The Science Behind CycloPower

Cyclodextrin-Based Products

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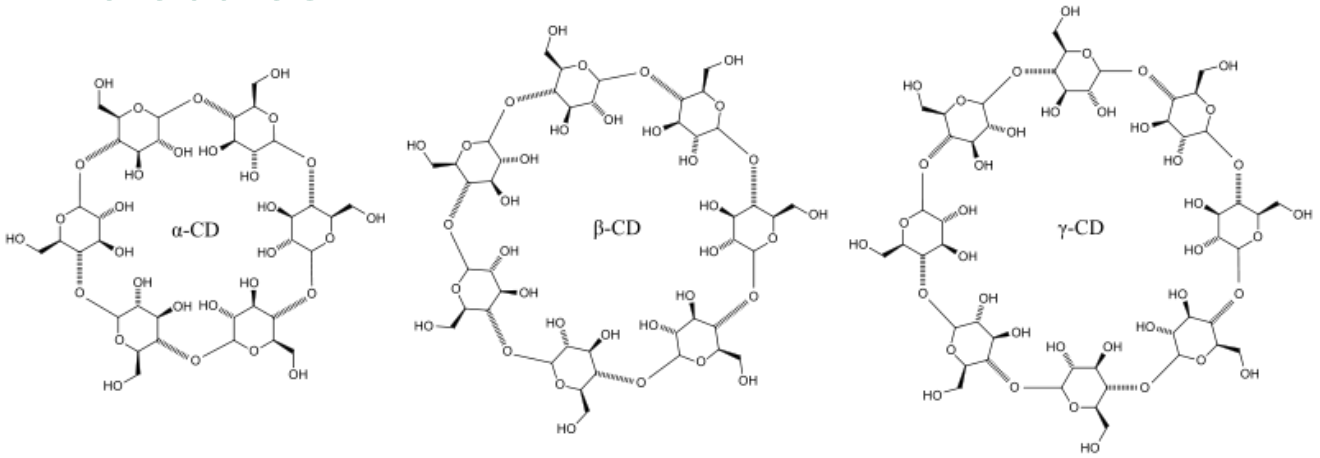
Cyclodextrins…What are they?

- Cyclodextrins are a circular compound made up of sugar molecules.



- Produced from starch via enzymatic conversion
- Used in the food, pharmaceutical and chemical industry

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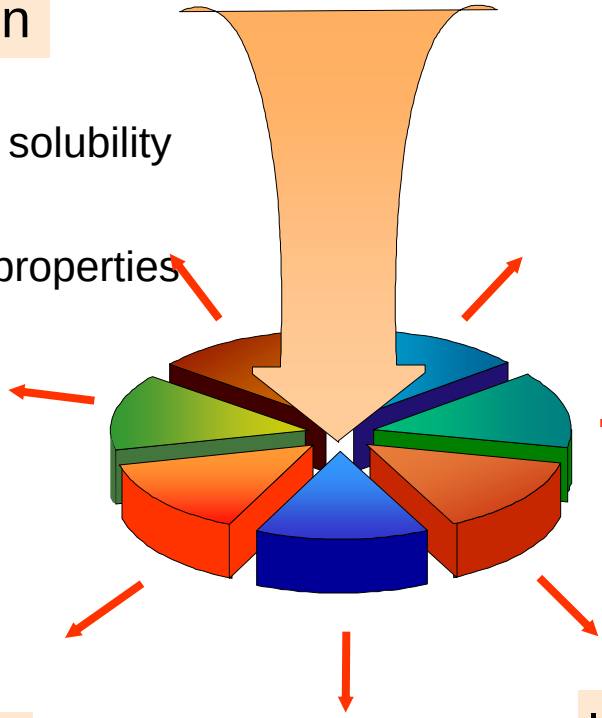
Uses of Cyclodextrins

Solubilisation

- enhancement of water solubility
- avoid organic solvents
- change of rheological properties

Stabilisation

- light, UV-radiation
- temperature
- oxidation
- hydrolysis



Reduction

- unpleasant odor
- bad taste
- Cleaning effect

Controlled release

Selective extraction

Reduction of volatility

Increase of Bioavailability

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What is Manuka Health Doing?

- We are using cyclodextrins to form COMPLEX MOLECULES with Manuka Honey and Propolis

→ enhanced bioactivity

- Not a new idea…
  - coenzyme Q10…..supplementation for angina, heart attacks
  - beauty creams with encapsulated Vit C
  - Lipioic Acid

Manuka Honey

- Manuka Honey is recognised as having a suite of bioactivities
  - antibacterial, antifungal, anti-inflammatory etc
  - Methylglyoxal
- Methylglyoxal activity can vary
  → the higher the Methylglyoxal content the greater the antibacterial activity

→ How can we harness the power of MGO™ Manuka Honey for health?

