

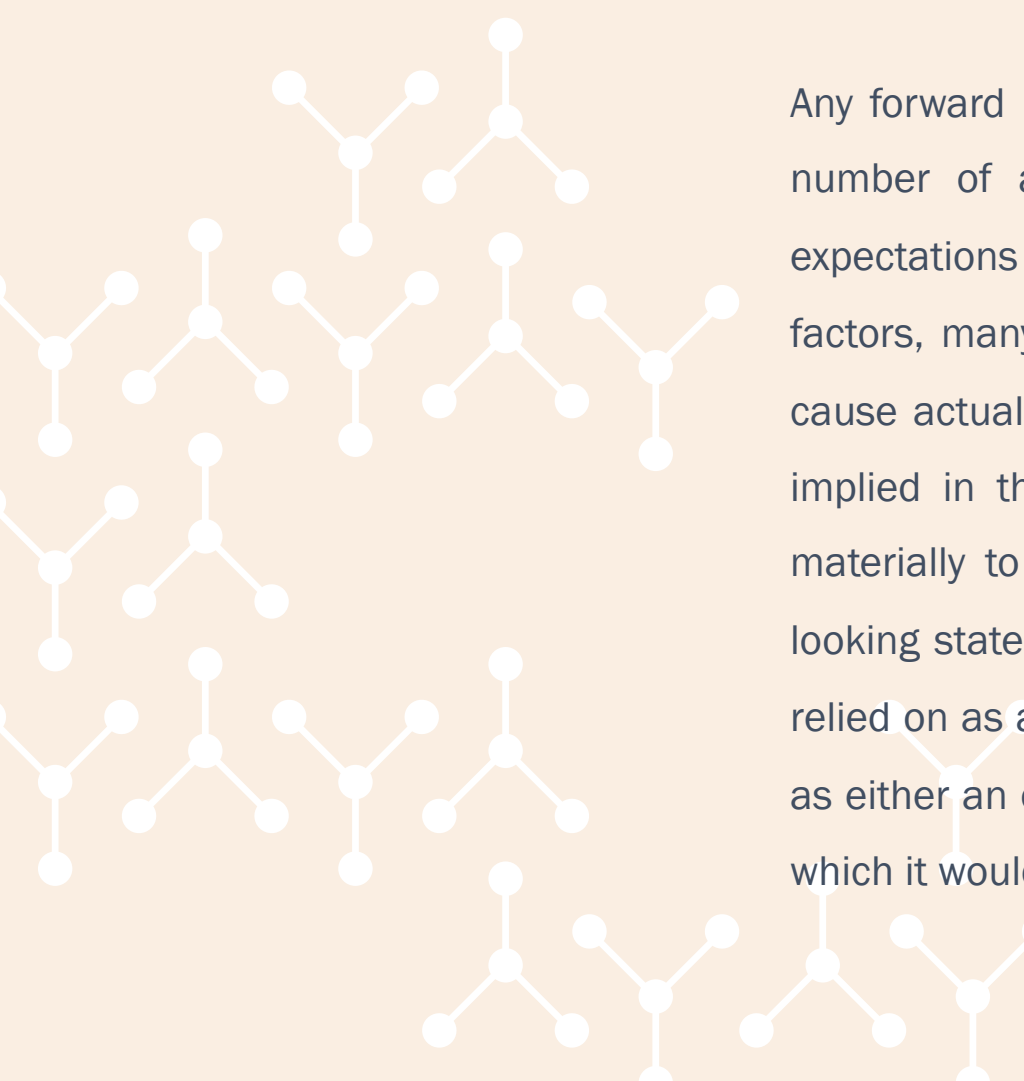
# AN EMERGING LEADER IN CANCER IMMUNO-ONCOLOGY

---

Investor Presentation

April 2019

## NOTICE: FORWARD LOOKING STATEMENTS



Any forward looking statements in this presentation have been prepared on the basis of a number of assumptions which may prove incorrect and the current intentions, plans, expectations and beliefs about future events are subject to risks, uncertainties and other factors, many of which are outside Imugene Limited's control. Important factors that could cause actual results to differ materially from any assumptions or expectations expressed or implied in this brochure include known and unknown risks. As actual results may differ materially to any assumptions made in this brochure, you are urged to view any forward looking statements contained in this brochure with caution. This presentation should not be relied on as a recommendation or forecast by Imugene Limited, and should not be construed as either an offer to sell or a solicitation of an offer to buy or sell shares in any jurisdiction in which it would be a contravention of applicable law.

## Strong preliminary results from ongoing clinical trials

- Promising Phase 1 clinical trial results across lead candidate B cell vaccines
- Currently have two therapies (HER-Vaxx and B-Vaxx) in Phase 2 studies with a pipeline of other therapies and combinations undergoing earlier stage development

## Robust pipeline of B cell vaccines targeting high potential areas

- Robust pipeline of novel B cell vaccines targeting large therapeutic areas
- Immuno-oncology treatments are at the forefront of cancer innovation with the leading drugs<sup>1</sup> generating over US\$23bn in 2018
- Vision to transform and improve the treatment of cancer patients

## Fully funded to progress clinical program

- Company currently fully funded in supporting all clinical research programs
- Focus on continuing to build awareness for the product through acceptance of abstracts and presentations at key industry conferences such as AACR
- A number of key clinical and preclinical catalysts are expected in 2019

## Best in class leadership team with a track record in drug development

- Experienced board and management team with successful track record developing, licensing and commercialising early stage drugs

## Active market with numerous commercialisation and M&A opportunities in the sector

- Currently targeting the gastric and lung cancer market with the potential to extend beyond these indications in the future
- The immuno-oncology sector has attracted intense interest from big pharma as highlighted from recent M&A and licensing deals

Notes:

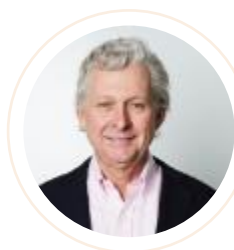
1. The subset Herceptin, Perjeta, Opdivo and Keytruda

# Lead by an experienced management team which have significant clinical development commercialisation expertise in the sector



**Leslie Chong**  
SYDNEY, AU  
Managing Director & CEO

- 20+ years of oncology experience across Phase I – III clinical development programs
- Ex Senior Clinical Program Lead at Genentech, one of the world's most successful biotech businesses which sold the best selling breast cancer drug Herceptin
- Also worked at global majors GSK and Exelixis



**Paul Hopper**  
SYDNEY, AU  
Executive Chairman

- Founder of Imugene
- Extensive international & ASX biotech capital markets experience particularly in immuno-oncology & vaccines
- Former Chairman of Viralytics, Founder & Director of Prescient



**Dr Axel Hoos**  
PHILADELPHIA, USA  
Non-Executive Director

- Senior Vice President and Head of Oncology at GSK
- Former Medical Lead for Yervoy, the first immuno-oncology treatment to improve first survival
- Chairman of the BoD of the Sabin Vaccine Institute
- Co-Chair of the Cancer Immunotherapy Consortium Think-Tank



**Mr Charles Walker**  
BRISBANE, AU  
Non-Executive Director

- Experienced listed biotech CEO and CFO (ASX:ACL and ASX:IMU)
- Extensive financial markets experience having executed 50+ cross border transactions
- Clinical experience includes managing pipeline of drugs in all stages from discovery, through to Phase III to product launch



**Dr Mark Marino**  
CALIFORNIA, USA  
Chief Medical Officer

- 28+ years of experience in drug development
- Former CMO of Cytori, Head of Clinical Pharmacology at Eisai and Roche, Head of R&D at Mannkind and VP Clinical Development at Daiichi



