CURE ASTHMA SYMPOSIUM 2025

Integrated Strategic & Scientific Report

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Asthma Australia

ASTHMA AUSTRALIA

CURE ASTHMA

CURE Asthma is the name of the initiative driven by Asthma Australia in close partnership with Professor Gary Anderson at the University of Melbourne which aims to generate a high performing national network of clinicians, researchers, consumers and other stakeholders to commit to coordinated effort to find cures for the major types of asthma.

Finding cures in asthma has not been a focus of major respiratory research efforts recently, where the attention has been on further disease control discoveries. CURE Asthma deliberately and strategically aims to agitate and influence this mindset and inspire this generation and those that follow to think bigger – as the Lancet Commission on Asthma called for: "We [also] call for no more "me too" medicines for asthma", rather, a targeted and strategic focus on true disease modification, enduring remission and cure.

Decades of high-quality disease mechanism, epidemiologic and clinical research, much delivered by Australian leaders, provides abundant foundations from which to build. Recent remission outcomes experienced by a subset of people with asthma on targeted therapies open the window to explore what eliminating disease means at a biological and experiential level. Contemporary computational biology and bioinformatics – including 'digital twins' - methods applied to Australia's world leading data cohorts, and next generation, AI-enabled precision drug development technologies, all give us real hope that this ambitious goal – finding cures in asthma – can truly be realised.

ACKNOWLEDGEMENT OF COUNTRY

Asthma Australia acknowledges the Traditional Custodians of the lands on which we work and pay our respect to Elders past and present, including the Aboriginal and Torres Strait Islander peoples.

We recognise and respect the holistic concept of health for First Nations Peoples which embraces physical, social, emotional, cultural, and spiritual wellbeing, for both the individual and the community, and which encompasses the importance of connection to land, water, culture, spirituality and ancestry.

We acknowledge and uphold the intrinsic connections and continuing relationships Aboriginal and Torres Strait Islander peoples have to Country and value the cultural knowledge, strength and resilience in our work to improve the lives of people with asthma.

1. Executive Summary

The CURE Asthma Symposium 2025 marked a pivotal moment in Australia's national effort to move asthma from a condition managed indefinitely to one that can be prevented, reversed, and ultimately cured. Over two days, Asthma Australia convened 115 current and emerging leaders spanning clinical medicine, immunology, epidemiology, data science, bioinformatics, advanced analytics, health policy, commercialisation, consumer advocacy, and community leadership, in partnership with the University of Melbourne's Bio21 Institute. The purpose of the symposium was to refine the scientific roadmap and co-design the strategic frameworks required to deliver the CURE Asthma ambition at a national scale.

Across plenary sessions, workshops, and structured "plan for success" discussions, participants demonstrated strong alignment around both the scientific plausibility of curing asthma and the practical steps required to make this ambition achievable. The level of engagement and shared purpose throughout the symposium provided confidence that CURE Asthma can be successfully delivered through disciplined coordination and sustained national collaboration.

Strategic priorities and enablers

A central focus of the symposium was defining the foundational structures needed to support a national mission. Key priorities emerging from the "plan for success" discussions include:

- Clarifying governance and leadership arrangements, including multi-institutional collaboration frameworks, confidentiality provisions, and data-sharing agreements
- Establishing and administering the national CURE Asthma mission on an ongoing basis
- Developing a CURE Asthma strategic plan with a clear vision, goals, milestones, and underpinning values and principles, supported by:
    - Defined structure and leadership roles
    - Sustainable resourcing and funding pathways
    - Communication and advocacy strategies
    - A flagship grant pipeline and enabling infrastructure
- Embedding consumer centricity across strategy, advocacy, communication, and translation
- Supporting inclusive national collaboration, including structured engagement, regular communications, and deliberate opportunities to enable, include, and empower early- and mid-career researchers

With these foundations in place and made accessible to a growing national network of collaborators, participants agreed that the initiative would be well positioned to address the core scientific challenge posed on Day 2 of the symposium.

