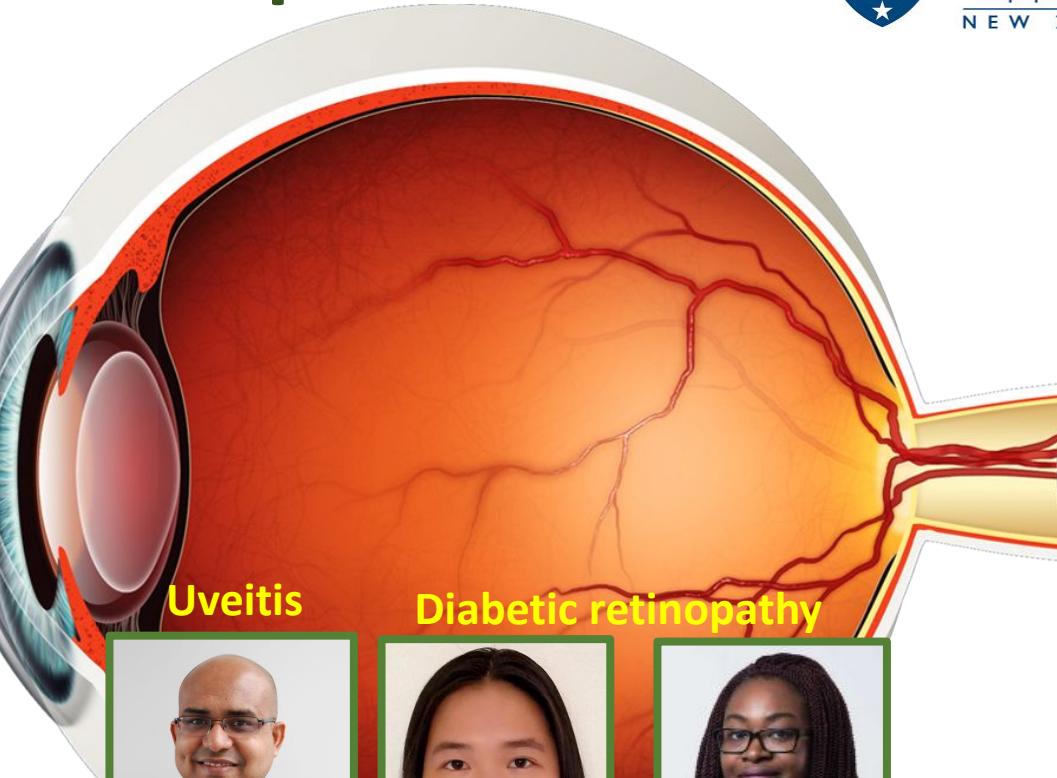
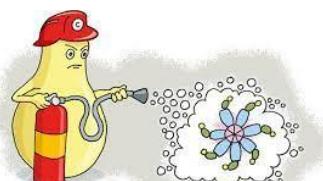
Dr Yosra Agban

Non-aqueous
eyedrops



Santosh Bhujbal

Delivery of inflammasome blockers



Avik Shome



Charisse Kuo



Dr Lola Mugisho
Disease mechanisms/biomarkers



Henry Louie



Extracellular
vesicles



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Drug Delivery and Bioelectronics



