Health economic modelling update from the UK

Simulating T1D progression in populations

Professor Richard Oram

University of Exeter

EXCEED

UNIVERSITY OF EXETER | Exeter Centre of Excellence for Diabetes Research

DIABETES UK
CARE. CONNECT. CAMPAIGN.

Declarations

- Research funding and a licensing agreement with Randox to make a T1D GRS biochip

- Consulting for Sanofi, Novo

Summary

- UK is at an early stage, with sparse data
- We developed a “digital twin population” that can be adapted to countries with sparse data.
- Potential uses
- “all models are wrong, some are useful”*

*George Box

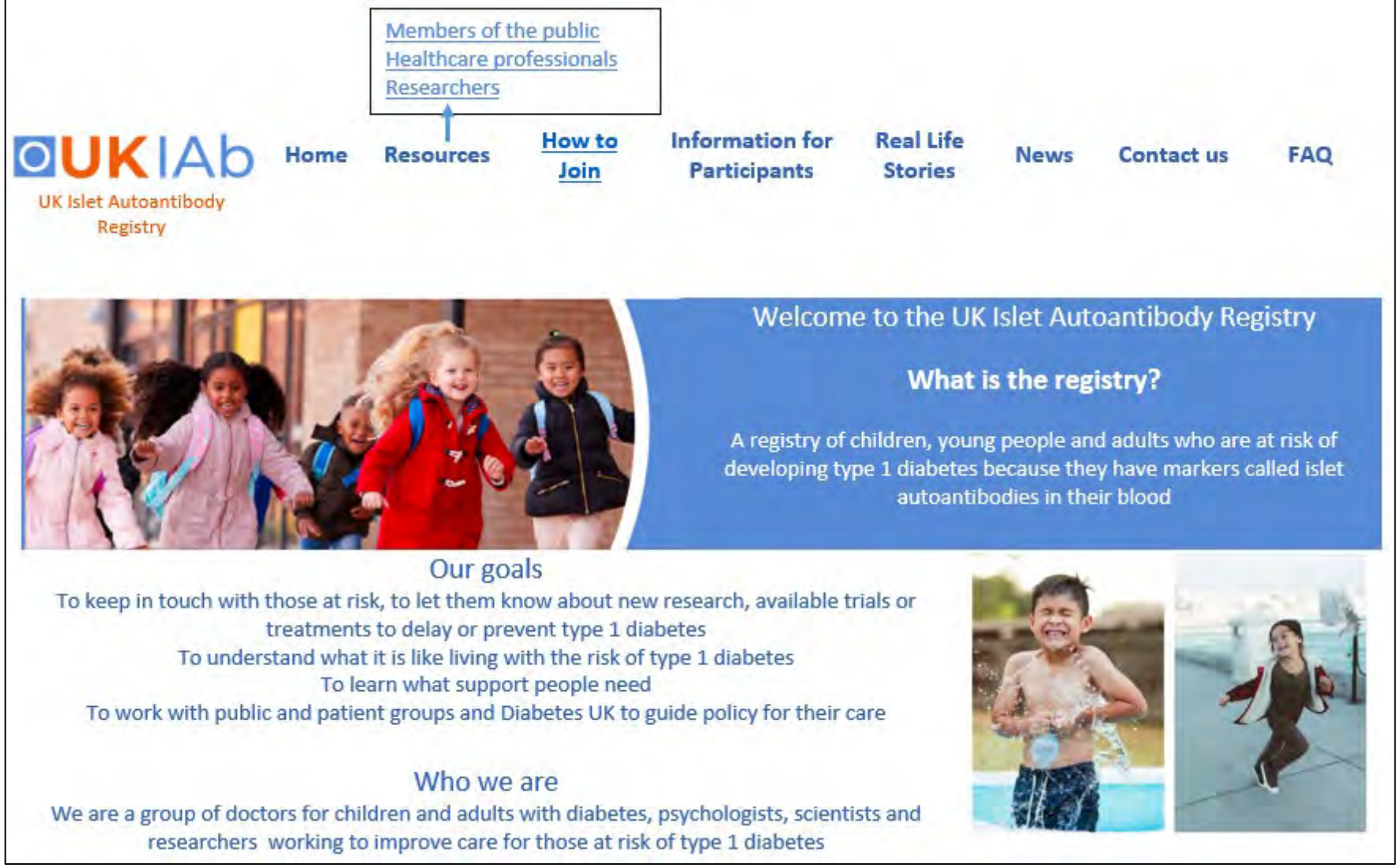
Initial UK Health economic modelling work

