ARVELLA THERAPEUTICS

ASX: ALA

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IMUGENE
Developing Cancer Immunotherapies

Strategic Collaboration

September 2022

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Arovella Therapeutics Highlights

World Leading Partners

Arovella licenced its iNKT Cell Therapy Platform from Imperial College London and its DKK1 mAb/CAR from MD Anderson and is collaborating with Imugene

Allogeneic Platform, Two Targets

Arovella is developing off the shelf cell therapies for CD19 expressing lymphomas and solid tumours, and DKK1 producing cancers.

Acquiring New Technologies

Arovella continues to focus on sourcing, evaluating and acquiring innovative technologies that align with key focus areas

Data Driven

Arovella uses data to drive decision making for its key assets and clinical indications

World Class Team

Arovella's leadership group has deep experience in drug development, particularly cell therapies

Growth Potential

Arovella is the only ASX listed company working with an iNKT cell therapy platform and the only company worldwide with CAR technology targeting a DKK1 peptide

INTRODUCTION TO IMUGENE

Imugene is a biotech company headquartered in Australia and publicly traded on the Australian Securities Exchange (ASX:IMU)

IMUGENE
Developing Cancer Immunotherapies

2013
Paul Hopper builds Imugene around technology originating from the Medical University of Vienna

2015
Leslie Chong from Genentech joins Imugene

2017
HER-Vaxx enters the clinic

2018
Licensed extensive B cell portfolio and platform from OSU & Mayo Clinic invented by Prof Pravin Kaumaya

2019
Completed the acquisition of a prolific oncolytic virus from City of Hope invented by Dr Yuman Fong

2021
Licensed onCARlytics from City of Hope invented by Dr Y Fong, Dr S Priceman & Dr A Park

2021
Strategic Partnership with **Celularity**

2021
CHECKvacc enters the clinic

2021
Strategic Partnership with **Eureka**

2021
HER-Vaxx Clinical Trial Supply Partnership with Merck KGaA & Pfizer

2021
PD1-Vaxx Clinical Trial Supply Partnership with Roche

2021
Entered the S&P/ASX 200 Index

2022
VAXINIA enters the clinic

2022
HER-Vaxx Phase 2 Final OS

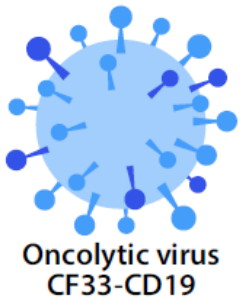
2022
Strategic Partnership with **Arovella**

CAR19-iNKT + CF33-CD19

An off-the-shelf cell therapy and oncolytic virus combination to mark and destroy solid tumours

Combing CAR19-iNKT Cells and CF33-CD19 (onCARlytics)

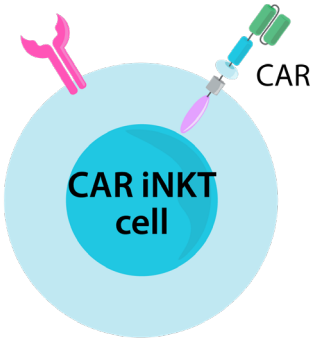
- CF33 is an oncolytic virus that targets tumour cells and not healthy cells
- The virus was developed at City of Hope by Professor Yuman Fong
- Dr Saul Priceman has engineered CF33 to induce CD19 production after tumour cells have been infected
- Phase 1 trials for CF33 commenced October 2021 with CHECKvacc and May 2022 with VAXINIA



IMUGENE
Developing Cancer Immunotherapies

City of Hope®

- CAR19-iNKT cells are very potent and are rapidly activated to kill CD19 expressing cancer cells
- The product is being developed as an off-the-shelf product for cancer treatment
- The platform was developed by Professor Tassos Karadimitris at Imperial College London