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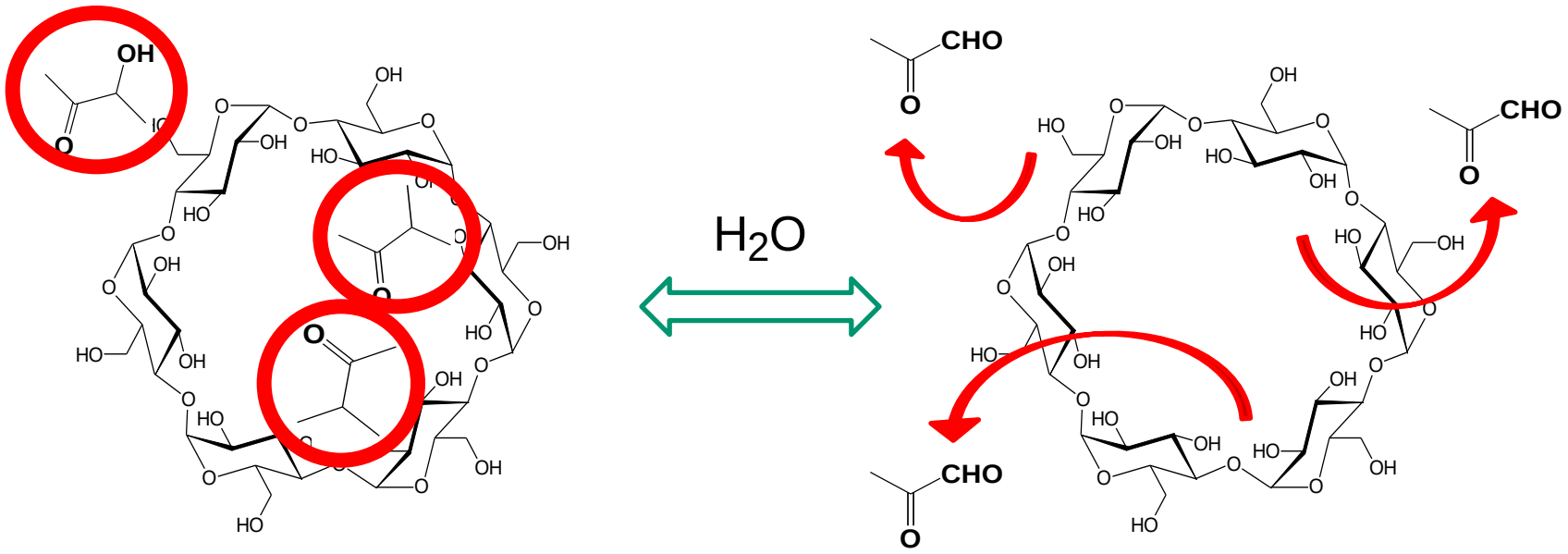
Combining Manuka honey and α-Cyclodextrin



Methylglyoxal

Patent Pending : WO 2010/044042

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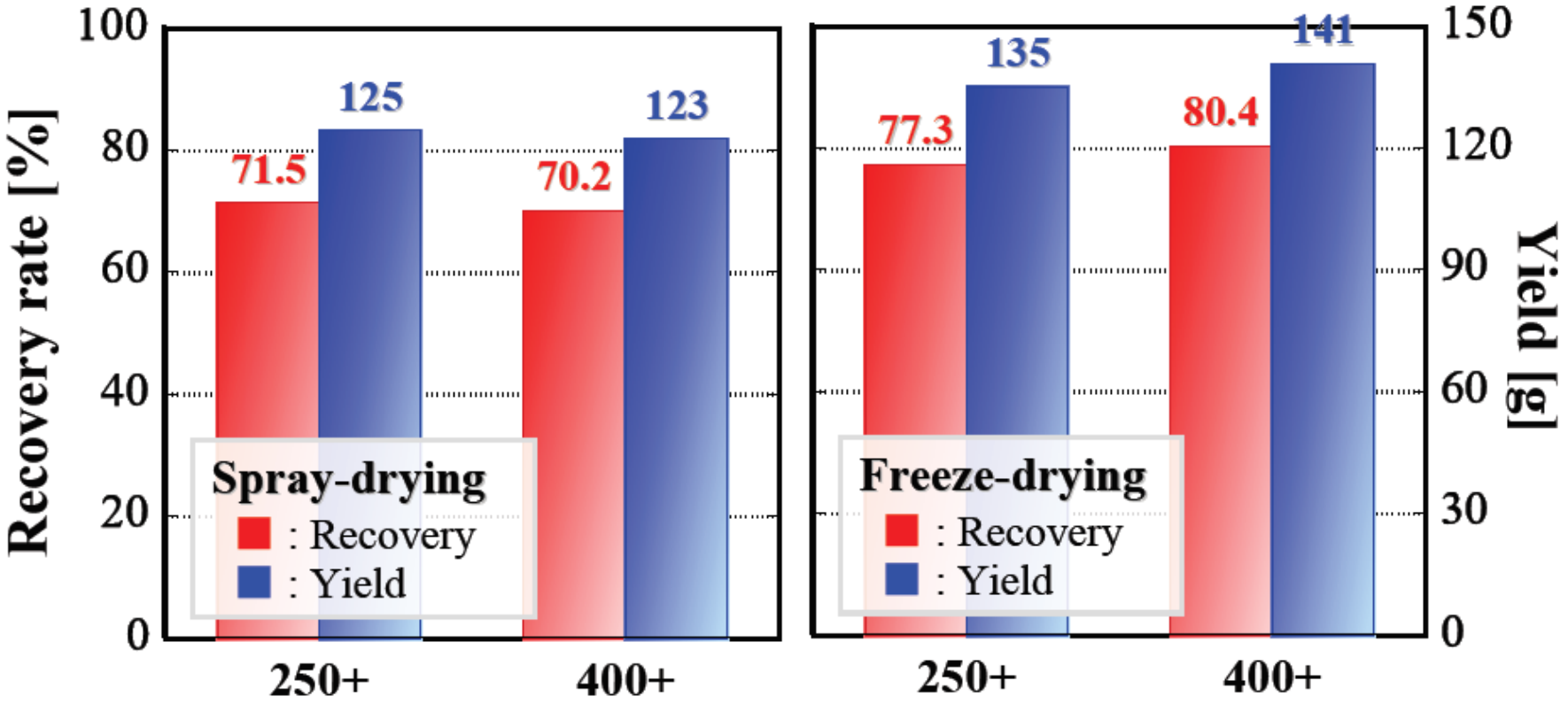
Methylglyoxal Retained



