

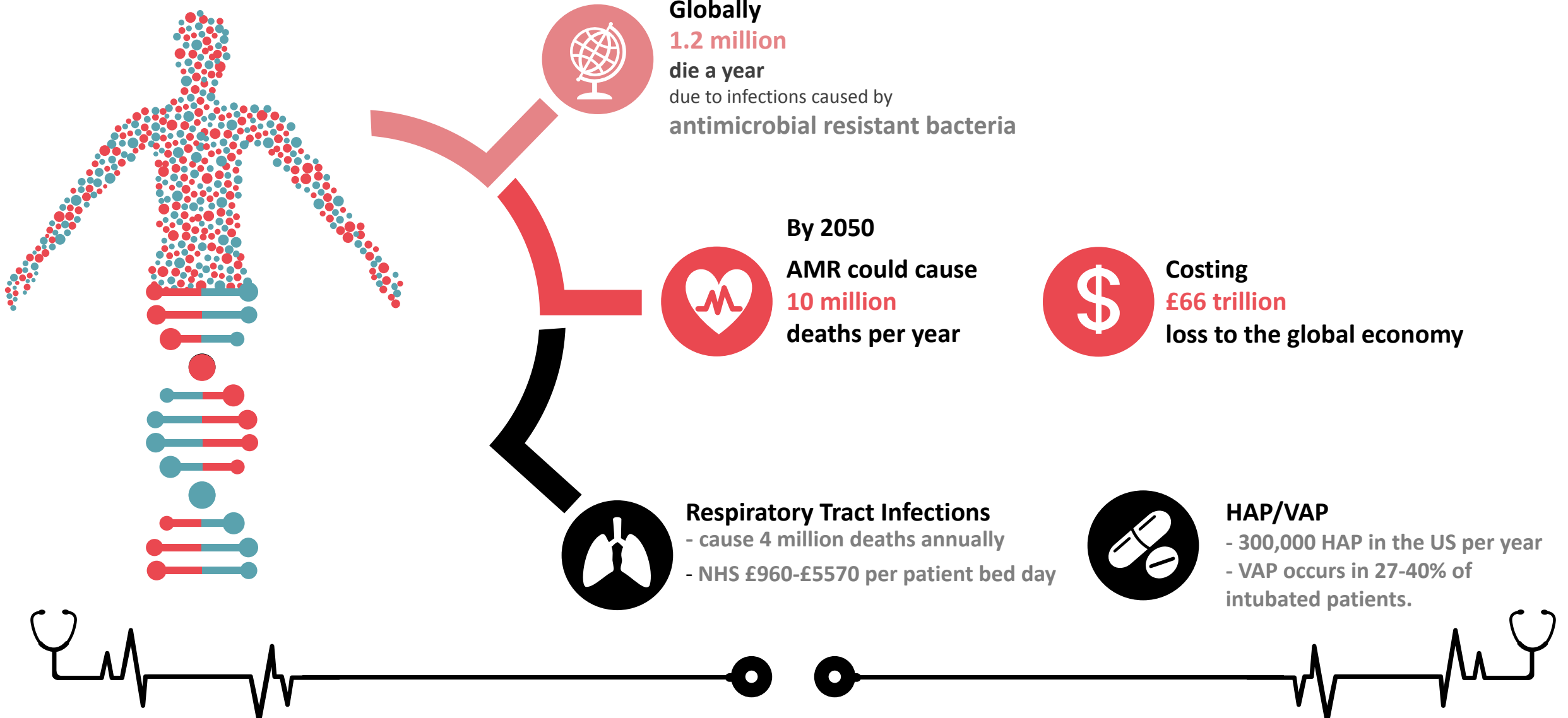


MetalloBio



Anglo Nordic Life Science Conference – April 2023

The Global Problem: Antimicrobial Resistance



Our Solution: A New Antimicrobial Class



Multimodal Compound

2 modes of action in one compound. Beneficial when evading resistance mechanisms.



Broad Spectrum

More active than clinical antibiotics (0.5-4 μM) on a broad-spectrum of pathogens including WHO and CDC critical strains.