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Imperial College London

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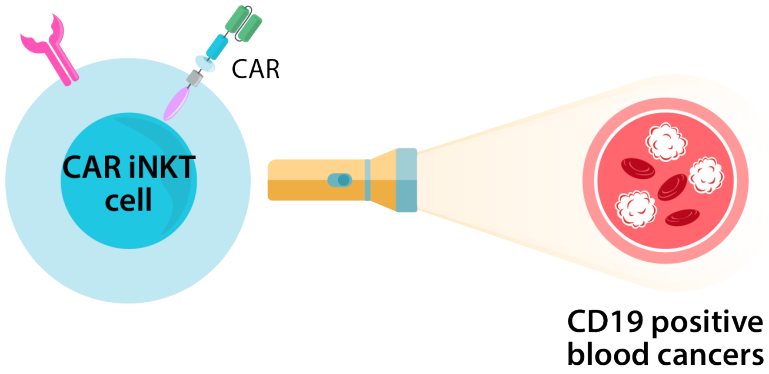
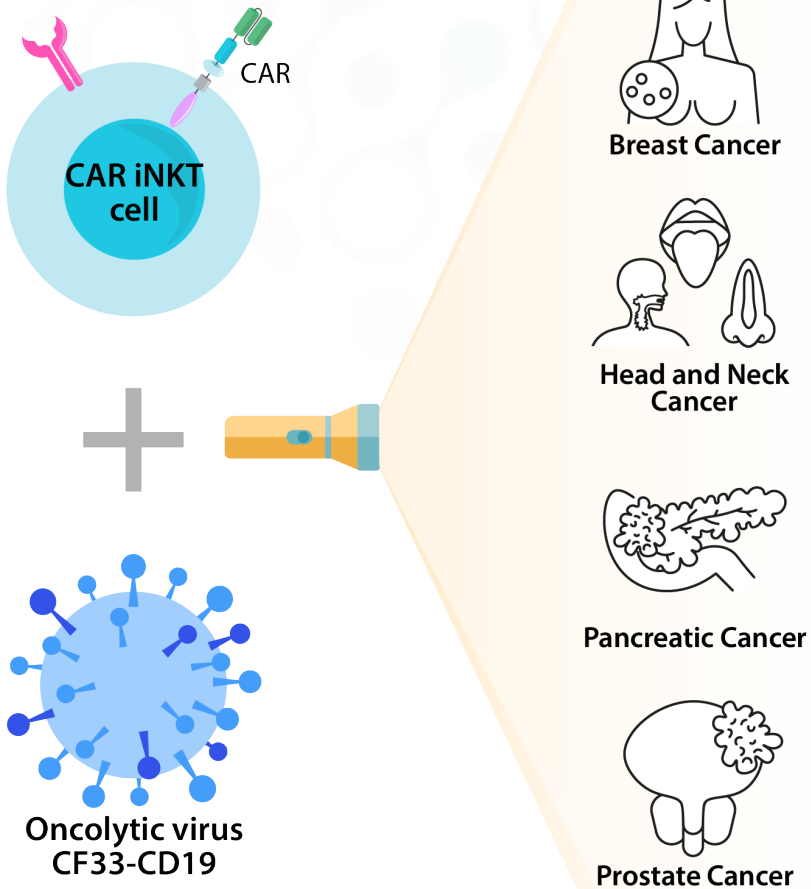
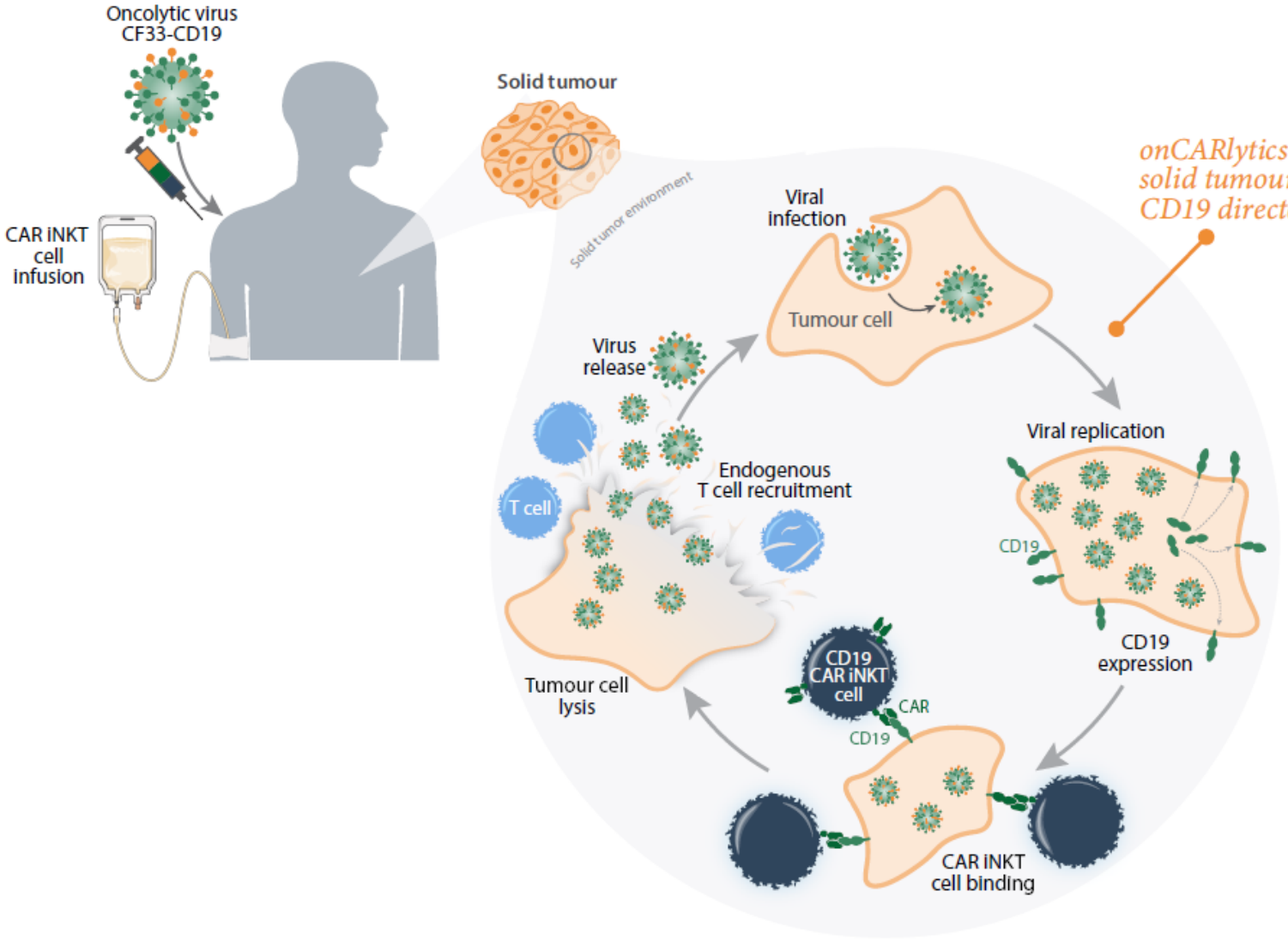
Expanding ALA-101's Utility



- We expect CAR19-iNKT cells to be effective against blood cancers that naturally produce CD19
- Combining CF33-CD19 with CAR19-iNKT cells opens up the possibility of treating a range of solid tumours



What is the Mechanism of Action?



1. OnCARlytics infects tumour cells
2. Virus replication and production of CF33-CD19 on the cell surface enabling CD19 targeting
3. Tumour cell lysis leads to viral particle release and the combination promotes endogenous immune cell recruitment to tumours
4. Released viral particles re-initiate virus infection of surrounding tumour cells.

Arovella Therapeutics Cell Therapy Pipeline

Cell Therapy

	INDICATION	DISCOVERY	PRECLINICAL	PHASE 1	PHASE2/3[1]	PARTNER
ALA-101 (CAR19-iNKT)	**CD19 expressing cancers**	CD19 Expressing Lymphoma				
ALA-101 + CF33-CD19	**Solid tumours**	Solid Tumours				IMUGENE Developing Cancer Immunotherapies
ALA-104 (DKK1-CAR-iNKT)	**Multiple Myeloma**	Multiple Myeloma & Solid Tumours				

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ALA-101 + CF33-CD19 Upcoming Milestones

Activity	Target Date
▪ Finalise Agreement and Study Setup	Q4 2022
▪ Complete *in vitro* (test tube) study to assess CAR19-iNKT cell activity against CD19 producing cancer cells	Q1 2023
▪ Complete *in vivo* (mouse) studies to assess CAR19-iNKT cell activity against solid tumours in an animal model	Q2 2023
▪ Complete the strategy for manufacturing, pre-clinical toxicology, and clinical Phase 1 study	Q3 2023
▪ Manufacturing for preclinical toxicology and Phase 1*	H1 2024
▪ FDA pre-IND meeting	H1 2024
▪ GLP Toxicology study*	H1 2024
▪ Regulatory clearance for Phase 1*	H1 2024
▪ 1st Patient dosed*	H2 2024

**Dependent on the availability of suppliers and timing of previous milestones*

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Arovella Company Overview

Financial Snapshot

ASX CODE	ALA
Market capitalisation[1]	$18.1 million
Shares on issue	669.8 million
52-week low / high	$0.020 / $0.057
Cash (June 30 2022)	$6.1 million

Major Shareholders

Shareholder	Ownership (%)[2]
THE TRUST COMPANY (AUSTRALIA) LTD	37,546,656 (5.68%)
MANN BEEF PTY LTD	20,000,000 (3.03%)
UBS NOMINEES PTY LTD	15,064,640 (2.28%)
ZERRIN INVESTMENTS PTY LTD	14,000,000 (2.12%)
DYLIDE PTY LTD	12,500,000 (1.89%)

1. *As of September 23, 2022*
2. *As of 24 August 2022*

Upcoming Milestones FY23

Activity for Arovella (now to June 2023)	Therapy	Complete (CY)
▪ Strategic planning outcomes	Company Wide	Q4 2022
▪ Finalise CAR19-iNKT and onCARlytics Agreement and study setup	ALA-101/CF33-CD19	Q4 2022
▪ Complete *in vitro* (test tube) study to assess CAR19-iNKT cell activity against CD19 producing solid cancer cells	ALA-101/CF33-CD19	Q1 2023
▪ Complete *in vivo* (mouse) studies to assess CAR19-iNKT cell activity against solid tumours in an animal model	ALA-101/CF33-CD19	Q2 2023
▪ Complete target validation studies for DKK1-CAR-iNKT	ALA-104	Q1 2023
▪ Complete *in vitro* (test tube) and *in vivo* studies (mouse) for DKK1-CAR-iNKT against multiple myeloma and solid tumours	ALA-104	Q2 2023
▪ Optimise CAR Candidate to complete IND enabling studies	ALA-104	Q2 2023
▪ Complete process development and confirmation manufacturing runs for CAR19-CAR-iNKT	ALA-101	Q2 2023
▪ Continued search for potential world class therapeutic assets focused on cancer treatment	Company Wide	Ongoing