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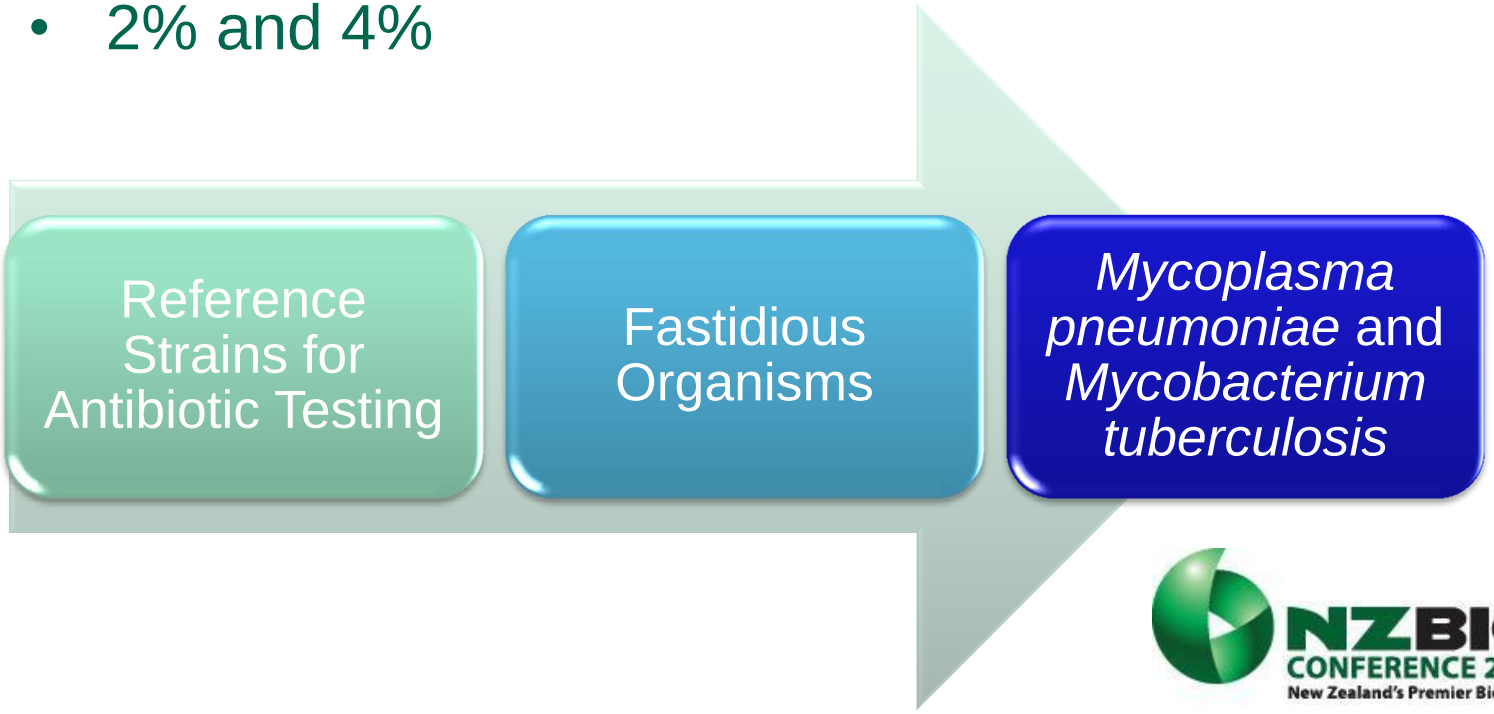
The Antibacterial Activity of MGO™Manuka honey and α-CD

- Study at Auckland University looking at bacterial growth/inhibition with the honey *vs* complex
  - MGO™ Manuka Honey 250, 400, 550
  - 2% and 4%