**Dr Nick Ede**  
MELBOURNE, AU  
Chief Technology Officer

- 25+ years peptide vaccine and drug development
- Former CEO Adistem and CEO of Mimotopes
- VP Chemistry Chiron (now Novartis), Research Fellow CRC Vaccine Technology



**Dr Anthony Good**  
SYDNEY, AU  
Vice President of Clinical Research

- 20+ years experience in global clinical development
- Integral to the development of significant new medicines including Viagra, Revatio, Lipitor, and Somavert
- Ex Pfizer Global Research and Development, Ex Covance Clinical Services

Imugene has a team with oncology drug development experience

# Imugene's Scientific Advisory Board consists of world leading oncologist, researchers and developers



**Prof Pravin Kaumaya**  
OHIO STATE UNIVERSITY, USA

- Prof of Medicine Department of Obstetric Gynecology at Ohio State University
- Research focus in tumour immunology, mechanisms of tumour cell-immune cell interactions, and immune mechanisms
- Research focus on fields of vaccine with emphasis on peptide vaccines for cancer



**Dr. Michael Galigiuri**  
CITY OF HOPE, USA

- President of City of Hope National Medical Center and holds the Deana and Steve Campbell Physician-in-Chief.
- Elected President of the American Association for Cancer Research (AACR) in 2017



**Prof. Josep Taberero**  
VALL D'HEBRON, BARCELONA, SPAIN

- President of European Society for Medical Oncology (ESMO)
- President of the Medical Oncology Department at the Vall d'Hebron
- Director of the Vall d'Hebron Institute of Oncology (VHIO)



**Prof Tanios Bekail Saab**  
MAYO CLINIC, USA

- Professor of College of Medicine and Science
- Program Co-Leader, GI Cancer, Mayo Clinic Cancer Center
- Medical Director, Cancer Clinical Research Office (CCRO)
- Senior Associate Consultant, Mayo Clinic AZ



**Prof Peter Schmid**  
BARTS CANCER INSTITUTE, QUEEN MARY UNIVERSITY OF LONDON

- Medical Oncologist
- Expertise in breast and lung cancer, cancer immunotherapy and early drug development
- Leads the Centre of Experimental Medicine at Barts Cancer Institute



**Prof. Ursula Wiedermann-Schmidt**  
MEDICAL UNIVERSITY OF VIENNA, AUSTRIA

- Co-inventor of HER-Vaxx
- Professor of Vaccinology at Medical University of Vienna



**Dr Neil Segal**  
MEMORIAL SLOAN KETTERING CANCER CENTER, USA

- Medical Oncologist
- Expertise in GI, Colon, Pancreatic cancers
- Active clinical immunology researcher
- Clinical lead in several trials using PD-L1 inhibitors



**Dr Yelina Janjigian**  
MEMORIAL SLOAN KETTERING CANCER CENTER, USA

- Medical Oncologist
- Expertise in esophageal and stomach (gastric) cancer
- Active in GI clinical trials testing combinations of Her-2 and checkpoint inhibitor therapies

Imugene has a world renowned advisory board of scientists and oncologists



## Immuno-oncology - A rapidly growing market

- Immuno-oncology allows for a more targeted treatment
- Harnesses the patients own immune system to recognise and destroy cancer cells
- Multiple first-line treatments approved



## B cell peptide vaccines provide potential benefits

- ✓ Potentially leading to a better outlook for the long term survival of patients with advanced cancers
- ✓ Has the potential to inhibit tumour recurrence with potentially less toxic side effects



## A pioneer and leader in the B cell peptide cancer vaccine space

- Imugene is the market pioneer and leader in B cell peptide cancer vaccines
- Currently has the most advanced B cell peptide cancer vaccines clinical program in the industry



# B cell based antibodies have distinct advantages to existing treatments

B cell Vaccines offer a unique opportunity to intervene at multiple points in the immune system and create immune memory which enhances durability of response.



## NATURAL B CELL DERIVED ANTIBODIES



## MONOCLONAL ANTIBODIES

### Safety

Stimulates the immune system to produce natural Abs, potentially safer, as demonstrated by HER-Vaxx

Synthetic Ab, with side effects (including ventricular dysfunction, CHF, anaphylaxis, immune mediation)

### Efficacy

Polyclonal Ab response reduces risk of resistance and potentially increases efficacy

Monoclonal Ab - single shot

### Durability

Antibodies continuously produced a lasting immune response to inhibit tumor recurrence

Half life up to 12 days sometimes less

### Usability

Potentially low numbers of vaccinations required per year

Requires regular infusion

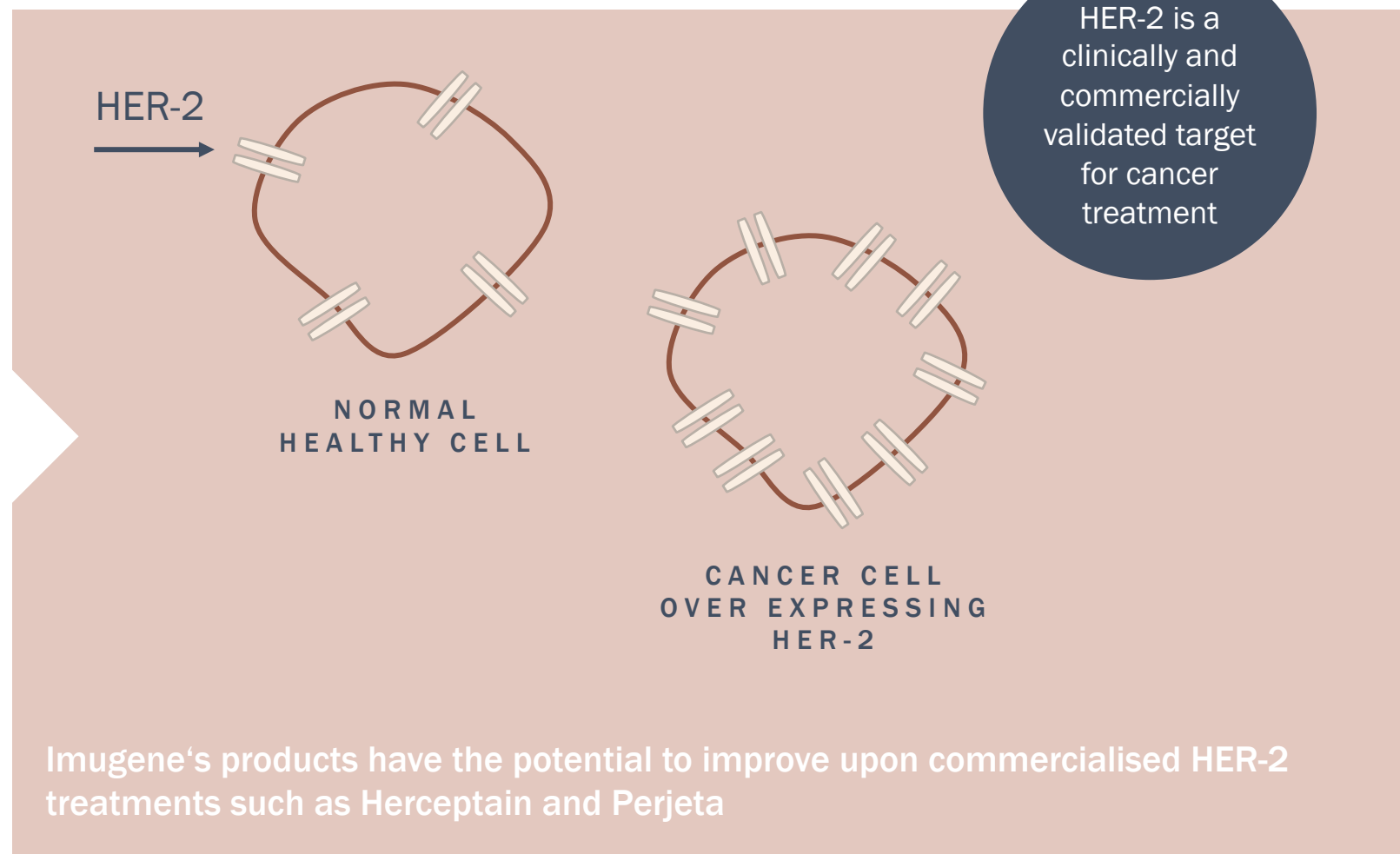
### Cost

Low cost of production enables greater pricing flexibility facilitating combination