Company Wide | ALA-101 | ALA-101 + CF33-CD19 | ALA-104

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Cancer Continues to be a Major Health Issue

Worldwide, an estimated 19.3 million new cancer cases (18.1 million excluding non-melanoma skin cancer) occurred in 2020[1]

Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020[2]

The global cancer therapeutics market is expected to reach $366 billion by 2030, from $167 billion in 2021, growing at a CAGR of 9.1%[3]

1. https://pubmed.ncbi.nlm.nih.gov/33538338/
2. https://www.who.int/news-room/fact-sheets/detail/cancer
3. https://www.globenewswire.com/en/news-release/2022/04/04/2415940/0/en/Cancer-Therapeutics-Market-Size-to-Surpass-US-365-99-Bn-by-2030.html

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Cell Therapy Revolution to Treat Cancer

Recent Media Attention – Feb & May 2022

CNN health Life, But Better Fitness Food Sleep Mindfulness Relationships Edition

T-cell immunotherapy tied to 10-year remission in two leukemia patients, study finds

First patients of pioneering CAR T-cell therapy 'cured of cancer'

Cancer-killing cells still present 10 years on, with results suggesting therapy is a cure for certain blood cancers

Science journal Nature reveals decade-long remissions; sparks hope for curative potential of CAR-T treatment

Health & Biotech

February 11, 2022 | Special Report

ABC NEWS Melbourne Change location

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SCIENCE

Leukaemia-fighting CAR T-cells kept patients in remission for 10 years — and counting

ABC Science / By science reporter Belinda Smith

Posted Thu 3 Feb 2022 at 5:30am

NEWS

First CAR T-cell child celebrates cancer cur

by: Peyton Kennedy

Posted: May 12, 2022 / 06:34 PM EDT

Updated: May 12, 2022 / 06:34 PM EDT

World's first recipient of Car-T cancer therapy is now 17

Emily Whitehead welcomes news Car-T is available to Irish children with leukaemia

Fri, Apr 29, 2022, 02:00

Published May 12, 2022

10 Years Cancer-Free! Emily Whitehead, Now 17, the First Child Cancer Patient to Receive Revolutionary CAR T-Cell Therapy, Celebrates Major Milestone

Children's Hospital of Philadelphia

Emily Whitehead, First Pediatric Patient to Receive CAR T-Cell Therapy, Celebrates Cure 10 Years Later

Whitehead received life-saving treatment at CHOP, under the care of Dr. Stephan Grupp, transforming the field of cancer immunotherapy

11-May-2022 9:55 AM EDT, by Children's Hospital of Philadelphia Contact Patient Services

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iNKT Cell Therapy Platform

Imperial College London

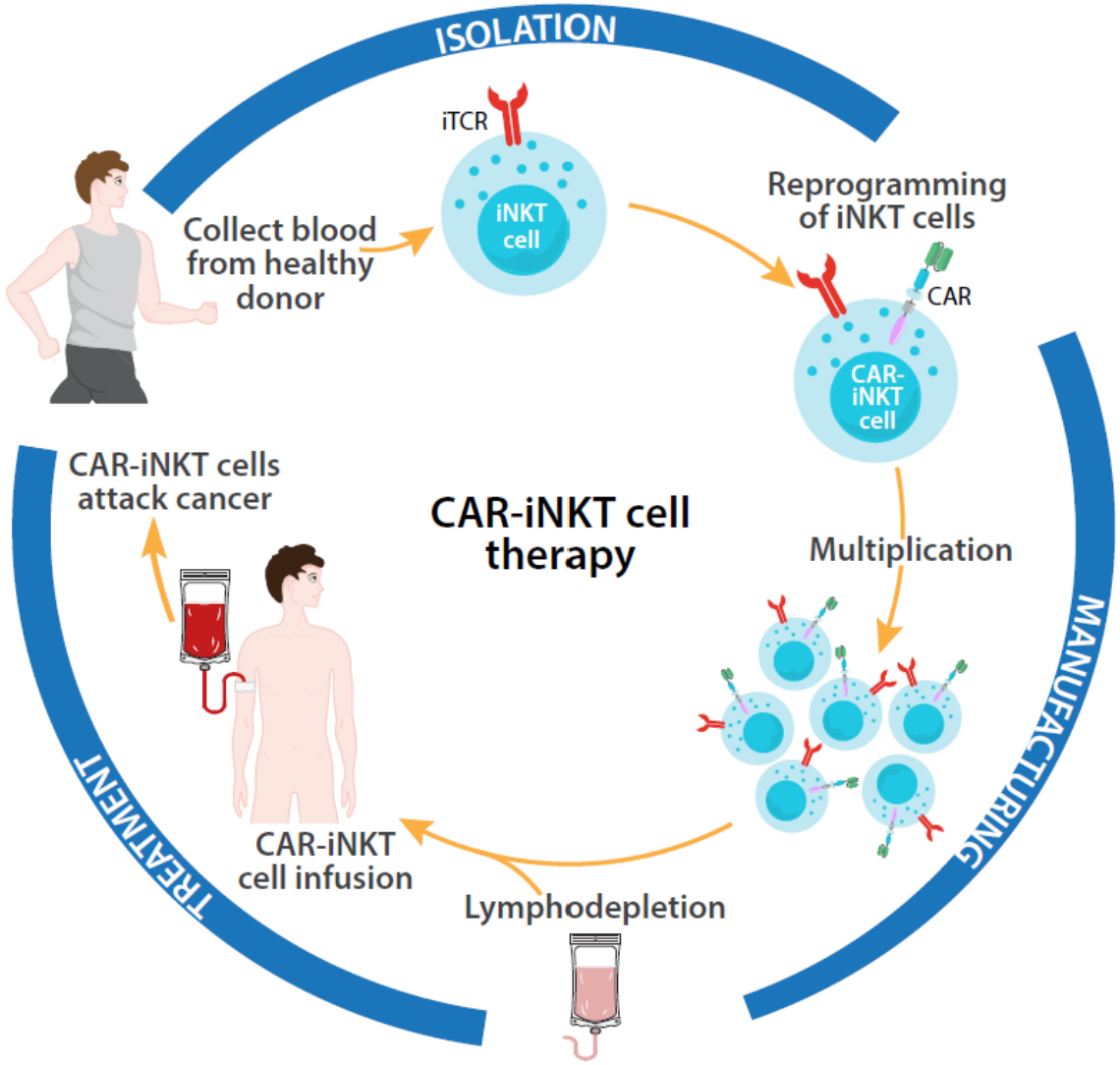
CAR-iNKT Cell Therapy Production and Advantages

CAR-iNKT Production Steps

1. Blood Collection and Immune Cell Harvesting
2. Isolation and Re-programming of iNKT Cells
3. Multiplication of Cells
4. Cells are Administered to the Patient

CAR-iNKT Cell Advantages

1. Preclinical evidence demonstrates iNKT cells can suppress graft versus host disease (GVHD)
2. Can be used “off the shelf”
3. One of the most potent immune cells
4. Activation of other immune system components
5. For tumours that produce CD1d, data shows that they perform better than conventional T cells