Scientific focus and research questions

Day 2 centred on the integration of **clinical medicine and epidemiology** with **advanced analytics, bioinformatics, and artificial intelligence** to address the major questions within the CURE Asthma roadmap. These questions focus on three interrelated domains:

- **Predict and prevent**: understanding molecular mechanisms of bacterial and viral pathogenesis, immune modulation in early life, and trajectories of lung growth that lead to persistent asthma
- **Restore and repair**: identifying biomarkers of airway repair and restoration, and therapies capable of inducing remission or preventing relapse

- **Precision and discovery**: applying machine learning and explainable AI to longitudinal data and biological samples to stratify patients, identify curative pathways, and enable precision treatment

Participants highlighted the importance of international collaboration, shared cohorts, and initiatives such as the FUTURE study to accelerate discovery and validation.

The central conclusion of the symposium was clear: curing asthma is scientifically plausible, strategically feasible, and nationally achievable — provided it is pursued with coordination, discipline, and the full breadth of contemporary scientific capability.

This report synthesises the symposium's scientific, technological, strategic, commercial, government, philanthropic, and community perspectives into an integrated narrative to guide Asthma Australia, partners, funders, and research leaders through the next phase of the CURE Asthma initiative.

2. Why CURE, why now?

Asthma remains one of Australia's most burdensome chronic health conditions, disproportionately affecting children, vulnerable communities, and First Nations peoples. Despite decades of progress, the fundamental disease mechanisms driving onset, persistence, and remission remain incompletely understood — constraining innovation to symptom control rather than targeted disease modification.

But recent scientific and technological developments have opened new frontiers:

- Longitudinal cohort depth – CURE ADIRE - spanning 70+ years
- Advanced multiomics platforms capable of deconvoluting molecular mechanisms of disease
- AI and generative modelling enabling digital twins and therapeutic simulations
- Clinical frameworks for remission reshaping how chronic airway disease can be conceptualized
- Machine-learning driven biomarker discovery for early prediction, precision stratification and personalised treatment.

The CURE Asthma Roadmap integrates these capabilities into a coherent national mission.

3. CURE ADIRE: Australia's Asthma Data Integration Engine

3.1 Overview

CURE ADIRE (Asthma Data Integration Research Engine) promises to work as a major scientific backbone of the CURE Asthma initiative. It will be a federated national platform integrating over 75,000 participants' data and biospecimens across the life course, from prenatal to the 6th generation in adulthood.

3.2 What CURE ADIRE will enable

- Harmonised molecular, clinical, environmental & immunological datasets
- Multiomics level discovery at unprecedented scale
- Discovery of precision biomarkers of disease onset and mechanistic transitions
- Precision stratification to target therapies effectively
- Digital-twin trajectory modelling
- Synthetic cohort generation for therapeutic hypothesis testing.

3.3 Work Packages

1. **Governance & Initiation**

   Policies, procedures, committees, international partnerships, and ethical frameworks.

2. **Cohort Harmonisation**
   Aligning decades of data across participating cohorts

3. **Informatics**
   Federated cloud infrastructure, secure data portals, interoperability

4. **Advanced Analytics & AI**
   NLP extraction, structured ML pipelines, deep-learning modelling

5. **Capacity & Communication**
   Training, talent development, stakeholder engagement.

