

**ASX: ALA**

Arovella Therapeutics Limited  
ACN 090 987 250



**ASX Release**

6 September 2023

**INVESTOR PRESENTATION**

**MELBOURNE, AUSTRALIA 6 September 2023:** Arovella Therapeutics Ltd (ASX: ALA), a biotechnology company focused on developing its invariant Natural Killer T (iNKT) cell platform to treat cancer, is pleased to provide an update to investors in the form of the attached presentation.

The presentation will be used in Arovella's non-deal investor roadshow being conducted this week.

The presentation is attached to this announcement and can be viewed on the Company's website [www.arovella.com.au](http://www.arovella.com.au).

*Release authorised by the Managing Director and Chief Executive Officer of Arovella Therapeutics Limited.*

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**NOTES TO EDITORS:**

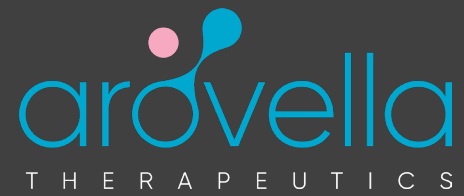
**About Arovella Therapeutics Ltd**

Arovella Therapeutics Ltd (ASX: ALA) is a biotechnology company focused on developing its invariant natural killer T (iNKT) cell therapy platform from Imperial College London to treat blood cancers and solid tumours. Arovella is also expanding its DKK1-peptide targeting technology licenced from MD Anderson and used in conjunction with its iNKT cell therapy platform. Arovella's lead product is ALA-101. ALA-101 consists of CAR19-iNKT cells that have been modified to produce a Chimeric Antigen Receptor (CAR) that targets CD19. CD19 is an antigen found on the surface of numerous cancer types. iNKT cells also contain an invariant T cell receptor (iTTCR) that targets  $\alpha$ -GalCer bound CD1d, another antigen found on the surface of several cancer types. ALA-101 is being developed as an allogeneic cell therapy, which means it can be given from a healthy donor to a patient.

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**Glossary: iNKT cell** – invariant Natural Killer T cells; **CAR** – Chimeric Antigen Receptor that can be introduced into immune cells to target cancer cells; **TCR** – T cell receptors are a group of proteins found on immune cells that recognise fragments of antigens as peptides bound to MHC complexes; **B-cell lymphoma** – A type of cancer that forms in B cells (a type of immune system cell); **CD1d** – Cluster of differentiation 1, which is expressed on some immune cells and cancer cells; **aGalCer** – alpha-galactosylceramide is a specific ligand for human and mouse natural killer T cells. It is a synthetic glycolipid.

The Company is also commercialising ZolpiMist™ to treat short-term insomnia.

For more information, visit [www.arovella.com](http://www.arovella.com)

This announcement contains certain statements which may constitute forward-looking statements or information ("forward-looking statements"), including statements regarding negotiations with third parties and regulatory approvals. These forward-looking statements are based on certain key expectations and assumptions, including assumptions regarding the actions of third parties and financial terms. These factors and assumptions are based upon currently available information, and the forward-looking statements herein speak only of the date hereof. Although the expectations and assumptions reflected in the forward-looking statements are reasonable in the view of the Company's directors and management, reliance should not be placed on such statements as there is no assurance that they will prove correct. This is because forward-looking statements are subject to known and unknown risks, uncertainties and other factors that could influence actual results or events and cause actual results or events to differ materially from those stated, anticipated or implied in the forward-looking statements. These risks include but are not limited to: uncertainties and other factors that are beyond the control of the Company; global economic conditions; the risk associated with foreign currencies; and risk associated with securities market volatility. The Company assumes no obligation to update any forward-looking statements or to update the reasons why actual results could differ from those reflected in the forward-looking statements, except as required by Australian securities laws and ASX Listing Rules.

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**arovella**  
T H E R A P E U T I C S

ASX:ALA

**Investor Presentation**  
Non-deal Roadshow  
September 2023

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# Arovella Therapeutics Highlights



## Off-the-Shelf iNKT Cell Platform

Arovella is developing off-the-shelf iNKT cell therapies to target blood cancers and solid tumour cancers



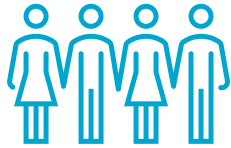
## Lead Product Advancing to Clinic

ALA-101, a potential treatment for CD19-expressing blood cancers, is being progressed to phase I clinical trials, expected to commence in 2024



## Addressing Key Unmet Need

Arovella's iNKT cell platform is well positioned to solve key challenges that hamper the cell therapy sector



## Strong Leadership Group

Arovella's leadership team and its Board have proven experience in drug development, particularly cell therapies



## Strategic Acquisitions

Arovella is focused on acquiring innovative technologies that strengthen its cell therapy platform and align with its focus areas



## Unique Value Proposition

Arovella is among few companies globally developing an iNKT cell therapy platform

# Arovella Financial Overview

## Financial Snapshot

ASX CODE	ALA
Market capitalisation <sup>1</sup>	\$55.9 million
Shares on issue	901.96 million
52-week low / high <sup>1</sup>	\$0.020 / \$0.105
Pro Forma Cash (June 30 2023 + SPP) <sup>2</sup>	\$7.38 million

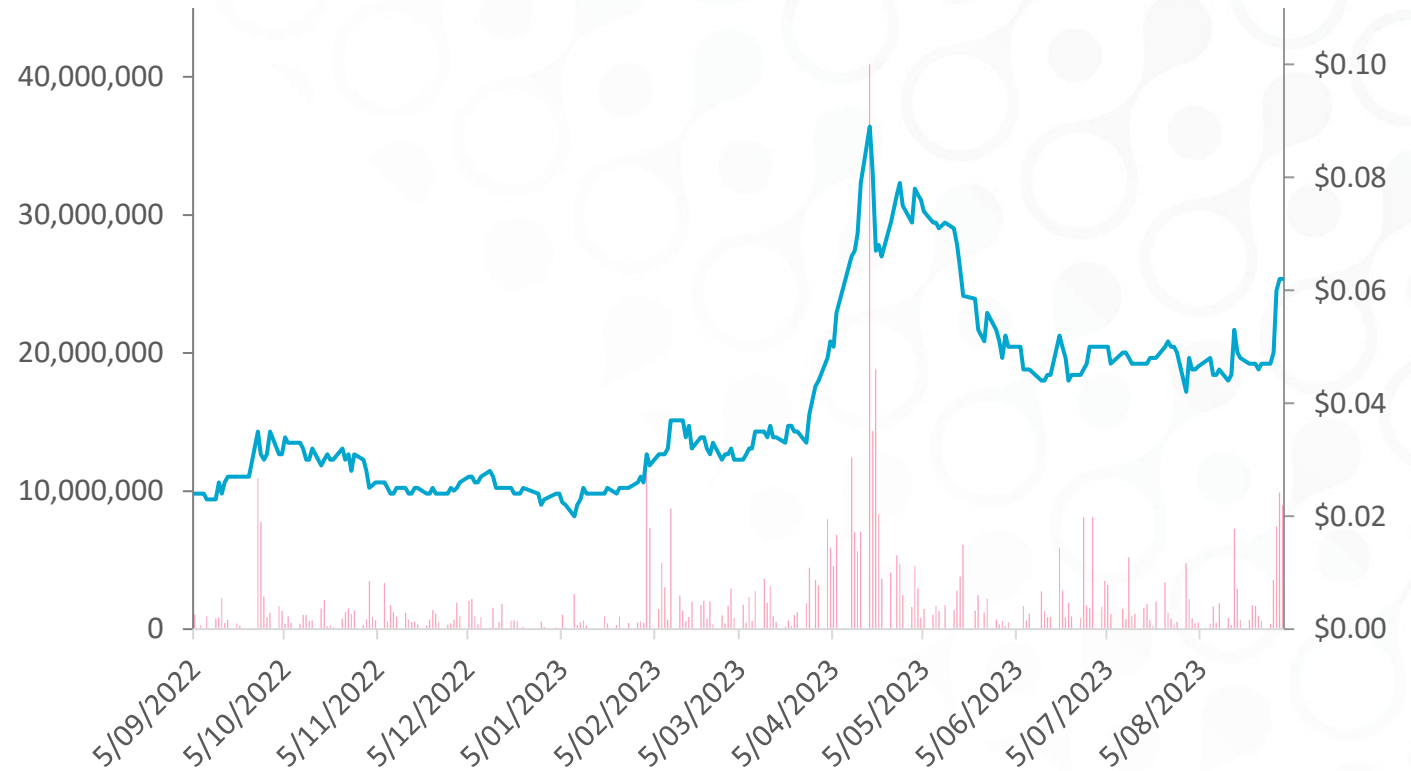
## Major Shareholders

Shareholder	Ownership (%) <sup>1</sup>
THE TRUST COMPANY (AUSTRALIA) LIMITED	55,285,161 (6.13%)
RICHARD JOHN MANN	50,905,657 (5.71%)
UBS NOMINEES PTY LTD	20,620,196 (2.31%)
BLACKBURNE CAPITAL PTY LTD	19,175,000 (2.15%)
DYLIDE PTY LTD	15,666,666 (1.76%)

























1. As of 1 September 2023

2. Includes \$2.2m from the SPP that closed 6 July 2023, but not funds from the R&D tax incentive rebate expected before November 2023