CAR-iNKT Cells are Engineered to Enhance Activity

	APPROVED CAR-T CELLS	CAR-NK CELLS	CAR-iNKT CELLS
Subpopulation of T cells with NK cell properties	✗	✗	✓
Intrinsic anti-cancer receptor (dual targeting)	✗	✗	✓
Naturally suppress GVHD	✗	✗	✓
Allogeneic, 'off-the-shelf' dosing	✗	✓	✓
Low risk of CRS or neurotoxicity	✗	✓	✓
Minimal genetic engineering for off the shelf	✗	✓	✓
Persistence	✓	TBD	TBD[1]

CAR – Chimeric Antigen Receptor; iNKT – invariant Natural Killer T Cell; CRS – Cytokine Release Syndrome; TBD – To Be Determined

1. Spontaneous secondary remission observed in preclinical animal models

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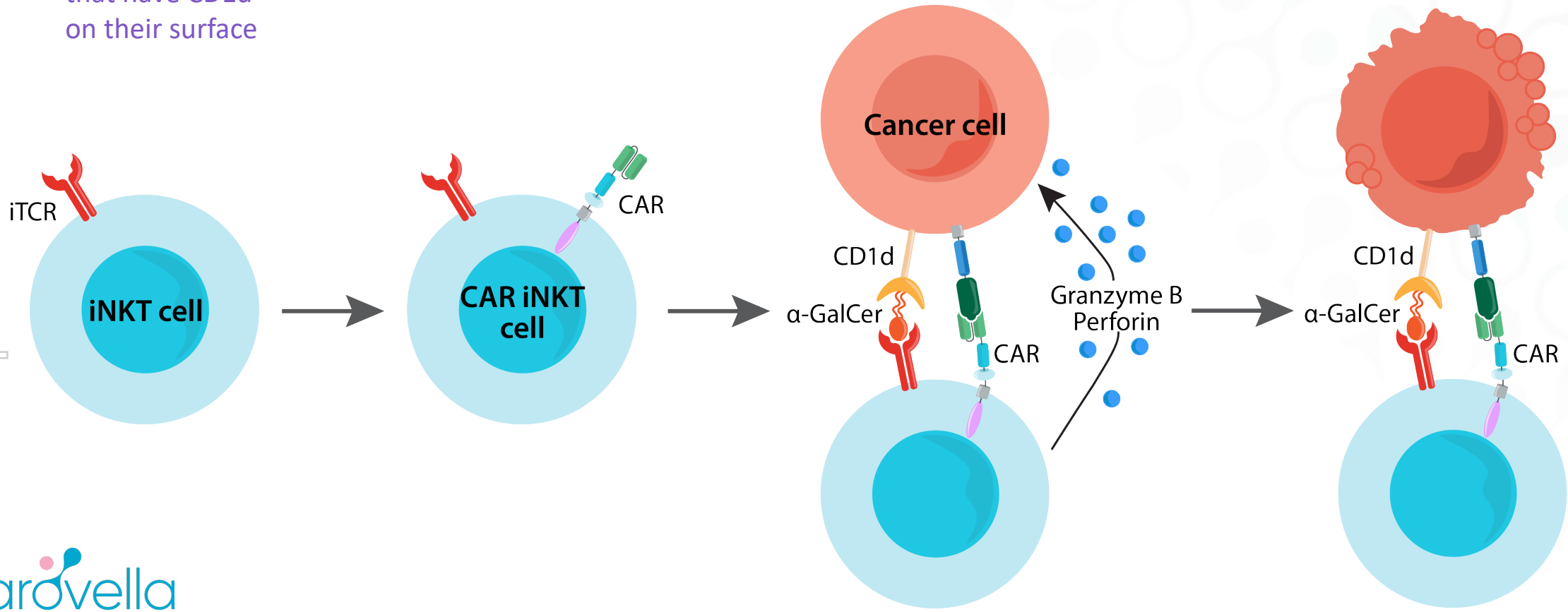
How does the CAR-iNKT Cell Therapy Platform Work?

1. iNKT cells contain an iTCR that naturally assists to recognise and kill cancer cells that have CD1d on their surface
2. We introduce a chimeric antigen receptor (CAR) to target cancer cells, making them dual targeting
3. CAR-iNKT cells are activated after they attach to the cancer cells, releasing components to trigger cancer cell death
4. The cancer cell is killed, and other components are recruited to assist



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CAR19-iNKT (ALA-101)

An off-the-shelf cell therapy for CD19 expressing cancers

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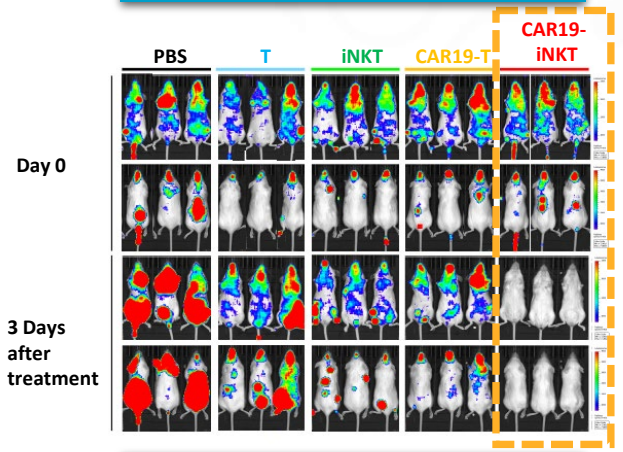
ALA-101: CAR19-iNKT Cells to Treat Blood Cancers

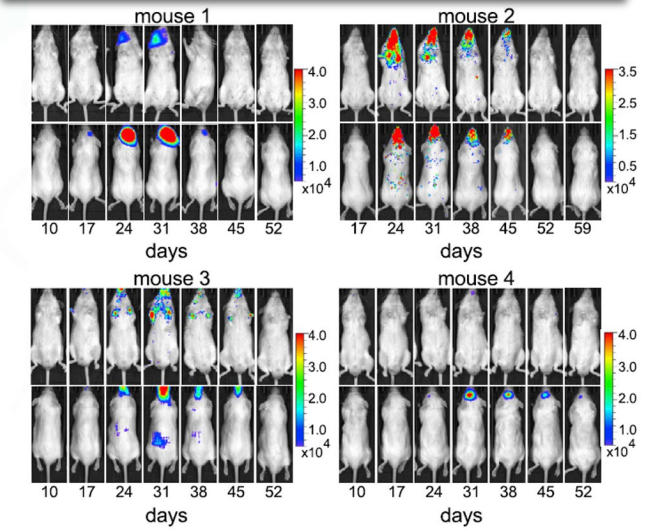
- ALA-101 is anticipated to be an effective, off-the-shelf cell therapy for the treatment of CD19 expressing cancers
- Our data validates the use of iNKT cells as a treatment for CD19 expressing cancer types
- ALA-101 is more efficient at clearing tumour cells than conventional cell therapies when the cancers produce CD1d and CD19
- Our therapy results in better animal survival than conventional cell therapies
- Commenced the manufacturing of the plasmid and lentivirus in Q1 2022
- Q-Gen selected as cell therapy manufacturer