- Led By Dan Pollard, Alan Brennan, Rachel Besser
  - Work in progress
- Initial results: challenge of cost effectiveness for DKA prevention alone
- BUT - modest general population screening data specific to UK

Rachel Besser
Colin Dayan

Submitted to DUK 2025

NIHR | National Institute for Health Research



DTU
Diabetes Trials Unit

- Free IAb confirmation testing
- www.ukiab.co.uk, live next week

DIABETES UK
KNOW DIABETES. FIGHT DIABETES.

UNIVERSITY OF OXFORD

B-S-P-E-D

the Bart's OXford family study

ADDRESS 2
Supporting TYPE 1 Diabetes Research

Type 1 Diabetes TrialNet

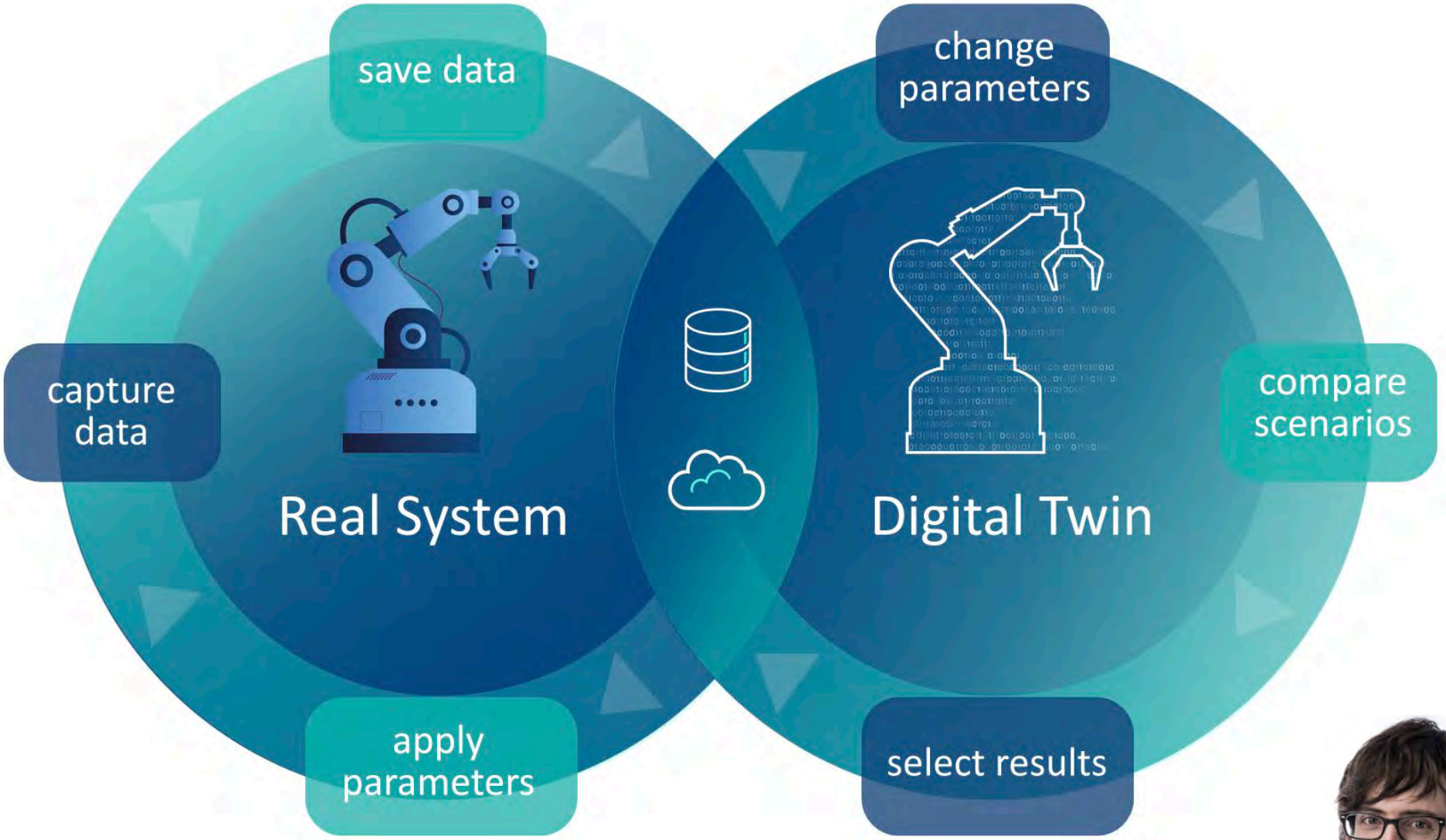
ELSA

T1DRA

INNODIA

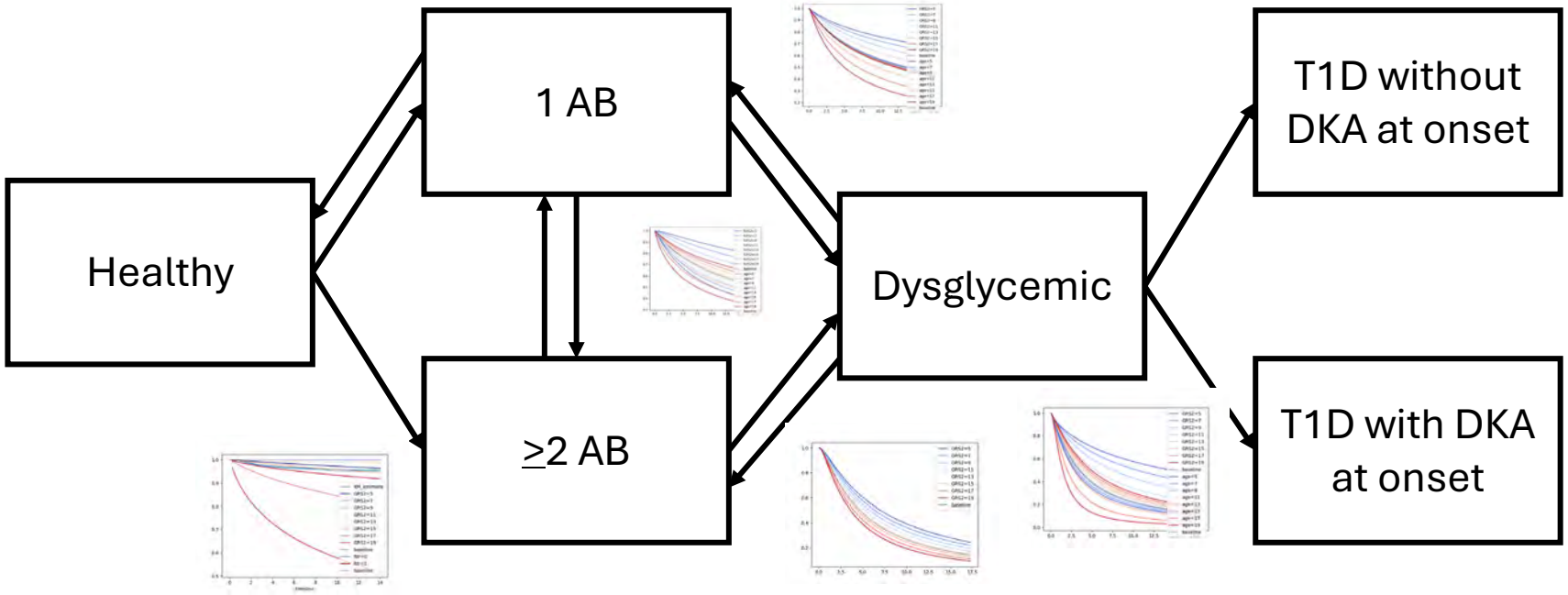
How to plan screening with little data in your country?

- Are TEDDY/FR1DA etc..generalizable to the UK and elsewhere?
- how could we simulate/model progression of T1D to design and optimize screening
- Can we build a “digital twin” population to simulate screening?