Expensive course of treatment >US\$100K per year

# What is Imugene's B cell vaccine (HER-Vaxx) trying to solve?

- HER-2 (Human Epidermal Growth Factor Receptor) stimulates cancer cells to grow
- 10 - 30% of gastric, breast, ovarian and pancreatic cancer patients have tested HER-2 positive
- The incidence of increased HER-2 (known as over expression) in the body is associated with a higher chance of cancer spreading and an increased probability of cancer recurrence










# How does HER-Vaxx work?

3 Peptides “mimic” the epitope  
(antibody binding site)

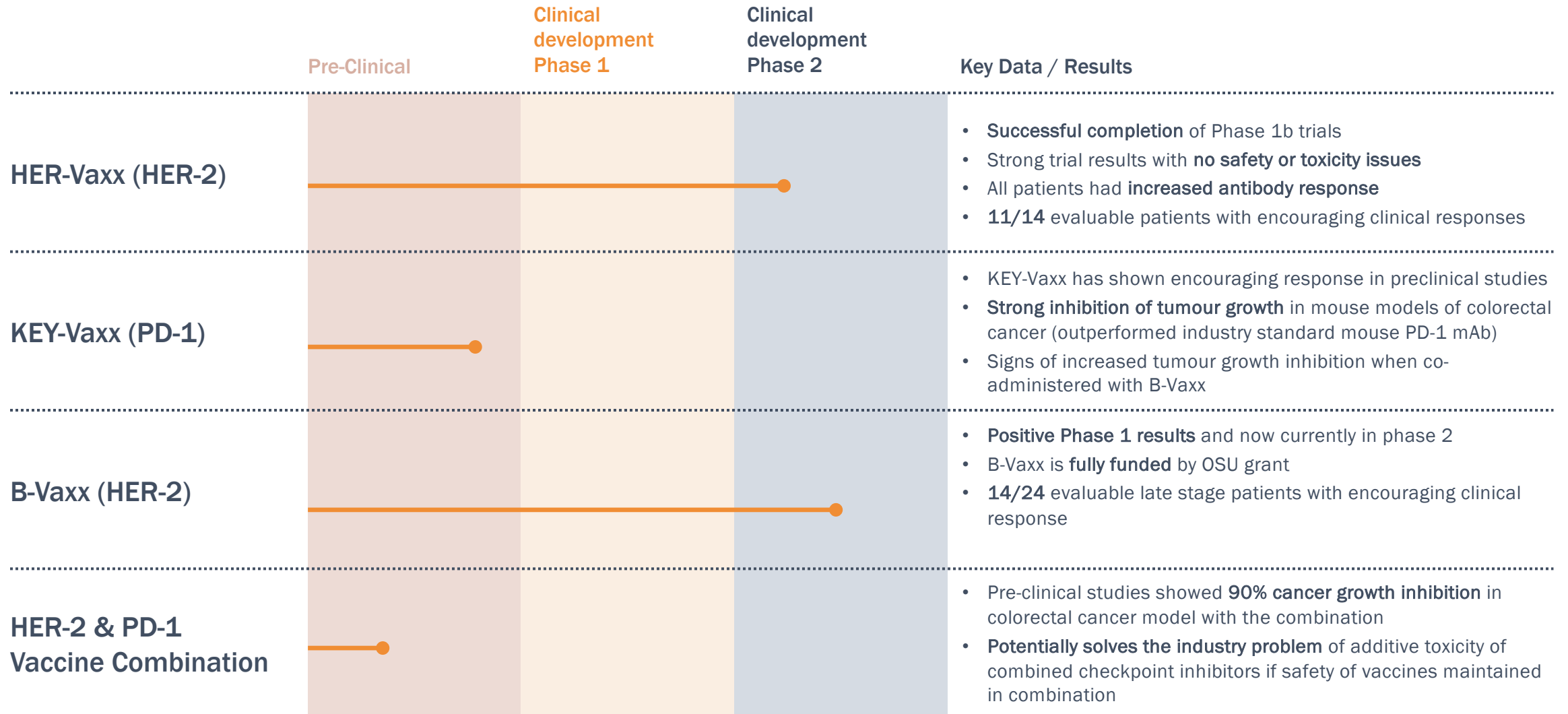


# A significant market opportunity across key Imugene vaccines

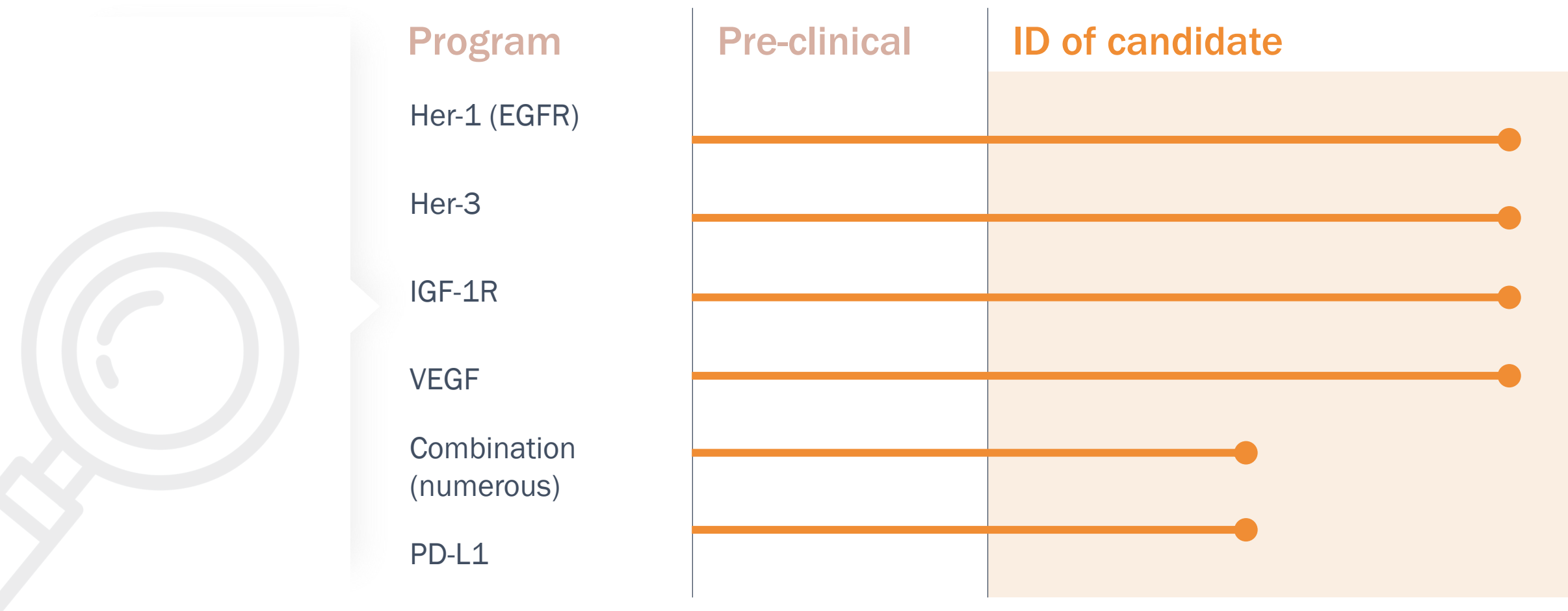
		 <b>GASTRIC CANCER</b> (HER-VAXX)	 <b>LUNG CANCER</b> (KEY- VAXX)
<b>Incidence</b>	<b>Newly diagnosed cases</b>	1m cases per year, globally 19% relate to HER2+ cancers	1.8m cases per year, globally
	<b>5 year relative survival rate</b>	< 25%	~18%
<b>Prognosis</b>	<b>Survival</b>	Median survival is 7-10 months	17% chance of surviving at least 5 years
	<b>Existing treatment costs</b>	US\$140,000 per year	n.a
	  	n.a	US\$150,000 per year
		n.a	US\$157,000 per year

