

AIM: POLB OTCQB: POLBF

# Company Presentation June 2022

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# **Building a Leading Infectious Diseases Company**



5.13%

Spun out from 🏀 Sp

Deep roots in infectious disease & the clinical trials business Fully funded £25m raised at IPO July 2021

London stock exchange Long term shareholders including leading institutions

Cathal Friel 7.28%

Schroders Investment Management

Poolbeg has a unique capital light & early monetisation model

**O**nly similar company is Evotec in Germany which has a \$4.7bn market cap. Evotec also has deep roots in the clinical trials business

Targeting booming infectious disease market Expected value >\$250bn by 2025 **Experienced team** have previously created c. \$1bn in shareholder value

- Rapidly expanding portfolio of assets
- Self funding business model out-licensing early and often
- Focusing on the European and N. American rights can sell the China, India, Korea & other market rights for cash
- Becoming a one-stop-shop for bigger pharma and biotechs seeking infectious disease assets

#### **Experienced Leadership Team** POOLBEG PHARMA No Jeremy Skillington Ian O'Connell **Cathal Friel Carol Dalton** Chairman CFO **VP IR & PR** CEO this Open Orphan Open Orphan Open Orphan INFLAZOME Targeted Therapies for Inflammatory Diseases AMRYT **RAGLAN CAPITAL** 11 Genentech **Deloitte** POOLBEG **RAGLAN CAPITAL** A Member of the Roche Group PHARMA **Prof Luke O'Neill Patrick Ashe Eddie Gibson Non-Executive Director Non-Executive Director Non-Executive Director** ,|||| Trinity College elan HORIZON **INFLAZOME** Dublin **Bristol Myers** Fargeted Therapies for Inflammatory Diseases WICKENSTONES Squibb The University of Dublin gsl GlaxoSmithKline

# **Operational Highlights**



Executing on our strategy – momentum continuing to build

ОÆ

Markets

## Multiple deals completed

Expansion & diversification of portfolio – reducing risk & increasing upside potential

✓ POLB 002

- ✓ POLB 003 + 5 other
   vaccine candidates under review
- ✓ Oral Vaccine Delivery Platform

**POLB 001** 

On track for LPS challenge study in June 2022

Data expected by year end with monetisation to rapidly commence thereafter

# **2** Artificial Intelligence deals signed

Identify new drug targets & treatments for RSV & Influenza

# **Well Capitalised**

£20.9m at 31 Dec 2021

Low cash burn & long cash runway

Pursuing non-dilutive funding

New Investors offered to purchase £1.6m distribution in specie shares at market price (5.9p) before end of lock-up period

April 2022

Commenced trading on US OTCQB market

March 2022

# **Rapid Development & Frequent Out-Licencing**

Developing multiple assets at once - reducing risk





### **Recent infectious disease deals**

**GSK acquires Affinivax** \$2.1b upfront + \$1.2b follow-on, May 2022 *Pneumococcal vaccine & vaccine platform* 

> **Pfizer acquired ReViral** up to \$525m, April 2022 *Respiratory Syncytial Virus (RSV)*

### **Bav Nordic licence Chinese rights to Nuance Pharma**

\$12.5m upfront + \$200m follow-on, Mar 2022 Respiratory Syncytial Virus (RSV)

**Merck acquired Oncolmmune** 

\$425m upfront, Nov 2020 COVID-19

Pfizer's Valneva deal \$130m upfront + \$188m follow-on, April 2020 Lyme Disease

# **Expanding Pipeline of Assets**

### **Product pipeline**



Product Candidate	Program	PreClinical	Phase 1	Phase 2	Phase 3
POLB 001	Severe Influenza treatment	LPS study data e	vpected H2 '22	L O	
POLB 002	Respiratory virus infections treatment & prophylactic			lonetisat Zone	
POLB 003	Melioidosis vaccine*			2	

#### **Programmes & Platforms**

Pre-IPO

Targeting significant upfront payments followed by milestone payments & royalties

Artificial Intelligence Drug Discovery Programme Influenza	Artificial Intelligence Drug Discovery Programme Respiratory Syncytial Virus ONETHREE BIOTECH	Oral Vaccine Delivery Platform Developing vaccines for multiple indications	Vaccine Discovery Platform Identify vaccine candidates from naturally occurring immune response	<b>PredictViral<sup>TM</sup></b> Identify patients at risk of developing severe disease early
1 <sup>st</sup> Data - H1 2023	1 <sup>st</sup> Data - H2 2022			

*In active discussions for a range of other assets* 

Post-IPO \*Reviewing 5 additional bacterial vaccine candidates from UCD

# POLB 001 - Severe Influenza Treatment

Clinical stage potential blockbuster immunomodulator

### June 22 - LPS human challenge trial to commence

H2 22 - Early human efficacy data expected

### Plan for early monetisation thereafter

- Trial to gather broad dataset de-risk and increase value
- Patent protected until 2038, expanding IP
- Worldwide rights for all uses in humans
- Potential peak sales \$275m+ in influenza alone
- Exploring further disease indications increase value



POLB 001's ability to interrupt the feedback loop of inflammatory mediators that result in a 'cytokine storm' make it an ideal candidate to reduce disease severity for those most at risk



To simulate hyperinflammatory conditions, immune cells were treated with IL-6 and TNF- $\alpha$ , and IL-8 was used as a marker to measure resulting inflammation. The addition of POLB 001 reversed the inflammatory response in a dose dependent manner.