CAR19-iNKT Outperforms Conventional Therapies

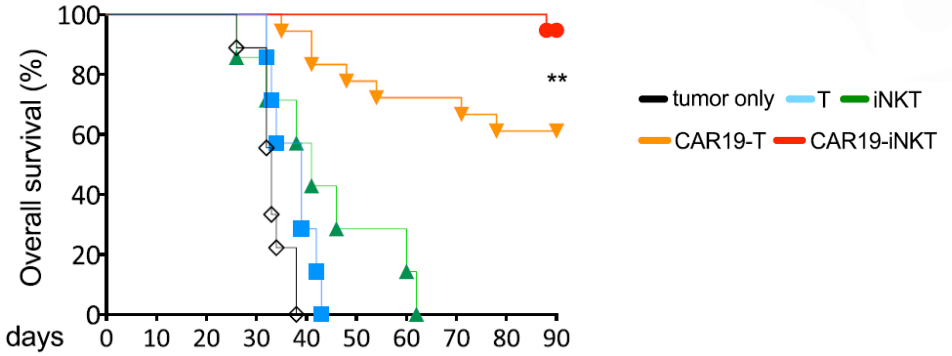
Faster Killing of Cancer Cells That Have CD1d



Spontaneous Secondary Remission



Increased Survival Over CAR-T Cells



Rotolo *et al.*, Cancer Cell (2018)

DKK1-CAR-iNKT (ALA-104)

An off-the-shelf cell therapy for multiple myeloma (blood cancer) and potentially solid tumours

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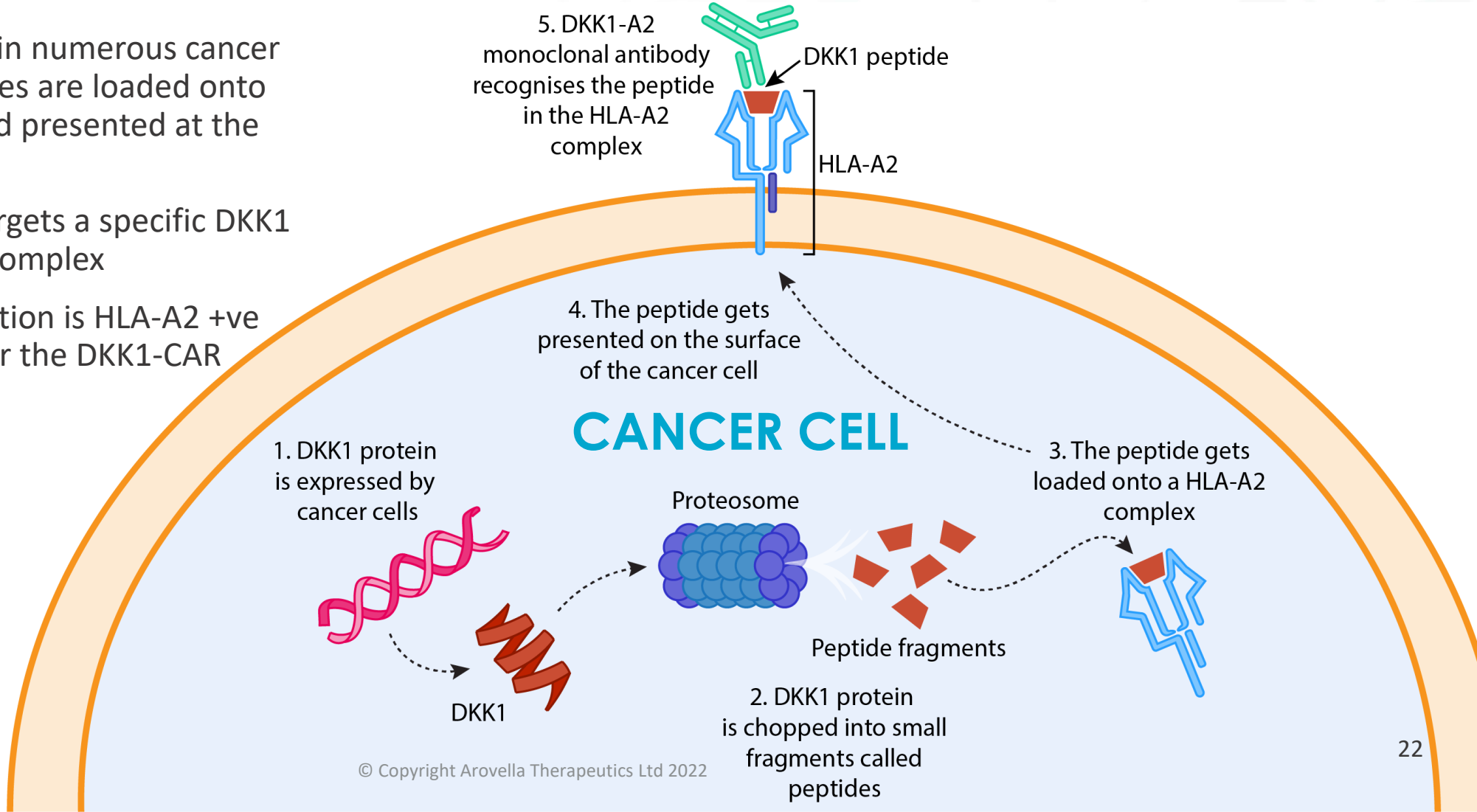
A Novel Cancer Target – DKK1 Peptide (ALA-104)

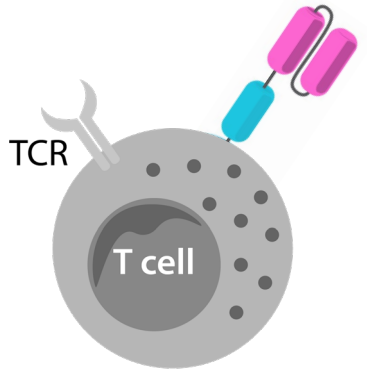
- DKK1 is a secreted protein that functions as a negative regulator of the WNT signaling pathway
- DKK1 is overproduced in numerous cancer types and DKK1 peptides are loaded onto immune complexes and presented at the surface of cancer cells
- Our DKK1 mAb/CAR targets a specific DKK1 peptide in an HLA-A2 complex
- ~40-50% of the population is HLA-A2 +ve meaning the market for the DKK1-CAR could be quite large



Development of DKK1-CAR to Date

- The DKK1 mAb was developed at MD Anderson and can be incorporated into a chimeric antigen receptor (CAR)
- The DKK1 peptide-targeting mAb has demonstrated activity against multiple myeloma and breast cancer
- The DKK1 peptide-targeting scFv has been incorporated into CAR-T cells, and has excellent activity against blood cancers and solid tumours (unpublished data)
- Arovella will combine the DKK1-CAR with its iNKT cell therapy platform and initially target multiple myeloma, where DKK1 is highly expressed