## ALA Price and Volume - 12 Months



# Recent Cell Therapy Transactions

Date	Type of deal	Acquirer/Licensee	Target/Licenser	Cell Type	Stage	Upfront (\$M)	Milestones (\$M)	Total deal value (\$M)
Aug-23	License <sup>1</sup>	 <b>IMUGENE</b> Developing Cancer Immunotherapies	 <b>PRECISION BIOSCIENCES</b>	T Cell	Phase 1b	\$21	\$206	\$227
Aug-23	Strategic Investment (ROFR) <sup>2</sup>	 <b>astellas</b>	 <b>POSEIDA THERAPEUTICS</b>	T Cell	Phase 1	\$25	\$0	\$25
May-23	License	 <b>janssen</b>	 <b>CBMG</b> Cellular Biomedicine Group	T Cell	Phase 1b	\$245	undisclosed	
Jan-23	Acquisition	 <b>AstraZeneca</b>	 <b>neogene THERAPEUTICS</b>	T Cell	Phase I	\$200	\$120	\$320
Oct-22	Development collaboration <sup>3</sup>	 <b>GILEAD</b>	 <b>ARCELLX</b>	T Cell	Phase II	\$225	undisclosed	
Sep-22	Research collaboration	 <b>Genentech</b> A Member of the Roche Group	 <b>ArsenalBio</b>	T Cell	Preclinical	\$70	undisclosed	
Aug-22	Licence & strategic collaboration	 <b>Roche</b>	 <b>POSEIDA THERAPEUTICS</b>	T Cell	Phase I	\$110	\$110	\$220
Sep-21	Development collaboration	 <b>Genentech</b> A Member of the Roche Group	 <b>Adaptimmune</b>	T Cell	Preclinical	\$150	\$150	\$300
Aug-21	Research collaboration	 <b>GILEAD</b>	 <b>APPIA BIO</b>	iNKT Cell	Preclinical	undisclosed	undisclosed	\$875
May-21	Acquisition	 <b>Athenex</b>	 <b>kuur THERAPEUTICS</b>	iNKT Cell	Phase I	\$70	\$115	\$185
Jun-21	Acquisition	 <b>eterna</b>	 <b>Novellus THERAPEUTICS</b>	Multiple	Preclinical	\$125	\$0	\$125
Dec-19	Acquisition	 <b>astellas</b>	 <b>XYPHOS</b>	Multiple	Preclinical	\$120	\$545	\$665

1. Precision is eligible for double digit royalties on net sales and \$145 million in milestone payments and tiered royalties for additional programs
2. Arcellx also received a \$100m equity investment from Gilead
3. Poseida also received a \$25m equity investment from Astellas
4. See Slide 31 for deal references

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# Arovella is in a Differentiated Sector of Cell Therapy



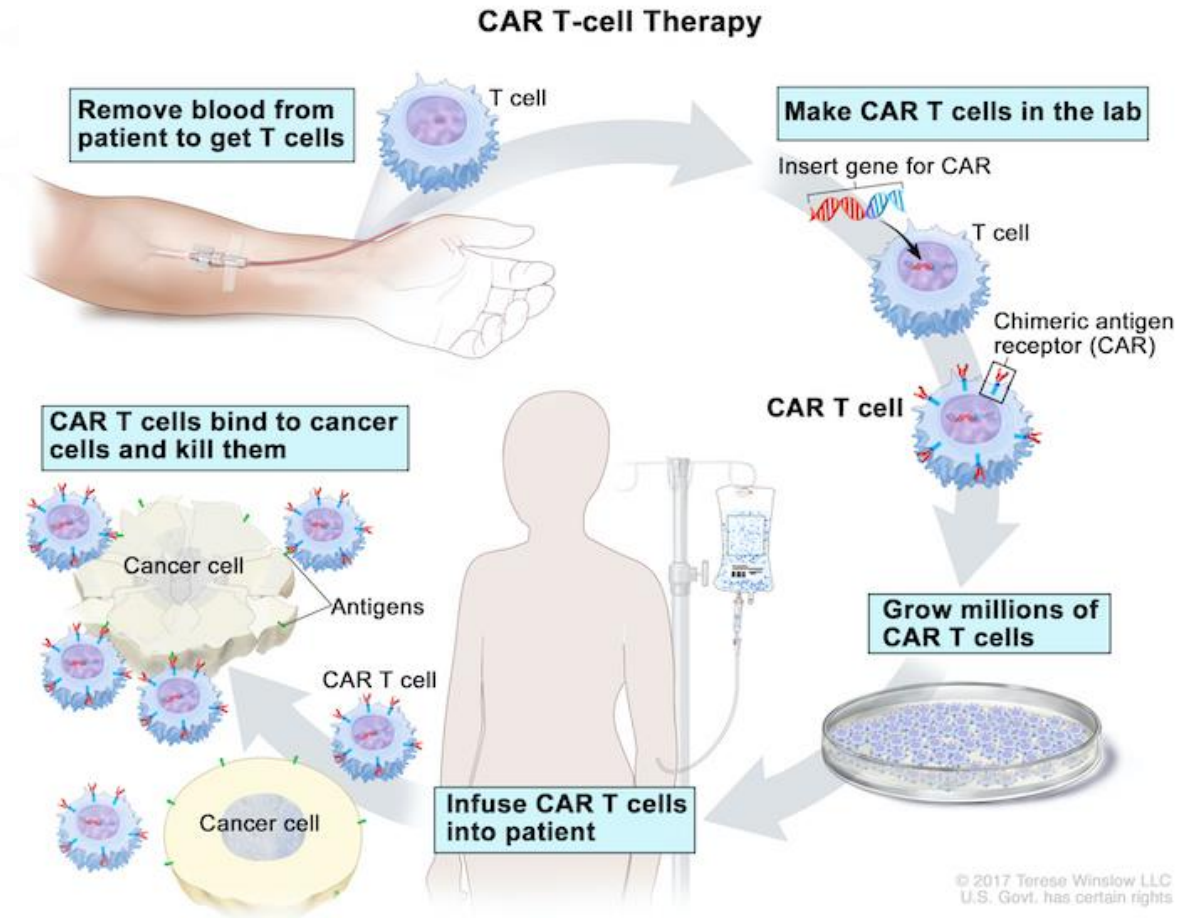
Companies with T cell, NK cell, or iNKT cell therapy programs. Source: Company analysis based on public information



# CAR-T Cell Therapy is Personalised Medicine

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- T cells are a common type of immune cell that fight infections and can help fight cancer
- To generate autologous CAR-T cells, T cells are taken from a patient with blood cancer and 'reprogrammed' to produce a Chimeric Antigen Receptor (CAR)
  - The CAR is able to specifically recognise cancer cells through a target antigen
- CAR-T cells are administered to the patient to find and kill the tumour cells
  - Once the CAR binds to a tumour cell, the CAR-T cell is activated to kill the tumour cell



<https://www.ohsu.edu/sites/default/files/2021-04/CAR%20tcellTherapy7-700px.jpg>

# CAR-T Has Revolutionized Blood Cancer Treatment

- CAR-T cells have demonstrated ability to **cure** haematological cancers and have generated strong sales
- The Cell Therapy market is expected to reach \$61.2 billion by 2030<sup>1</sup>
- 40-60% of patients relapse post-CAR-T therapy<sup>2</sup>

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<https://emilywhiteheadfoundation.org/10-years-of-car-t/>

Product	Approval Year	2022 Revenue
 <b>YESCARTA<sup>®</sup></b> (axicabtagene ciloleucel) <small>Suspension for IV infusion</small>	2017	US\$1160m <sup>3</sup>
 <b>KYMRIAH<sup>®</sup></b> (tisagenlecleucel) <small>Suspension for IV infusion</small>	2017	US\$536m <sup>4</sup>
 <b>Abecma<sup>®</sup></b> (idecabtagene vicleucel) <small>Suspension for IV infusion</small>	2021	US\$388m <sup>5</sup>

1. <https://www.businesswire.com/news/home/20230529005130/en/Global-Cell-Therapy-Market-Report-2023-Advancements-in-Biotechnology-Drives-Growth---ResearchAndMarkets.com>
2. Zinzi et al., 2023 Pharmacological Research - 10.1016/j.phrs.2023.106742
3. [https://s29.q4cdn.com/585078350/files/doc\\_financials/2022/q4/GILD-Q4-FY22-Earnings-Press-Release-2-February-2023.pdf](https://s29.q4cdn.com/585078350/files/doc_financials/2022/q4/GILD-Q4-FY22-Earnings-Press-Release-2-February-2023.pdf)
4. [https://www.novartis.com/sites/novartis\\_com/files/q4-2022-media-release-en.pdf](https://www.novartis.com/sites/novartis_com/files/q4-2022-media-release-en.pdf)
5. <https://bioprocessintl.com/bioprocess-insider/therapeutic-class/bms-sees-car-t-sales-rocket-in-line-with-increased-capacity/#:~:text=For%20the%20full%20year%202022,%2487%20million%20the%20year%20prior.>

# CAR-T Cell Therapies Pose Major Supply Challenges

- **T cells must originate from the patient to be treated** so each manufacturing batch is patient-specific
  - **High manufacturing and supply chain costs** lead to high drug costs (>\$500k per patient)
  - Starting material (T cells) can be compromised due to disease, **reducing efficacy**
  - Limited number of centres able to collect cells and manufacture the therapy so **not all eligible patients can be treated**