Breakthrough T1D™
Formerly JDRF

Modelling pediatric population to simulate screening strategies



Objective

Brett McQueen

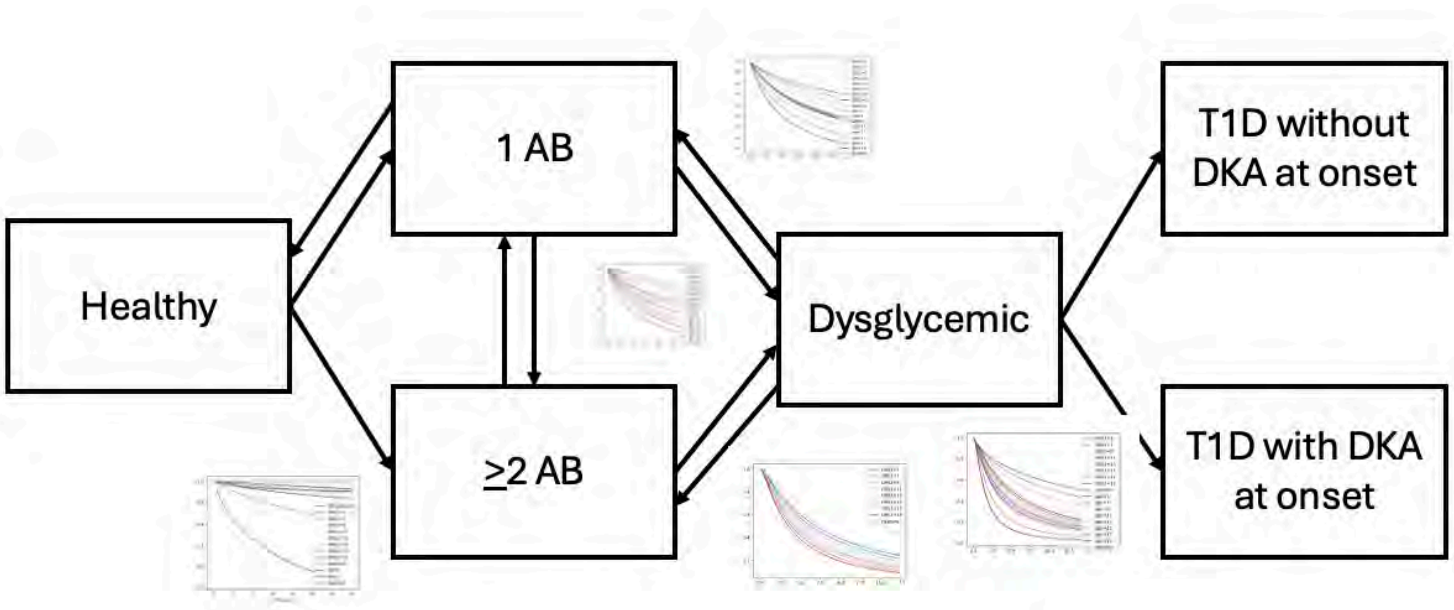
Gonçalo Leiria

Lauric Ferrat /Jonathan Fieldsend

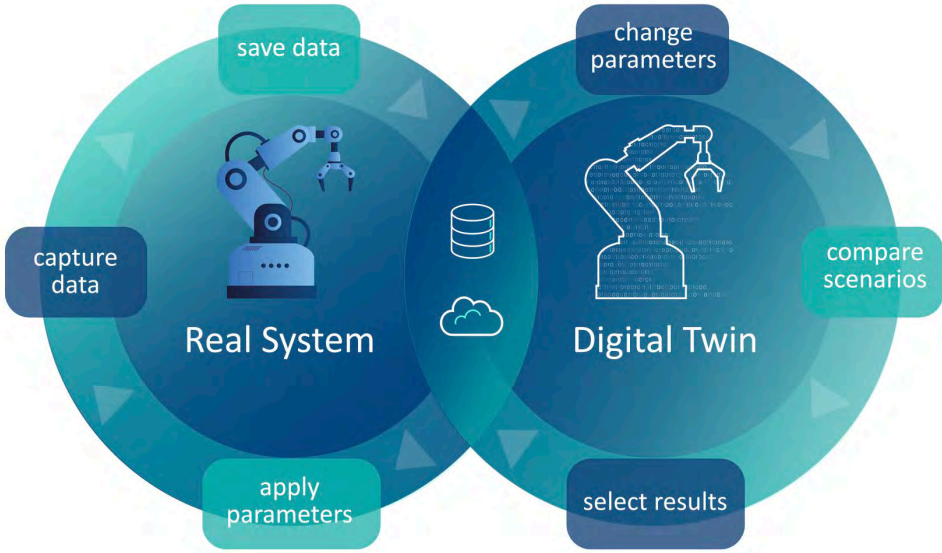
TEDDY
The Environmental Determinants of Diabetes in the Young

Type 1 Diabetes TrialNet

But why a “digital twin”??