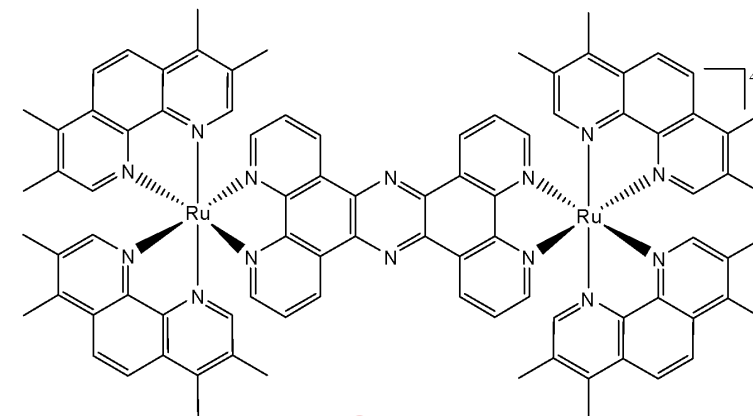
Novel Target

Multiple mechanisms of action including a novel target, confirmed by imaging and RNA-Seq



No Cross Resistance

Little-no-emergence of resistance in comparison to clinical antibiotics over 2-months of passaging.



Lead Series 1



In Vivo Efficacy

High efficacy against *A. baumannii* and *P. aeruginosa* – invertebrate model - *Galleria mellonella*.



Low Toxicity

Non-toxic *in vitro* and *in vivo* (invertebrate and murine model) with a large therapeutic window - 2 orders of magnitude.



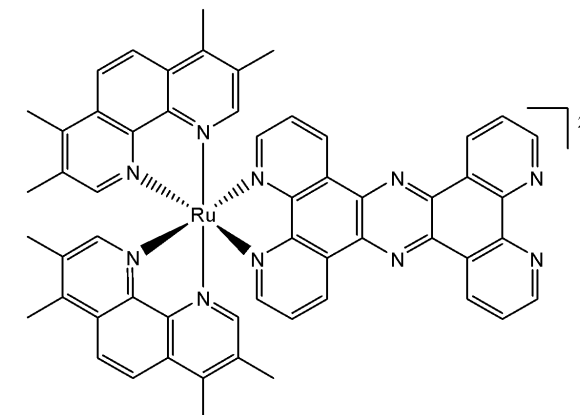
Modular Synthesis

Modular, 4-step, gram-scale synthesis with interchangeable ligands giving the capability to generate a series of complexes.

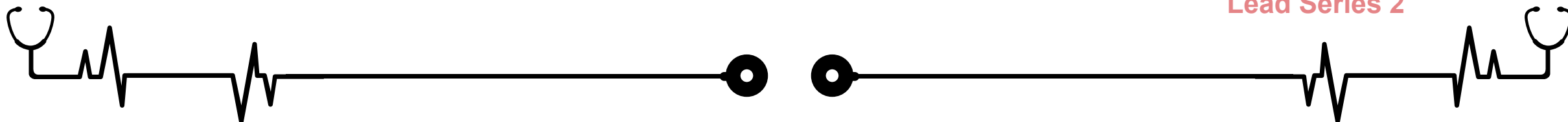


Multiple Applications

Broad spectrum activity when incorporated into different polymers at 1% loading – antimicrobial materials applications.



Lead Series 2





In Vitro (test tube) Activity

- Efficacy on ~150 bacterial strains
 - MIC50 and MIC90s
- Low mammalian toxicity and no DNA damage
 - Antimicrobial and antibiofilm efficacy.

01

Mechanism of Action

- Di-TMP novel multimodal mechanism – outer-membrane and cardiolipin
- Potential further patentable targets identified by RNA-Seq.
 - Biological assays, imaging, RNA-Seq.
- Mono-TMP disrupts bacterial DNA processing
 - Biological assays and imaging.

02



Ex Vivo (tissue) Activity

- No toxic effects to lung tissue.
- Clears *A. baumannii* and *P. aeruginosa* – lung tissue.
- Clears *P. aeruginosa* cornea infection.

03



04

Invertebrate Model



- Efficacy against ESKAPE pathogens
- Non-toxic at 100x effective antibiotic level
- No adverse effects in the larvae.