POOLBEG PHARMA

# POLB 002 - Respiratory Virus Infection Immunotherapy

### First-in-class, broad spectrum, RNA-based

- Late preclinical stage
- Prophylactic & therapeutic
- Delivered intranasally
  - triggers nasal cells into an antiviral state to protect against the virus
  - blocks the virus from replicating

### **Respiratory Virus Infections**

5-20%

global population infected by seasonal outbreaks **3M+** annual deaths worldwide Top 5

global cause of death





Flu A + active P. 002 Flu A + inactivated P. 002



# A global need for respiratory virus infection products

Most respiratory virus infections cannot be treated

15%

**INFLUENZA** 

VACCINES Protection variable

**ANTI-VIRAL THERAPIES** 

Require diagnosis of virus type



FEW AVAILABLE TREATMENTS

United UN News

Nations Global perspective Human stories

Infectious diseases 'clear and present danger' everywhere

27 December 2021



There will be another pandemic, infectious disease experts say. June 2, 2022

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# POLB 003 – Melioidosis Vaccine

### Potential for non-dilutive funding

- Late pre-clinical stage
- Wellcome Trust funded early development
- Global incidence of Melioidosis rising due to climate change
- CDC designated Tier 1 Select Agent biothreat
- Antibiotic resistant
- Under the agreement with UCD, 5 other vaccine programs are also being evaluated





#### POLB 003 significantly enhances survival in a murine model of chronic Melioidosis



# Additional vaccine candidates from UCD

Poolbeg has also agreed an option agreement for 5 additional vaccine antigen candidates which it is currently evaluating



# **Oral Vaccine Delivery Platform**

Exclusive licence to encapsulation technology for vaccine generation

- Developing oral vaccine delivery platform that generates 'mucosal immunity'
  - Preventing pathogens from infecting the body
  - Prevent transmission of disease
- Easy administration needle free
- Highly attractive market
- Multiple disease indications

### **Benefits of Oral Vaccines**

Drives mucosal immunity Easier distribution & administration

Overcomes needle phobia







# **Artificial Intelligence**



Severe Disease

**Moderate** Disease

### Al Powered Drug Discovery Programmes

# Ground breaking innovation



First time human challenge data analysed using AI

### **Prioritise drugs**

with existing Phase I safety data – reducing spend and risk Identify drugs that are more likely to succeed



### Influenza

- Deal signed with CytoReason March 22
- To identify new drug targets
- CytoReason work with 5/10 top global pharma including Pfizer, Roche, Sanofi
- Outputs expected in H1 2023



## RSV

**<b>Disease Severity** 

Deal signed with OneThree Biotech Inc – Feb 22

Mild Disease

**Data & samples collected** 

**Clinical Data, Immunological Data, Digital Biomarkers** 

- Identify new drug targets & treatments
- Outputs expected in H2 2022

Tracking disease progression



# **Key Upcoming Milestones & Opportunities**

Multiple value inflection points in 2022 & beyond

### **POLB 001**

LPS challenge study to commence June 2022 Data expected before year end 2022 – monetisation commences

POLB 002

Development plan underway

POLB 003

Complete in-licence & evaluation of 5 other vaccine programs

**Oral Vaccine Delivery Platform -** Development plan underway

**RSV AI Drug Programme** - Outputs expected in H2 2022

Influenza Al Drug Programme - Outputs expected in H1 2023

Non-dilutive funding - Applications progressing

**IP Portfolio** - Continuing to expand & strengthen







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# Questions?