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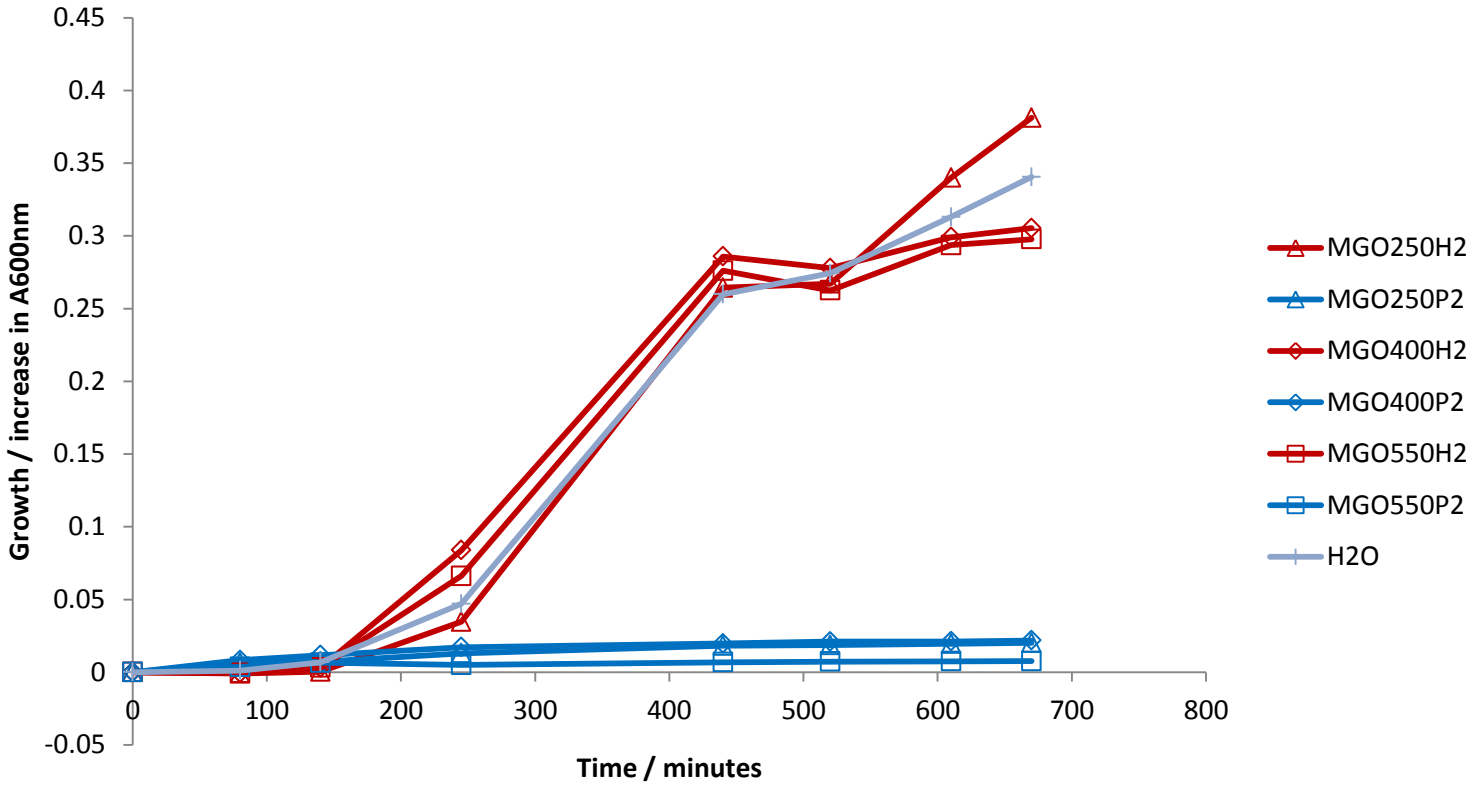
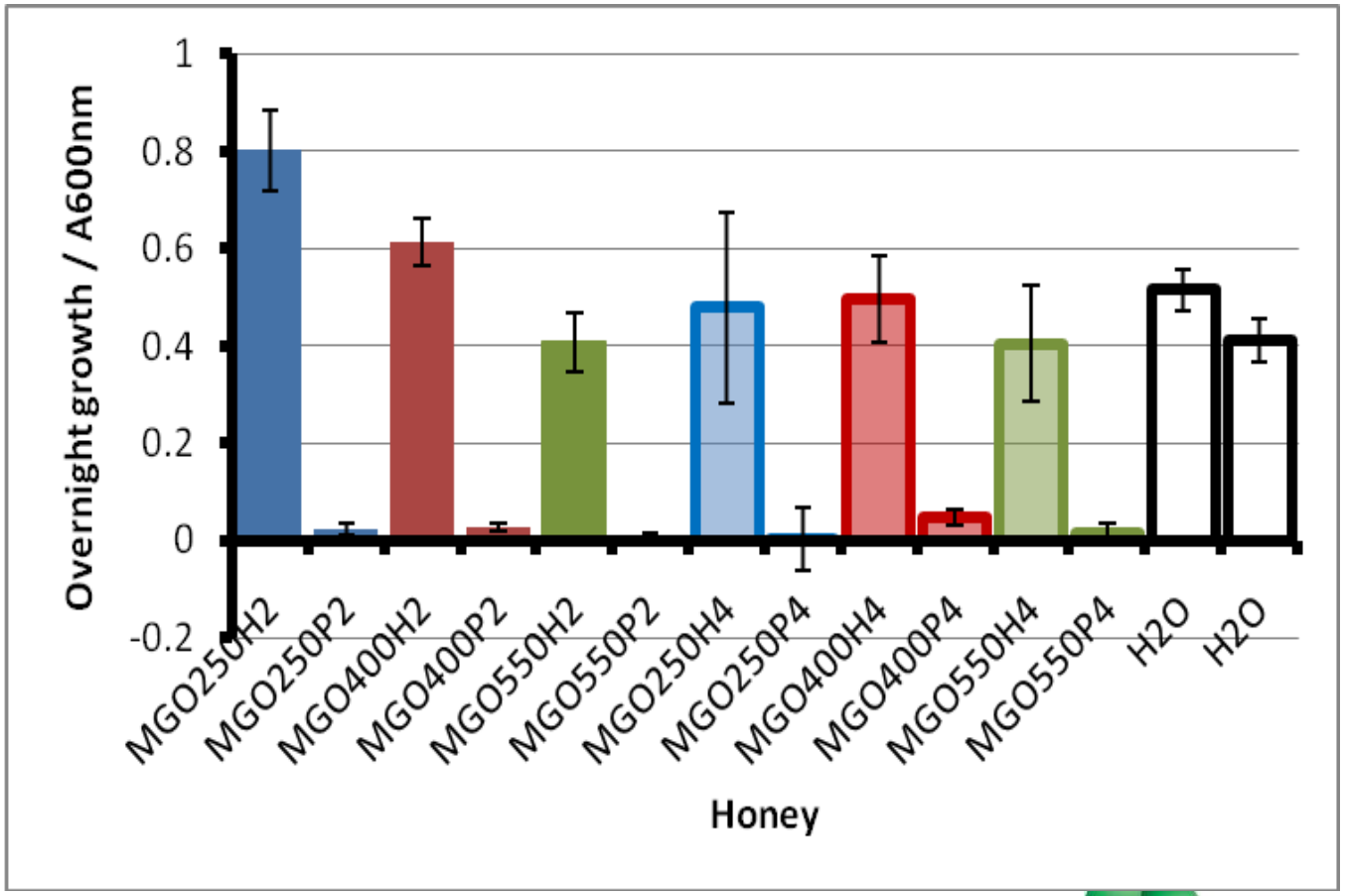
Phase 1 Results