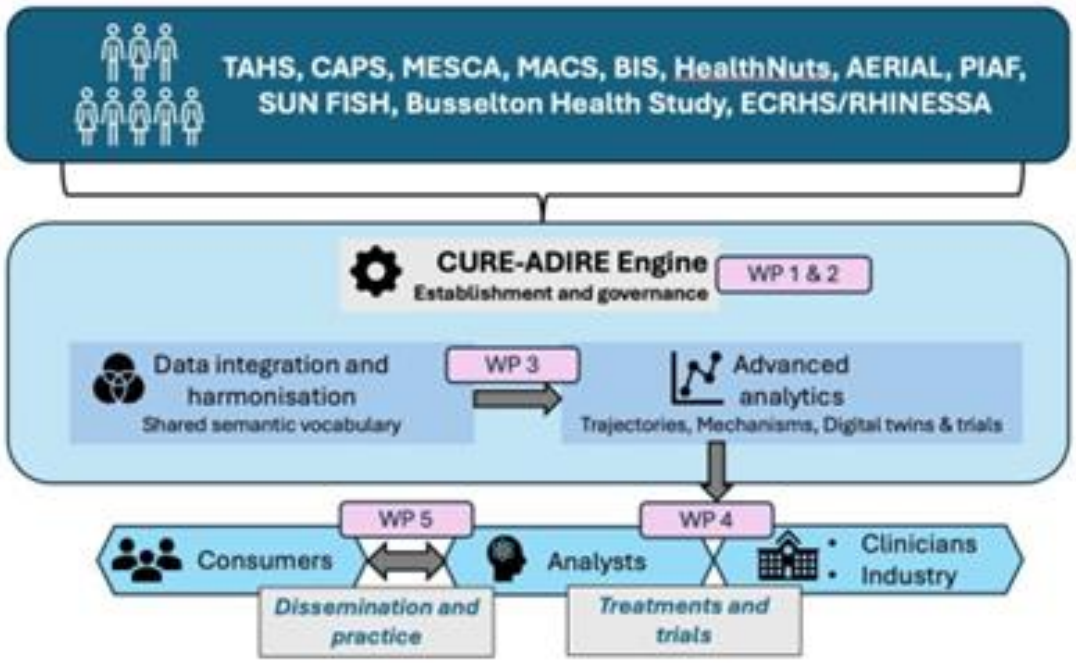

Figure 1: STRATEGIC FRAMEWORK OF CURE ADIRE. THE COHORTS ARE HIGHLIGHTED IN THE TOP PANEL, WHO WILL COLLABORATE TO INTEGRATE, HARMONISE AND DESIGN ADVANCED DATA ANALYTICS (WP1&2), WHICH WILL BE ACCESSED FOR SPECIFIC ANALYSIS TO FURTHER CURE GOALS (WP4&5)

4. Scientific Domain 1: Early – Life Virology & Immune Development

4.1 Translational Opportunity

Early childhood viral infections — particularly those involving rhinovirus, RSV, enterovirus, and other members of the Picornaviridae family — are established precursors to persistent asthma, yet **the molecular mechanisms remain poorly mapped.**

CURE seeks to answer:

- Why do some children clear viral infections with no long-term consequences?
- Why do others develop chronic airway inflammation or defective repair?
- What environmental, bacterial, prenatal, and immunological factors modulate this?

4.2 Key Knowledge Gaps

- Viral acquisition patterns in early life
- Interaction with early microbiome development
- Prenatal environmental exposures and epigenetic imprinting
- Host susceptibility markers
- Immune maturation trajectories

4.3 Technologies Accelerating Discovery

- **VirScan / VirCapSeq** for lifetime virome profiling
- **scRNAseq** for immune cell response mapping
- **Epigenomic profiling** for developmental imprinting
- **ML-driven trajectory modelling** to map viral → asthma transition points

4.4 Digital Organoids

There is potential to harness ML models to simulate immune–epithelial interactions at the molecular level, offering a breakthrough in testing therapies that may prevent disease onset.

5. Scientific Domain 1: Precision Remission Science

Evidence and analysis of treatment-induced remission was presented, emphasising the effectiveness of biologics and macrolide antibiotics in achieving this. The impact on the lived experience is profound, and 'life changing' is a phrase commonly used. Simply put, for a subset of people with asthma, they are achieving what Asthma Australia's strategic vision calls for: *To Help People Breathe Better So They Can Live Freely.* 30-40% of people on specialised therapy for difficult-to-treat and severe asthma are achieving this outcome.