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# Appendix

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# **Experienced Leadership Team**



#### **Cathal Friel** Chairman

- Co-founder & Chairman of Open Orphan plc
- Co-founder & shareholder in Amryt Pharma plc; leading London & Nasdag orphan drug company
- Established Raglan Capital in 2007
- Founder & Chairman of Fastnet Oil & Gas plc which IPO'ed 2012
- Co-founder of Merrion Stockbrokers in Dublin in 2001





- 19 years global industry experience: US, UK, Germany & Ireland
- BD & employee #3 at Inflazome. Sold to Roche in 2020. €380M + milestones: significant ROI to investors. Developing treatments for inflammatory diseases
- BD at Genentech (USA), Ethris (Germany). Co-founded & CEO of TriMod Therapeutics
- PhD in Biochemistry NUI Galway & Post-Doc at UC San Francisco

Genentech



Deloitte

CFO

RTO of Venn plc

Ian O'Connell

public markets experience

• Financial professional with healthcare &

Co-founder, VP Corp Dev & Board Observer at

Open Orphan - led acquisition of hVIVO plc &

• Worked with Cathal Friel & Amryt's senior

Corporate finance at both Raglan Capital &

Member of Chartered Accountants Ireland

management to establish Amryt Pharma plc



### **Carol Dalton VP IR & PR**

- Co-founder & VP Investor Relations & Public Relations at Open Orphan plc & Poolbeg Pharma plc
- Managed multiple funding rounds of in excess of £47m
- Managed & maximised Open Orphan's worldwide media coverage in 2020
- Senior Associate at Raglan Capital
- BSc in Nutraceuticals with a focus on antimicrobial resistance





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PHARMA



#### **Patrick Ashe Non-Executive Director**

- >30 years of experience in pharma & biotech
- BD at Elan plc for 16 years
- Co-founder and BD lead at Athpharma, AGI Therapeutics & Vidara
- BD at Horizon Therapeutics following acquisition of Vidara







**INFLAZOME** 

# **Prof Luke O'Neill**

**Non-Executive Director** 

**INFLAZOME** 

- Co-Founded Inflazome which was acquired by Roche in 2020 for €380m + milestones
- World-renowned immunologist & Chair of Biochemistry in the School of Biochemistry & Immunology at Trinity **College Dublin**
- Fellow, Royal Society & Royal Irish Academy Gold Medal for Life Science Trinity College



### **Eddie Gibson**

### **Non-Executive Director**

- 24 years' experience leading biopharma organisations
- Led many major European launches and creation & implementation of global access plans many therapy areas including virology
- Founder of Wickenstones, pharma market access consultancy ....







**Deloitte.** 

# **Experienced Team to Execute**

### Additional team members



#### Industry leading CMO

- Expert in designing and implementing clinical trials
- Over 20 years experience in pharma & biotech with drug development focus
- Clinically experienced medical doctor
- Previously CMO for North American Nasdag listed biotech company



#### **Liam Tremble**

part of Open Orphan plo

pgroup

**Clinical Operations Project Manager** 

- BSc honours degree in Immunology, Masters in **Translational Biology**
- PhD on the role of the immune system in melanoma
- Joined hVIVO 2020, key strategist in Volunteer Delivery and Clinical Science Group departments



### Alan Bell

KING'S LONDON

#### Clinical Development Project Manager

- 14+ years experience in clinical development for Phase I-III drugs
- Published in inflammation pathway analysis, associated biomarkers
- Qualifications in Clinical Physiology, **Respiratory Medicine**, Human & **Clinical Pharmacology**



#### **Ross Crockett Financial Controller**

- Extensive experience in senior finance positions in public listed companies incl. Amryt Pharma plc, Cove Energy plc, Fastnet Oil & Gas plc & Orogen Gold plc
- Member of Chartered Accountants Ireland



### Initial Scientific Advisory Board Members



### **Elaine Sullivan, PhD**

- CEO of Dargle Therapeutics & Executive Chairman of Keltic Pharma
- 25 years of international experience working in Pharma and Biotech including as VP of Global External R&D at Eli Lilly
- Raised \$100m for Carrick Therapeutics as Founder
- NED at Open Orphan plc, IP Group plc, Active Biotech AB and Supervisory Board at Evotec AG







### **Prof Luke O' Neill**

- Co-Founded Inflazome which was acquired by Roche for €380m in 2020
- World-renowned immunologist and Chair of Biochemistry in the School of Biochemistry and Immunology at Trinity College Dublin
- Fellow, Royal Society & Royal Irish Academy Gold Medal for Life Science







### Daniel F.Hoft, MD, PhD

- Director of the Division of Infectious Diseases, Allergy & Immunology at Saint Louis University (SLU) School of Medicine
- Principal Investigator of SLU's Vaccine & Treatment Evaluation Unit, one of nine NIH centres
- 32 years experience in immunology and infectious disease







part of Open Orphan pl





# **Booming Infectious Disease Market**

Vaccines, Therapeutics, Diagnostics



# Market expected to exceed \$250bn by 2025 Big Pharma seeking products



2021 forecast: COVID-19 brings infectious disease R&D out of the wilderness Dec 22, 2020



Infectious diseases 'clear and present danger' everywhere

27 December 2021



Flu Vaccine Mismatch Raises Further Concerns About 'Twindemic' With Covid-19

Dec 19, 2021



# **Capital Light & Early Monetisation Model**

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### A model that works



The only other company in the space following a similar model to Poolbeg

- Roots as a CRO, brings assets through Phase I & II
- Out-licence / partner with Big Pharma for significant upfronts + milestones + royalties



