



The pathway towards precision medicine for type 1 diabetes

A VISION FOR INDIVIDUALISED T1D APPROACHES



Type 1 diabetes (T1D) is a complex autoimmune condition that develops and progresses differently for each person.

Current approaches to management of T1D generally adhere to the principles of a 'one size fits all' approach involving glucose monitoring and insulin administration, with limited options available for individualisation.

While there are a range of management technologies and types of insulin available, healthcare providers do not have access to the kind of information necessary to inform decisions about personalised care.

Precision medicine offers hope for a different future, where the prevention, prognosis, diagnosis, and treatment of T1D can be tailored based on an individual's genes, environment, and lifestyle, to provide the right care at the right time.

The concept of precision medicine is not new, but its application in T1D research has been limited until recently. Change is on the horizon, with a concerted effort to understand its role in T1D now underway.

As one of the leading funders of T1D research, JDRF Australia is taking the lead in this area and prioritising research which can uncover new understandings of how and why T1D develops differently for different people (Figure 1).

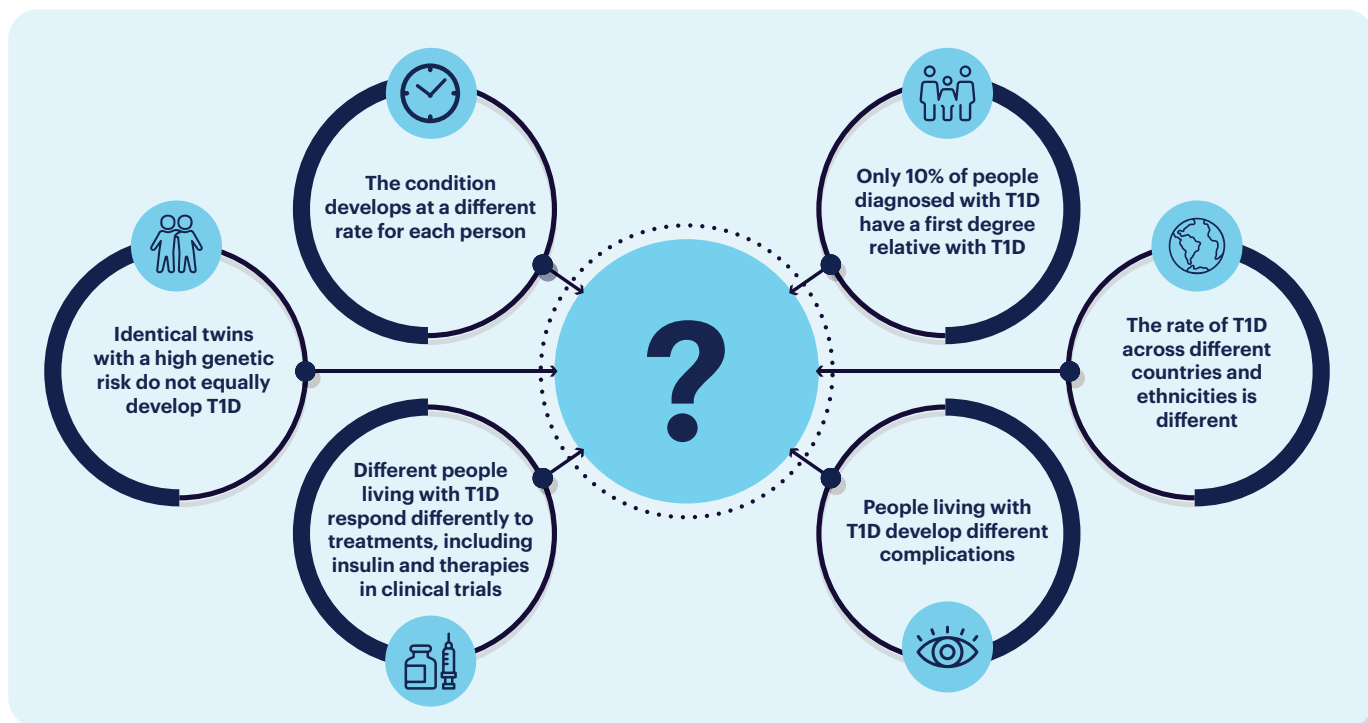


Figure 1. T1D develops differently for each person: genetic risk, age of initiation of the condition, rate of complications, response to treatment, gender differences and incidence of T1D related to geographic location are just a few aspects that could influence T1D. Research still isn't clear on what is underpinning these differences.