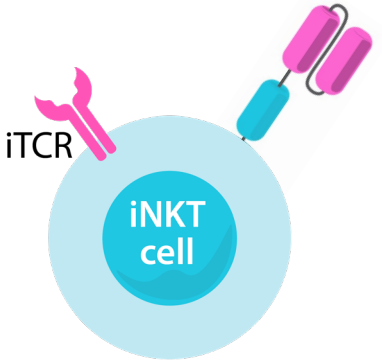
Already Completed



DKK1-CAR-T cells

Multiple Myeloma ✓
Pancreatic Cancer ✓
Lung Cancer ✓
Breast Cancer ✓

Arovella To Complete



DKK1-CAR-iNKT cells

Multiple Myeloma
Pancreatic Cancer
Lung Cancer
Breast Cancer

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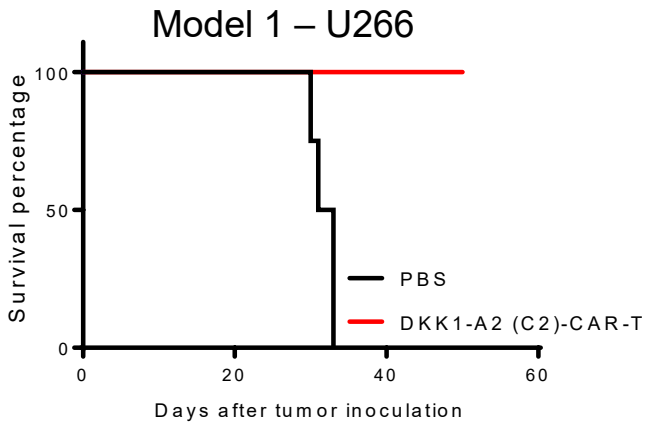
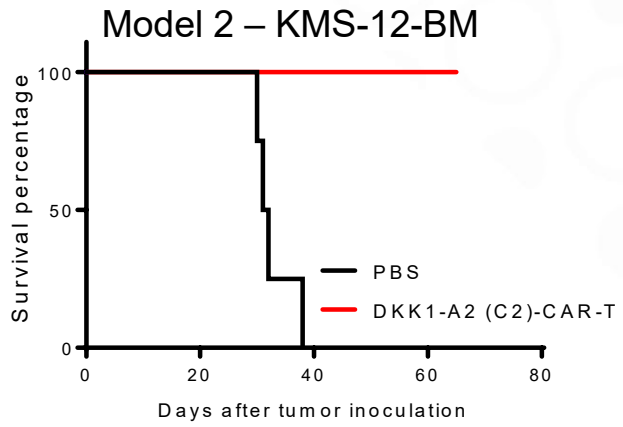
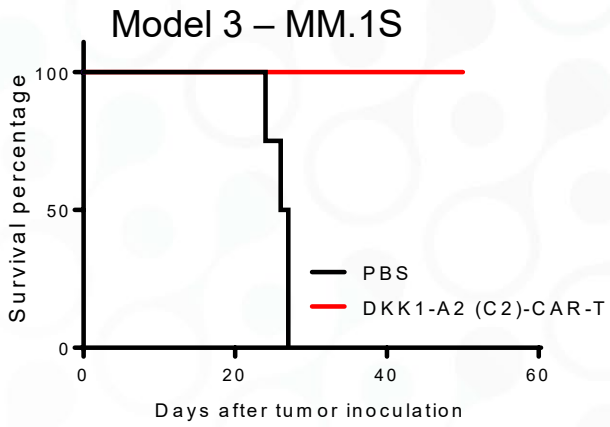
DKK1-CAR-T Cell Activity in Multiple Myeloma

DKK1-CAR-T cells were tested in three different animal models for multiple myeloma, displaying robust activity in all standard models







- All treated mice were alive at 50-60 days, while untreated mice succumbed to the cancer at 30-40 days
- Multiple myeloma cells also express CD1d, so including DKK1-CAR into iNKT cells will make them dual targeting
- DKK1-CAR-T cells also have activity in animal models for **lung**, **pancreatic** and **triple negative breast** cancer

DKK1-CAR-T Preclinical Safety

Prof Qing Yi at Houston Methodist has demonstrated:

- They only kill cells that have the DKK1 peptide presented in an HLA-A2 complex on their surface
- They do not kill healthy blood cells
- That the DKK1-CAR-T cells are considered safe using *in vivo* models
- The DKK1 mAb targeted only 1 out of 35 normal tissues tested (tonsil)

Arovella will confirm:

- That the DKK1 technology does not target or attack healthy cells
- The ability to combine DKK1-CAR with Arovella's iNKT cell therapy platform

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The Inventor – Professor Qing Yi

Professor Qing Yi is a trained medical immunologist with over 25 years of experience. He is one of the leading investigators in the fields of tumor immunology and immunotherapy in multiple myeloma and other cancers. He has trained at the **Karolinska Institute**, **MD Anderson**, the **Cleveland Clinic** and is now at **Houston Methodist**.

Professor Yi is the Director for the Center for Translational Research in Hematological Malignancies and Associate Director for the Cancer Center Basic Research Programs, Cancer Center Houston Methodist.

Professor Yi has been awarded 9 R01 grants, 1 project and 1 core grant in the MD Anderson Myeloma SPORE (P50), 4 R01-type translational grants from the LLS, 4 Senior Researcher Awards from the MMRF, 2 K99/R00 grants, and numerous intramural and industry grants. Dr Yi was recruited to Houston Methodist through an Established Investigator Award from CPRIT with a total grant amount of ~$6 million.

Professor Yi and colleagues have published more than 160 peer-reviewed research articles, with 45 being in top-tier journals with an impact factor of greater than 10.

Arovella Team

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Arovella Has a World Class Team

Dr. Elizabeth Stoner

INTERIM CHAIRPERSON

Dr. Stoner is a distinguished biopharma executive, who brings decades of international industry experience to her role, including senior roles in Clinical Development Operations at Merck Research Laboratories. Liz is an Executive Partner at MPM Capital, and she has held numerous leadership roles at MPM portfolio companies. Liz was previously an Assistant Professor of Paediatrics at Cornell University Medical College.

Dr. Michael Baker

CEO & MANAGING DIRECTOR

Dr. Baker has over 15 years experience in scientific research, drug development and venture investing sectors. He was an Investment Manager with the leading Australian life science fund, BioScience Managers. He also conducted due diligence to shortlist investment opportunities and played an active role in managing portfolio companies.

Dr. Debora Barton

DIRECTOR

Dr. Barton has over 20 years of oncology experience, in academia, as a practicing physician and in the biotechnology / pharmaceutical industry. Served in key senior executive positions, including Carisma Therapeutics and TScan Therapeutics, where Dr. Barton is currently the Chief Medical Officer, and Advanced Accelerator Applications, acquired by Novartis during Debora's tenure.

Mr. Gary Phillips

DIRECTOR

Mr Phillips has more than 30 years of operational management experience in the pharmaceutical and healthcare industry in Europe, Asia and Australia. He is currently the CEO and Managing Director of the ASX-listed company, Pharmaxis — previously he was the CEO at Ciba Geigy in Hungary (Merged to form Novartis in 1996) where he led the successful launch of a portfolio of new products.

Dr. Sandhya Buchanan

VP MANUFACTURING & QUALITY

Dr. Buchanan has more than 20 years' experience working in cell & gene therapy and vaccine development. Dr Buchanan was formerly at Atara Biotherapeutics as the chemistry manufacturing and control technical lead for autologous CAR-T programs and head of Viral Vector Development. Dr Buchanan has a PhD in Pharmaceutical Sciences from the University of Colorado Health Sciences Center.