## ■ **Manufacturing CAR-T takes 4-6 weeks** for each patient

- Patients with aggressive disease sometimes **die while waiting for treatment**
- **Manufacturing run failures can occur**, further increasing the time to treatment (and cost)

Arovella's **off-the-shelf** CAR-iNKT cell platform has the potential to address the challenges of CAR-T cells with the potential for improved efficacy

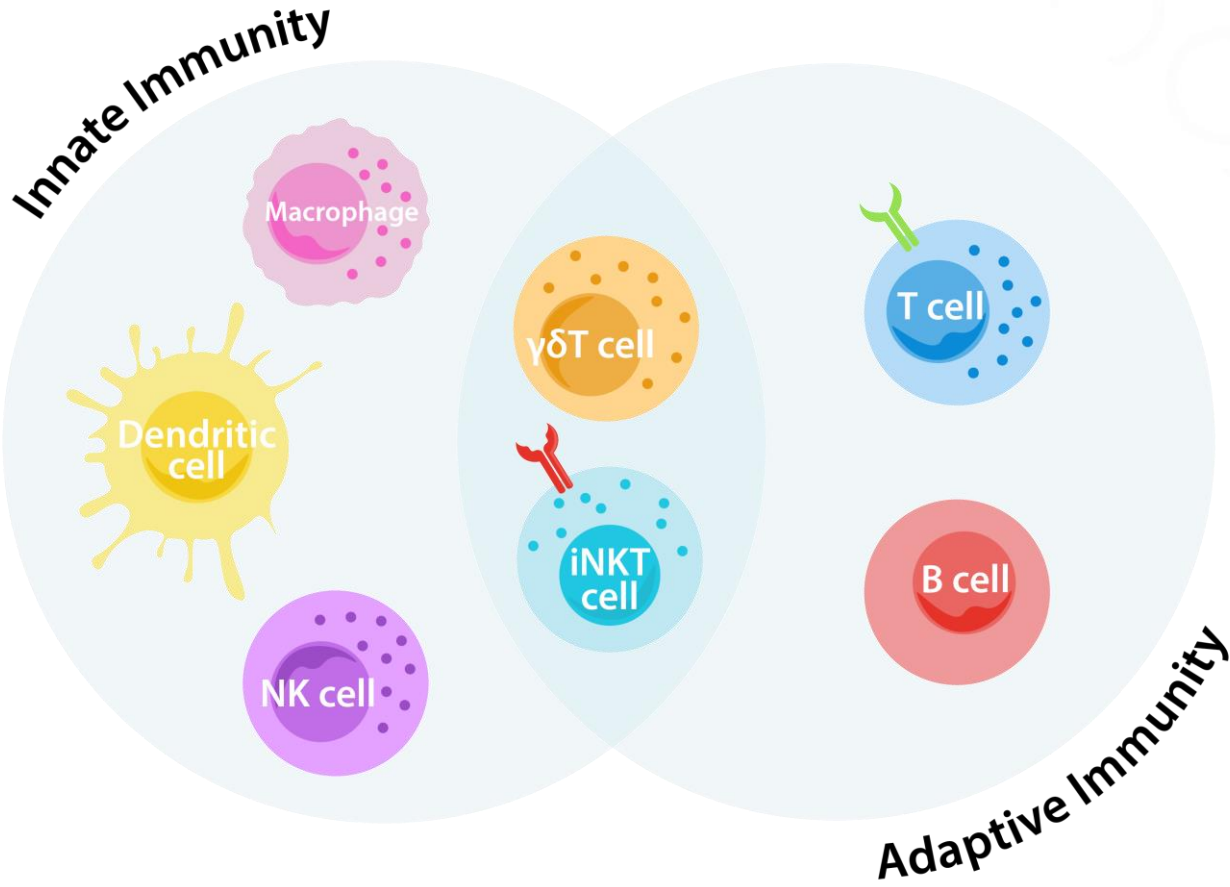


Autologous CAR-T 4-6 weeks



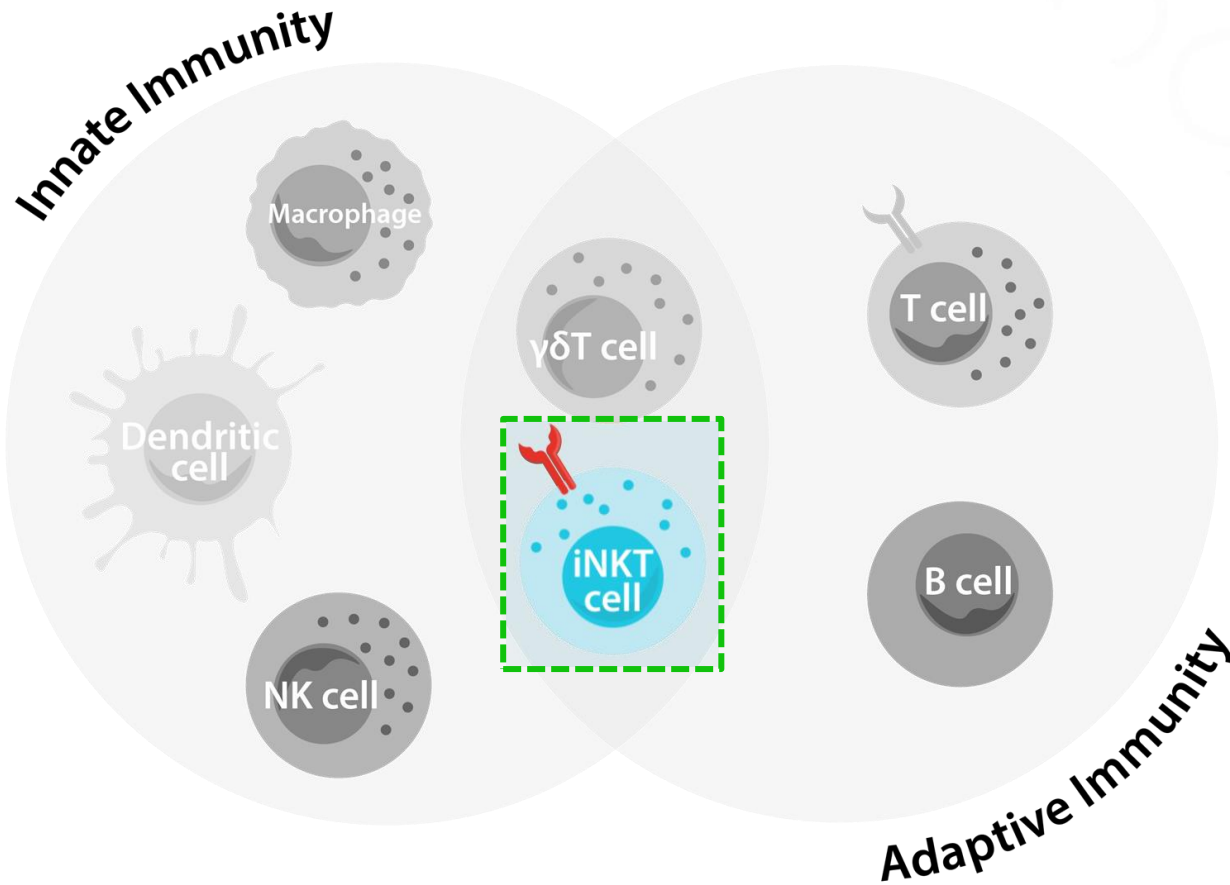
# Introducing invariant Natural Killer T (iNKT) Cells

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# iNKT Cells Represent a Next-Gen Cell Therapy

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## Front line of the human immune system

- Bridge innate and adaptive immune responses
- Contain both T cell and NK cell killing mechanisms
- Naturally target and kill cancers that express CD1d

## Strong safety profile

- They do not cause graft versus host disease (GVHD)