Sources: Scientific journals, press releases and internal company findings

# Imugene has a developing pipeline of cancer vaccines



# Imugene discovery pipeline



## Phase 1b – Complete



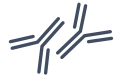
### Trial

- Phase 1b
- Open label



### Patients

- Gastric Cancer
- Up to 18 patients in 3 cohorts (10, 30 and 50 µg)



### Study

HER-Vaxx in combination with chemo: Cisplatin and 5FU or capecitabine



### Endpoints

- Recommended Phase 2 Dose of HER-Vaxx
- Safety and Toxicity
- Immunogenicity (anti-HER-2 antibody titres)



### Study Results

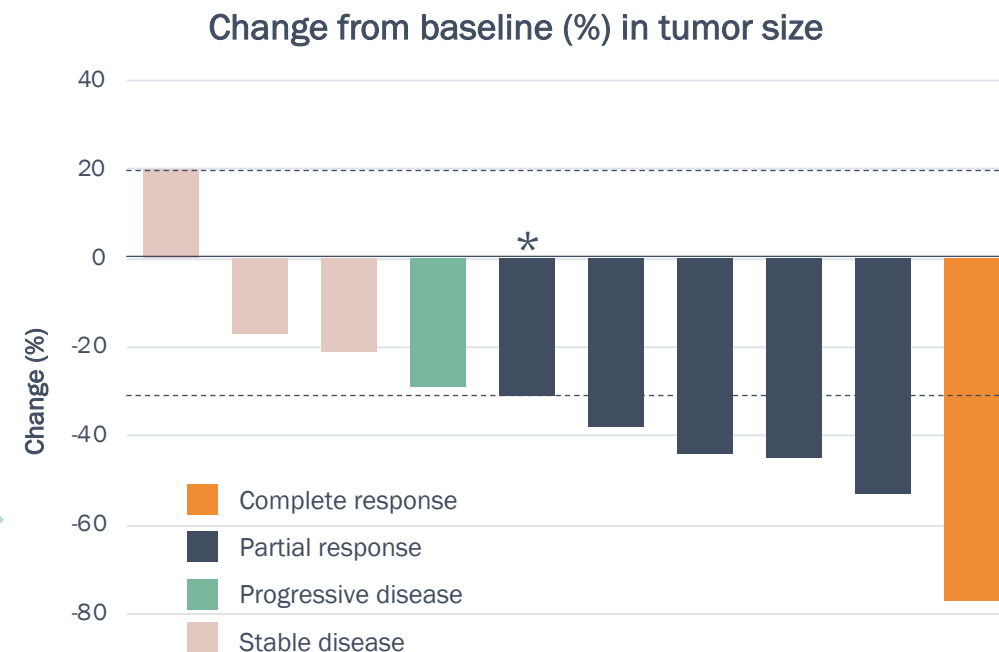
- 50 µg selected as the RP2D
- No safety or toxicity issues
- All patients had increased antibody response
- Best Response Rates
  - 1 Complete Response
  - 5 Partial Response
  - 4 Stable Disease



# Positive results for HER-Vaxx Vaccine Phase 1b trial

## Key Findings

- ✓ **11 out of 14** were evaluable for vaccine-specific immune responses and tumour response assessment
- ✓ Those patients that were dosed with **50 micrograms** showed marked **increases of HER-2 specific antibody levels**
- ✓ **2 of the 3 patients** dosed with 50 micrograms demonstrated greater than **40% reduction in tumour size from baseline to day 56**
- ✓ The vaccines were well tolerated and safe with antibody responses at the highest dose of 50 micrograms with **no significant local or systemic reactions**
- ✓ Trial showed **clear dose-dependence** of HER-2 specific antibody production



### RECIST definitions;

Complete response (CR)	Disappearance of all target lesions
Partial response (PR)	At least 30% decrease in size of target lesions
Progressive disease (PD)	At least 20% increase in size of target lesions or the appearance of one or more new lesions: *Target lesions decrease by 30%; per RECIST PD due to 2 new lesions
Stable disease (SD)	Neither sufficient shrinkage to qualify for PR nor sufficient increase to qualify for PD

1. Defined as less than 10mm for the sum of all the target lesions



## Phase 2 commenced - First patient dosed March 2019



### Trial

- Phase 2
- Open label
- Asia
- Eastern Europe
- India



### Patients

- Gastric Cancer
- Up to 70 patients



### Study

#### Randomized

HER-Vaxx in combination with standard of care chemotherapy

#### Or

Standard of care chemo: Cisplatin and 5FU or capecitabine or oxaliplatin

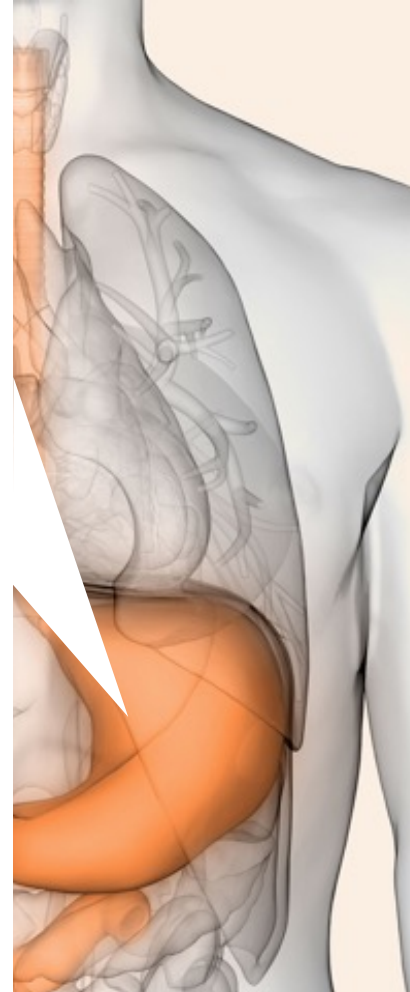


### Primary Endpoints

- Overall survival
- Progression-free survival

### Secondary Endpoints

- Safety and Tolerability
- Immune response



Phase 2 designed to provide definitive data

# KEY-Vaxx: A new entrant in the checkpoint inhibitor market



## How PD-1 targeted treatments work

PD-1 targeted treatments **block PD-L1 expressing tumour cells from binding PD-1 on T-cells** (resulting in increased activation of the T cell immune response in the tumour microenvironment)



## Limitations of current treatments

- Current checkpoint inhibiting monoclonal antibody therapies only effective in 10-30% of patients
- Require intravenous infusions every 2-3 weeks and has a high toxicity profile when used in combination
- Very expensive