THE SCIENCE BEHIND THE VISION

The environment holds the key

We now know that a major factor in the process of T1D development is the interplay between genes and environmental exposures, like viral infections, gut bacteria, and potential environmental toxins.

In simple terms, a person's genetic makeup (or genetic predisposition) is 'triggered' by these environmental exposures, initiating the development of T1D.

Genomics can unlock new answers

To better understand how this process unfolds, we need further investment in the field of genomics, which studies the total genes in our DNA, and the changes in our genes and cells under different environmental conditions or pressures.

The information obtained through genomics would enable precision medicine (Figure 2). This could make possible a future where we know which treatment options would be most effective for each person, why some people are more susceptible to complications than others, why progression differs from person to person, and eventually, how we can intervene to stop T1D in its tracks.

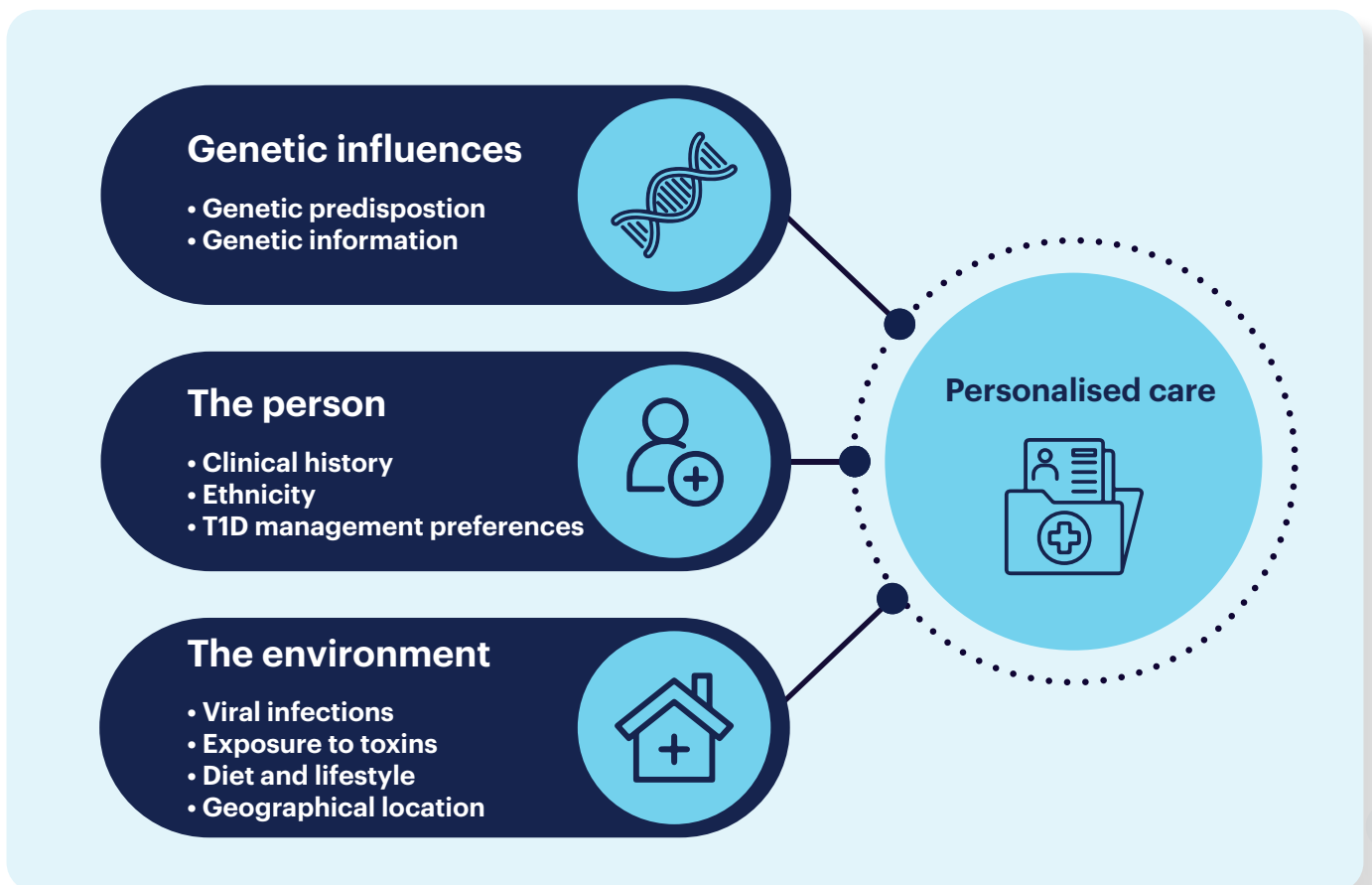


Figure 2. Understanding how genetic influences, personal characteristics and the environment interact to drive and progress T1D are central to establishing precision medicine for those with T1D.

THE FUTURE: PRECISION MEDICINE FOR T1D

Precision medicine would transform T1D care, informing customised approaches for everyone living with or at risk of T1D and bringing the right treatments, to the right people, at the right time (Figure 3).

Using a precision medicine approach to T1D management ranges from new ways to delay or even prevent T1D to new, customised therapies designed to benefit those at all stages of the condition.

Precision medicine could mean a future with improved T1D:



Prediction

T1D development could be predicted based on information about genes and the environment



Detection

Every Australian child at risk of a T1D diagnosis is identified early through screening, and is monitored closely



Delays

Opportunities to delay T1D progression with therapeutic intervention are unlocked



Treatments

People already diagnosed with T1D can utilise therapies and technologies tailored to their clinical differences and personal preferences



Complication reduction