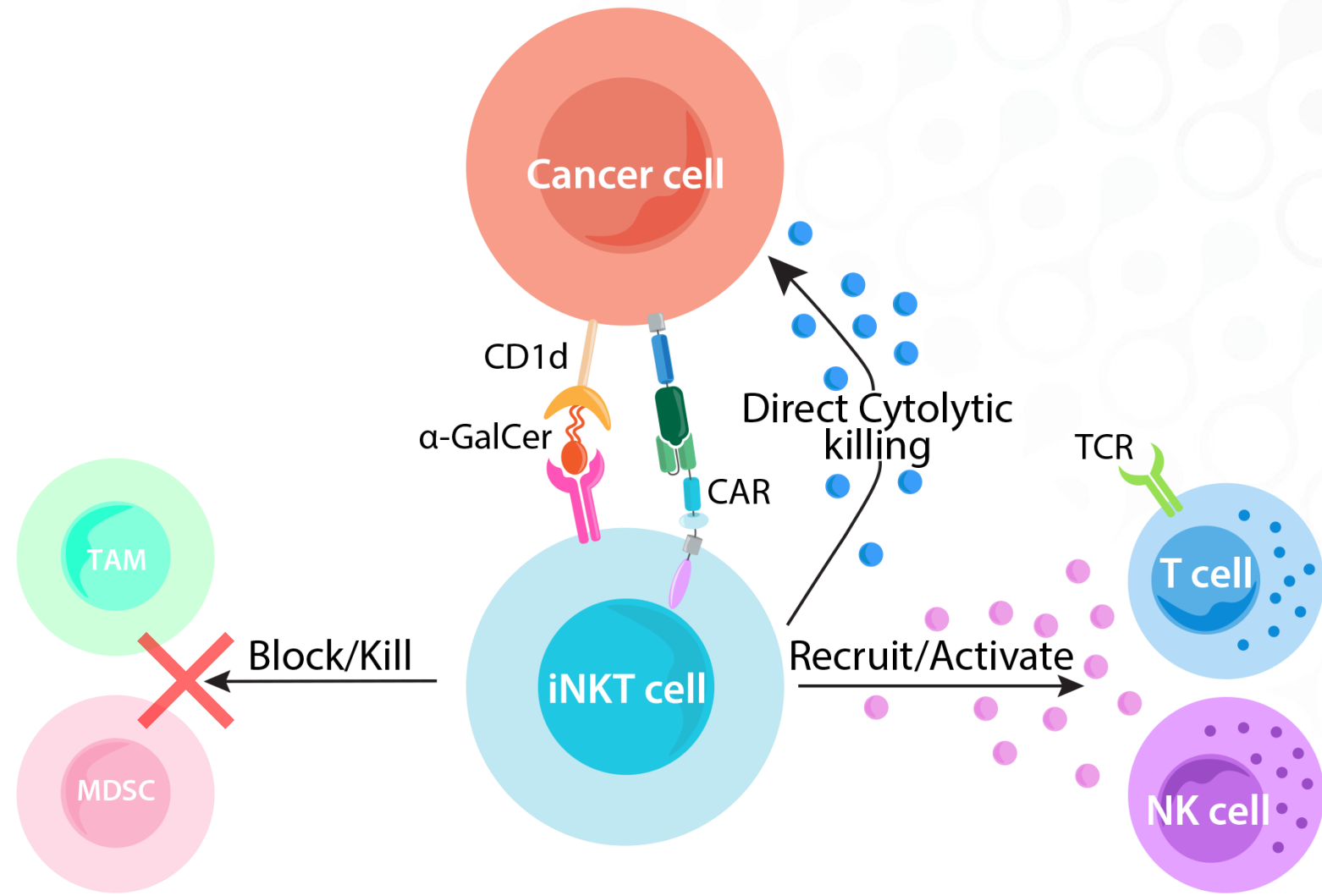
## Multiple anti-cancer properties

- Shape the tumour microenvironment by blocking/killing pro tumour cells (TAMs/MDSCs)
- Infiltrate tumours and secrete signaling molecules to activate other immune cells to kill tumour cells

TAM – Tumour associated macrophage  
MDSC – myeloid derived suppressor cell

# CAR-iNKT Cells Have Multiple Ways to Kill Cancer Cells

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TAM = Tumour Associated Macrophage; MDSC = Myeloid Derived Suppressor Cell; CAR = Chimeric Antigen Receptor; NK = Natural Killer

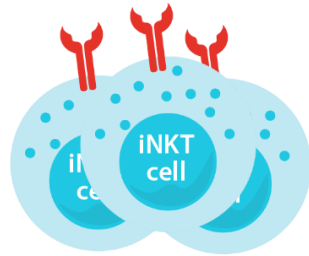
# CAR-iNKT Cell Therapy Production Advantages

## MANUFACTURING

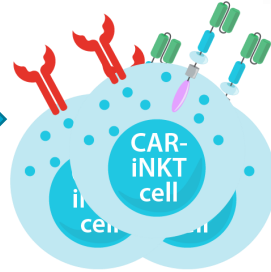
Collect Healthy Donor Blood



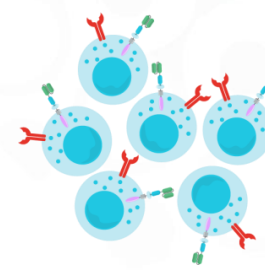
Isolate iNKT cells



Engineer iNKT cells to produce a CAR



Expand to grow billions of CAR-iNKT cells



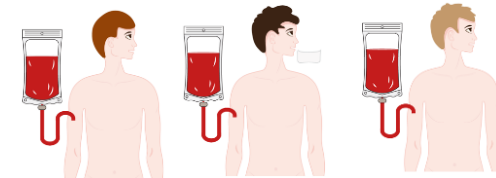
Vial and freeze CAR-iNKT cells



Thaw CAR-iNKT cells



Dose eligible patients



TREATMENT

## Off-the-shelf Manufacturing Advantages

1. Healthier starting material
  - Potentially better efficacy
2. Scalable manufacturing with reduced costs
  - Reach more patients
3. Faster access to treatment
  - Improved outcomes for aggressive cancers
4. Removes risk of manufacturing run failure

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# CAR19-iNKT (**ALA-101**)

A next generation **off-the-shelf** cell therapy for  
CD19 expressing cancers





# ALA-101: Targeting CD19-expressing Blood Cancers

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## Incidence



- CD19 is commonly expressed on B cell blood cells, including:
- **B cell Non-Hodgkin's Lymphomas**  
Annual incidence of ~65,000 in the US<sup>1</sup> and ~95,000 in Europe<sup>2</sup>
- More than 60% of patients do not achieve long-term remission with first-line approved therapies
- **B cell Leukaemias**  
Annual incidence of ~23,000 in the US (~5,500 deaths)<sup>1</sup>

## Current Treatments



- Four approved autologous CAR-T products target CD19
- **Autologous CAR-T recently elevated to 2<sup>nd</sup>-line therapy**
- 6-month complete response rates for auto-CAR-T in relapsed and refractory DLBCL is only 30-35%
- Substantial safety risk with high rates of CRS, ICANS and infection
- **Significant unmet need remains**

## ALA-101 solution



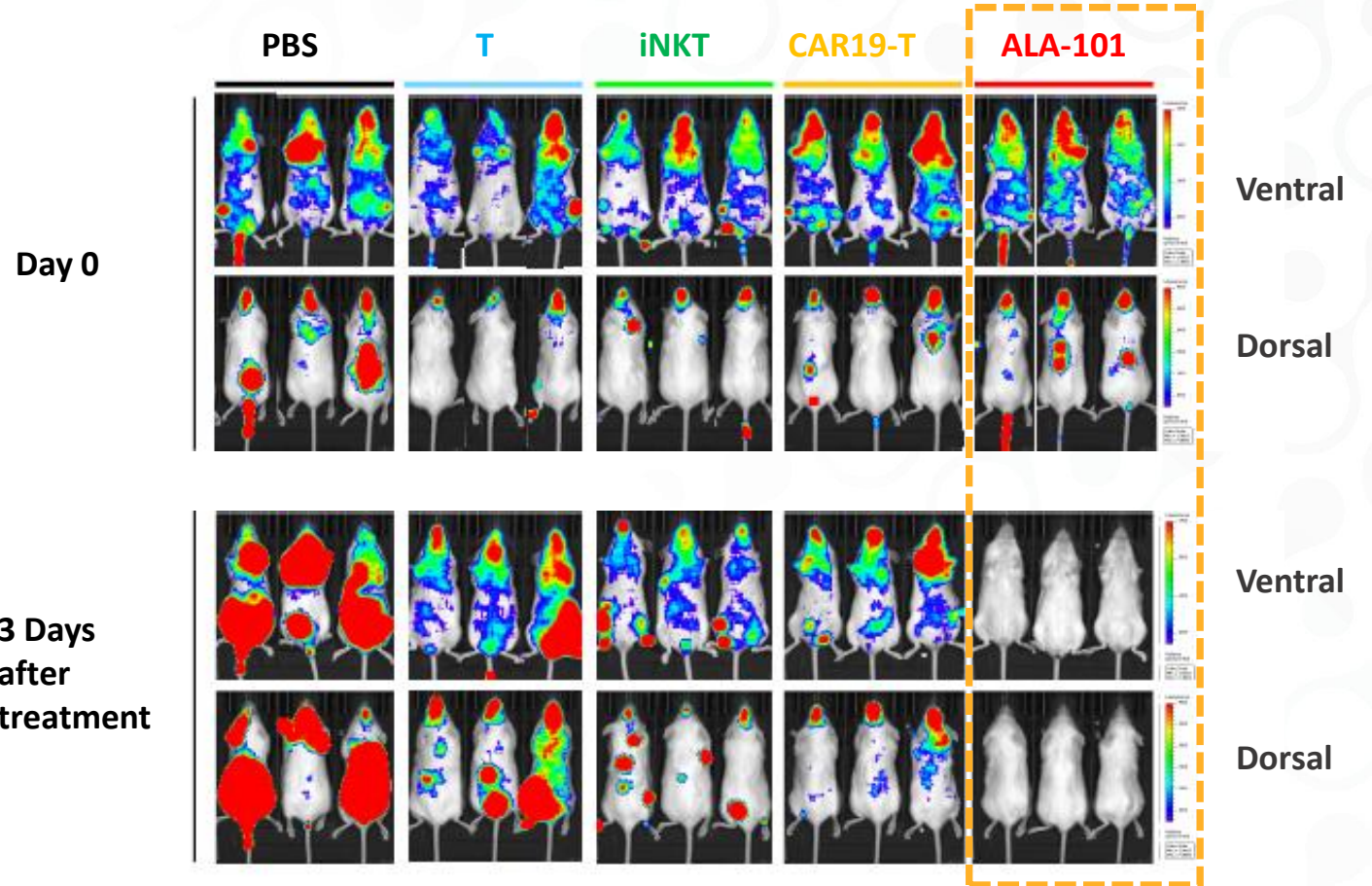
- ALA-101 is an off-the-shelf iNKT cell therapy that targets CD19-expressing cancer cells
- **ALA-101 is an attractive potential treatment for B cell Lymphomas and Leukaemias**
- Phase I clinical trial in Non-Hodgkin's lymphoma expected to commence in 2024