Dr. Mini Bharathan

VP DEVELOPMENT & TRANSLATIONAL MEDICINE

Dr. Mini Bharathan has spent her career in the field of immunology and developing innovative cell therapies to treat human disease. Mini has over 15 years of biotechnology industry experience leading preclinical and translational medicine research teams. Mini will drive the development of Arovella's pipeline of iNKT cell therapies into and through clinical trials.

Thank You

Dr Michael Baker
CEO & Managing Director

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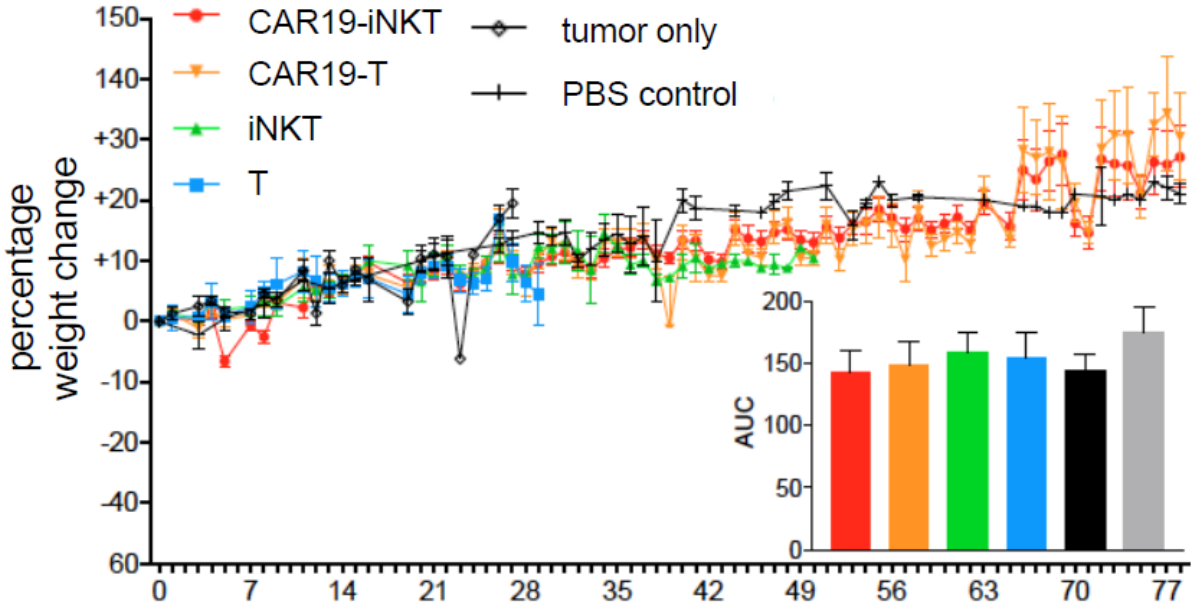
Appendices

Preclinical *In Vivo* Safety Evaluation of CAR19-iNKT cells

CAR19-iNKT cells do not elicit adverse effects in preclinical mouse tumour models

- No body weight loss
- Data in mouse models did not show off-target effects
- No histological changes in normal tissues
- Beside the profound anti-lymphoma effect of CAR19-iNKT cells, there was no evidence of negative pathology findings, clinically or as determined by extensive histopathological analysis

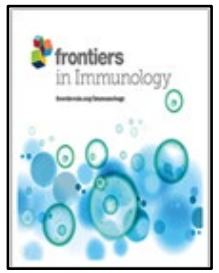
Mice Body Weight



Rotolo *et al.*, Cancer Cell (2018)

iNKT Cells Protect Against Graft Versus Host Disease

2017

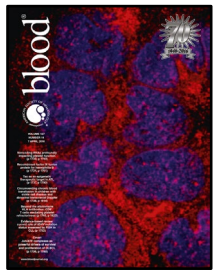


Front Immunol
2017 July 31;8:900
Invariant Natural Killer T Cells As Suppressors of Graft-versus-Host Disease in Allogeneic Hematopoietic Stem Cell Transplantation

2017

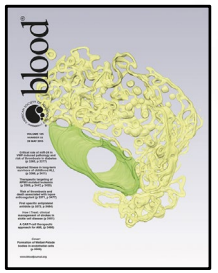
Leukemia
2017 Apr;31(4):903-912
Pre-transplant donor CD4⁻ invariant NKT cell expansion capacity predicts the occurrence of acute graft-versus-host disease

2016



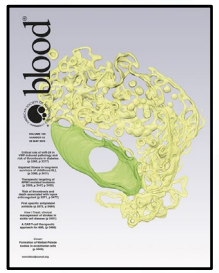
Blood
2016 Apr 7;127(14):1828-35
Larger number of invariant natural killer T cells in PBSC allografts correlates with improved GVHD-free and progression-free survival

2015



Blood
2015 May 28;125(22):3374-3375
A party of three: iNKT cells in GVHD prevention

2015



Blood
2015 May 28;125(22):3491-3500
Third-party CD4⁺ invariant natural killer T cells protect from murine GVHD lethality

2014

Blood
2014 Nov 20;124(22):3320-3328
CD4⁺ invariant natural killer T cells protect from murine GVHD lethality through expansion of donor CD4⁺CD25⁺FoxP3⁺ regulatory T cells

2012

Blood
2012 May 24;119(21):5030-6
Graft invariant natural killer T-cell dose predicts risk of acute graft-versus-host disease in allogeneic hematopoietic stem cell transplantation

2011

Blood
2011 Mar 17;117(11):3220-3229
Low doses of natural killer T cells provide protection from acute graft-versus-host disease via an IL-4–dependent mechanism

2010

Transfusion
2010 Feb;50(2):407-17
Adoptive therapy by transfusing expanded donor murine natural killer T cells can suppress acute graft-versus-host disease in allogeneic bone marrow transplantation

2008

J Immunol.
2008 Sep 1;181(5):3268-76
Human Invariant NKT Cells Display Alloreactivity Instructed by Invariant TCR-CD1d Interaction and Killer Ig Receptors

- Conventional CAR-T cell therapies are limited to autologous products due to the potential for acute graft versus host disease (GVHD)
- Allogeneic CAR-T cell products require additional genetic engineering
- Invariant Natural Killer T (iNKT) cells have been shown to intrinsically protect against GVHD
- Arovella's CAR-iNKT cell therapies will be developed as allogeneic products, requiring minimal genetic engineering

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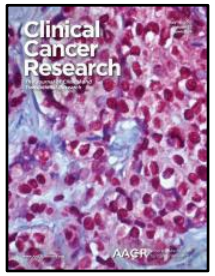
Use of iNKT Cells in Clinical Trials

2020

[Nat Med](#)
2020 Nov;26(11):1686-1690.
Anti-GD2 CAR-NKT cells in patients with relapsed or refractory neuroblastoma: an interim analysis

2017

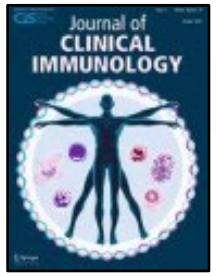


[Clin Cancer Res](#).
2017 Jul 15;23(14):3510-3519
Adoptive Transfer of Invariant NKT Cells as Immunotherapy for Advanced Melanoma: A Phase I Clinical Trial

2013

[Blood](#)
2013 Jan 17;121(3):423-430
Clinical regressions and broad immune activation following combination therapy targeting human NKT cells in myeloma