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

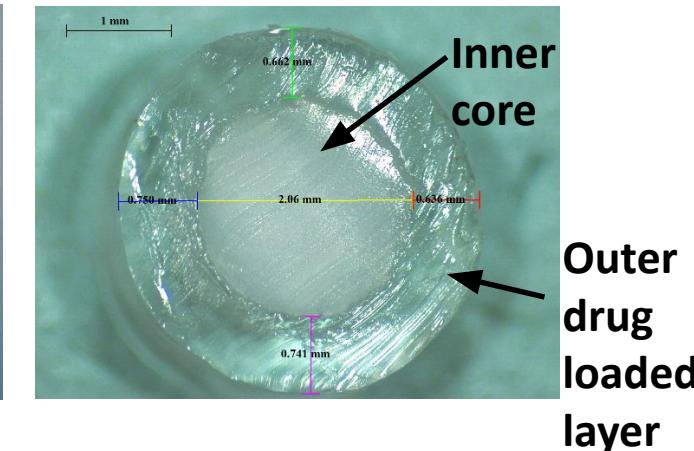
Delivery of growth factors



Establishing regenerative
electric fields



Stable polymer formulation
with high levels of drug loading





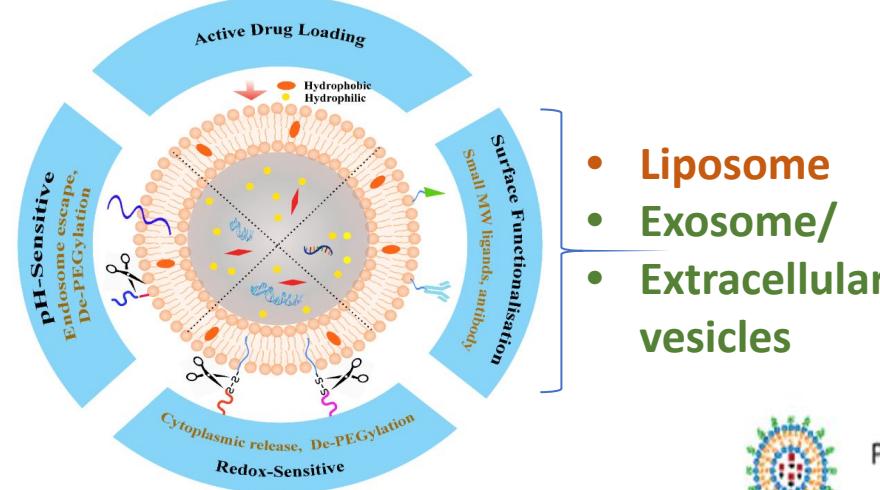
Drug delivery systems



Target

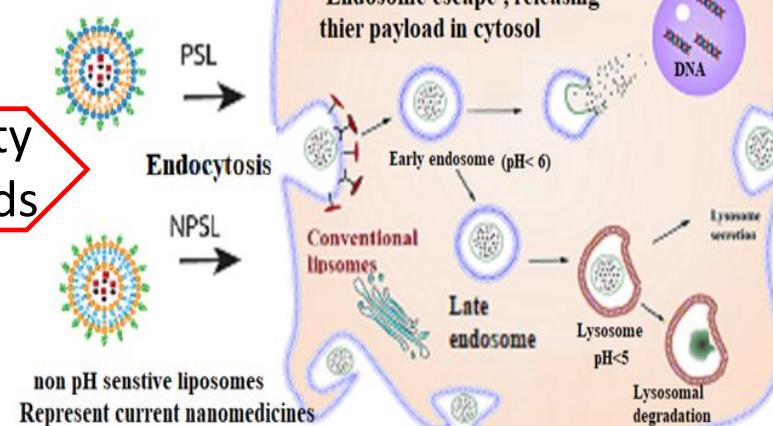


Publications



- **Liposome**
- **Exosome/**
- **Extracellular vesicles**

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



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

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:

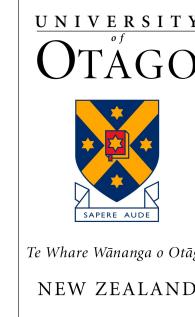
- Pulmonary arterial hypertension

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
shyamal.das@otago.ac.nz



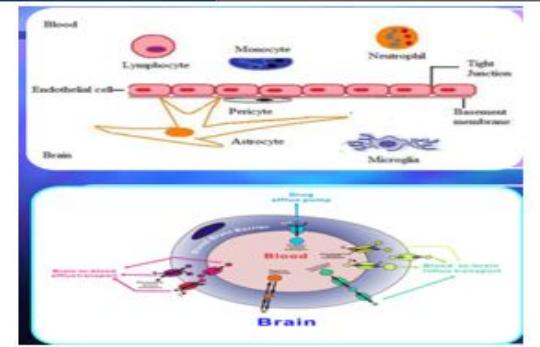
Barrier intensity



4.0

TEER Values:

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



GIT barrier

Blood Brain Barrier (BBB)

Skin barrier

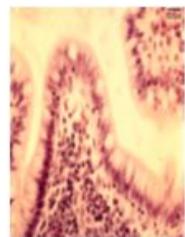
Barrier intensity



3.5

TEER Values:

Colon (*in vivo*): $1350 \Omega \cdot \text{cm}^2$
Caco-2 cell line: $350 \Omega \cdot \text{cm}^2$



Barrier intensity



5.0

TEER Values:

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



Strategies
to Enhance Drug
Permeability
across Biological
Barriers



<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)



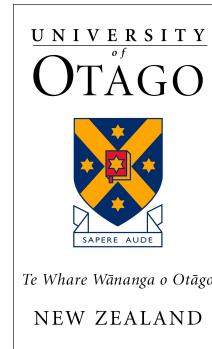
Drug Delivery Research Group (www.drugdelivery.aut.ac.nz)



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Precision Antimicrobials: Targeted Therapeutics for Food and Companion Animal Infections