NHL = Non-Hodgkin's Lymphoma; DLBCL = Diffuse Large B Cell Lymphoma; CRS = Cytokine Release Syndrome; ICANS = Immune Effector Cell Associated Neurotoxicity Syndrome  
1. American Cancer Society, Cancer Facts and Figures 2023, 2. IHE, Comparator Report on Cancer in Europe 2019, 3. <https://www.targetedonc.com/view/epidemiology-in-b-cell-malignancies>

# ALA-101: Enhanced Tumour Killing *In Vivo*

## ALA-101 rapidly eradicates tumour cells in mice

- Tumour cells expressing CD19 and CD1d were intravenously delivered into mice
- Mice were treated with:
  - PBS (saline)
  - Unmodified T cells (T)
  - Unmodified iNKT cells (iNKT)
  - CAR19-T cells
  - ALA-101
- After three days, ALA-101 resulted in significant regression of tumour cells
- In all other treatments, we observed strong tumour cell persistence
- ALA-101 displays swift action

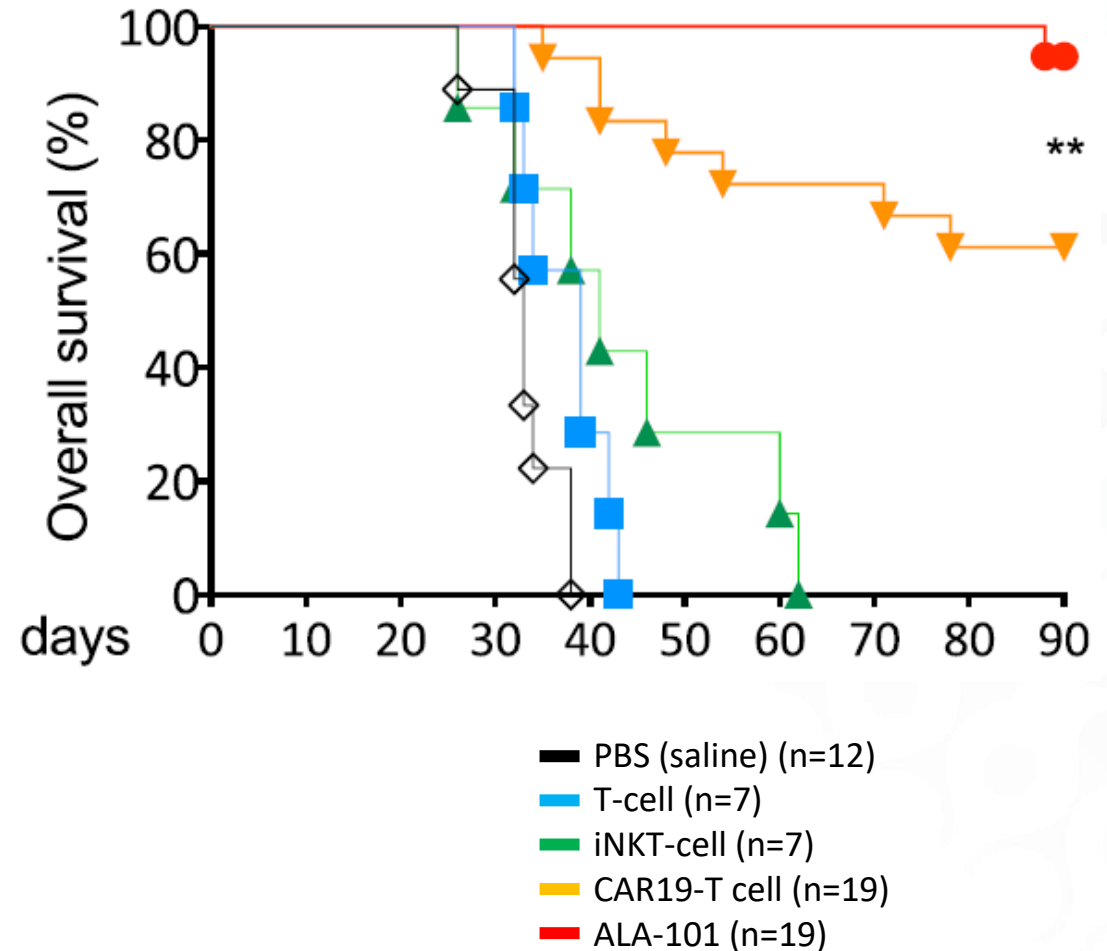


Rotolo *et al.*, Cancer Cell (2018)

# ALA-101: Next Generation Cell Therapy

## ALA-101 significantly increased survival in mice versus treatment with CAR19-T cells

- Tumour cells expressing CD19 and CD1d were intravenously delivered into mice
- Mice were treated with:
  - PBS (saline)
  - Unmodified T cells (T)
  - Unmodified iNKT cells (iNKT)
  - CAR19-T cells
  - ALA-101
- After 90 days, only mice treated with CAR19-T cells or ALA-101 remained alive
- 1.5x more mice treated with ALA-101 remained alive after 90 days relative to CAR19-T cells
- **ALA-101 has the potential to be an effective, off-the-shelf cell therapy for the treatment of CD19-expressing cancers**

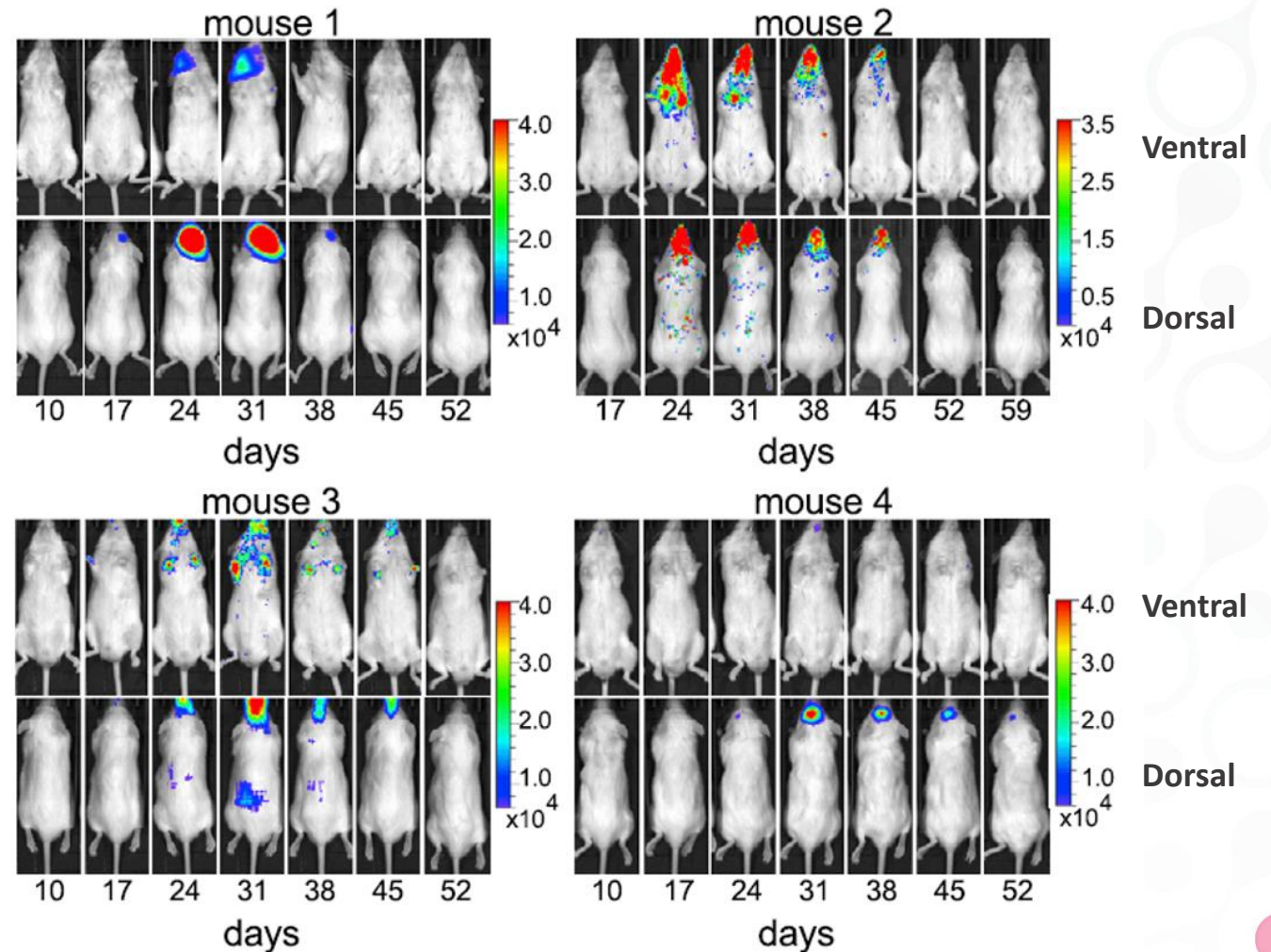


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# ALA-101: Spontaneous Secondary Remission