05

Preclinical Mouse Model

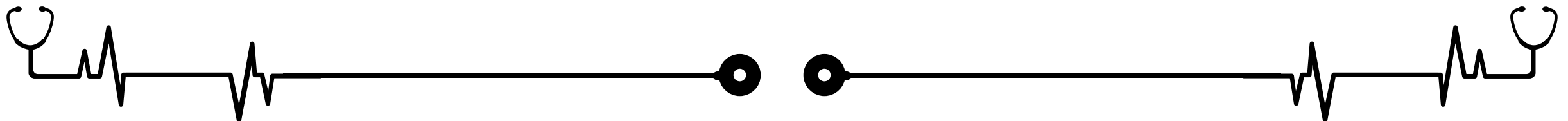


- 50xMIC therapeutic window *in vivo* – murine model
- Good bioavailability – high concentration in lungs, plasma, kidney, liver and spleen.
- Good plasma half-life
- 9-hour Sepsis Model *E. coli* efficacy at <0.01 mg/kg.

06

Coating Efficacy

- Efficacy against all ESKAPE pathogens
- Tailored elution.
- 15 times more active than market leaders
- Antimicrobial and antibiofilm.



Platform Technology with Multiple Applications

Core Commercial Strategy Programme

Global antibiotics market - \$57.9 billion/annum by 2028

Global antibiotic resistance

\$8.21 billion 2017

\$13.6 billion by 2025

Respiratory tract - \$35.5 billion by 2027

A pharmaceutical drug to treat multi-drug resistant ESKAPE pathogens.
Initial patient populations – urinary tract and respiratory tract infections.

Governmental Initiatives

NHS Value – Based Subscription Model

Up to £10 million annually for new antibiotics – valuation based on clinical need and novelty.
Deal has now been made by NHS and Pfizer (US) and Shionogi (Japan) - £10 million

Pasteur Act

Developers would be paid contractually agreed-upon amounts annually, for a duration ranging from five years up to the patent life.

Strategic Partnerships

Out-licence the IP on an application specific basis

Medical device coatings

\$3.3 billion 2020

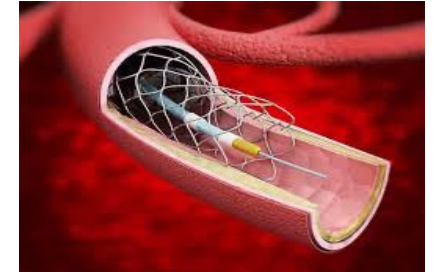
\$5.6 billion 2025

Catheters - \$1,527.3M 2026

Endotracheal tubes - \$2.6B 2024

Paid proof-of-concept collaboration with B. Braun

Revenue 1-2 years



Antimicrobial additives

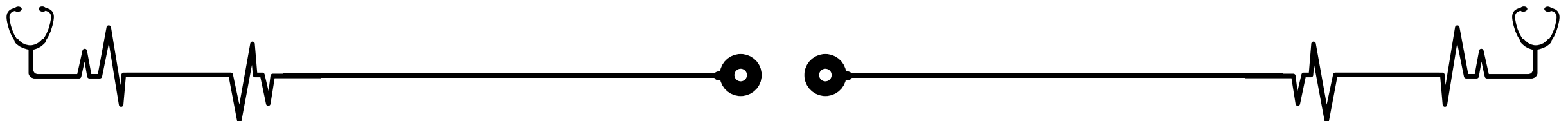
\$2.2 billion 2020

\$3.7 billion by 2025

**Option-to-license with market leader
4-month option period £45k fee**

Revenue 6-months

Indicative deal value - \$5.5 million + royalties
(TRL3 paint)