Treatment-induced remission is now common among people receiving biologics for severe asthma. Spontaneous remission, though less common, is epidemiologically observed. Understanding the molecular basis of remission may reveal granular insights on pathways to enduring remission and cure.

The future of remission may be one of the paths to CURE, defined by 'complete remission off treatment' (see figure 5 below). Further clinical criteria are proposed to substantiate the definition of CURE, including elimination of disease, normalisation of lung function, and reversal of acquired damage. Such definition will be important to guide innovative CURE trials.

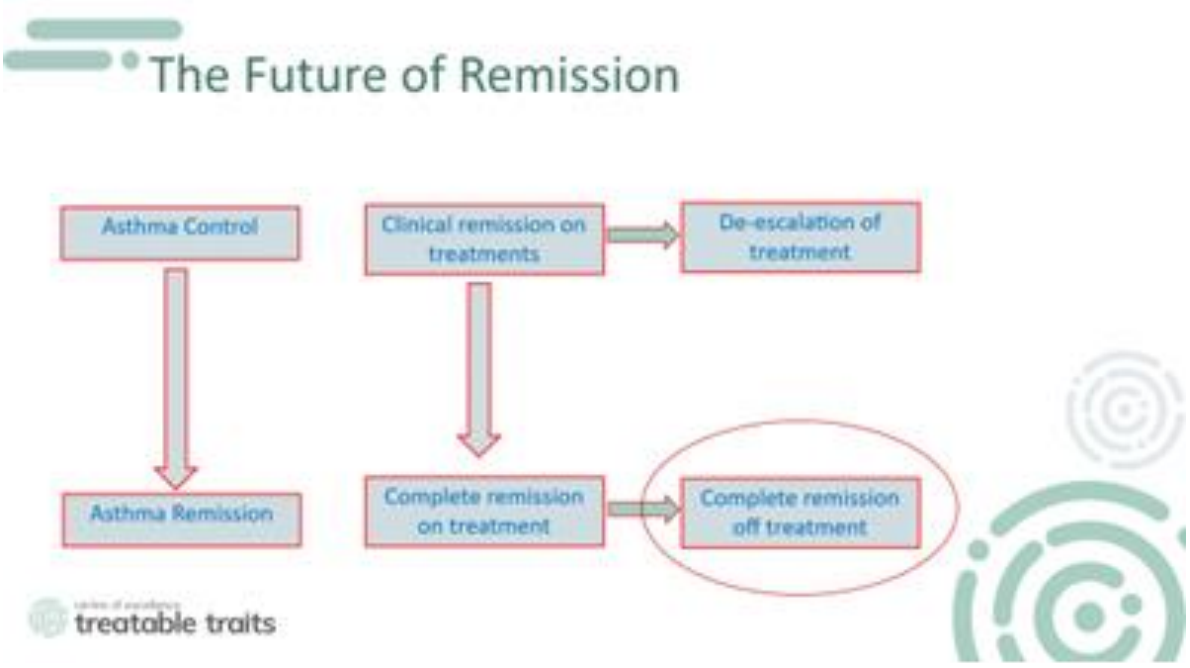

Figure 2: The pathway from remission to cure

5.1 Key Questions

- *What distinguishes people who achieve remission from those who do not?*
- *How close is remission to a "cured" state? How can the CURE ADIRE platform and machine learning help us define biomarkers that reflect complete disease modification and enduring remission>cure?*
- *How do antivirals, immunomodulators, and biologics influence remission? And potential for cure?*

5.2 The FUTURE Study

The FUTURE study is a multi-site precision-biomarker study mapping the molecular determinants of remission and relapse.

