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Vice President

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About Recce Pharmaceuticals Ltd

- ▶ Founded in 2008
- ▶ Publicly listed on ASX 2016 (ASX:RCE)
- ▶ Whole new class of antibiotic
- ▶ RECCE® 327 – broad spectrum antibiotic for sepsis
- ▶ Qualified Infectious Disease Product (QIDP) designation
RECCE® 327 labelled under GAIN Act for:
 - 10 years market exclusivity (post approval)
 - Fast track (life of regulatory process)
- ▶ Patented manufacturing to Phase I & II volumes
- ▶ In discussion with US Food & Drug Administration



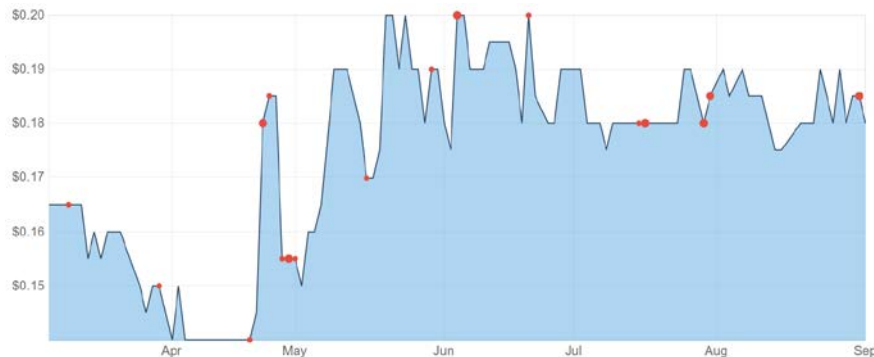
*Recce is a drug
discovery and
development business,
commercialising a new
class of synthetic
antibiotics to address the
global health challenge of
antibiotic resistant
superbugs.*

Recce Pharmaceuticals Ltd - Capital structure

Major shareholders 31 March 2018

| | |
|---------------------------|-------|
| 1. G. & O. Melrose* | 35.0% |
| 2. Foord Asset Management | 5.2% |
| 3. J. Graham* | 4.1% |
| 4. M. Dilizia* | 3.3% |
| 5. State One Equities | 2.9% |

ASX:RCE 6 months



* Held by Executive Directors

Snapshot

| | |
|-----------------------------------|---------------------------|
| ASX code | RCE |
| Shares on issue | 89.34 million |
| Share price | AUD 19 cents |
| Market Cap (approx.) | USD \$12.1 million |
| Cash and deposits 30 June 2018 | USD \$0.5 million |
| Trading range 52 week | AUD 14-26.0 cents |
| Average daily volume 3 months | 84.4K |

Tackling Superbugs – RECCE® 327 (Video)



Antibiotic Resistance - Asia

- ▶ 4.73 million deaths attributable to AMR in Asia every year by 2050¹
- ▶ A new superbug infection reported every 18 minutes!²
- ▶ 1/3 of Hong Kong's elderly care home residents carry **MRSA superbugs** - 3 times that rate in Shanghai³
- ▶ AMR in Hong Kong FAR exceeds that other countries - **20 times higher** than UK or Sweden⁴
- ▶ Antibiotic consumption increased **79%** in mainland **China** – **103%** in **India** (2000-15)⁵
- ▶ ½ of all *S.aureus* bacteria in Hong Kong are drug resistant - 4x higher than the percentage of Britain⁶
- ▶ Community carriage rates for *E. coli* (ESBL) superbug dangerously high in South East Asia from 30-60%⁷



