

# Priority Research Programme

## *Science of Food*

Distinguished Professor Harjinder Singh

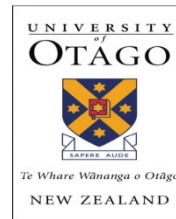
Riddet Institute, Massey University

Host Institution



# Science of Food - Goals

1. Establish a cluster of expertise in developing prototype high-value foods for clinical validation.
2. Develop NZ Inc capability in the translation of clinical/nutrition knowledge into practical, innovative food formats with consumer appeal.
3. Support the needs of the HVN health programmes and integrate food science and technology into the HVN health target programmes.



HIGH-VALUE  
NUTRITION

Ko Ngā Kai  
Whai Painga

# Science of Food Projects

**Project 1:**

**Scanning the Horizon**

**Project 2:**

**Bioactive Food Systems**

# Research Team



Prof. Harjinder Singh  
Dr Simon Loveday  
Dr Abby Thompson

Dr Matt Miller  
Prof. Charles Eason

Dr Brendan Haigh

Lynley Drummond

## Capability development:

- > Postdoc (Z. Niu) – drug delivery
- > Postdoc (A. Fani) – food formulation
- > Research Officer (A. Rashidinejad) – decision support system
- > Ph.D. student – co-funded by Riddet/MFAT



Dr Arlene McDowell



Assoc. Prof. Yoav Livney

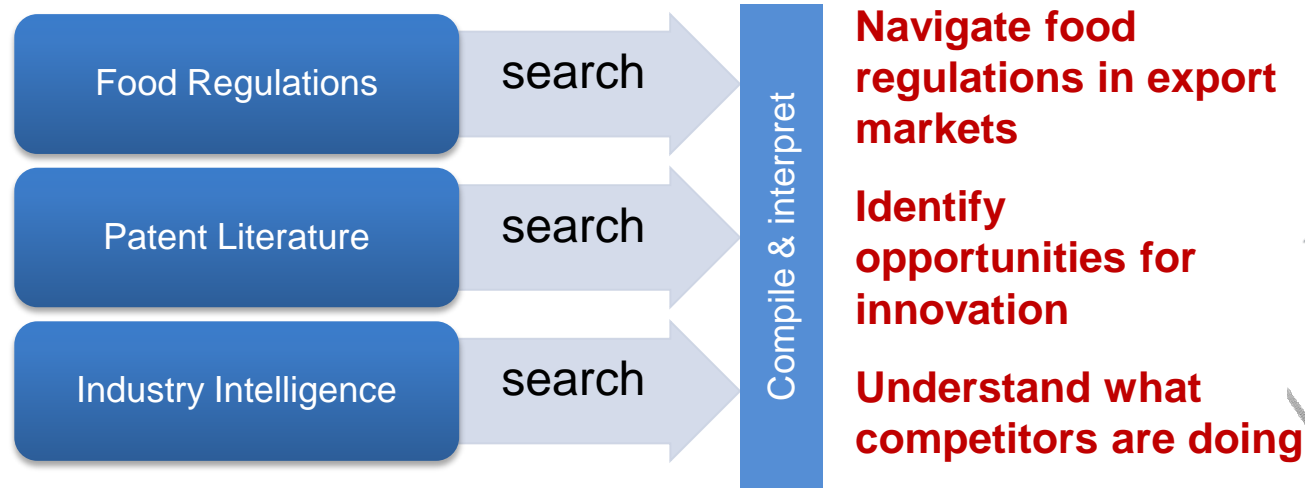
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**Science**  
Challenges

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# Scanning the Horizon

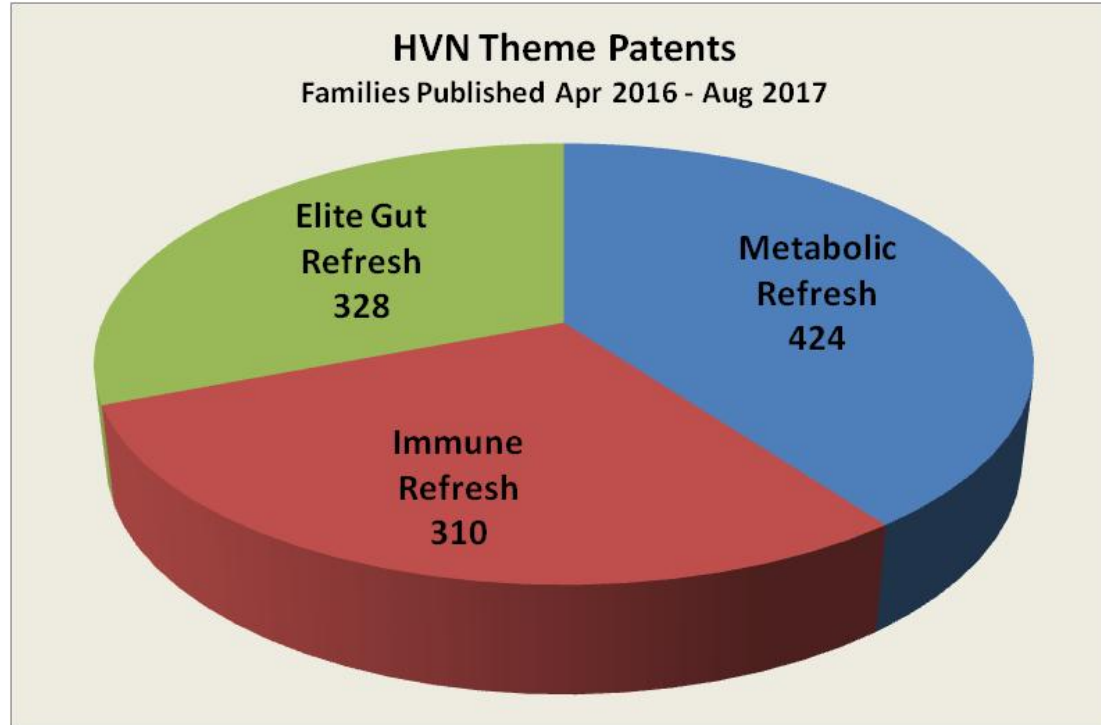
**Goal:** to provide up-to-date tailored intelligence on international practice in the development of foods for health and wellness