Streptococcus pyogenes

Phase 1 Results



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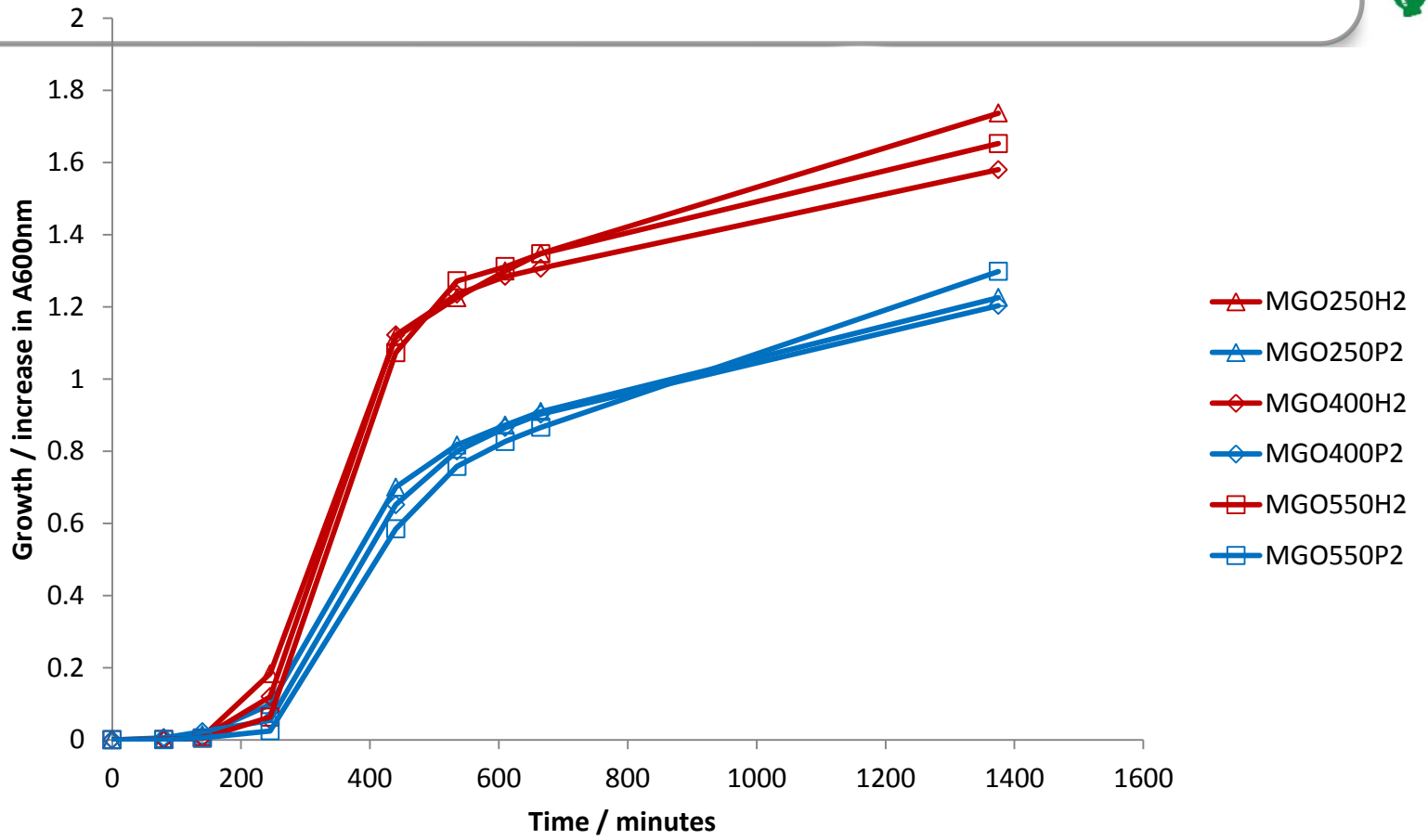