1 WHO – Antimicrobial Resistance in the Western Pacific Region 2016

2 South China Morning Post – Published May 2014

3 South China Morning Post – Published Aug 2018

4 The Guardian – Published June 2018

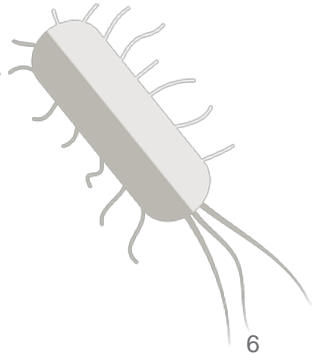
5 Sci Dev Net – Published April 2018

6 The Standard – Published Nov 2017

7 The Hong Kong College of Pathologists – Published July 2018

H. Pylori in Asia – a real problem!

- ▶ *H. pylori* is one of the most common bacterial pathogens, **estimated to infect about 60% of the world's population - 4.4 billion people**¹ - much higher rates in countries such as China and India.
- ▶ **70-90% population of developing countries infected with *H. pylori***²
- ▶ **About 20% of infected individuals with *H. pylori* develop** gastroduodenal disorders, including **gastric cancer**.³
- ▶ US FDA believe that *H. pylori* has the potential to pose a **serious threat to public health**⁴
- ▶ *H. pylori* has been added to the list of pathogens, which **qualify under its QIDP (Qualified Infectious Disease Product) designation**, to facilitate specific antibiotic drug development.⁵
- ▶ **RECCE® antibiotics has demonstrated *in-vivo* efficacy against *H. pylori* bacteria** – data synergies with lead compound - expanding markets (*H. Pylori*) – Drug portfolio opportunity



Natural antibiotics vs synthetic antibiotics

- ▶ Overuse of antibiotics has led to antibiotic resistant bacteria in humans and animals (superbugs)
- ▶ Antibiotic resistance is widely acknowledged as an urgent global health issue
- ▶ Commercial antibiotics are naturally derived – superbugs have been forming for millennia – and will continue to do so!
- ▶ RECCE® 327 is a new class of broad-spectrum antibiotic
 - Entirely man-made and designed with purpose – not reliant on what's found in nature.
 - Unique mechanism of action – many 'Active-sites', as opposed to the traditional (natural) antibiotics 'few'.
 - Universal mechanism of action - detailed experimentation demonstrates it does not succumb to superbugs.



Pre-formed
natural superbugs

Contain natural antibiotics



NO Pre-formed
natural superbugs

Synthetic antibiotics

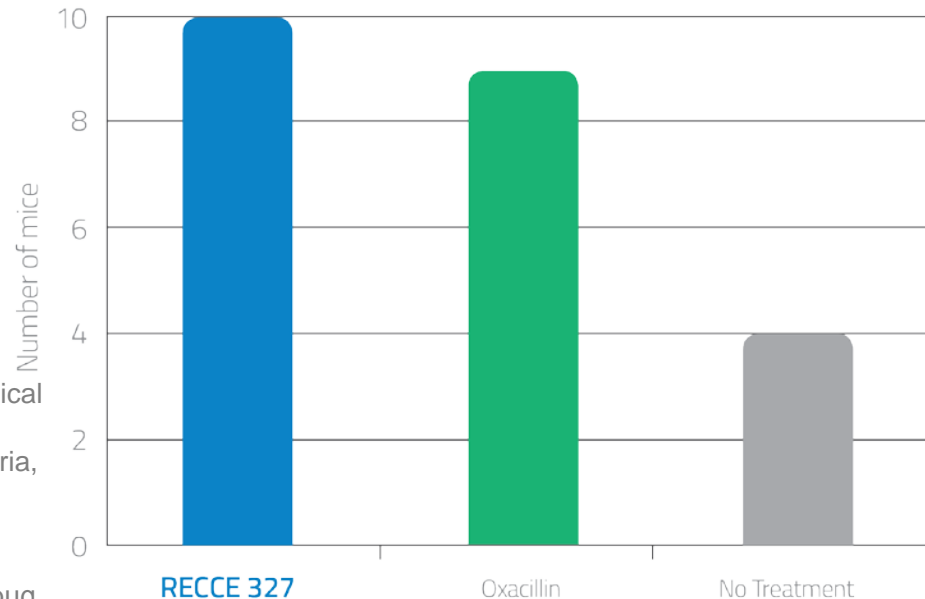
Independent study* example treating sepsis

- ▶ Three groups of 10 mice were each infected with MRSA (*S.aureus* superbug)
- ▶ All ten mice treated with RECCE® antibiotic survived
- ▶ Nine mice treated with current antibiotic (Oxacillin) survived
- ▶ Four mice that had no treatment at all, survived

Note: Oxacillin was chosen for its known activity against MRSA. It is however a 'narrow-spectrum' antibiotic. In a clinical context, where diagnostics cannot immediately determine bacterial type, use in combatting any number of other bacteria, may likely see a less favorable patient outcome...