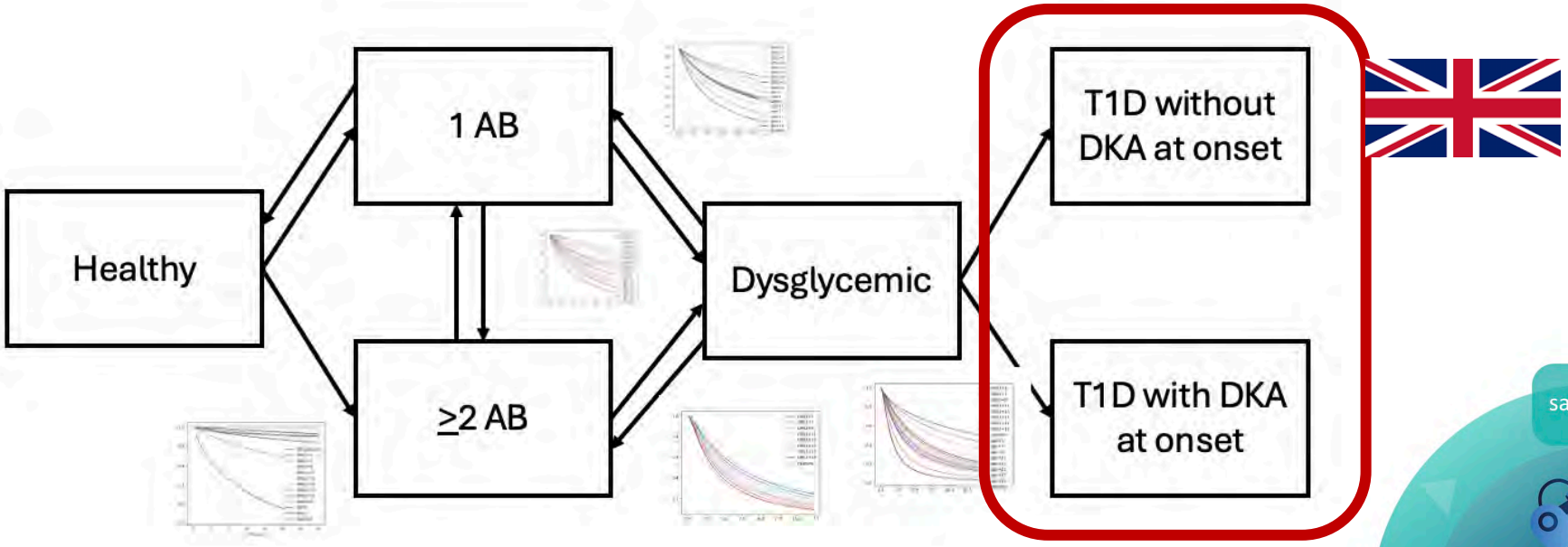
We need to integrate information from a variety of sources to represent a general population, and we can modify model