**KEY-Vaxx potentially addresses these problems**

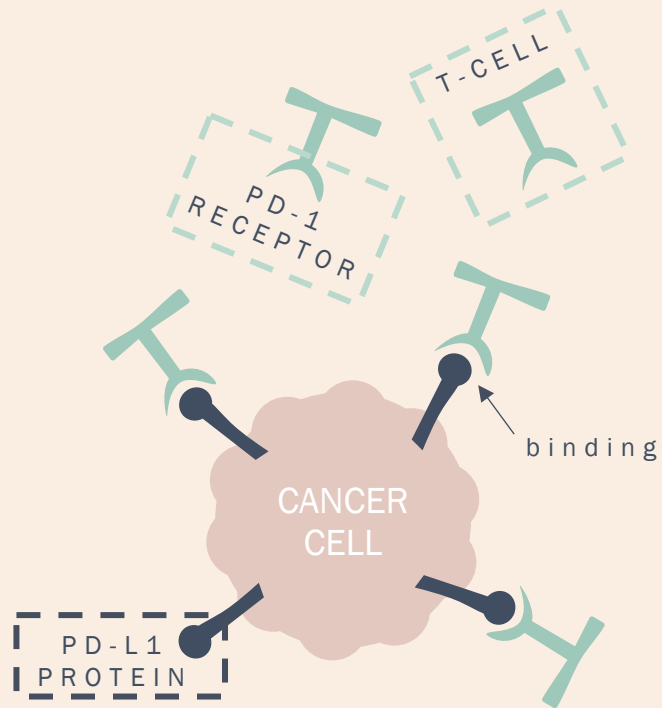
KEY-Vaxx is a PD-1 B cell vaccine, aimed to induce the body to produce polyclonal antibodies while existing commercialised immunotherapies **Keytruda® (Merck)** and **Opdivo® (BMS)** are monoclonal antibodies

**Current phase:**  
Phase 1 (commence in Q4 2019)

**Next key milestones**  
GLP tox results  
Drug manufacture  
FDA IND

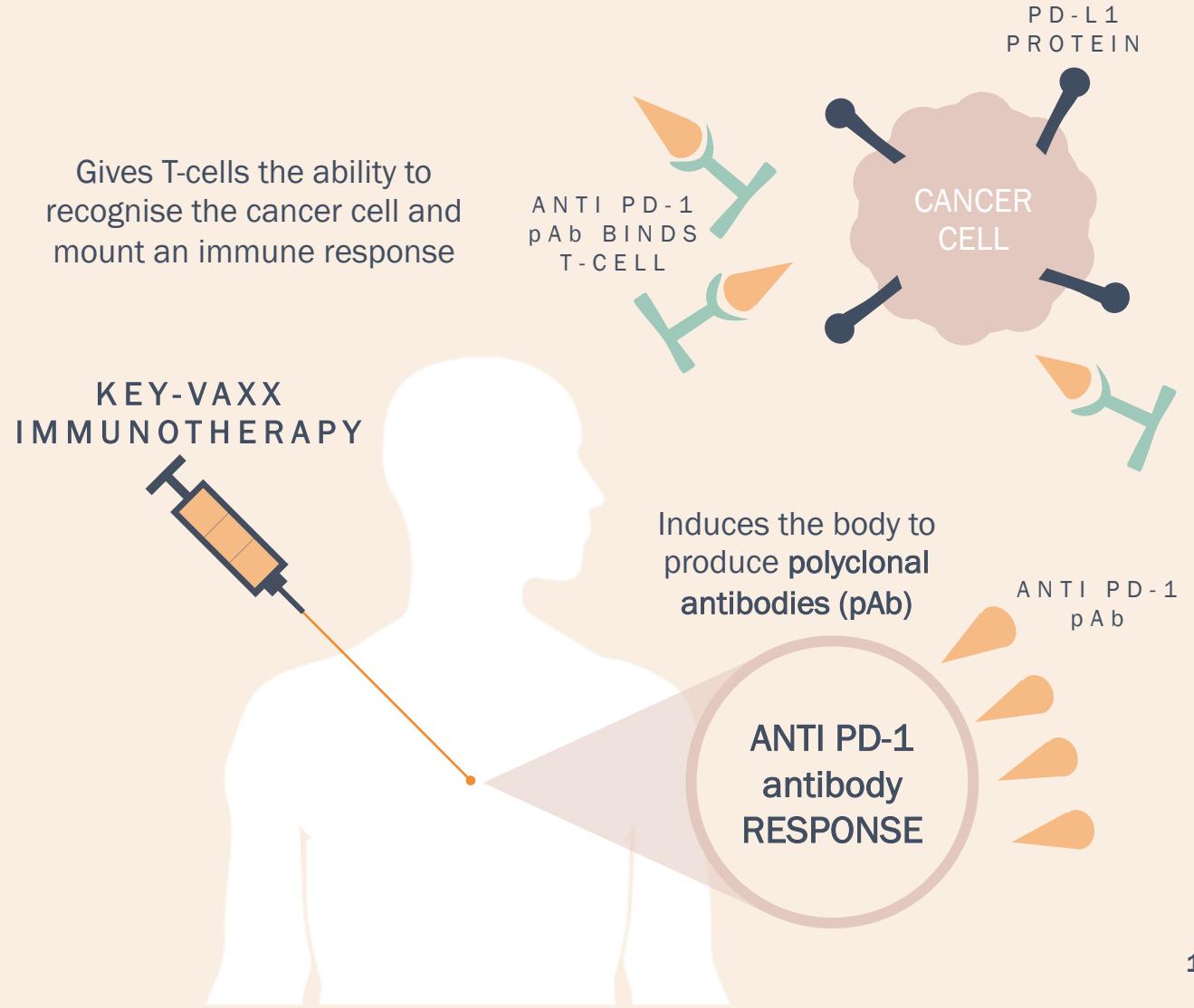
# How does KEY-Vaxx work?

## HOW CANCER STAYS UNDETECTED BY THE IMMUNE SYSTEM



The PD-L1 protein binds to the PD-1 receptor and stops the T-Cell from recognising the cancer cell, allowing the cancer cell to survive and spread

## KEY-VAXX STOPS THE CANCER CELL FROM AVOIDING T-CELL RECOGNITION AND KILLING

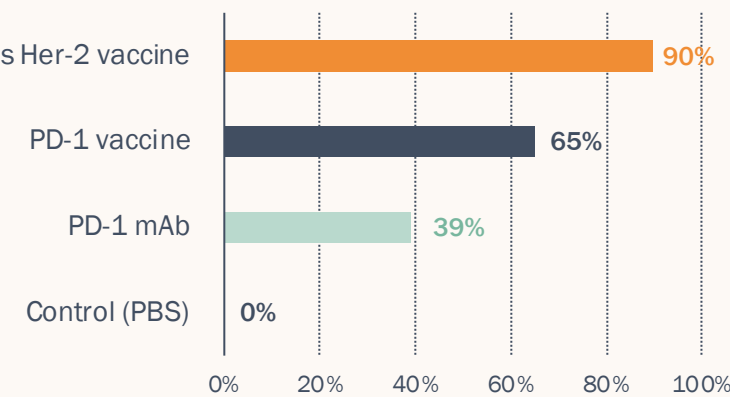


# PD-1/HER-2 Combination: Potential to increase response rates in HER-2+ cancers

## Immuno-oncology combinations driving value

- Combining drugs for **better immuno-oncology outcome** is driving value creation
- Big Pharma are looking for **novel combinations** that
  - ✓ Combine without increasing toxicity
  - ✓ Combine with minimal cost increase
  - ✓ Combine for better response rates and efficacy