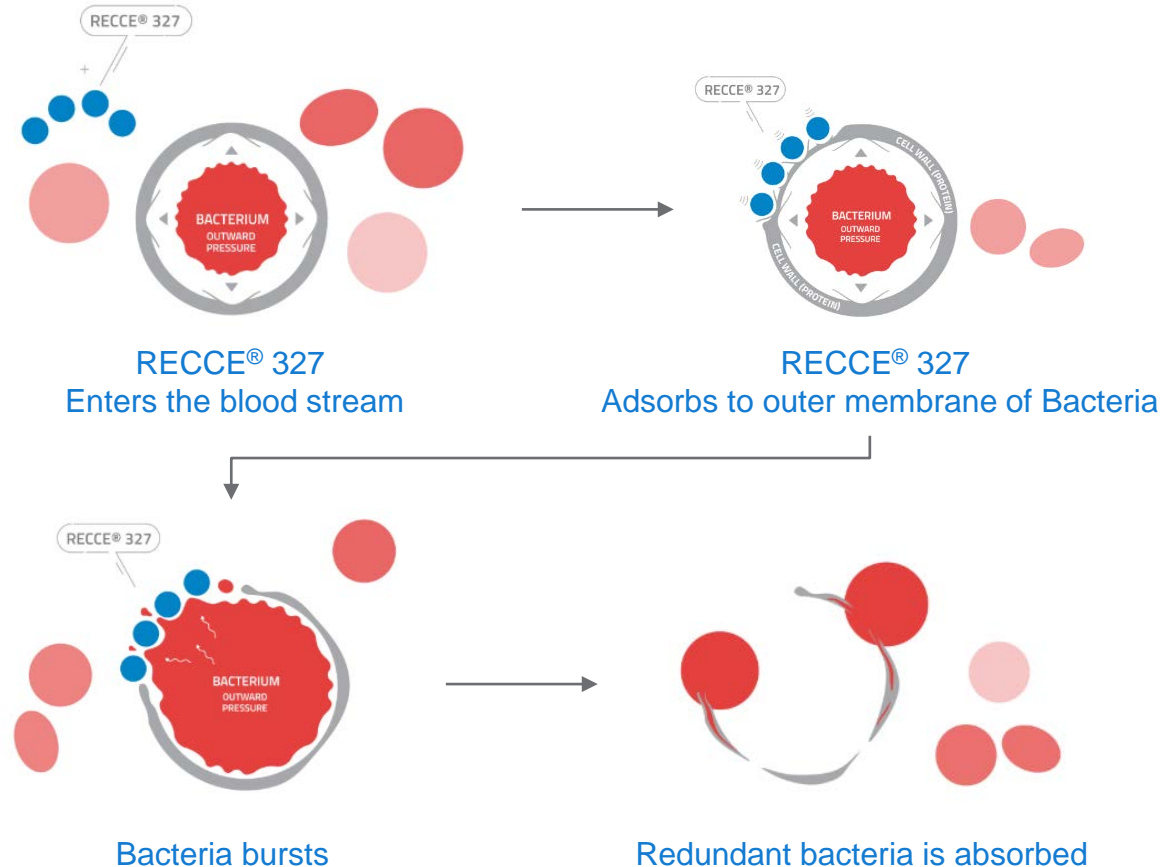
RECCE® 327, with its proven 'broad-spectrum' activity, has shown strength against a range of bacteria including superbug forms, delivering rapid kill of deadly germs.

Number of Mice that survived
Sepsis from *S. aureus* (superbug)