## ALA-101 activity may persist to eradicate tumour cells following relapse

- Four mice treated with ALA-101 had the cancer return to the brain
- In all four mice, the cancer was eliminated a second time with no additional dosing
- This provides evidence that CAR19-iNKT cells can survive and continue to protect against cancer cells *in vivo*
- Potential to use ALA-101 to treat central nervous system lymphoma or brain metastases



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

# ALA-101 Data Confirms Activity and Off-the-shelf Capability

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- Arovella's proprietary manufacturing process facilitates the production of large numbers of potent CAR-iNKT cells
  - *Essential to produce multiple doses from a single batch and address the manufacturing costs and logistical challenges of current personalised therapies*



- Arovella has produced ALA-101 using a lentiviral vector system with a proven safety profile in preparation for the manufacture of clinical material



- ALA-101 demonstrated significant cancer killing and significantly extended lifespan in an aggressive model of human Leukemia (B-Cell Acute Lymphoblastic; B-ALL)
  - *Confirming the potential of ALA-101 as an effective treatment for CD19+ leukemias and lymphomas*

Arovella continues to progress ALA-101 towards first-in-human clinical trials

# iNKT Cells to Target Solid Tumours

Arovella's strategy to target and kill solid tumours – 90% of newly diagnosed cancer cases<sup>1</sup>

1. <https://www.cancer.gov/types/common-cancers>

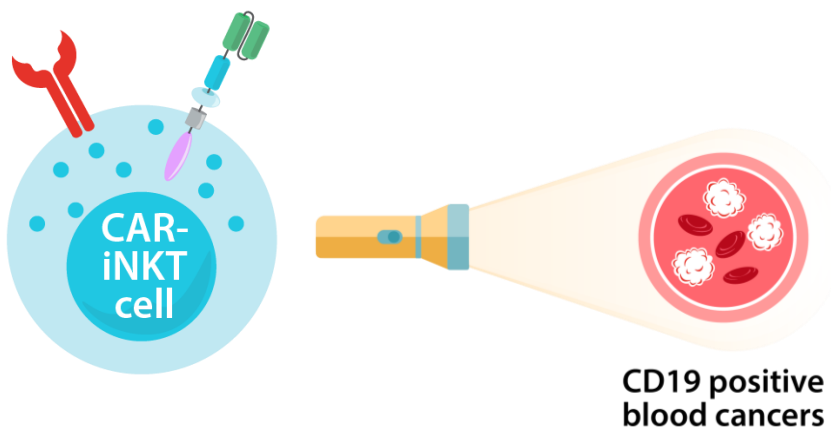


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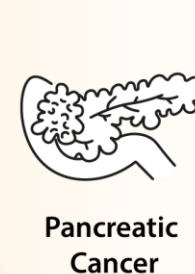
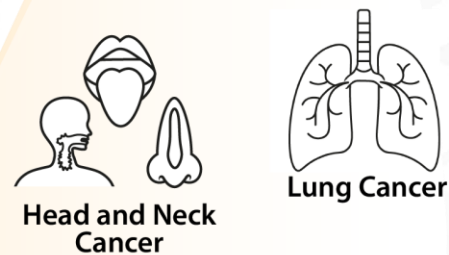
# iNKT Cell Platform to Target Solid Tumours

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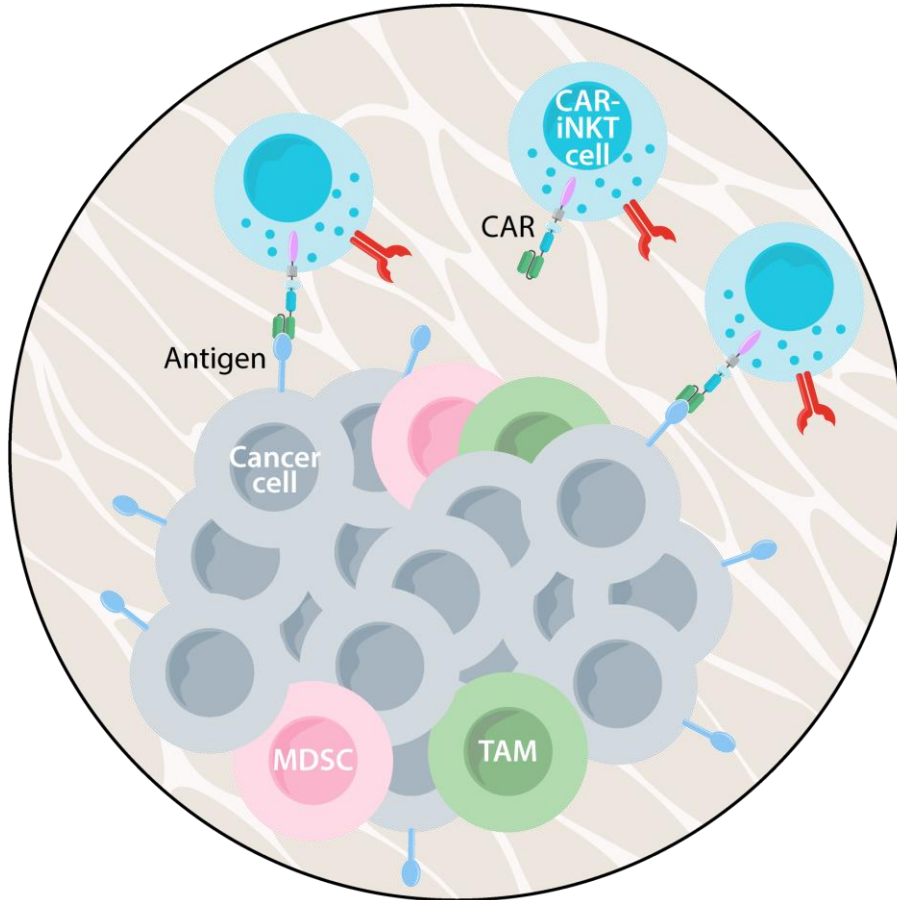
- We expect ALA-101 to be effective against blood cancers that naturally express CD19

ALA is actively building the iNKT cell platform to expand into treatment of solid tumours

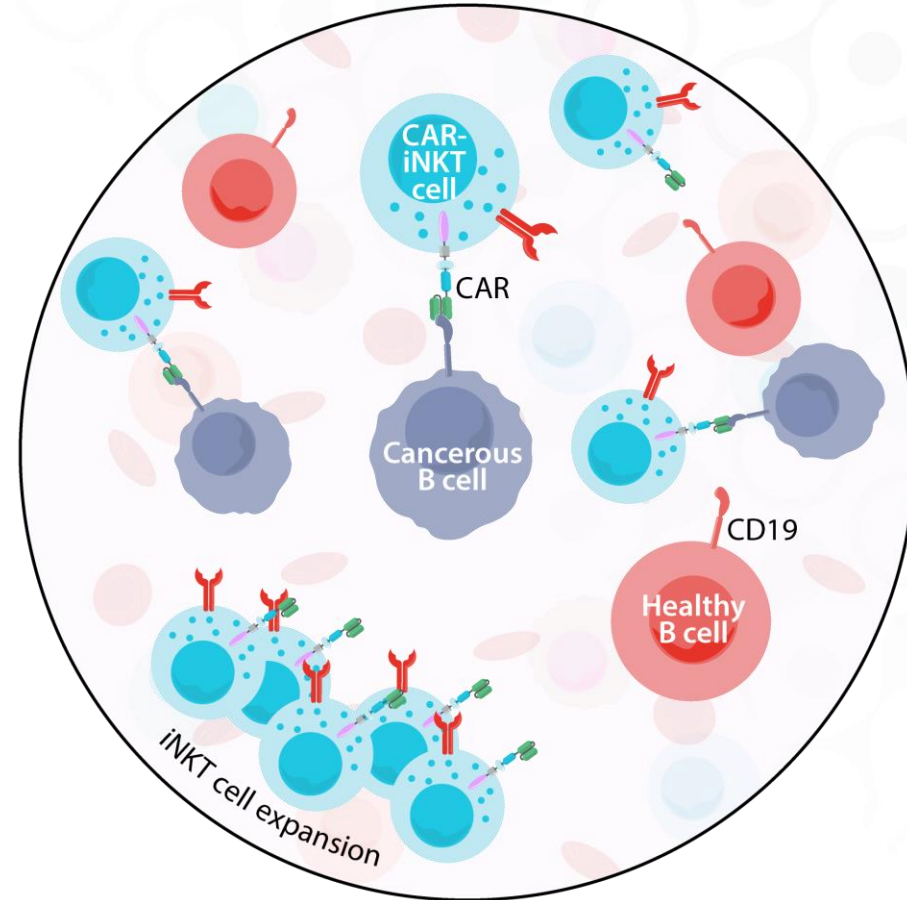


# Solid Tumours Pose Challenges to CAR-T

- Access to tumour
- Antigen specificity and uniformity
- Tumour microenvironment contains pro-tumour cells