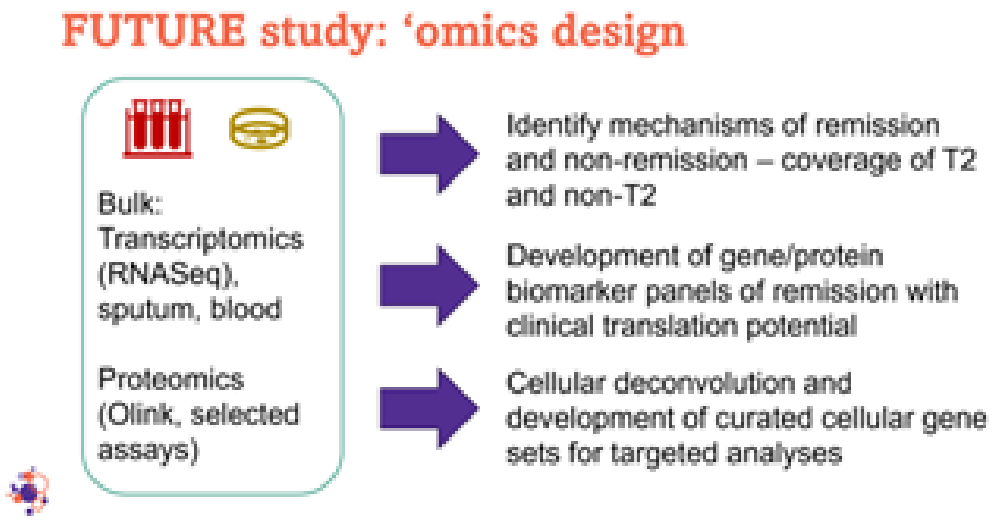

Figure 3: The FUTURE study to further precision in asthma treatment

This work builds on precedents that demonstrate utility of clinically-translatable molecular panels that predict clinical outcomes. Anticipated local and longitudinal validation, application to more mild disease and targeted single-cell 'omic studies will provide important foundations, signals and leads for CURE science.

Interferon responses and their role in explaining failures of biologic treatments via viral exacerbations, as well as the potential of immunomodulators in enhancing interferon responses and reducing exacerbations may be an important line of inquiry for FUTURE. The parsing of the 'asthmas' is agreed as important when considering remission and CURE goals, as it will both tell us more about 'the asthmas', and provide us specific targets to focus on.

6. Implications for the cure asthma research roadmap

6.1 Predict & Prevent (A and B in figure 4 below)

Objective: Intervene early enough to prevent (early) asthma from developing and persisting.

Key Components:

- Early-life biomarkers
- Immune-maturation interventions
- Lung growth trajectory modulation

6.2 Repair & Restore (C and D in figure 4 below)

Objective: Reverse established disease and damage caused by disease

Key Components:

- Remission-inducing therapies
- Tissue repair and regeneration pathways
- Molecular reversal of airway remodeling
- Infection-triggered relapse prevention.