Staphylococcus Aureus

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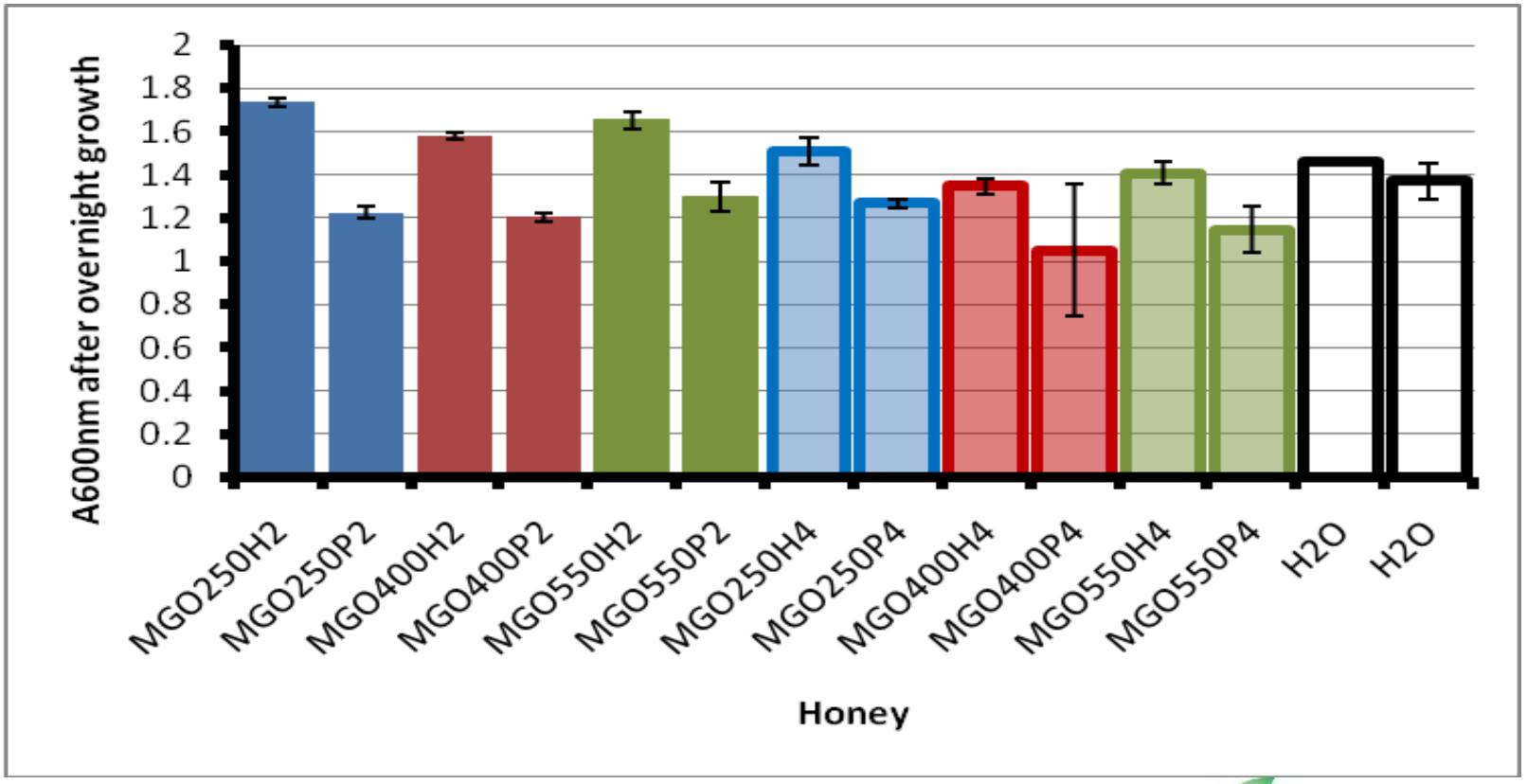