## % CANCER GROWTH INHIBITION IN COLORECTAL CANCER MODEL



Inhibition of cancer growth 16 days after infusion of cancer cells

Imugene's  
novel therapies  
have the potential  
to tick all three  
boxes

## Opdivo / Yervoy Case Study

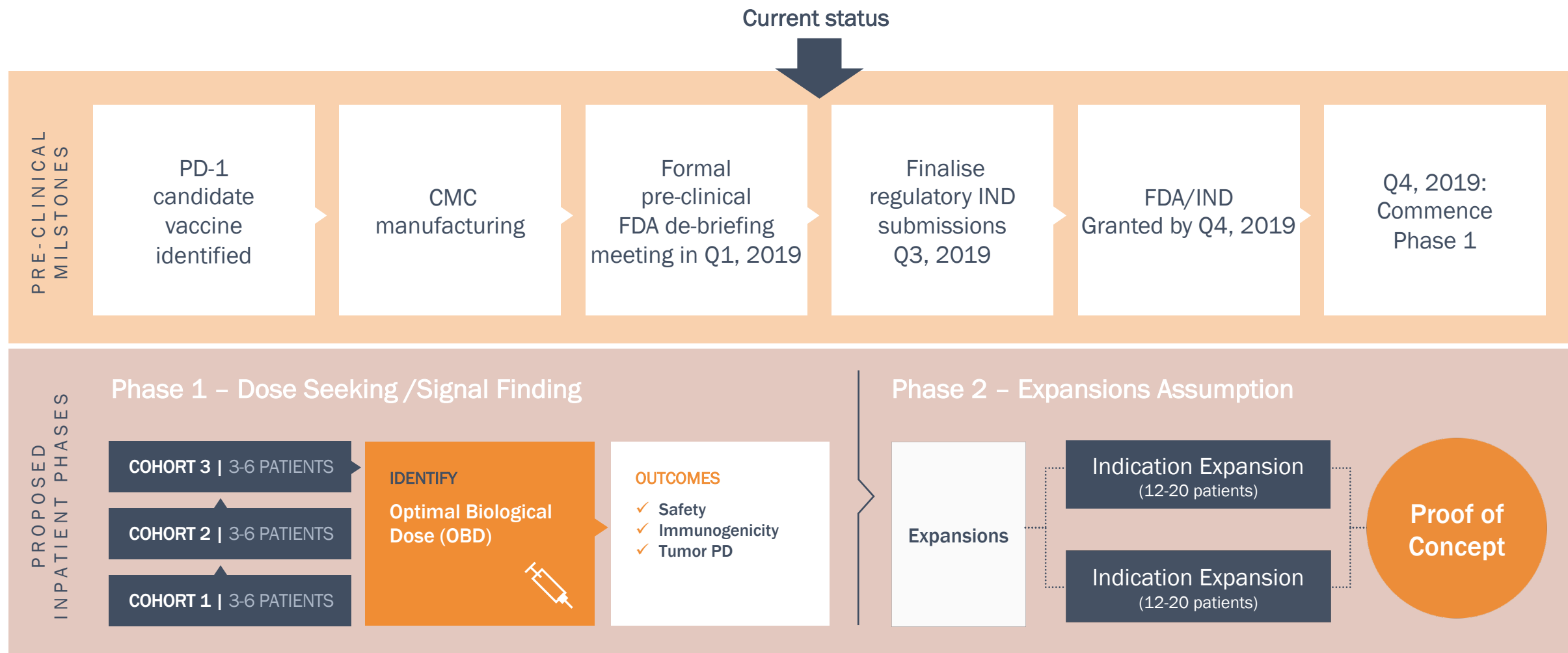
In 2018, the FDA approved the Opdivo and Yervoy combination for a subset of patients with metastatic colorectal cancer

Provides a novel therapeutic option with a higher response rate than that from monotherapy immunotherapy

**BUT** more significant toxicity is noted with the combination, and immune-mediated side effects need to be monitored

Although early in development, Imugene's PD-1 and Her-2 cancer vaccines potentially provide efficacy and response rate with minimal toxicity

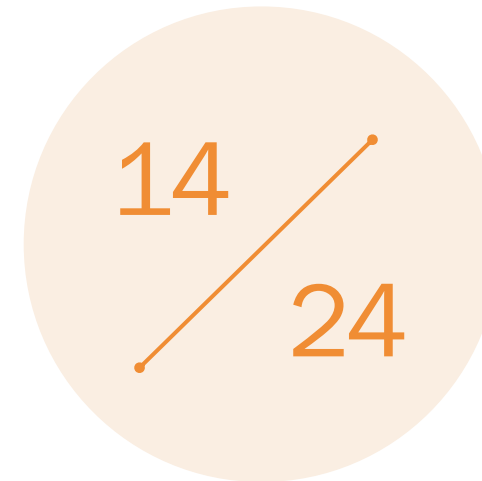
# KEY-Vaxx: Vaccine in Phase 1 development path



## B- Vaxx: Phase 1 trial results leading into Phase 2

- ✓ Similar to HER-Vaxx, B-Vaxx is a B cell peptide cancer vaccine **designed to treat tumours that over-express the HER-2 receptor** by binding to the same regions as **Herceptin® and Perjeta®**
- ✓ **Funded by OSU**
- ✓ It has been shown in pre-clinical studies and in a completed **Phase I study to stimulate a potent polyclonal antibody response to HER-2**

**Broad tumor types treated in Phase 1; now in Phase 2<sup>1</sup>**



**patients had stable disease**

- ✓ 2 out of 24 patients had partial response
- ✓ 1 patient had Progression free survival at 40+ months
- ✓ Accepted for publication in peer reviewed journal

**NO TOXICITY OBSERVED**



Note:

1. Phase Ib Immunotherapy Trial with a Combination of Two Chimeric (Trastuzumab-like and Pertuzumab-like) HER-2 B cell Peptide Vaccine emulsified in ISA 720 and nor-MDP Adjuvant in Patients with Advanced Solid Tumors, Immunological Response and Clinical Outcome. Tanios Bekaii-Saab, Daniel H. Ahn, Christina Wu, Robert Wesolowski, Amir Mortazavi, Maryam Lustberg, Jeffrey Fowler, Bhuvaneswari Ramaswamy, Lai Wei, Jay Overholser and Pravin T.P. Kaumaya. Clinical Cancer Research manuscript accepted for publication March 2019.



# The immuno-oncology market is experiencing robust growth

## Strong deal activity involving big pharma with a number of M&A and licensing transactions

 Acquired		A\$500m	Jun 2018	Oncolytic immunotherapy
 License		US\$2bn	Jan 2019	Clinical Immunotherapy
 Acquired		US\$1.8bn	Oct 2017	Cancer Vaccine
 Acquired		US\$300m	Feb 2019	Cancer Vaccine
 Investment		US\$125m	May 2018	Cancer Vaccine

## Strong sales for leading immuno-oncology treatments

  
(pembrolizumab) injection 100 mg

US\$7.2bn in 2018 sales

  
(nivolumab)  
INJECTION FOR INTRAVENOUS USE 10 mg/mL

US\$6.7bn in 2018 sales

  
trastuzumab

US\$7.1bn in 2018 sales

  
pertuzumab

US\$2.8bn in 2018 sales

In 2015 the immuno-oncology market was estimated at US\$45bn and is expected to reach US\$117bn by 2022

# Robust cash position with supportive institutional shareholder base

## Public Market Overview

Share Price <sup>1</sup>	A\$0.017
Market Capitalisation <sup>2</sup>	A\$61.4M
Cash equivalents (Mar-19)	A\$21.0M
Enterprise Value	A\$40.4M