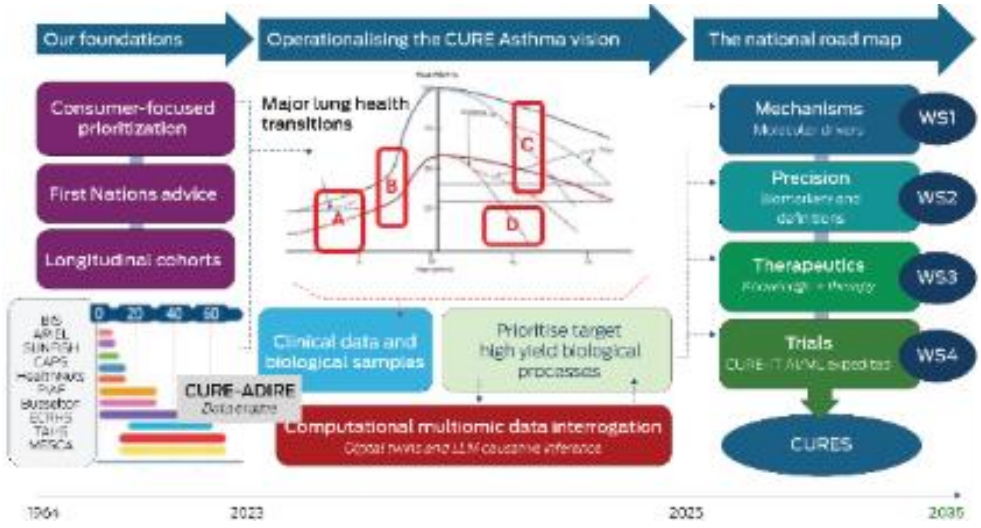

Figure 4: The CURE Asthma Roadmap. Consumer, First Nations and Major cohort assets underpin the molecular discoveries at 4 key transition points across the life cycle. Next generation technology and analytical platforms will enable translation to CURE.

7. Building a National Mission for CURE Asthma

7.1 What JDRF Taught us

Breakthrough T1D's 20-year journey demonstrated:

- Policy makers fund **purpose**, not science
- Communities influence political systems
- Long-term strategic alignment makes big science possible
- Messaging must be unified, consistent, and disciplined
- Successful strategy requires focus, making hard choices, and making and accepting hard choices

7.2 Building and sustaining collaborative network

- Leadership, ownership, coordination and accountability need to be defined
- Leadership should mobilise the right skills and resources to
  - Embed the CURE Asthma entity, building and accounting for a comprehensive strategy
  - Define the vision and values
  - Articulate one unified story

7.3 Policy & Advocacy Approaches

- Reframe asthma from “manageable” to “unacceptable”
- Build electorate-level advocacy anchored in lived experience
- Present a compelling economic case (update Deloitte Hidden Cost of Asthma, 2015)
- Sustain ongoing political engagement across election cycles

7.4 Philanthropy Insights

Major donors respond to:

- Clear mission
- Authenticity
- Tangible outcomes
- Belonging to something transformative

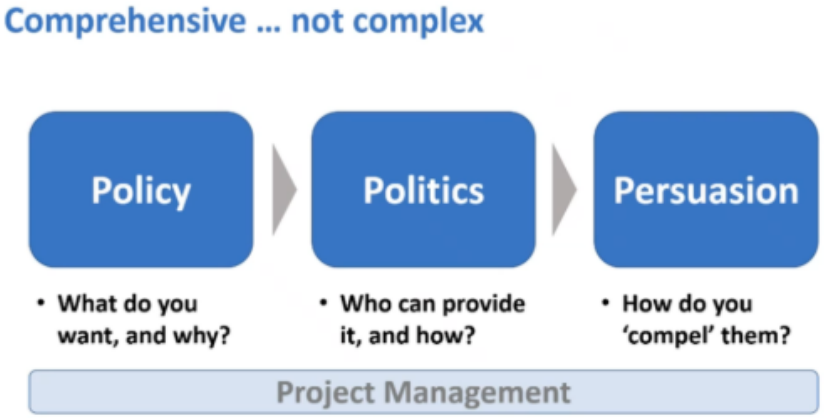

Figure 5: POLITICAL ENGAGEMENT STRATEGIC FRAMEWORK

8. Community Engagement

8.1 Principles

- No tokenism
- Continuous dialogue
- Sustained, sincere long-range approaches are needed for meaningful engagement of First Nations communities
- Meaningful engagement and consumer co-design

8.2 “Community as Co-Investigators”

Consumers should be engaged to help shape:

- priority-setting
- recruitment strategies
- outcome frameworks
- translation pathways.

9. Workforce, Translation & Commercialisation

Key Priorities

- EMCR mobility across labs
- Joint publications and shared infrastructure
- Bioincubators and accelerators for translation
- Streamlined governance & contracting
- Industry–academic alignment
- Mechanisms for safe sharing of IP

10. Consolidation of discussions: building for success

Strategic Intent

CURE Asthma must be positioned as a bold, nationally coordinated mission with a clear end goal. Success depends on a shared strategy that delivers value for all stakeholders: accelerating impact for people with asthma, advancing careers and leadership across the research community, and creating a compelling, fundable national proposition.