## Outputs: Case Studies and Reports

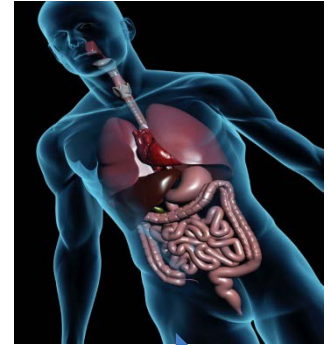
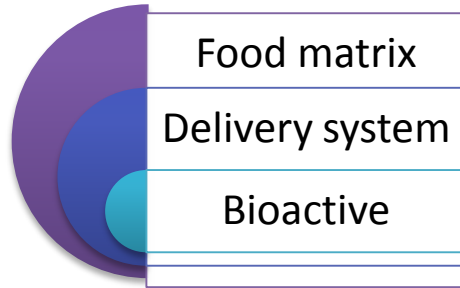


# Patents Published Since Original Report



# Bioactive Food Systems

Protecting and delivering bioactive compounds in food systems



Food System/product   Stable   Safe   Tasty   Bioavailable   Effective



# Why is this important?

- > Bioactive compounds are essential and non-essential compounds that occur in nature and have an effect on human health.
- > The development of foods, validated to elicit specific health benefits, often requires the addition of concentrates or extracts of the identified bioactive compounds or groups of compounds from source materials.
- > This enables the delivery of characterised and quantified levels of the bioactive compounds in the final formulated food product, which together with putative mechanisms of action is essential to achieve validated health



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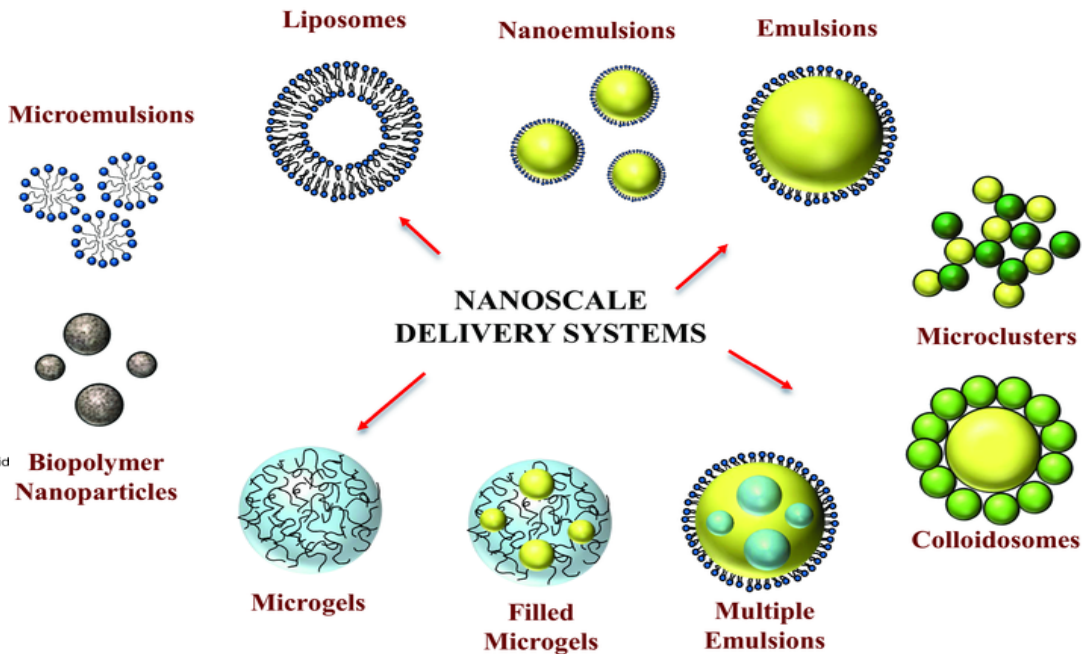
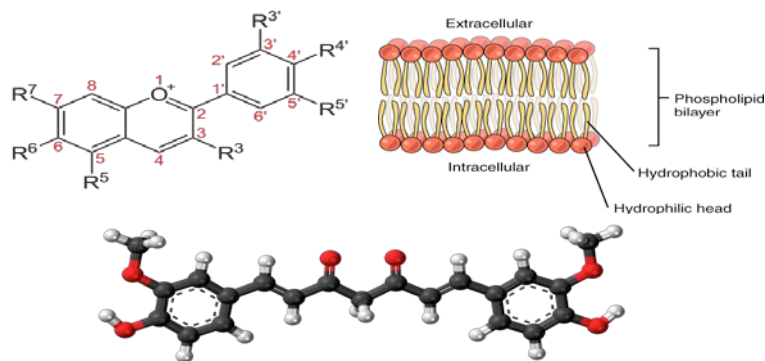
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# Key Food Formulation Challenges