Advantageous Over the Competition - Antibiotic

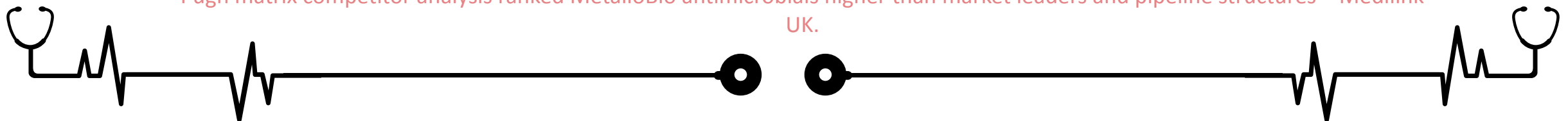


Antibiotic

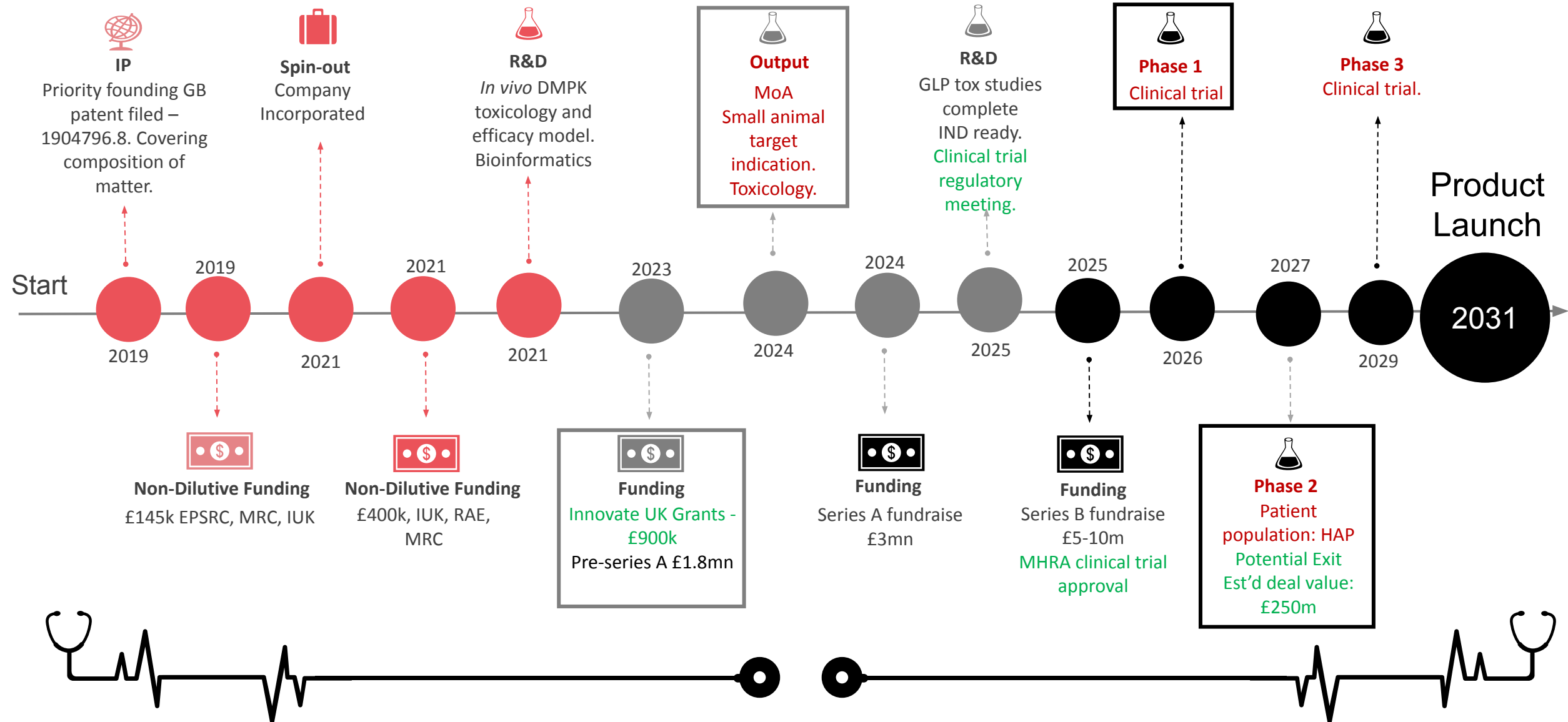
122 pipeline antibacterial agents, 72 address priority pathogens of these **10** represent a new class and 2 address all CDC and WHO urgent and critical pathogens