### **Evotec licence to Takeda**

Significant upfront + \$160m milestones per product + royalties, March 2021

**RNA targeting** 

# **Capital Light & Early Monetisation Model**



Big Pharma are looking to in-licence infectious disease products

# More deals, less in house development

The trend for sourcing clinical candidates via in-licensing, acquisition or co-development is continuing to expand



# POLB 001 – Mechanism of Action





- Influenza virus infects cells of the respiratory tract
- Pattern recognition receptors are activated by endosomal and cytoplasmic viral antigens
- 3 A signalling cascade involving p38 MAP Kinase results in activation of DNA promoters regulating the expression of inflammatory and antiviral cytokines

- A high viral burden can activate hyperexpression of cytokines
- Inflammatory cytokines act to selfamplify expression
- 6 A positive feedback loop results in a cytokine storm, also known as hypercytokinaemia that can cause severe tissue damage including ALI and ARDS



# POLB 001 – Ideally Suited as a Severe Influenza Therapeutic

### What is p38 MAP Kinase?

- Central role in regulation of pro-inflammatory signalling networks, cytokine synthesis in immune cells, and inflammatory diseases<sup>1</sup>
- Responsive to stress stimuli<sup>2</sup> such as inflammatory cytokines
- Inhibition shown to effectively alleviate inflammatory diseases<sup>3</sup> (e.g. arthritis)
- Our data shows an unexplored relationship between p38 MAP Kinase and pathogenic immune responses associated with severe Influenza, that has the potential to reduce adverse outcomes

# hVIVO's Unique Data & Samples Identified POLB 001





- Samples taken from patients with severe Influenza were compared against human challenge study subjects with 'mild' Influenza
- This work identified 24 potential molecules that play a role in Influenza severity, with p38 MAPK being the most important
- 40 p38 MAPK inhibitors were identified, and 8 were short-listed for detailed analysis
- Based on its superior performance and advantageous licensing terms, POLB 001 was chosen as the best candidate to take forward

Poolbeg Pharma's potential integration of **Artificial** Intelligence ('AI') into our licenced databanks will accelerate and provide additional power to this discovery tool



# Vast Array of Human Challenge Study Data & Samples ready to mine using AI

300,000 individual samples stored at -80°C in 22 freezers



Flu, RSV, HRV, Malaria, SARS-CoV-2



Analyze samples to uncover common protective pathways **Identify** pathways with clinical utility

### Select new drugs & drugs that can be repositioned quickly for new treatments

# Human Challenge Data

Human Challenge Study: healthy volunteers are exposed to an infectious agent in a quarantine setting to asses the efficacy of vaccines or treatments

- hVIVO is a world-leader
- Unique data <u>(Day -1)</u> from human challenge studies cannot be collected in a normal field trial
- Data is **ideally suited to identify drug targets** with clinical utility:
  - Known dose of virus and time of infection
  - Clean, multi-parametric data from pre-infection through to post recovery
  - We can apply to Flu, hRV, RSV,
     SARS-CoV-2 and Malaria







# **AI Drug Development**



### The human challenge model

The controlled nature of the quarantine environment means it is ideally suited for the identification of biomarkers due a number of factors



# PredictViral<sup>™</sup> Biomarker Platform for Predicting Severe Disease



Potential to transform the way infectious diseases are treated, opportunity to licence this tool to Big Pharma Further patent applications submitted – October 2021

#### **PredictViral™ Biomarker Diagnostics vs Traditional Diagnosis of Disease**

### **Advantages**

- Identify severe disease before it is symptomatically visible
- Triage patients based on predicted disease severity
- Increases window for effective treatment where early intervention is crucial, e.g. Influenza. i.e. 48hr window of efficacy for many antivirals



# **Unique Vaccine Discovery Platform**

**Contains** pathogen

specific T Cells

**Step 1.** T Cell Generation

No pathogen

specific T Cells

Harnessing the human challenge model to discover new vaccines



### What is an Epitope?

- Part of a pathogen that the immune system recognises
- It is the smallest unit of a molecule required to engage the immune system
- Effective vaccines require effective epitopes

Identification of epitopes that can generate robust immunity

### Significant value in vaccine design and discovery platforms

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Viral or

synthetic

peptides

Challenge

Agent

Step 2. Vaccine Discovery

T Cell -

epitope

reaction

Comparison

of responses



# Why Reposition Drugs?



Leverage new, **novel** disease biology **insights** 



Discovery & development phases already completed - **reducing spend** 

Already licenced and trialled in patients
- increased probability of success



Already proven to be safe, existing clinical safety & efficacy data to be utilised

Traditional drug discovery: 12-16 years<sup>1</sup>

Drug repositioning: <6 years at a fraction of the cost



### Poolbeg Pharma plc

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