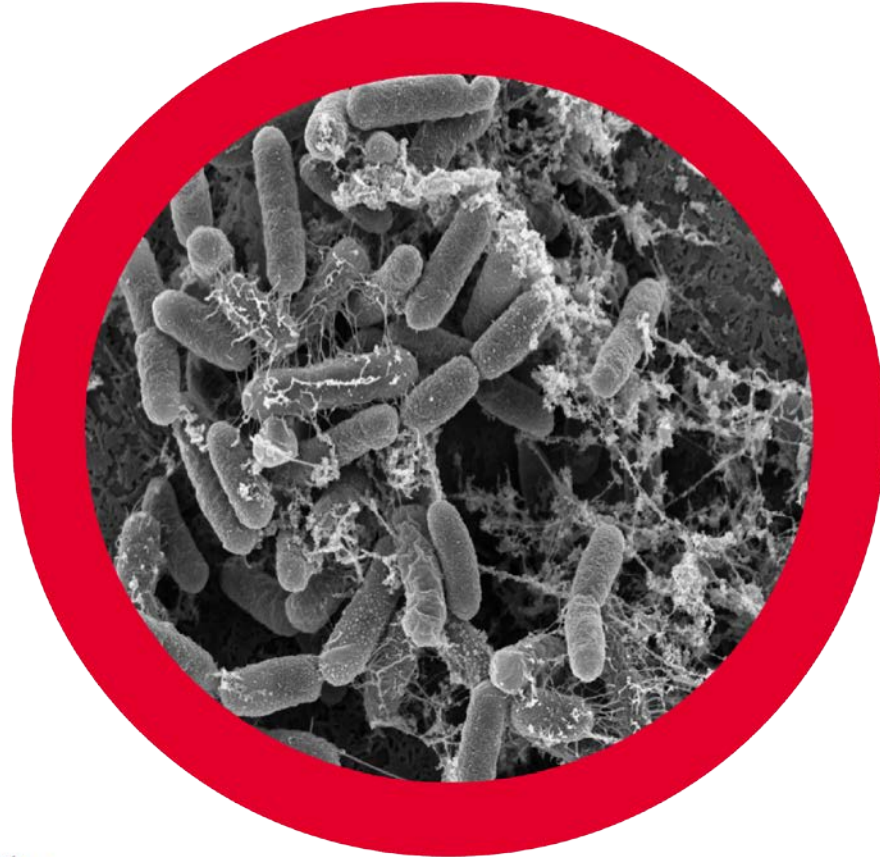


RECCE® 327 – how it works (in more detail)

- ▶ RECCE® antibiotics, attracted by protein in a bacteria's outer membrane, non-specifically attach through hydrophobic interaction
- ▶ Weakening the outer cell wall, internal pressure causes the bacteria to burst and lose viability
- ▶ Outer protein can mutate as much as it likes (superbug) - RECCE® antibiotic will still kill it!



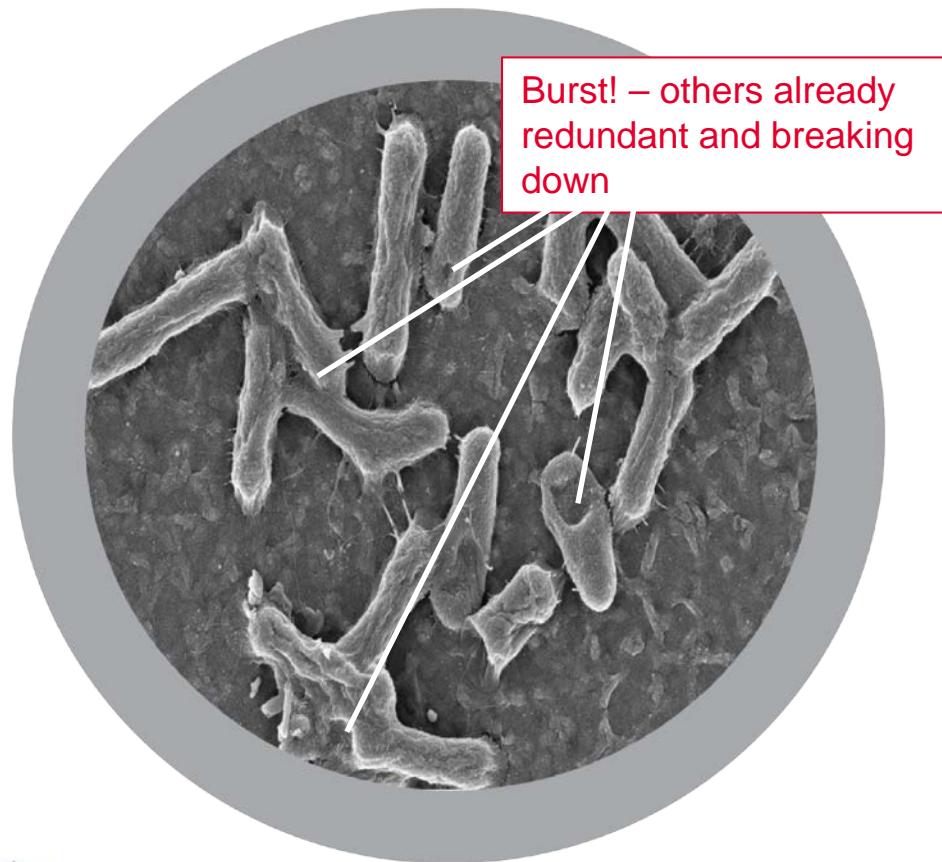
RECCE® 327 mechanism of action in practice