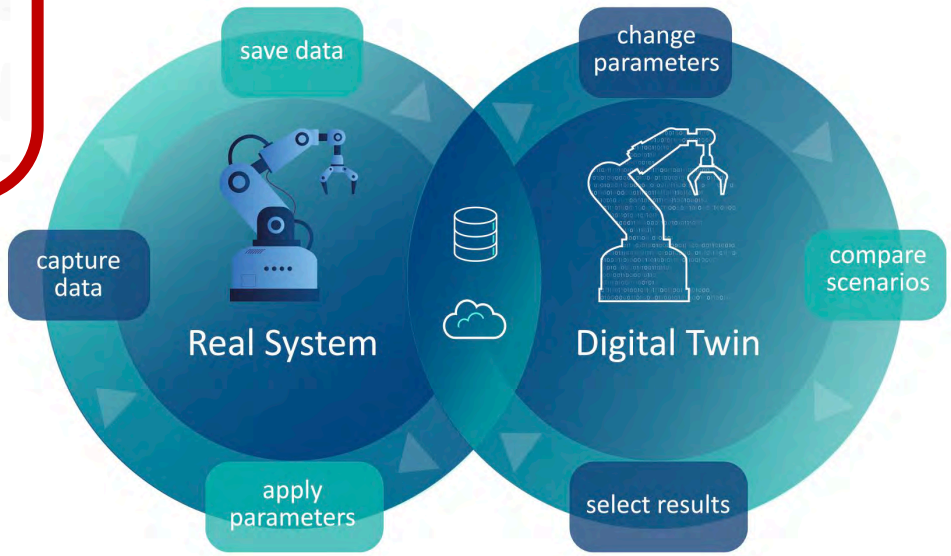


TEDDY
The Environmental Determinants of Diabetes in the Young

Type 1 Diabetes TrialNet

But why a “digital twin”??



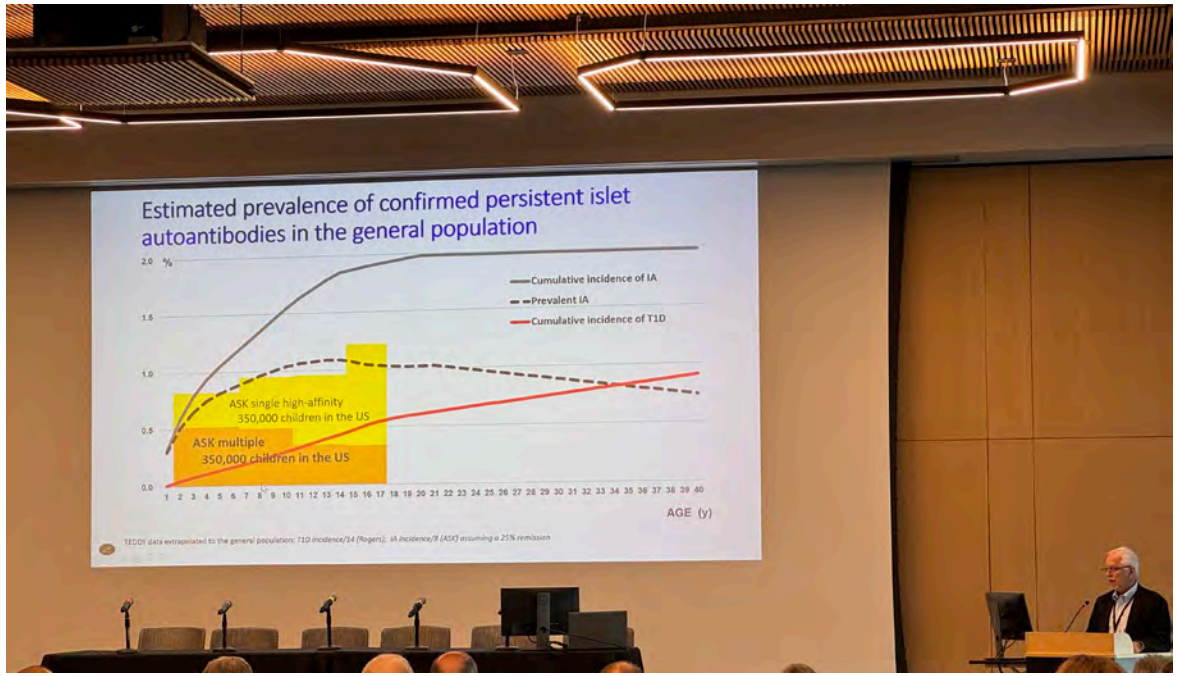


TEDDY The Environmental Determinants of Diabetes in the Young
Type 1 Diabetes TrialNet