2012



[J Clin Immunol.](#)
2012 Apr 26;32(5):1071-81
Accumulation of Activated Invariant Natural Killer T Cells in the tumour Microenvironment after α-Galactosylceramide-Pulsed Antigen Presenting Cells

2011

[Clin Cancer Res.](#)
2011 Aug 1; 17(15):5140-51
Comparison of Clinical and Immunological Effects of Intravenous and Intradermal Administration of α-GalactosylCeramide (KRN7000)-Pulsed Dendritic Cells

2009

[J Immunol.](#)
2009 Feb 15;182(4):2492-501
A Phase I-II Study of α-Galactosylceramide-Pulsed IL-2/GM-CSF-Cultured PBMCs in Patients with Advanced and Recurrent NSCLC

2008

[Cancer Immunol Immunother.](#)
2008 Mar;57(3):337-45
Phase I study of α-galactosylceramide-pulsed antigen presenting cells administration to the nasal submucosa in unresectable or recurrent HNC

2006

[Clin Cancer Res](#).
2006 Oct 15;12(20 Pt 1):6079-86
A Phase I Study of *In vitro* Expanded Natural Killer T Cells in Patients with Advanced and Recurrent Non–Small Cell Lung Cancer

2005

[J Exp Med.](#)
2005 May 2;201(9):1503-17
Sustained expansion of NKT cells and antigen-specific T cells after injection of α-galactosyl-ceramide loaded mature dendritic cells in cancer patients

2005

[Clin Cancer Res](#).
2005 Mar 1;11(5):1910-17
A Phase I Study of α-Galactosylceramide (KRN7000)–Pulsed Dendritic Cells in Patients with Advanced and Recurrent NSCLC

- iNKT cells, in the presence and absence of CARs, have been used in numerous clinical trials against a range of tumour types, including blood cancers and solid tumours
- Efficacy data is encouraging in both solid tumour and haematological malignancies
- The side effect profile is encouraging with low risk of neurotoxicity and cytokine release syndrome with no evidence of GVHD for allogeneic iNKT cell products

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DKK1's Role in Cancer

2021

Oncogene,
2021 Jul 01; 40(26)

The dickkopf1 and FOXM1 positive feedback loop promotes tumor growth in Pancreatic and Esophageal Cancers

2019

Annals of translational medicine,
2019 Dec 21; 146(2)

Crosstalk of estrogen receptors and wnt/β-catenin signaling in Endometrial Cancer

2019

Oncogene,
2019 Dec 06; 38

Dickkopf-1 contributes to Hepatocellular Carcinoma tumorigenesis by activating the Wnt/β-catenin signaling pathway

2019

American journal of cancer research,
2019 Feb 01; 9(2)

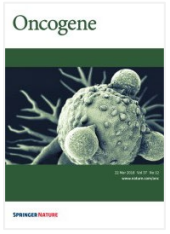
Dickkopf-1 (DKK1) promotes tumor growth via akt-phosphorylation and independently of wnt-axis in barrett's associated Esophageal Adenocarcinoma

2018

Clinical & experimental medicine,
2018 Sep 2035(8)

Dickkopf-1 (Dkk1) protein expression in Breast Cancer with special reference to Bone Metastases

2018



Oncogene,
2018 Mar 18; 37(26)

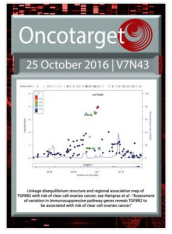
Activation of the dickkopf1-CKAP4 pathway is associated with poor prognosis of Esophageal Cancer and anti-CKAP4 antibody may be a new therapeutic drug

2017

Cell cycle,
2017 Jul 27; 16(17)

The role of dickkopf-1 as a potential prognostic marker in Pancreatic ductal adenocarcinoma

2016



Oncotarget,
2016 Sep 06; 7(43)

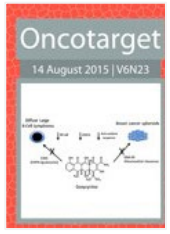
Dickkopf-1 expression is associated with tumorigenity and lymphatic metastasis in human hilar Cholangiocarcinoma

2016

Journal of cellular and molecular medicine,
2016 May 31; 20(9)

Dickkopf-1-promoted vasculogenic mimicry in Non-small Cell Lung Cancer is associated with EMT and development of a cancer stem-like cell phenotype

2015



Oncotarget,
2015 Jun 19; 6(23)

Serum dickkopf-1 is a novel serological biomarker for the diagnosis and prognosis of Pancreatic Cancer

- DKK1 is overproduced in a number of cancer types, including pancreatic, oesophageal, hepatocellular, breast, lung cancer and multiple myeloma
- Overexpression of DKK1 can indicate poor overall survival and shorter disease-free survival[1]
- DKK1 has recently emerged as a potential biomarker of cancer progression and prognosis for several types of malignancies[2]
- There is growing evidence that DKK1 plays an essential role in cancer progression[2]

1. Zhu et al., 2021

2. Chu et al., 2021

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Understanding Immunology and Cell Therapy

- **Antigen =** Any substance that induces the immune system to produce antibodies against it is called an antigen. Any foreign invaders, such as pathogens (bacteria and viruses), chemicals, toxins, and pollens, can be antigens.
- **CAR** = Chimeric Antigen Receptor can be introduced into immune cells to target cancer cells.
- **CAR-T** = Chimeric Antigen Receptor T Cell.
- **DKK1 =** Dickkopf WNT signalling pathway inhibitor 1
- **iNKT** = invariant Natural Killer T cells are components of the immune system that seek and destroy foreign or abnormal cells.
- **TCR** = T Cell Receptors are group of proteins found on immune cells that recognise fragments of antigens as peptides bound to MHC complexes.
- **CD1d** = Cluster of differentiation 1, which is expressed on some immune cells and cancer cells.
- **CD19 =** Cluster of Differentiation 19 is a protein that is expressed in a B cells and many cancer cell types.
- **Cell Therapy =** The use of intact cells to lessen or cure a disease. Cells may be from the patient (autologous) or from a healthy donor (allogenic).
- **iNKT =** invariant Natural Killer T cell; a naturally occurring immune cell.
- **Immuno-oncology** = The use of the immune system to treat cancer.
- **Invariant =** Never changing.
- **In vitro =** Work completed in a test tube or outside of an animal.
- **In vivo =** work completed using an organism (i.e. mouse, human).
- **Lymphomas =** Lymphoma is a cancer of the lymphatic system, which is part of the body's germ-fighting network.
- **Novel =** Of new or unusual kind.
- **Platform =** A systematic method to leverage prior knowledge for a given new therapy.

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Committed to helping people live longer and healthier lives

Patient-Centric
It starts with the end in mind. In our case, it is our patients.
At Arovella, we are invested in making a positive difference in helping patients live longer and healthier lives. Creating a brighter future for people is our driving force.

Data-driven and Milestone Focused
Behind all life-changing therapies is excellent, ground-breaking science. We utilise data to shape our decisions to enable us to reach our set milestones

Accountable, Honest and We Act With Integrity
Our mission of helping patients focuses us. We hold ourselves to account for our actions. We strive to do what is right for all of our stakeholders.

We Are Persistent and Never Give Up
Drug development is a challenging arena. We are committed to our mission of helping patients, and we will continue to push each other through positive and challenging times in the pursuit of developing life-changing therapeutics.