00:00 minutes

Before application
of RECCE® 327,
the *E.coli* bacteria
cells are healthy,
smooth and intact

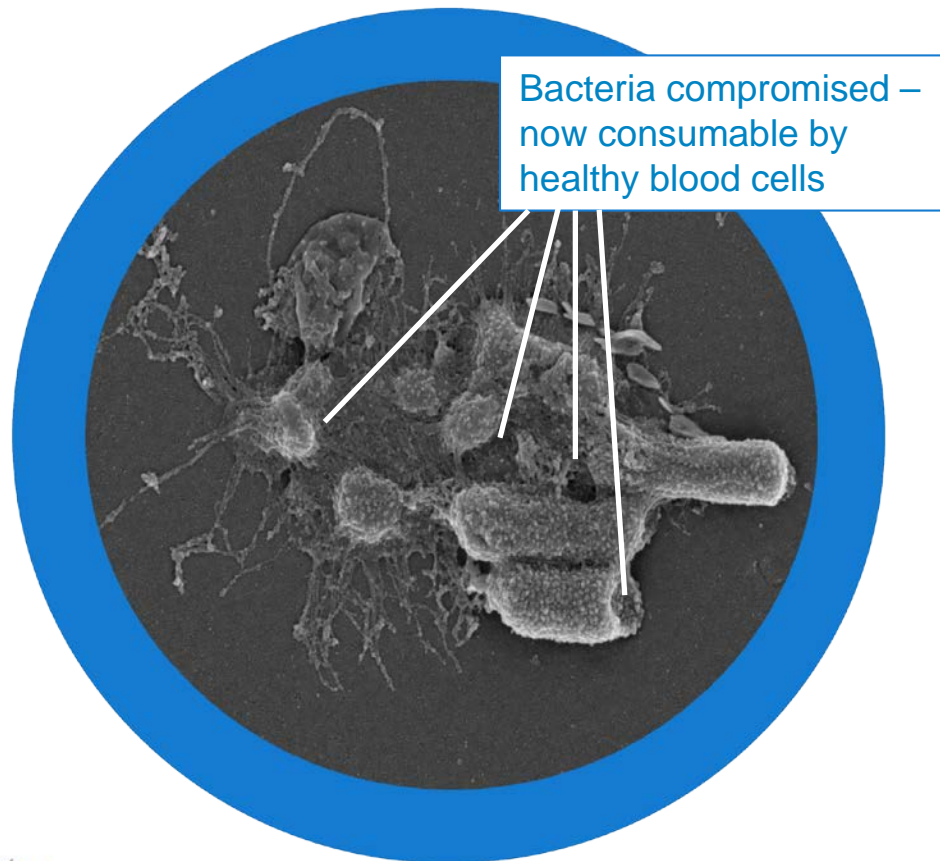
RECCE® 327 mechanism of action in practice



20 minutes

After application of RECCE® 327, the *E.coli* bacteria cell membrane begins to weaken and is disrupted

RECCE® 327 mechanism of action in practice



180 minutes

E. coli bacteria
cells (10e6 cfu/ml)
having their outer
membrane weakened
– and bursting from
treatment with
RECCE® 327 (1000
ppm)

RECCE® 327 – Safety and Efficacy (detail)

Efficacy

- Performs as a broad spectrum antibiotic
- Acts against bacteria in both normal and mutated superbug forms
- Multiple tests demonstrate efficacy against Gram-positive and Gram-negative *S.aureus* and *E.coli* including superbug forms
- Rate and MIC/MCK data demonstrates potency and broad spectrum activity against a range of bacteria
- Contains a patented polymeric structure, intentionally designed to overcome the traditional challenges of bacterial mutation/resistance
- *In-vivo* (mice) study against influenza virus

Safety

- Multiple studies of toxicity in small and large animals
- Multiple tests of mutagenicity (cancer) are clear
- Numerous studies to date indicate the safety of RECCE® 327
- Is suited to administration against sepsis by intra-venous drip
- Indicates a safe therapeutic dosing window



What is Qualified Infectious Disease Product?