Staphylococcus Aureus

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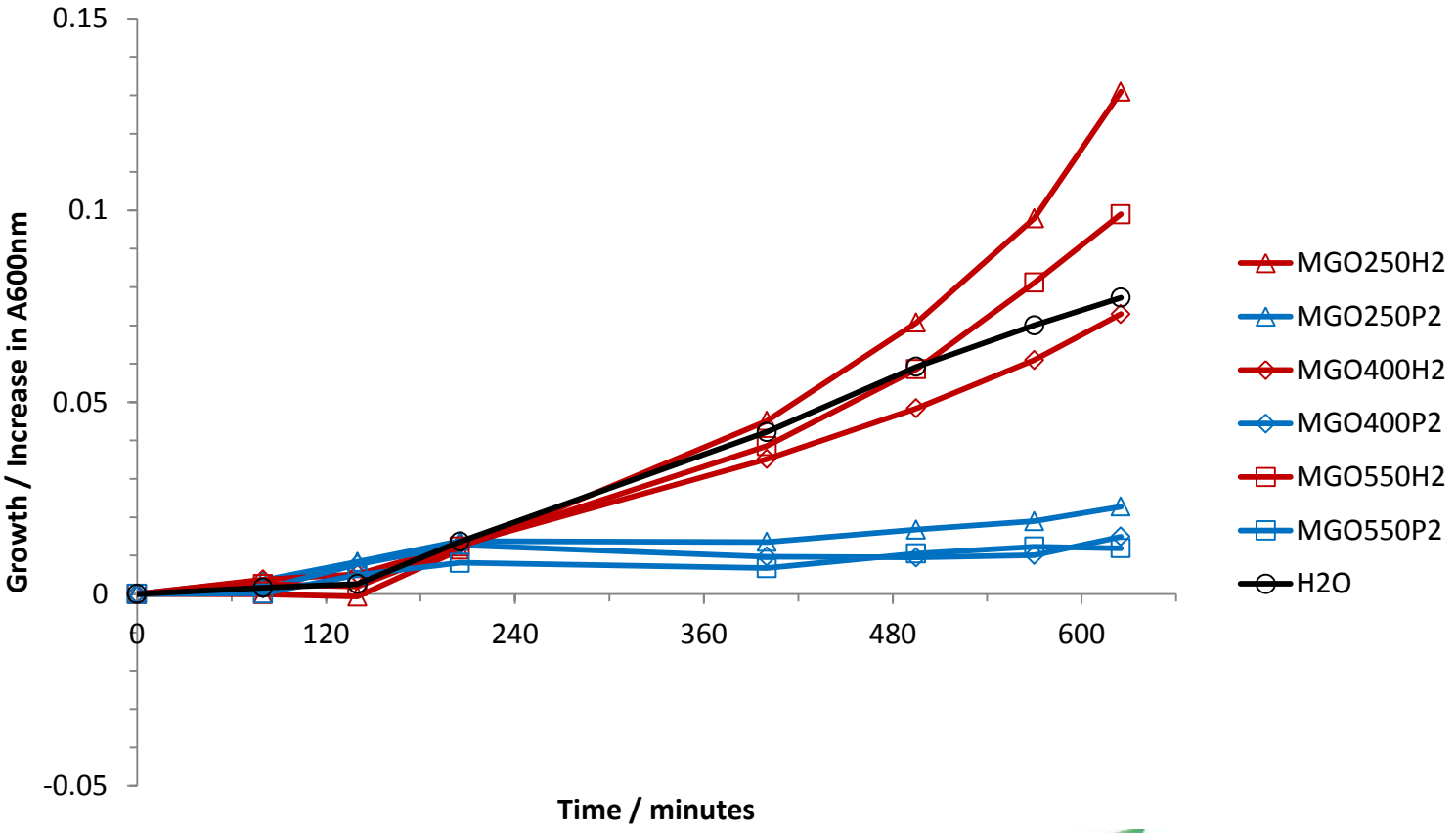