**Solid tumour**



**Blood cancer**

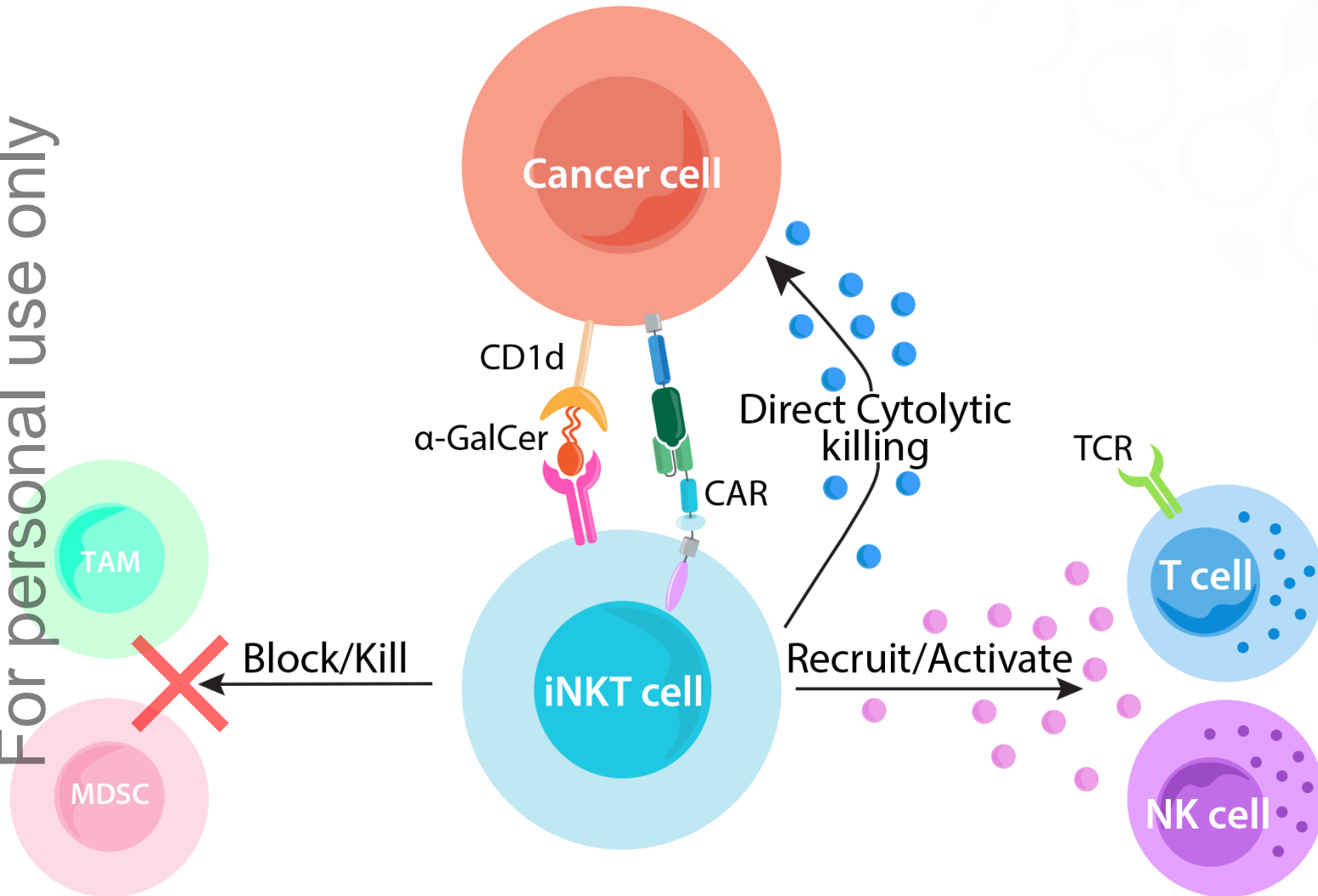
TAM = Tumour Associated Macrophage; MDSC = Myeloid Derived Suppressor Cell; CAR = Chimeric Antigen Receptor

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# CAR-iNKT Cells Have Multiple Ways to Kill Solid Tumours

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**Modification of the tumour microenvironment will be essential for success in solid tumours**

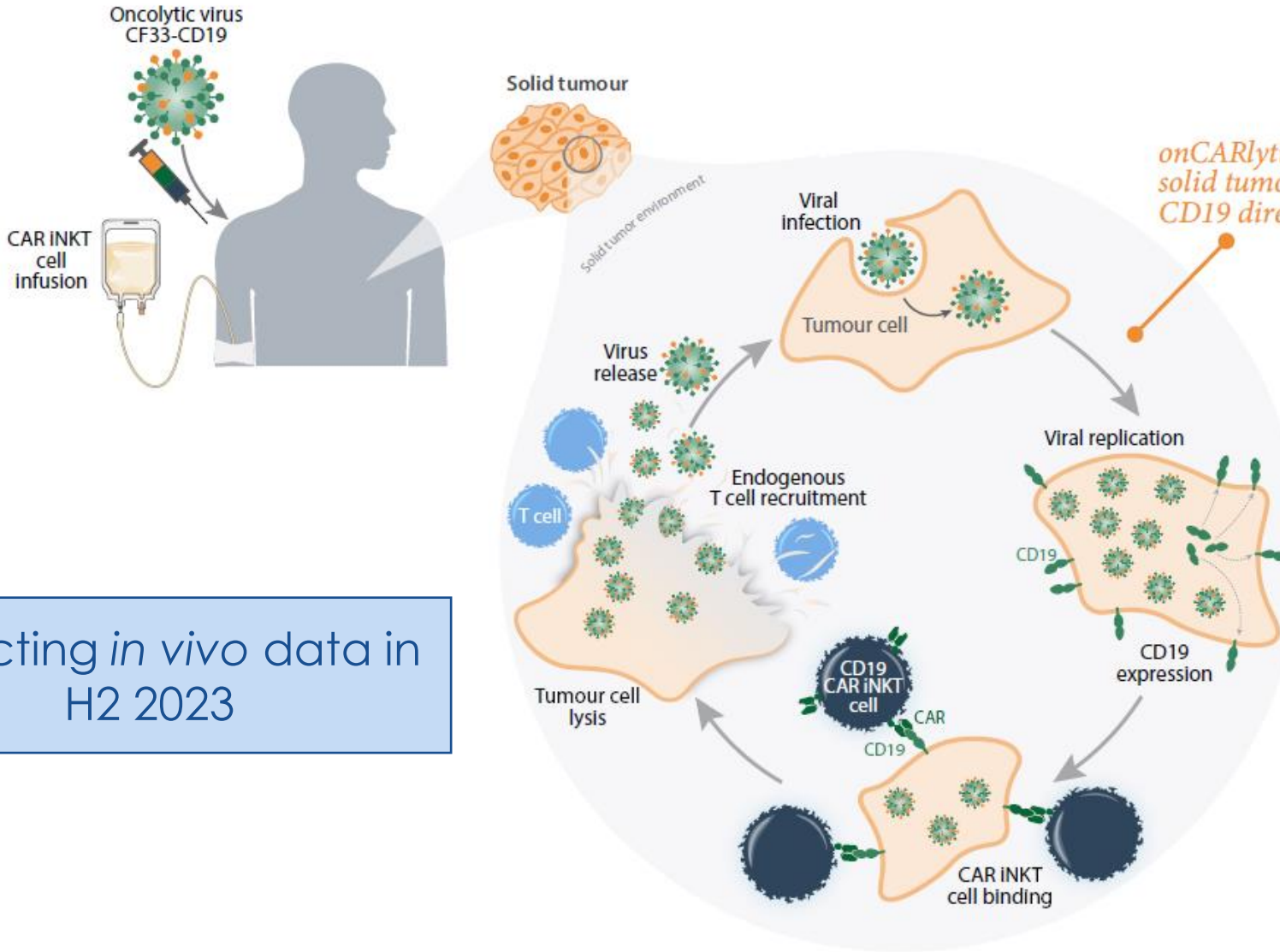
- iNKT cells:
  - Home to tissues and infiltrate tumours<sup>1,2</sup>
  - Block or kills cells that promote tumour growth<sup>3</sup>
  - Recruit other immune cells that can also kill tumour cells<sup>4,5</sup>

TAM = Tumour Associated Macrophage; MDSC = Myeloid Derived Suppressor Cell; CAR = Chimeric Antigen Receptor; NK = Natural Killer

1. Crosby and Kronenberg 2018 Nat Rev Immuno - 10.1038/s41577-018-0034-2; 2. Heczey et al., 2020 Nature Medicine - 10.1038/s41591-020-1074-2; 3. Zhu et al., 2019 Cell Stem Cell - 10.1016/j.stem.2019.08.004; 4. Gottschalk et al., 2015 Front Immunol - 10.3389/fimmu.2015.00379; 5. Carnaud et al 1996 J Immunol - 10.4049/jimmunol.163.9.4647

# Strategy 1: ALA-101 & Imugene's onCARlytics

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Expecting *in vivo* data in H2 2023

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.