- ▶ Legal status awarded under *US Generating Antibiotic Incentives Now (GAIN) Act*
- ▶ Labeled for **fast track designation** – speed the FDA's review process
- ▶ **10 years market exclusivity**, starting from the date of New Drug Application approval if RECCE® 327 completes the necessary clinical trials and is approved by the FDA
- ▶ QIDP designated drugs to treat serious or life-threatening conditions and fill an unmet medical need, are labeled for expedited review in order to facilitate their development

Qualified Infectious Disease Product (QIDP) designation is awarded if FDA considers the drug to treat “*serious or life-threatening infections, including those caused by an antibacterial or antifungal resistant pathogen.*”



Patents and trademarks

Patent portfolio covers all key geographies, manufacturing and modes of use

| Filed | Patent Family 1 <u>Granted</u> | Expiry | Patent Family 2/3 | Expiry | Trademarks registered |
|----------------|-----------------------------------|--------|----------------------|--------|--------------------------|
| Australia | ✓ | 2028 | ✓ | 2035 | ✓ |
| USA | ✓ | 2029 | Pending | 2035 | ✓ |
| Europe | ✓ | 2028 | Pending | 2035 | ✓ |
| Germany | ✓ | 2028 | Pending | 2035 | - |
| Spain | ✓ | 2028 | Pending | 2035 | - |
| France | ✓ | 2029 | Pending | 2035 | - |
| United Kingdom | ✓ | 2028 | Pending | 2035 | - |
| Italy | ✓ | 2028 | Pending | 2035 | - |
| Sweden | ✓ | 2028 | Pending | 2035 | - |
| Japan | ✓ | 2028 | Pending | 2035 | ✓ |
| China | ✓ | 2028 | Pending | 2035 | ✓ |

Patent Family 1 – granted

Unique and highly economical manufacturing process

Patent Family 2 – pending

Applications (Multi-drug delivery)

Patent Family 3 – pending

Anti-viral uses

Trademarks

RECCE® for use on pharmaceutical products and services

Manufacturing and production

- ▶ Wholly owned automated manufacturing facility in Sydney's Macquarie Park
- ▶ Raw materials plentiful and CHEAP - few \$/kilogram
- ▶ Automated manufacture process taking around 1¼ hours
- ▶ No expensive waste – 99.9% product yield
- ▶ Currently producing in volumes to support planned Phase I and Phase II clinical trials
- ▶ Facility built to pharmaceutical specification



Principal Engineer Arthur Kollaras & Executive Chairman/Chief Research Officer Dr Graham Melrose assess finished product

The Clinical Pathway to Antibiotic Approval

- ▶ Three distinct phases of clinical evaluation prior to approval for new drugs
- ▶ Multiple legislative and regulatory initiatives available to a new antibiotic developer
 - Facilitates and expedite drug development and review
 - Potential time/cost opportunities available along the way
- ▶ Medical observation is simple
 - Fast acting, highly symptomatic nature
- ▶ Patient outcomes are obvious and associated development costs to reach reg. approval may be less



Board and management structure

Dr Graham Melrose – President & CRO

BSc (Hons), PhD (UWA), MBA (Macq), FRACI, C Chem, FAICD

Founder and inventor. Former Executive Director and Chief Research at Johnson & Johnson (Aust) Pty Ltd in Sydney, with global responsibilities, particularly in Asia-Pacific

Michele Dilizia – Vice President

BSc (Med Sci), Grad Dip Bus (Mkting), BA (Journ), GAICD, MASM

Co-inventor and qualified medical scientist; specialisation in medical microbiology and regulatory affairs

James Graham – Vice President

BCom (Entrepreneurship), GAICD

Extensive experience in marketing, business development and commercialisation of early stage technologies with global potential

Dr John Prendergast – Non-Executive Vice President

BSc (Hons), MSc (UNSW), PhD (UNSW), CSS (HU)

US based, current Chairman and Co-founder of Palatin Technologies, Inc. (NYSE: PTN) and Lead Director of Heat Biologics, Inc. (NASDAQ: HTBX) – extensive experience in the international commercialisation of pharmaceutical technologies