## Top 5 Shareholders (as at April 2019)

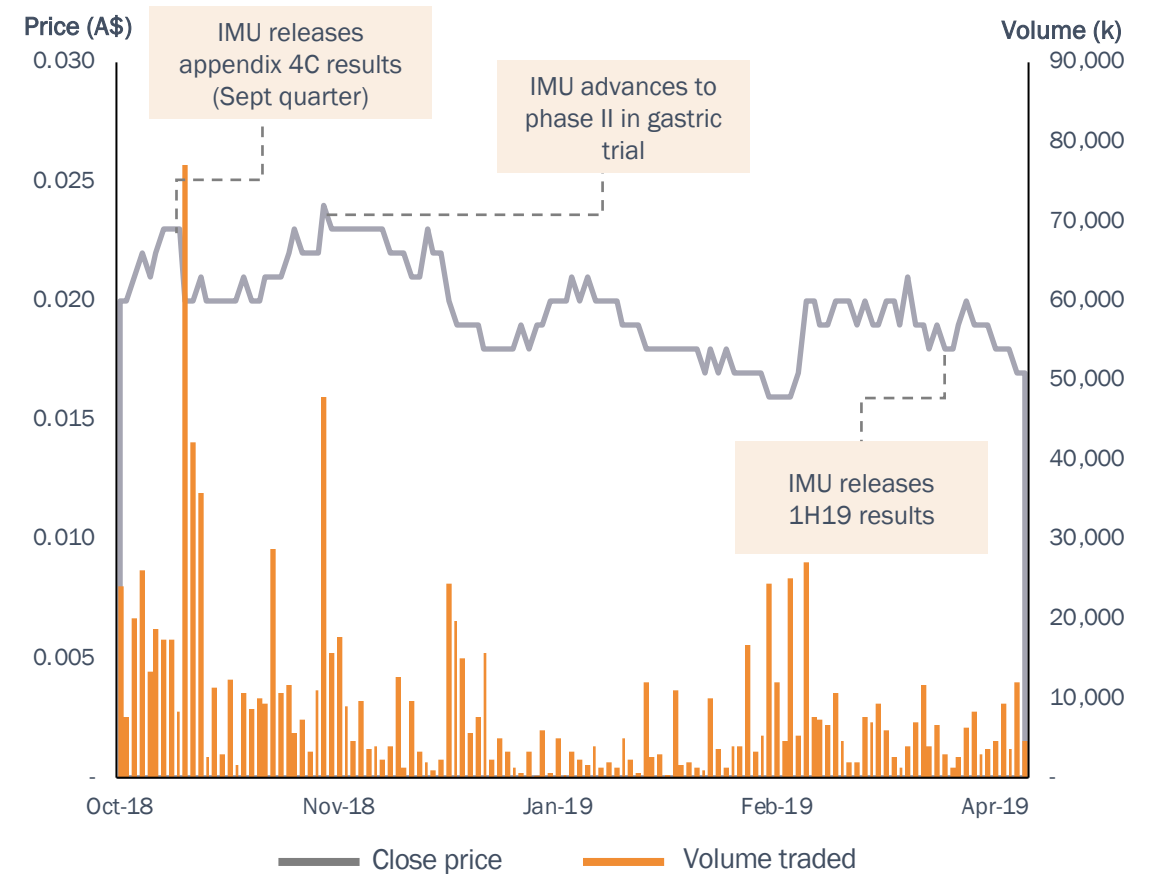
Private Portfolio Management	6.2%
HSBC Custody Nominees (Australia)	3.6%
Dr. Nicholas Smith	3.2%
Paul Hopper	2.1%
Sarah Cameron	1.7%

Note:

1. As of 10 April 2019

2. Market capitalization calculations based on ordinary shares (3.61n) only and excludes the dilutive impact of options outstanding (625m)

## Share Price Performance (last 6 months)



# Clinical development and milestones

Phase 2 clinical trials for key indications underway – trials underpinned by additional value-adding studies and an exciting pipeline

STUDIES	1Q CY2019	2Q CY2019	3Q CY2019	4Q CY2019
HER-Vaxx HER-2	<div>HER-Vaxx 1<sup>st</sup> patient dosed in Phase 2</div> <div>HER-Vaxx Phase 2 Regular updates expected</div>			
KEY-Vaxx PD-1	<div>KEY-Vaxx Phase 1 Preclinical tox and manufacturing nearing completion with FDA IND in Q3</div> <div>Key- Vaxx Commence Phase 1</div>			
B-Vaxx HER-2	<div>B-Vaxx Phase 1 clinical data published with further updates expected</div>			
Combo HER-2/PD-1	<div>Combo pre-clinical Preclinical studies ongoing demonstrating benefits of combining IMU B cell vaccines in validated animal models of cancer</div>			

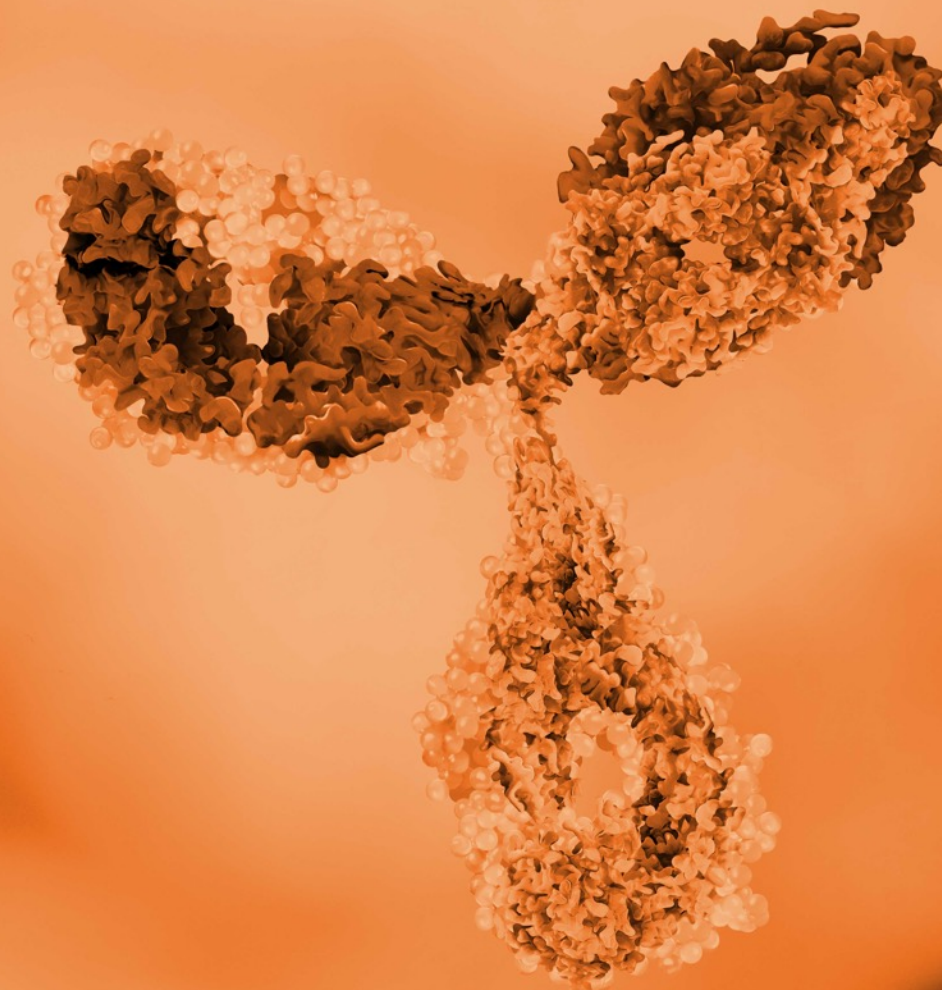
With a proactive approach to business development and brand awareness through participation in key conferences and acceptance in peer reviewed journals