- > Bioactives differ widely in their molecular, physiochemical and physiological properties
- > Compatibility with food matrix and processing conditions
- > Incorporation of bioactive into functional foods leads to:
  - solubility problems
  - flavour, taste and texture issues
  - retention of physiological activities
  - bioaccessibility and bioavailability
  - food matrix/structure effects on kinetics of release

# Delivery Systems for Protection of Bioactives

Hydrophilic  
Hydrophobic  
Surface active (amphiphilic)  
Extremely bitter or astringent  
Live or dead microorganisms



# Specific Objectives

Decision Support System (database) to support the development of foods containing bioactive compounds



Prototype bioactive-fortified food/beverages for human clinical trials



Novel bioactive delivery systems for gastric protection and target delivery to specific regions within the gastro-intestinal tract

- > Metabolic Health
- > Elite Gut
- > Immune Health
- > Weaning Foods

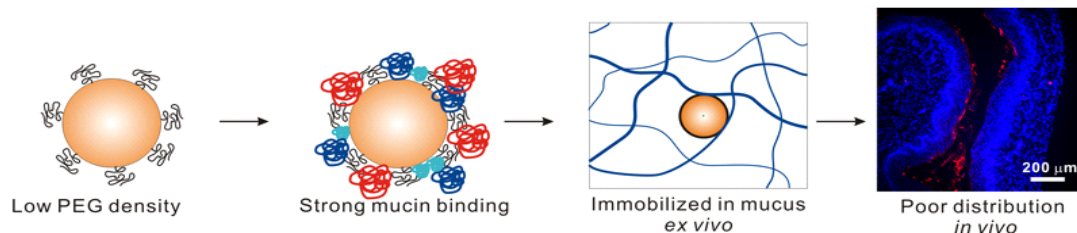
NZ Food and Beverage Industry  
(Industry Reference Group)

# Expected Outcomes

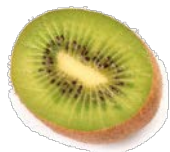
- > A guidance tool aimed at providing options for the effective formulation of bioactive compounds into foods, for use by the HVN Health Platform Programmes and the wider F & B industry.
- > Prototype food products that protect the bioactive compounds through processing and storage, whilst ensuring release during digestion.
- > Prototype products for use in HVN Health Platform Programmes clinical trials.
- > New IP (patents, technical knowhow) on novel delivery systems and/or food formulations containing protected and highly bioavailable bioactive compounds

# Future Directions

- > Advanced bioactive delivery platform, with a focus on targeted delivery to substantially enhance bioavailability



- > Develop a new research programme on “protecting the natural benefits of whole foods”
- > Explore new technologies to minimise the loss of bioactives and health-enhancing components during processing and distribution



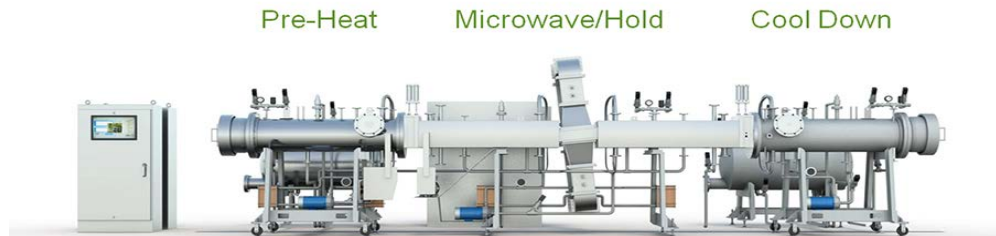
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# Disruptive Technologies: Examples

- > Microwave-assisted Thermal Sterilization (MATS)
- > Shockwave Technology
- > High Pressure Processing



# Future: Healthier by Nature

- > Food science will continue to drive the development of new products with natural ingredients –so that they not only benefit health but also taste great
- > Develop new concepts around whole food matrices/crude fractions/health enhancing components
- > Innovative textures, formats and formulations of products specifically designed for a range of consumers (age groups, demographics etc)