A/Prof Greg Walker

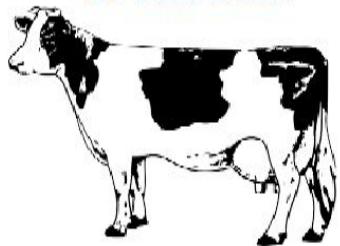
greg.walker@otago.ac.nz

Precision Antimicrobials

Protecting Critical Human Medicine by Developing Animal Only Therapeutics

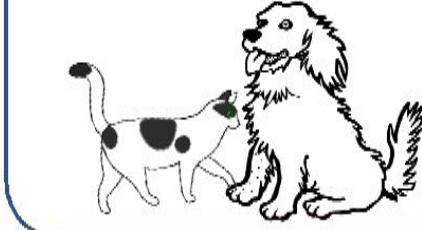
Lead Therapeutics Already Developed, and Validated *in vitro*
PCT Patent 62/608,141 (full patent filed on 20/12/18)

Food Animal Infections
(e.g. Bovine Mastitis)



Targets

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



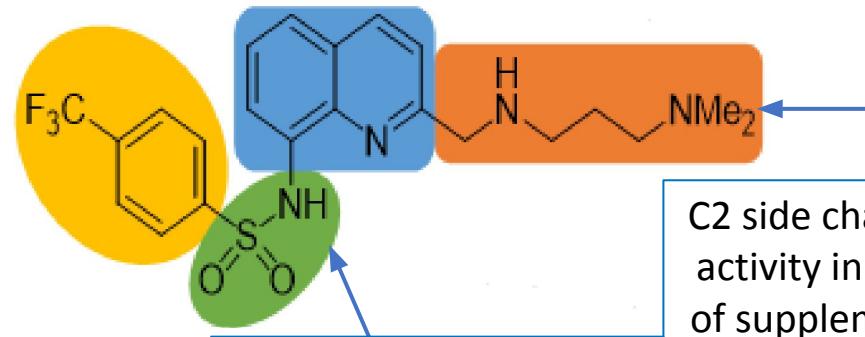
Novel Animal-only Therapeutics
New Mechanism of Action
Sustained Productivity
Animal Welfare Protected

Mastitis control

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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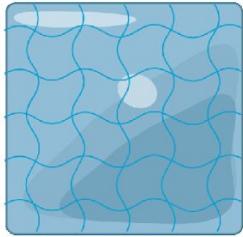
Dr Sachin Thakur

s.thakur@auckland.ac.nz

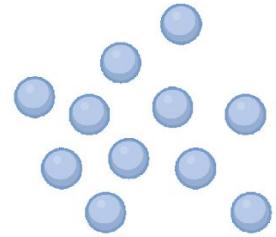
Ultrasound-
responsive
formulations

High throughput
preparation
techniques

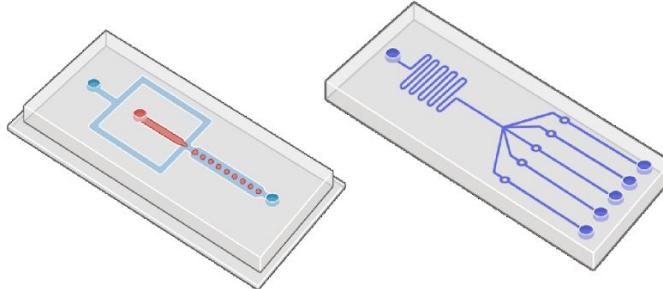
Therapeutic
ultrasound *in
vitro*



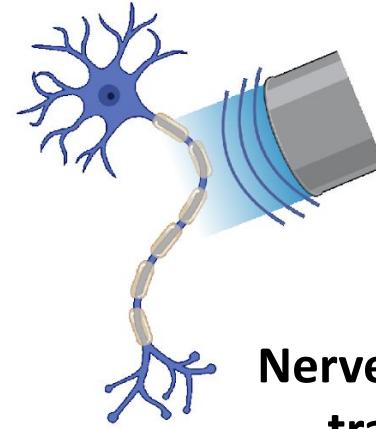
Hydrogels



Microbubbles



Crude bulk production techniques



Nerve repair following
traumatic injury

Upscaling precision-controlled microfluidics



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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



Dr Hani Abdeltawab

2. Nanocarriers: Nose-to-brain Delivery

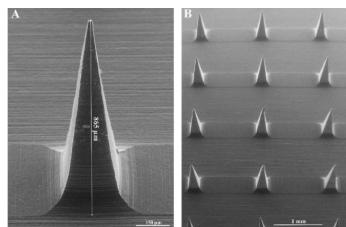


Harpinder Brar



A pathway to hope

3. Microneedles (Dissolvable)



Celine Chong



big research
for little lives •



Ola Abughazala

Diagnostic Method

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



Dr Mahsa Moteshakeri

- Electrode modification
- Electrochemical techniques



Barbara Angoro



Auckland Medical
Research Foundation
est. 1955

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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

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