Alistair McKeough – Company Secretary (Outsourced - Whittens & McKeough)

Alistair is a qualified lawyer and Principal/Managing Director of McKeough & Whittens, Alistair has broad experience as a commercial litigator and Company Secretary to ASX Listed companies

Justin Reynolds – CFO (Outsourced - Pitcher Partners Sydney)

Justin is a qualified accountant and Partner of Pitcher Partners Sydney, Justin has broad experience covering all areas of accounting, taxation and assurance. Particularly, Justin's areas of expertise are business services and outsourced accounting

Arthur Kollaras – Principal Engineer

BSc Beng (Chem), PhilEng (Enviro), MIEAust, MISPE

Highly qualified in chemical engineering and microbiology, has significant experience taking a new technology concept to pilot plant and full scale FDA standards and production internationally

Dr Justin Ward – Principal Quality Chemist

BSc (Chem), PhD (Chem), MRACI, CChem

A quality control expert who has worked with leading pharmaceutical companies, he is bringing Recce's research and development, and manufacturing up to US FDA requirements

Economics of antibiotic development

- ▶ A challenged business model – the antibiotic industry:
 - Traditionally the more effective an antibiotic, the less likely it is to be used by clinicians who want to ‘save it’. Less use – less sales...
 - Conventional antibiotics commonly suffer resistance quickly; investment in ‘new’ drug candidates a risk ROI
 - Pharmco’s cutting antibiotic R&D – yet market need has never been greater

How might one ‘unlock’ the anti-infectives industry?

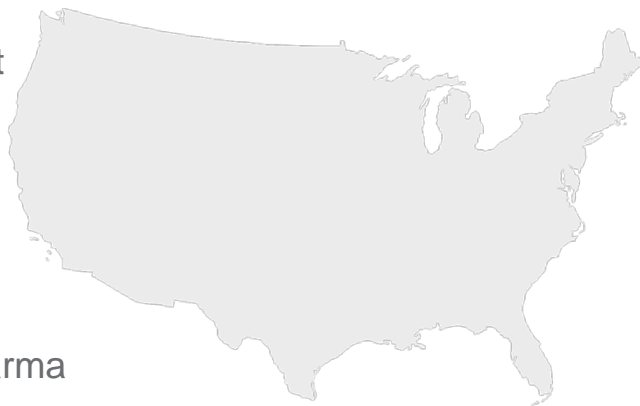
- ▶ A new class of antibiotics – having a unique mechanism of action that DOES NOT lose effectiveness with ‘bacterial mutation’ – superbugs – even with repeated use
- ▶ Broad spectrum capabilities against ALL deadly bacteria, Gr +/- and superbugs
- ▶ A drug that can be administered quickly, without impractical diagnostic delays, where clinical ‘guess-work’ could be a thing of the past!

Indications suggest RECCE® 327 may just be this needed change



US Legislative Support of Antibiotic Development

- ▶ US *Right-to-Try Act* passed in May/June 2018
- ▶ **Designed to give US patients with life threatening diseases, immediate and direct access to potentially lifesaving drugs** - that have completed Phase I clinical trials
- ▶ New legislation mitigates possibility of weeks of procedural delay - Previous legislation termed Compassionate Use
- ▶ **Potentially resulting in improved patient outcomes**
 - With reduced risk to those providing them
 - Potential to build earlier ‘direct’ distribution – diluting late-stage pharma market access model
- ▶ Further evidence of evolving regulatory environment in the US - Largest antibiotic market in the world
- ▶ Potential aimed at **expediting new drugs with lifesaving potential**
- ▶ Legislation does not affect Company’s business at present