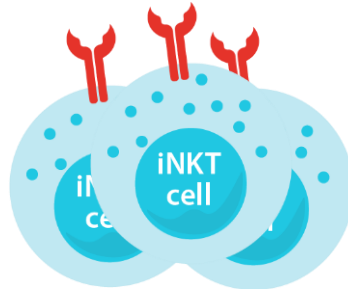
# Strategy 2: Add Additional CARs for Novel Targets

## MANUFACTURING

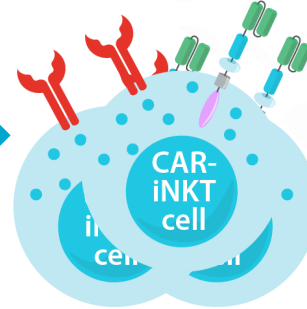
Collect Healthy Donor Blood



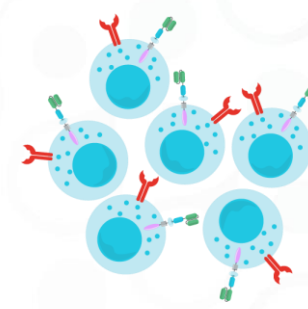
Isolate iNKT cells



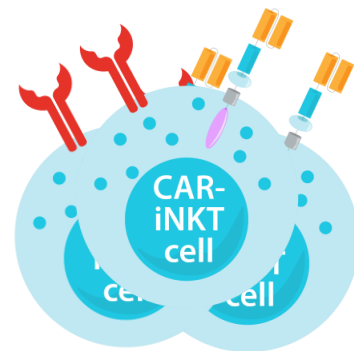
Engineer iNKT cells to produce a CAR



Expand to grow billions of CAR-iNKT cells



Vial and freeze CAR-iNKT cells



**CARs targeting novel antigens specific for solid tumours can be incorporated into iNKT cells using the same manufacturing process**

- New lentiviral vector is generated for each new CAR

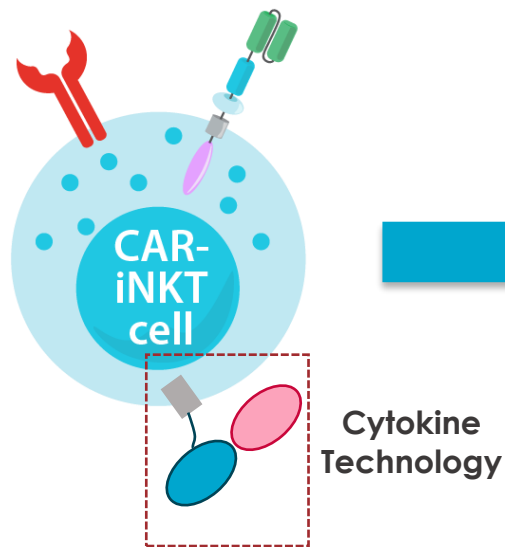
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# Strategy 3: “Armouring” iNKT cells

- Adding specialised cytokines to iNKT cells can increase persistence of the cells (how long they last in the body) and increase anti-tumour activity

Exclusive Option with University of North Carolina for cytokine technology developed by Prof. Gianpietro Dotti

Cytokine technology is incorporated into the lentiviral vector and does not require any change to the manufacturing process

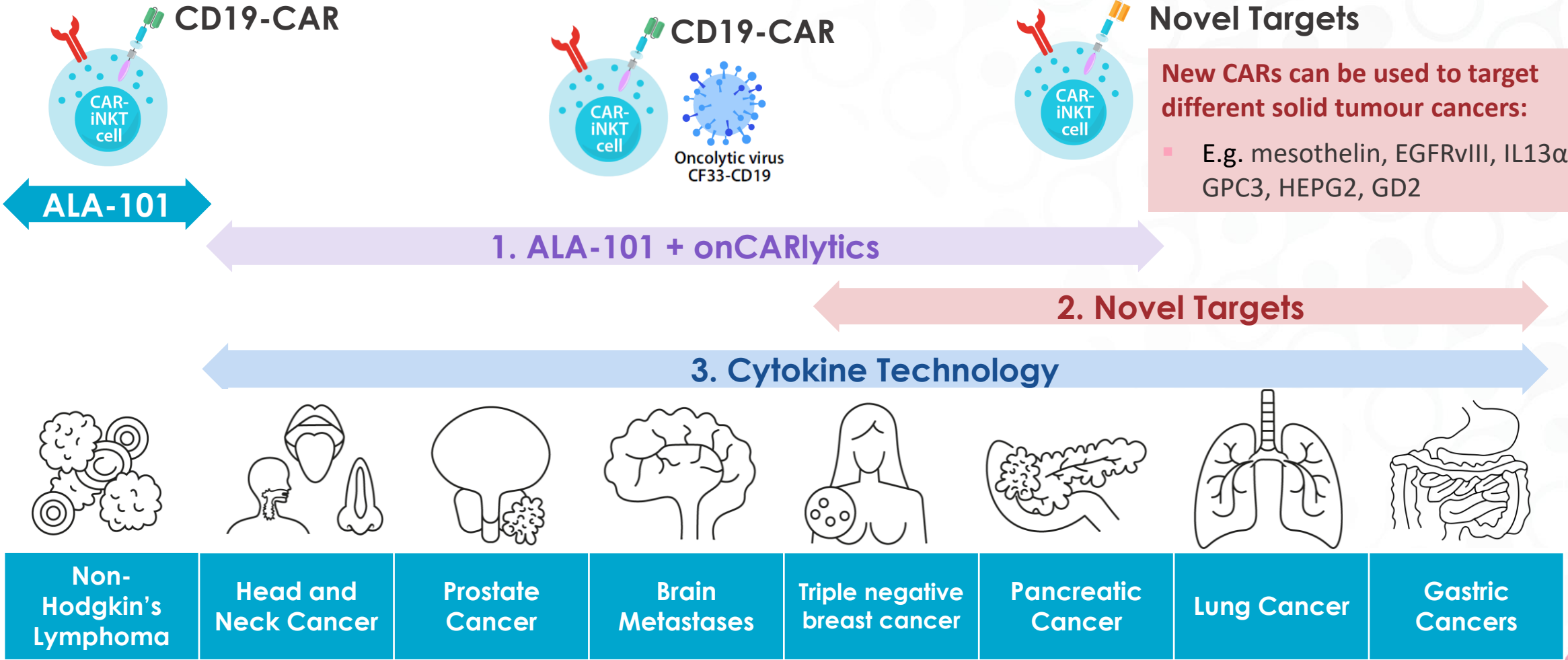


## iNKT cells incorporating the cytokine technology:

- **Expand more and survive for longer** than CAR-iNKT cells lacking the cytokine
  - ✓ 10-fold more circulating CAR-iNKT cells 4 weeks after treatment in a mouse model
- Have **superior anti-tumour activity** than CAR-iNKT cells lacking the cytokine
  - ✓ >75% of mice treated with CAR-iNKT cells containing the cytokine were alive at 61 days vs mice treated with CAR-iNKT cells lacking cytokine which all died within 49 days

# Arovella's Expanding Pipeline

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**New CARs can be used to target different solid tumour cancers:**

- E.g. mesothelin, EGFRvIII, IL13 $\alpha$ 32, GPC3, HEPG2, GD2

# Milestones for FY2024

- Arovella expects to advance ALA-101 into a phase I first-in-human clinical trial during 2024
  - Non-Hodgkin’s lymphoma patients, dose escalation, primary end point – DLTs, secondary endpoint – efficacy signals
- Arovella also continues to assess novel complimentary technologies to expand the use of the iNKT platform to treat solid tumours

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June  
2023

December  
2023

June  
2024

ALA-101

iNKT Cell  
Therapy  
Platform

- Complete process optimisation and scale-up in preparation for cGMP manufacture
  - Complete production of cGMP lentiviral vector
  - Finalise clinical trial plan for phase I study
- 
- Confirm the activity of CAR19-iNKT cells when combined with Imugene’s onCARlytics to target solid tumours in animal model
  - Analyse additional CARs to add to the platform
  - In-licence cytokine technology currently under option (pending positive data)

- Complete cGMP manufacture for phase I clinical trials
  - Complete preparatory activities for phase I study, including submission of regulatory dossier.
- 
- Initiate proof-of-concept testing for novel CARs and/or cytokine technology to expand iNKT platform for treatment of solid tumours

# Arovella Has a Strong Leadership Team

## LEADERSHIP



Dr. Michael Baker  
CEO & MANAGING DIRECTOR



Dr. Nicole van der Weerden  
CHIEF OPERATING OFFICER



Dr. Mini Bharathan  
SENIOR VP DEVELOPMENT &  
TRANSLATIONAL MEDICINE



Dr. Robson Dossa  
VP MANUFACTURING & QUALITY



Dr. Simon Poon  
DIRECTOR PROJECT  
MANAGEMENT



## BOARD OF DIRECTORS



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Mr. David Simmonds  
DIRECTOR



# Summary – Arovella’s CAR-iNKT Cell Platform

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**A novel allogeneic CAR-iNKT cell platform**  
iNKT cells serve as an excellent platform to develop allogeneic, or “off-the-shelf”, cell therapies to treat cancer



**Lead product progressing to clinical trials**  
ALA-101, a potential treatment for CD19-expressing blood cancers, is being progressed to phase I clinical trials, expected to commence in 2024



**CAR-iNKT cells have multiple anticancer properties**  
CAR-iNKT cells are dual-targeting with enhanced cancer killing ability



**iNKT cells have properties that may assist targeting solid tumours**  
Arovella continues to expand the iNKT cell platform to potentially treat solid tumours



**Improved manufacturing logistics**  
Allogeneic CAR-iNKT cells will significantly improve logistics and increase patient access



**Arovella is poised for growth**  
Arovella is developing a cutting-edge CAR-iNKT cell therapy platform, with an expanding pipeline and a strong leadership team



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# Thank You

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