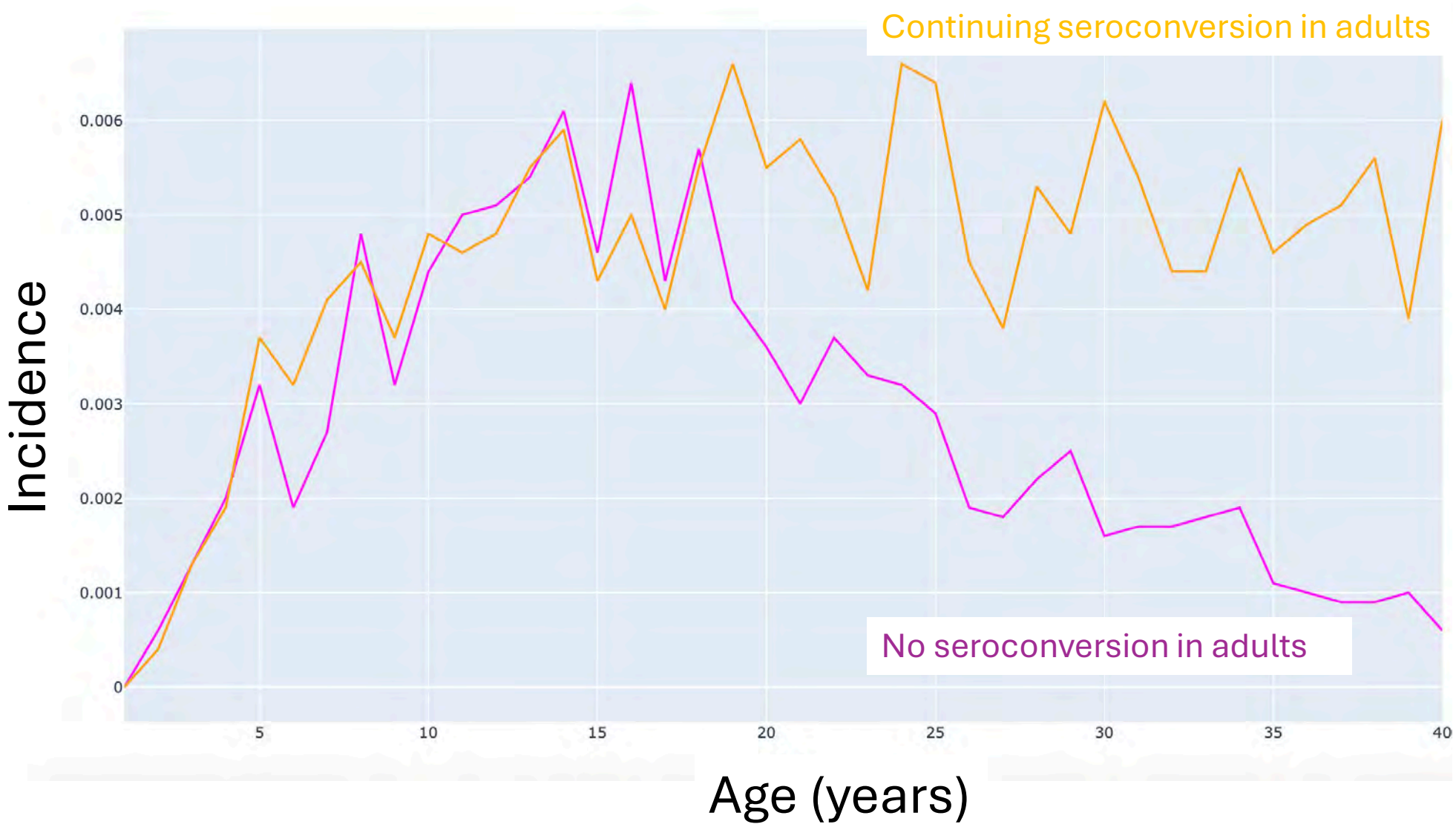
Optimize screening on cost-efficiency, remember this is a mathematical solution

Playing with the simulated population

- What about adults?
- Are people seroconverting into adulthood?
- Or is all the action in childhood?
- Goncalo can you show me two models of seroconversion?



