Research focus and expertise

Optimising treatment regimens (monotherapy, combinations) to combat antimicrobial resistance

- **Experimental microbiological** research (including dynamic infection models, multi-OMICS)
- **Mathematical modelling** (mechanism-based, population pharmacokinetic/ pharmacodynamic, quantitative systems pharmacology modelling, immune response)

→ Integrating both to develop better treatments against serious infections *(next slide)*

→ Support other projects through mathematical modelling of *in vitro*, *in vivo* and/or clinical data

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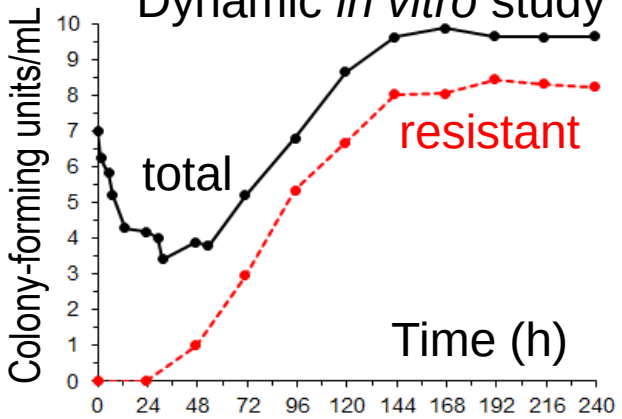
World's Top 2 in Pharmacy and Pharmacology 2023 (QS World University Rankings)

MONASH PHARMACY & PHARMACEUTICAL SCIENCES

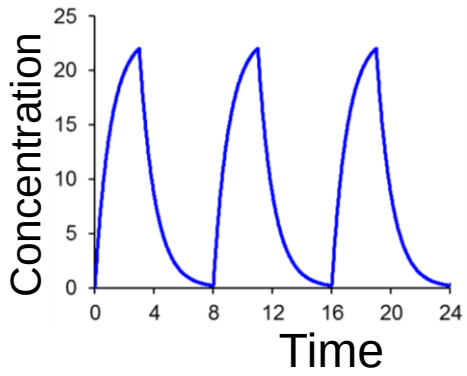
Combating antimicrobial resistance by integrating dynamic infection models, multi-OMICS and mechanism-based modelling towards personalised therapies

Bacterial isolates with resistance mechanisms common in East Asia

Dynamic *in vitro* study



Drug concentration-time profiles in patients representative of the region



Multi-OMICS of resistance

Drug

Bacterial killing

Resistance emergence

Pharmacokinetics

Mathematical modelling, AI

Impact of renal function, body weight, disease state, ethnicity, others

Pathogen

Infection

Host response

Host

Multi-OMICS on virulence factors, capsule, etc.

In vivo infection model, immune response

→ Model-optimised monotherapies or synergistic combination regimens, prospectively evaluated *in vitro* and *in vivo*
→ Tailored to characteristics of bacteria and patient, to maximise effectiveness and minimise resistance emergence