Consistent and visible use of the CURE Asthma identity across grants, communications and advocacy is essential to ensure recognition by funders, policymakers and decisionmakers.

Consumer, community and collaboration

Meaningful consumer and community engagement must be embedded from the outset and sustained throughout. This includes representation of populations disproportionately affected by asthma, particularly First Nations communities. Collaboration across the national scientific community—spanning talent development, funding, policy influence and operational models—is foundational to long term success.

Evidence, economics and advocacy

A renewed economic case is critical. The 2015 Deloitte Hidden Cost of Asthma report is outdated and should be refreshed to reflect the current burden of disease. The case must clearly articulate the goals of CURE Asthma, the risks across the full asthma spectrum (including so called “mild” asthma), and the systemwide health and economic impacts.

Clear, consistent messaging under the CURE Asthma banner is required across all scientific, clinical and advocacy settings. High impact case studies—drawn directly from clinical practice—are powerful tools for engaging policymakers and should be used strategically.

Learning from proven models

CURE Asthma must be prepared to “play the long game”. Experience from JDRF demonstrates the importance of:

- A clearly articulated long term vision
- Defined priorities aligned to political and election cycles
- Mobilising and supporting consumers to engage with local politicians
- Structured communication training to ensure messages are clear, consistent and effective

Political influence is often strongest at the local level, and consumer voices are central to sustaining asthma as a policy priority.

Networks as a core success factor

Strong networks underpin successful disease missions, major funding initiatives and innovation ecosystems. This was a consistent theme across CURE Asthma symposium success stories. CURE Asthma will work if enabled by a federated structure that nurtures national and international networks and enables partnerships across key stakeholders and peak bodies.

Representation, data and equity

CURE ADIRE must be developed in ways that avoid reinforcing existing biases in AI and health data. Ensuring diverse national and international cohort inclusion is essential so that AI models, digital twins and predictions are generalisable and equitable. A federated data approach provides a strong foundation for this.

At its core, CURE ADIRE is a data harmonisation initiative. Once harmonised, the dataset will enable transformative discovery using next generation analytical approaches, including integrated multiomics platforms.

Research questions and impact

Research question development must be deliberate, iterative and bidirectional—guided initially by strategic priorities and funding objectives, and later shaped through collaboration, network strength and emerging insights. Once data harmonisation and networks are established, computational and domain experts must align on the predictions that matter most for clinical, policy and population impact.

Once the CURE ADIRE data are harmonised and the collaborative network is functioning, the computational experts, in collaboration with domain expertise, will need to know which predictions are critical. Figure 6 below outlines one such period that research questions could target.