Complications related to T1D could be reduced or prevented

Figure 3. Precision medicine has the potential to transform the prevention, detection, prognosis and treatment of T1D.

THE WORK ALREADY UNDERWAY

JDRF Australia has already begun funding research projects in this area, including the work of **Professor Simon Barry** from the University of Adelaide's Robinson Research Institute.



In conditions like type 1 diabetes, the immune system is altered, leading it to mistakenly attack parts of the pancreas.

My focus is to unravel the genetics behind type 1 diabetes that cause this destructive process, so we can understand how the condition progresses and can be prevented.

I want to know not only if someone is genetically at risk of type 1 diabetes, but when they start to progress towards a diagnosis.

If we can get these answers, we can use them to inform personalised medicines, preventions, and cures. That's my ambition.

MAKING THIS A REALITY

Turning this vision from hope to reality requires the brightest scientific minds in Australia and access to the most sophisticated infrastructure, including state-of-the-art laboratories and cutting-edge technology and equipment.

We will also need to unite key players across the health sector, including clinicians, researchers, pharmaceutical companies, policymakers, strategic partners, and people with T1D across the nation.

While only at the beginning of this journey, JDRF Australia has already laid the groundwork for our vision, engaging in significant consultation with a multidisciplinary team whose expertise covers the fields of genomics and precision medicine.



This, alongside the existing genomics infrastructure in Australia, means that precision medicine for T1D is possible within the next decade.

Yet this depends upon significant investment. The generosity of philanthropists and donors who share in the vision of precision medicine for T1D will be the foundation of this future.

The work to bring precision medicine to T1D in Australia starts now, but we cannot do it alone.

JDRF Australia invites you to support an endeavour that has the potential to transform T1D care.

**For further information please
call 1300 363 126 or email info@jdrf.org.au**

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