**AACR**  
American Association  
for Cancer Research

**ASCO**  
AMERICAN SOCIETY OF CLINICAL ONCOLOGY

Gastrointestinal  
Cancers Symposium

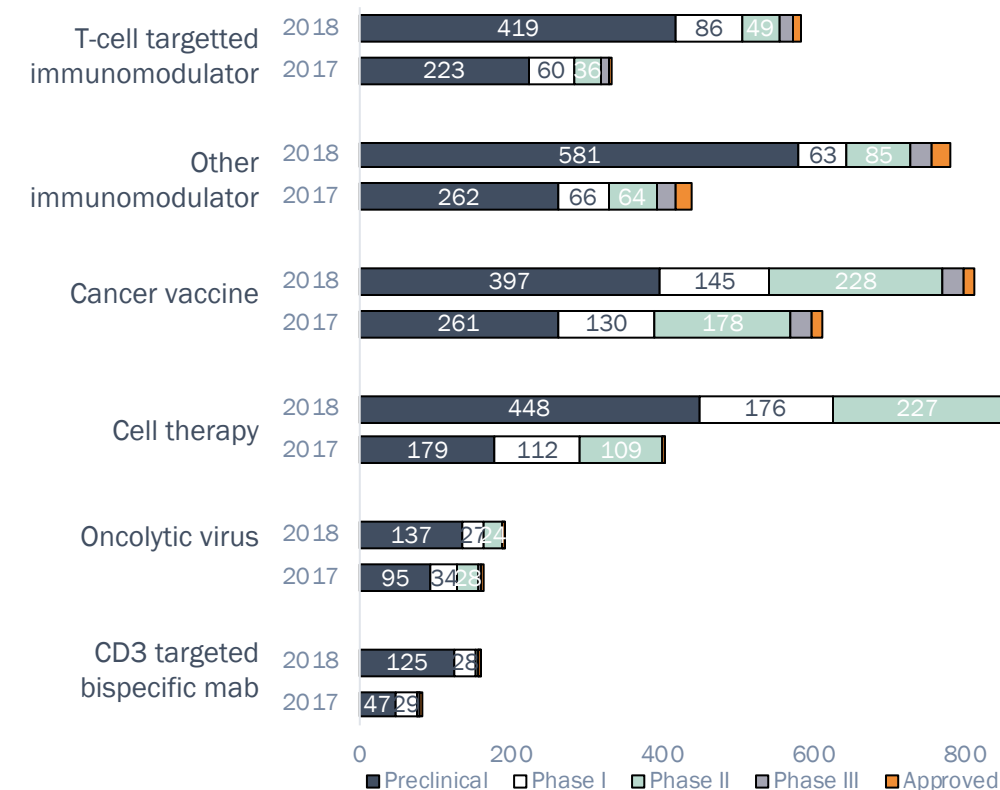


# Appendix

With strong interest in the sector, Imugene's products have the potential to outperform existing treatments

- ✓ Traditionally, cancer treatment options included: surgery, radiation, chemotherapy, and targeted therapy
- ✓ Immunotherapy is rapidly evolving and now widely regarded as a 5<sup>th</sup> pillar of treatment
- ✓ Sector growing rapidly - more than 600 licensing agreements signed in the oncology space (1/3 of these focused on immuno-oncology)
- ✓ Potential benefits of B cell peptide vaccines include:
  - Cheaper to produce
  - Targeted and lasting immune response
  - Safer and more convenient

## Significant growth in global immuno-oncology pipelines of 2017 and 2018



Source: [www.cancerresearch.org](http://www.cancerresearch.org)

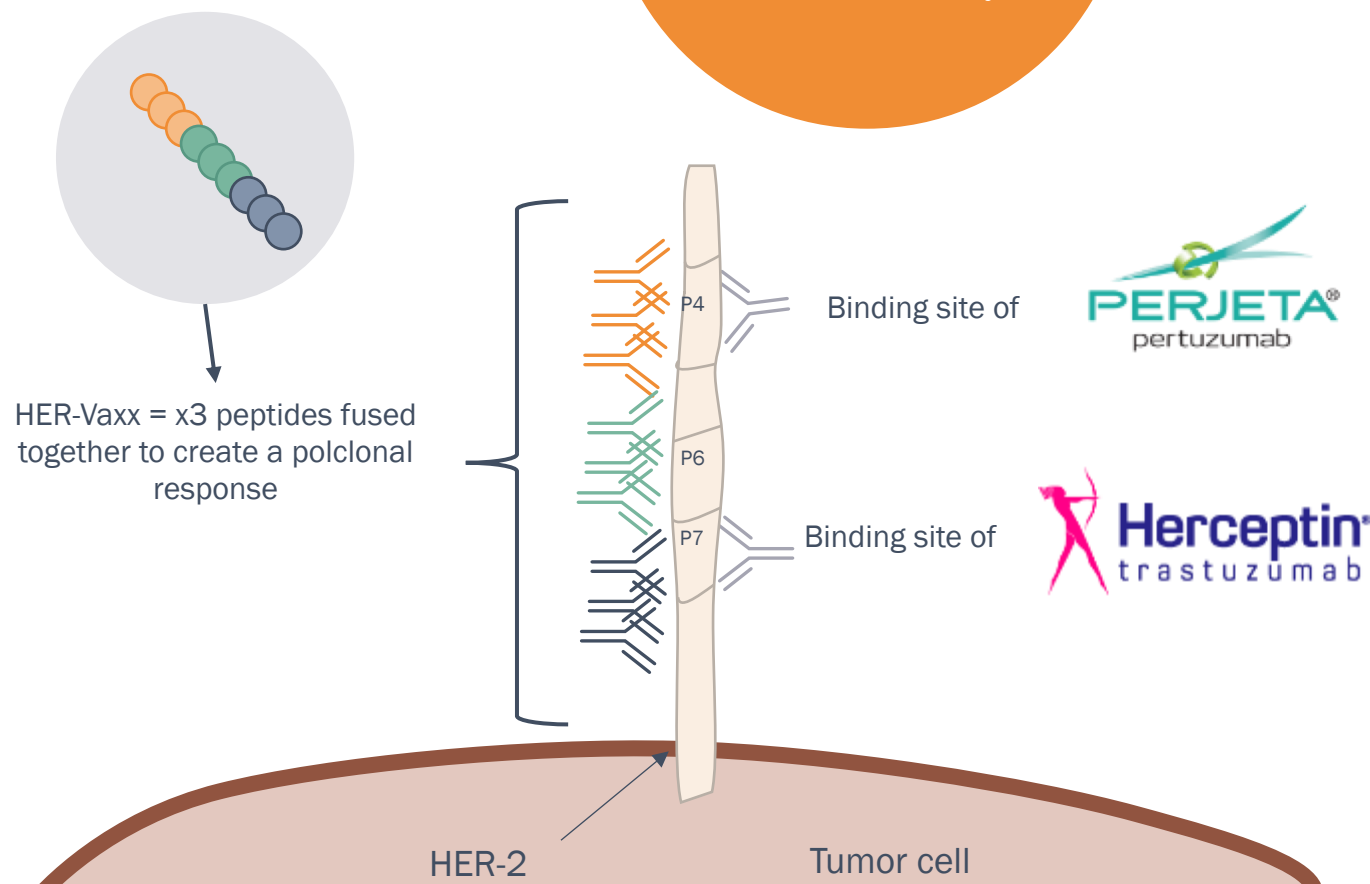


# HER-Vaxx uses a polyclonal response to target HER-2

HER-Vaxx address the targets of Herceptin and Perjeta combined as well as an additional site

- ✓ HER- Vaxx stimulates the patients immune system to produce polyclonal antibodies that target cells that are over expressing HER-2 receptors on their surface
- ✓ The patients B cells produce these polyclonal antibodies that repeatedly attack the cancer cell
- ✓ The Imugene team have identified peptides that mimic the part of the HER-2 which the antibody attaches itself
- ✓ HER- Vaxx stimulated production of polyclonal antibodies against HER2, with encouraging initial indications of efficacy in gastric cancer patients providing on-going proof of concept (PoC) for the B cell vaccine technology

B cell vaccines offer a unique opportunity to intervene at multiple points in the immune system and create immune memory





•————•

**Leslie Chong**  
**Managing Director & CEO**  
**leslie.chong@imugene.com**  
**+61 458 040 433**

•————•