	Developer	Phase	Target Indication	Gram-negative Targeting	New Class	Broad-spectrum	Multimodal Mechanism	Novel Mechanism	Targets all WHO and CDC Critical
DiTMP	MetalloBio	Preclinical	HAP/VAP	✓	✓	✓	✓	✓	✓
MonoTMP	MetalloBio	Preclinical	HAP/VAP	✓	✓	✓			✓
VNRX-7145	VenatoRx	Phase 1	Gram-negatives	✓	✓	✓			✓
AFN1720	Debiopharm	Phase 2	Acute Skin Infections		✓			✓	✓
Brilacidin	Innovation Pharma	Phase 2	Acute Skin Infections		✓				
Cefiderocol	Shionogi	Marketed	HAP/VAP	✓	✓	✓			✓
Gepotidacin	GSK	Phase 3	Pneumonia		✓			✓	
Lefamulin	Nabriva	Marketed	Pneumonia	✓					✓

Pugh matrix competitor analysis ranked MetalloBio antimicrobials higher than market leaders and pipeline structures – Medilink UK.



Positive Commercialisation Pathway

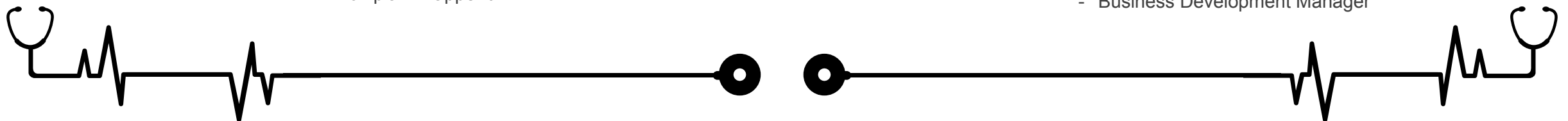
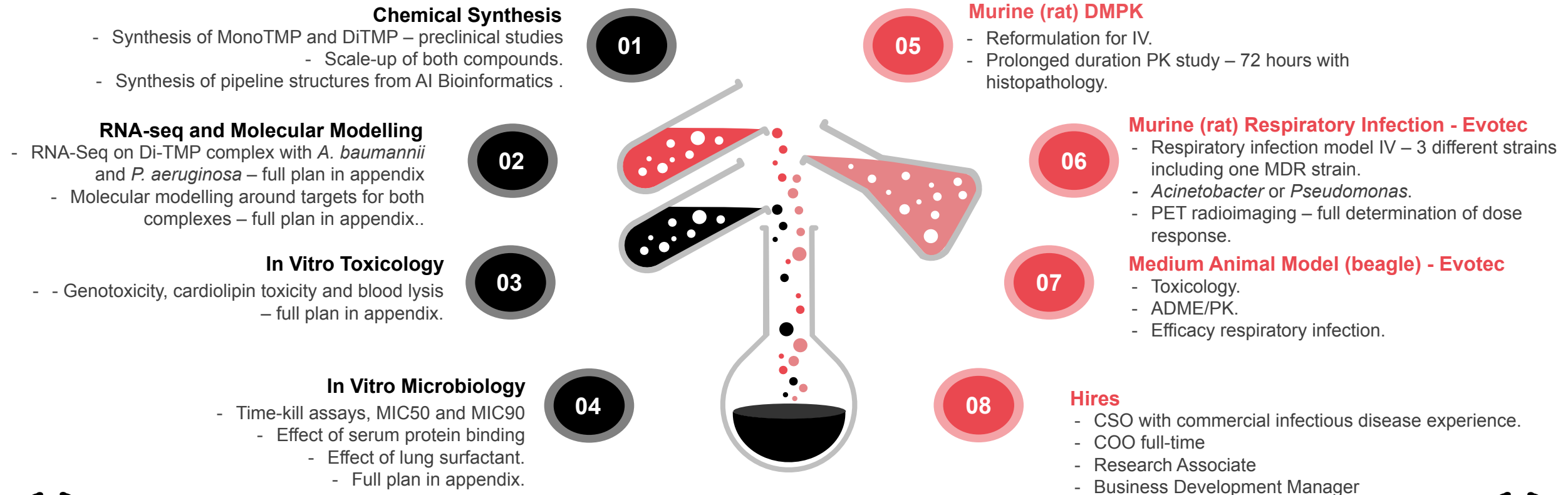