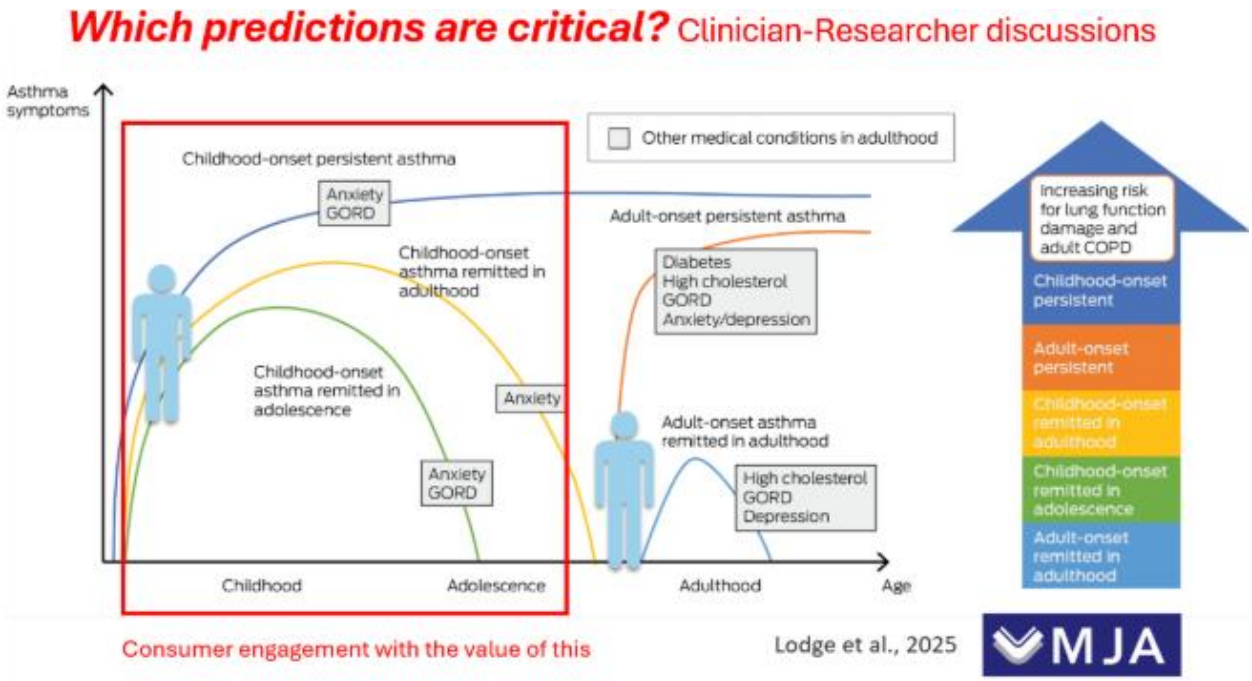

Figure 6: Life course asthma trajectories. Red box reflects a phase likely highly amenable to deconvoluting with CURE ADIRE and ML computational methods

Priority questions

Table 1: Priority questions to emerge from the scientific discussions.

Predict and prevent	**Restore and repair**
What is the molecular basis of the bacteria/viral pathogenesis of chronic asthma?	What biomarkers reflect the molecular processes of repair and restoration of airway tissue to its healthy state?
How can we enable immune modulation in early life to prevent viral illness becoming asthma?	Is there a therapy available that might modulate remission, or prevent relapse caused by viral illness (and therefore achieve CURE)?
How can we intervene in the trajectories of lung growth in early life to prevent persistent asthma?	How might we work with international cohorts and the FUTURE study (above, page 12) to discover precision biomarkers of disease and treatment response?
What can we learn about the molecular causes of 'the asthmas' using ML on longitudinal data and samples?	
Can we apply AI and explainability to find biomarkers to stratify patients for precision treatment for curative outcomes?	

11. Conclusions

The 2025 CURE Asthma Symposium reinforced a national agenda for a future in which asthma is no longer managed but eliminated. The convergence of multiomics platforms, AI-enabled modelling, extensive cohort data and samples, precision remission, and a disciplined national strategy positions this truly as Australia's unique opportunity.

"If remission is the horizon we can reach today, cure of asthma becomes the horizon you can set upon course to all tomorrow", (Prof Celeste Pjorsberg, University of Copenhagen).

The path to cures in asthma is not theoretical — it has begun.

Thanks and acknowledgements

Asthma Australia sincerely thanks all those who contributed to the success of the symposium and the development of this report. We gratefully acknowledge the invited speakers, panel members, and facilitators for their expertise, thoughtful contributions, and leadership throughout the program.

We also thank all attendees for their active participation, insightful questions, and shared experiences, which enriched discussions and helped shape the key themes and outcomes presented in this report.

Special thanks are extended to the organising committee and Asthma Australia staff for their dedication, planning, and delivery of the symposium. Finally, we acknowledge the support of partner and funding organisations whose commitment made this event possible.

With thanks to our sponsors

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- Prof Peter Sly, University of Queensland
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- Profs Peter Gibson and Vanessa McDonald, University of Newcastle
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- Profs Adam Jaffe and Guy Marks, University of New South Wales
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