Incidence of adult T1D from simulation



Summary

- UK is at an early stage, with sparse data
- We developed a “digital twin population” that is useful for health economic modelling, planning screening, test treatment effects or to creatively ask questions/generate hypothesis
- We are funded to make this available to others planning screening/intervention

Acknowledgements

- Research volunteers, people with T1D and their families

- Breakthrough T1D

- Goncalo Leira, Lauric Ferrat, Jonathan Fieldsend, Conner Jackson, Brett Mcqueen, Bill Hagopian, Marian Rewers

Acknowledgements

People with T1D and their families

Exeter

- **Andrew Hattersley,** Seth Sharp, Mike Weedon, Tim Mcdonald, Angus Jones, Bev Shields, Nick Thomas, Pam Bowman, Kash Patel, Mike Weedon, Maggie Shepherd, Bea Knight, Nick Thomas, Noel Morgan, Sarah Richardson, Anita Hill, Michelle Hudson, Rob Bolt, Suzie Hammersley , Sam Jones, Tim Frayling, Jamie Harrison, Matthew Johnson, Sarah Flanagan, Sian Ellard, Alice Carr, Brittney Resnick, Gail Aldred, Becky Dobbs, Kev Colclough, Jayne Houghton, Jon Locke

Baylor College of Medicine

- **Maria Redondo, Ashok Balasubramanyam**

Randox

- Helena Murray, Mollie Conroy

IU

- Carmella Evans-Molina, Emily Sims, Jamie Felton,

Seattle (PNRI)

- Bill Hagopian

U of A

- Peter Senior, Anne Halpin, Trish Campbell, Andy Mason

South Florida

- Jeff Krischer, Kendra Vehik

Cardiff

- Colin Dayan

Pune

- Ranjan Yajnik

Sanford Health

- Kurt Griffin

QMUL

- Sarah Finer

SEARCH study

- Ralph D'Agostino/Jasmin Divers/Dana Dabelea
- Cate Pihoker

Chinese University of Hong Kong

- Ronald Ma, Ray Wan

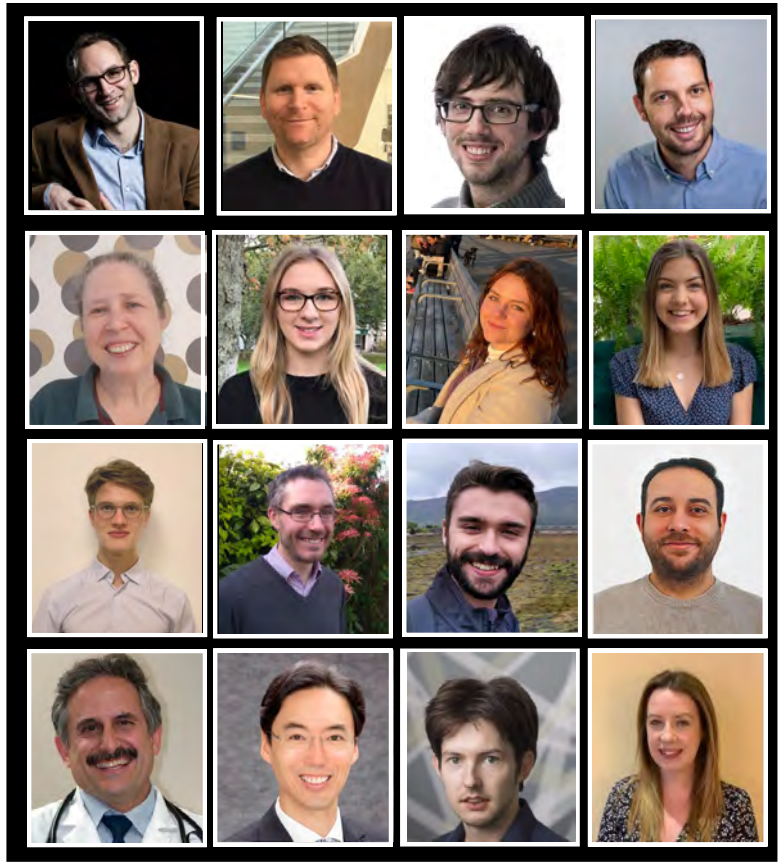
Oxford

- Rachel Besser, John Todd

Bristol

- Kathleen Gillespie, Anna long

Exeter "GRS" Team



DIABETES UK
CARE. CONNECT. CAMPAIGN.

Type 1 Diabetes TrialNet

MRC Medical Research Council

THE LEONA M. AND HARRY B. HELMSLEY CHARITABLE TRUST

EXCEED

DiabetesGenes

wellcome

JDRF IMPROVING LIVES. CURING TYPE 1 DIABETES.

NHS National Institute for Health Research

NIH

TEDDY The Environmental Determinants of Diabetes in the Young

RANDOX

www.diabetesgenes.o