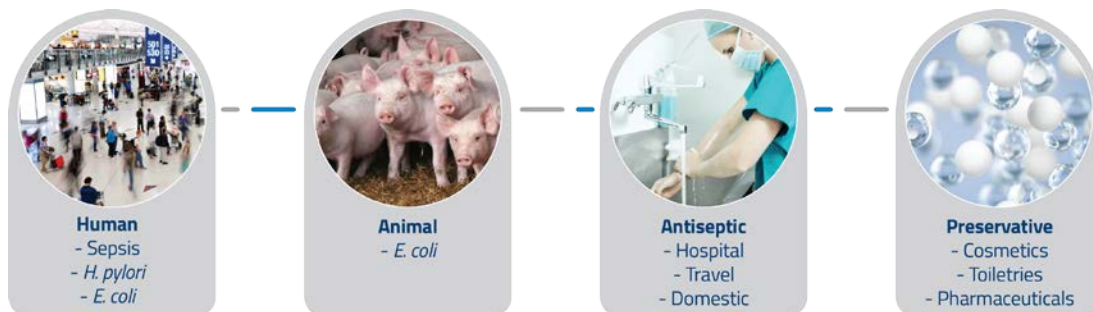


Global market interest in antibiotic resistant treatments – M&A activity

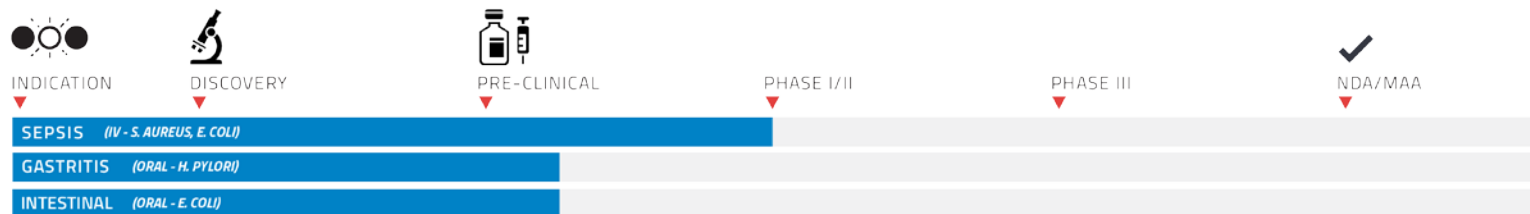
| Date | Company | Acquired/merger/ acquisition by | Deal value (US\$) | Phase acquired | Detail |
|--------|--------------------------------|------------------------------------|-------------------------------|-------------------|---|
| Dec-14 | Cubist | Merck | \$8.4bn | Ph III | Antibiotics - one marketed - Cubicin for G-pos \$625m (revenue in 2010, over \$1bn in 2013) – mostly MRSA |
| Aug-16 | Astra Zeneca (antibiotics) | Pfizer Inc | \$1.5bn | Ph II-NDA | Late-stage small molecule antibiotics business – most markets outside the US only |
| Jan-15 | Meiji Seika Pharma & Fedora | Roche | Up to \$750m | Ph I | Beta-lactamase inhibitor (ex. Japan) |
| Oct-17 | Warp Drive Bio | Roche | Up to \$387m | Device | Potential natural antibiotic identification technology |
| Dec-17 | Summit Therapeutics | Eurofarma | Up to \$27m | Ph II | Clostridium difficile infection (Latin America only) |
| May-16 | Vertex Pharma | Spero Therapeutics | Not disclosed | Ph I | Bacterial infections |
| Jan-18 | Prokaryotics | Merck | Not disclosed | Preclinical | Bacterial cell envelope enzymes |
| Mar-18 | Redx Pharma | Deinove | Not disclosed | Preclinical | Gram-negative bacteria |

RECCE® antibiotics – a technology

Recce's technology enjoys the added opportunity of multiple markets and product categories.



Current RECCE® 327 development program



Estimated timelines/indications are subject to changes in development plans and regulatory requirements/clarifications

NDA - New Drug Application

MAA - Marketing Authorisation Application

Investment summary



Qualified Infectious Disease
Product Designation (QIDP)



Generating Antibiotics Now
(GAIN) Act approved



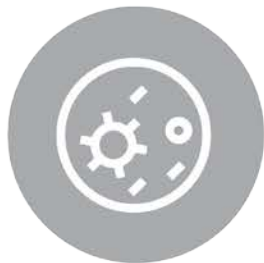
Proprietary technology as a
new class of antibiotics



Lead compound addressing
the most expensive condition
faced by hospitals worldwide



Early commercialisation
potential



Initial focus on sepsis-
potentially the first treatment
for sepsis



Favourable legislative and
financial landscape



Experienced commercial
management and board



Creating value by meeting
key milestones



Established manufacturing
(volumes suitable for Ph I/II)

Thank you

James Graham

Vice President

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