Moxarella Cattharalis

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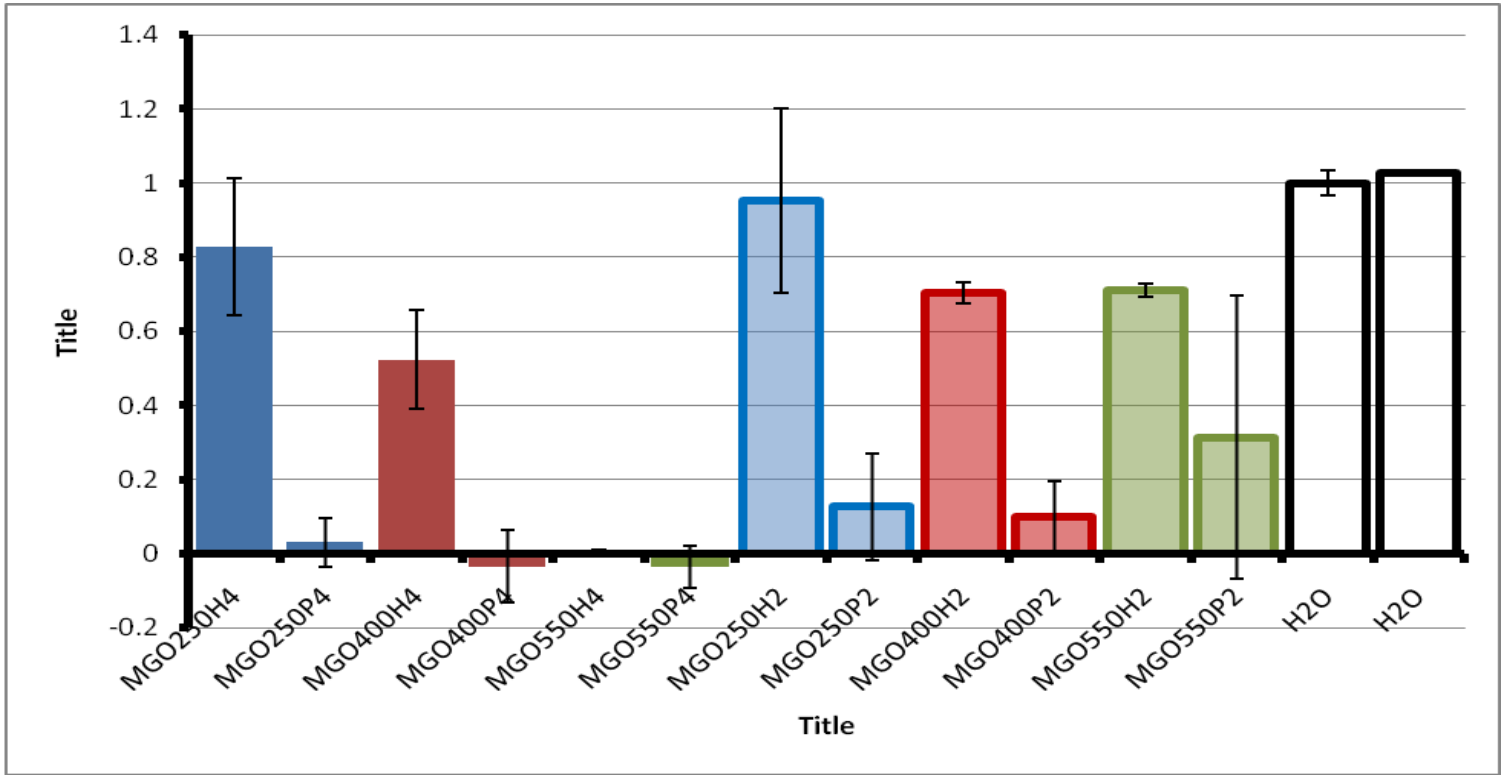

Moxarella Cattharalis

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Propolis - Developments

- Propolis is the resinous mixture collected by bees that protects the hive

- New Zealand propolis also has a range of bioactive compounds…
  - high antioxidant content, immunostimulatory, antibacterial, *H. pylori*, reduce airway inflammation
  - CAPE and other bioflavonoids (Chrysin, Galangin, Pinocembrin)

Propolis and Cancer

The Product

- Unique profile compared with overseas propolis
- NZ propolis high in CAPE
- Inactivates the oncogenic kinase PAK1

What We Know

- shown in *in vitro* and clinical work to suppress cancer tumour growth
- Studies with NF-tumour cell lines show IC_{50} at 1.5 – 5 μg/ml

The Opportunity

- Is it possible to increase the potency of this product?
- Can we better standardise the product for delivery to cancer patients etc?

Propolis CycloPower

- Created a complex using NZ Propolis and γ-cyclodextrin
  - Virtually 100% recovery of CAPE and major flavonoids
  - Improved delivery system and solubility
  - Removes taste and smell of Propolis
  - Standardised product
- Developing a strong research program to assess the bioactivities of propolis tincture and propolis cyclodextrin complex

The Propolis Program

- Working on characterising New Zealand Propolis so that we can better understand variability and provide quality products
    - Measuring major bioflavonoids
    - Standardising methodologies
    - Increasing supply chain
- Developing a strong research program to assess the bioactivities of propolis tincture and propolis cyclodextrin complex

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Where To From Here?

- Great initial results… Manuka Honey assays moving onto Phase 2 and 3

- Propolis Program underway

- **Other Opportunities**
  - Undertaking a range of bioactivity tests
  - Anti-inflammatory assay using gut markers – using Manuka complex and propolis complex
  - Antioxidant testing
  - Anti-tumour testing (*in-vitro* and possible *in-vivo*) to assess propolis complex

Questions?

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