Funding Ask – pre-Series A

Pre-Series A fundraise: £1.8mn

Committed: £1.03mn DSW Ventures Lead Investor

Grants: £400k Innovate UK SMART Grant, £50k Innovate UK Women in Innovation award, £500k Biomedical Catalyst



Good Early Commercial Traction



Systemic Antimicrobial

- Ongoing project with UK AMR SME.
- Ongoing conversations with top 10 pharmaceutical companies.
- Global committee stage with pharmaceutical corporate investment firm.
- Invited to apply for J&J and BARDA's Blue Knight initiative including J Labs space and a scientific advisory group – virtual or Washington DC



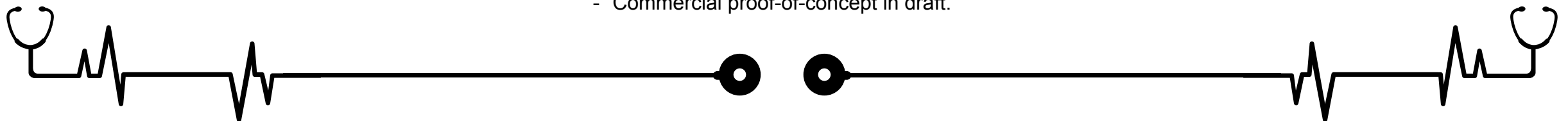
Coatings and Materials

- Paid projects with top 10 medical device company and global portfolio company.
- Project in discussion with top 10 materials company.
- NDA discussions with three further materials companies.

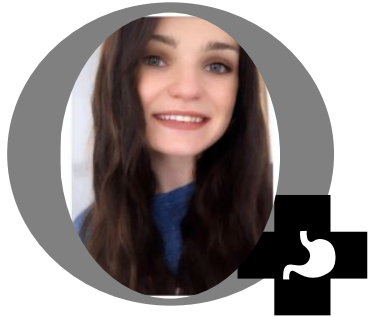


Option Fees and Commercial Agreements

- Global portfolio company - £45k Option Fee Signed – 6-month proof-of-concept.
- Top 10 medical device company - commercial agreement in progress – paid proof-of-concept ~£100k.
- Commercial proof-of-concept in draft.



Strong Management Team



Dr Kirsty Smitten
Chief Executive Officer

A Royal Academy of Engineering Enterprise Fellow and key inventor of the technology with a PhD in Chemistry and Microbiology. KS has led the technology's development since inception and secured significant non-dilutive funding.

Awards: ELRIG Early Career Impact Awards. Forbes 30 Under 30. Nova Prize in Chemistry.



Dr Michael Murray
Executive Chairman

Business advisor and Royal Society Entrepreneur in Residence at the University of Sheffield (TUoS) with extensive C-suite experience. MM owns Murray International Partners Ltd a business consultancy company and has led and closed numerous life science deals ranging from hundreds of thousands to multi-billions of dollars.



Professor Jim Thomas
Chief Scientific Advisor

A professor of Bioinorganic Chemistry at TUoS. His research involves recognition of sensing ions, bioanions and biomolecules within cells, with a focus on antimicrobials and anticancer agents. JT has a track record of publishing in high impact factor journals and securing multi-disciplinary research grants.



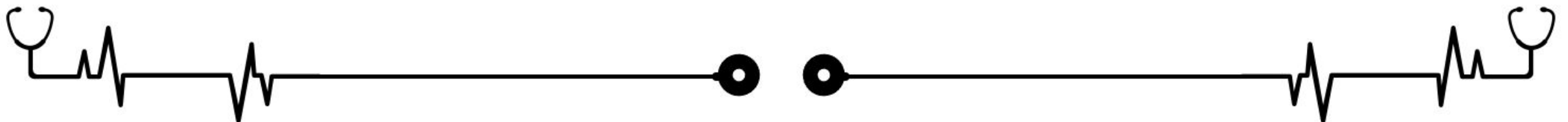
Dr Richard Senior
Chief Operations Officer

A commercialisation manager of life sciences at TUoS and a qualified patent attorney. RS has supported the project since its inception. RS has a PhD in Biomaterials and Tissue Engineering from TUoS and has experience in patent law as a technical assistant at Withers and Rogers LLP.



Ross McMaster
Chief Financial Officer

RM is director of Suel Ltd and is Fellow of the Association of Chartered Accountants. RM has a background in local and national chartered accountancy and specializes in the provision of company structuring, strategic and business planning, management accounting and financial forecasting.



Research Staff and Advisory Group

Research Staff



Dr Simon Fairbanks
Research Associate Chemistry



Dr Matthew Culbert
Research Associate Engineering

Scientific Advisory Group – Still Being Appointed



Dr Tim Nichol
Antimicrobial Coating Advisor



Prof Frederik Claeysens
Engineering Advisor



Dr Esther Karunakaran
Microbiology Advisor



Dr Clare Lankester
Regulatory Mentor



Professor Tom Smith
Antimicrobial Coating Advisor



Dr Edwin Moses
Commercial Mentor to the CEO



Dr Samantha McLean
Microbiology Advisor



Professor Lesley Hoyes
Microbiome Expert



Business Model – High Return on Investment

B2B License Based Business Model

Systemic Drug Modelled Phase 2 licence indicative deal valuation - £250m

2026: Upfront £25m

2027: First patient recruited - £62.5m

2030: Market authorisation application - £62.5m

2031: Market authorisation - £100m

Royalties: 7-9%.

TRL3 catheter coating deal valuation (US) - £647k

2026: Upfront £64.7k

2027: First patient recruited - £129.5k

2030: Market authorisation application - £194.2k

2031: Market authorisation - £259k

Royalties: 5-7%.

Examples of Funding and Deals in the Space

GSK acquisition of Affinivax - 2022

- \$2.1 billion upfront and \$1.2 billion in development.
- Phase 2 development pneumococcal vaccine

Centauri Therapeutics Series A Round - 2022

- \$32 million – BIVF, Novo Holdings REPAIR and Evotec
- Preclinical immunotherapy for infectious disease

Innoviva Merger with Entasis - 2022

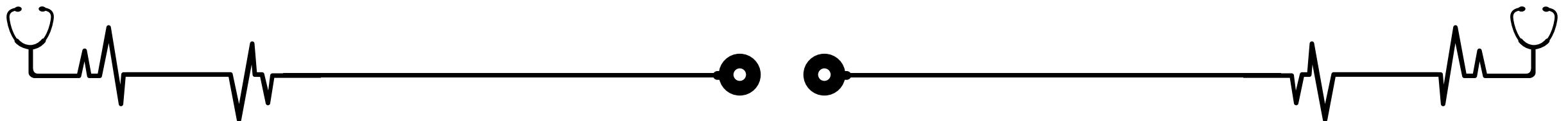
- \$113 million for 40% of shares, Innoviva owned 60% already
- Phase 3 clinical trials

Pfizer Equity and License Agreement Spero Therapeutics - 2021

- \$40 million equity and \$80 million + 8-10% royalties
- Phase 1

Pfizer Acquires Amplyx Pharmaceuticals - 2021

- Undisclosed amount Amplyx was valued at \$500M-\$1B 2020
- Phase 2



The Main Points

Systemic Antimicrobial - preclinical development

- Novel antimicrobial class with broad spectrum activity.
- Novel target and multi-modal mechanism of action.
- Higher activities than clinically available antibiotics.
- Little-to-no-emergence of resistance.
- Expected licence deal at Phase 2 in 2026 - £250 million value + royalties
- Composition of matter patent – PCT application number: WO2020201754 has entered Regional/National Phase for all major territories.

Antimicrobial additive

- Efficacy at 1% loading levels.
- Broad-spectrum antibiofilm efficacy.
- Expectation to out licence at TRL3/4.
- Co-development agreement with a market leader to develop the technology for specific applications, option fee revenue within 1-month, license fee revenue within 5-months.
- Licensing based business model with application specific licensing.

Commercial

- Application-specific licensing model for the non pharmaceutical applications of the technology.
- MetalloBio have formed a partnership with the Cystic Fibrosis Foundation and MDC CF AMR Syndicate who are financing some CF-relevant activity studies on respiratory pathogens and putting a CF advisory board together for MetalloBio.

