Optimising autoantibody assays for T1D screening

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wmhtia

Birmingham Health Partners
Collaboration. Innovation. Application.

NHS
University Hospitals Birmingham
NHS Foundation Trust

“I want to test 20,000 children……”

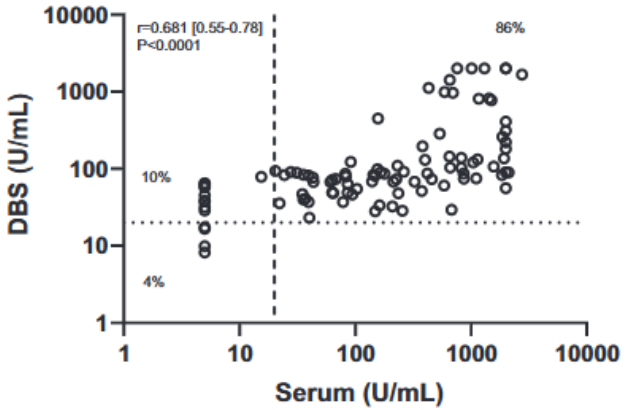
Facilitating sampling

- Venesection- number of challenges
  - Technically difficult in children
  - Expensive to arrange facilities and phlebotomy
  - Transport for central trials analysis is complex and expensive

- Dried blood spot
  - Technically easier
  - Can be done at home
  - Can be sent in the post
  - CIS had a lot of experience as had used extensively during COVID
  - But could T1D antibodies be detected accurately?

Detection of T1D in DBS samples

- ✓ Pilot study: Validated in 100 known T1D patients
- ✓ Paired serum and DBS- RSR 3Screen Assay
- ✓ DBS as sensitive and specific as serum- strong correlation between serum and DBS.
- ✓ Good acceptability- *"the main benefit of the home test is that you can do it whenever you want, you don't have to take time off to have an appointment."* [A010, Parent with type 1 diabetes]
- ✓ ISO accreditation as a clinical test
- ✓ Ready to support ELSA study
- ✓ To date, we have successfully completed laboratory testing for ~20,000 children with 30,000 recruited so far



DIABETIC Medicine
DIABETES UK
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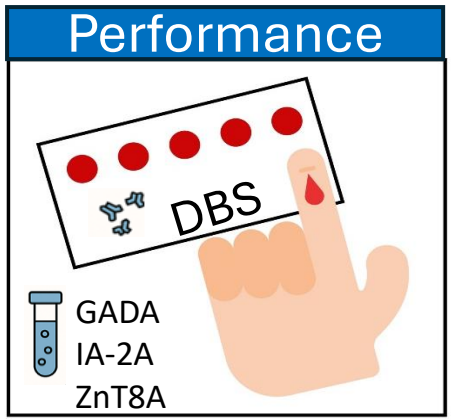
RESEARCH ARTICLE | Open Access

Establishing the performance and acceptability of dried blood spot sampling to screen for islet-specific autoantibodies

Siân E. Faustini, Lauren M. Quinn, Madeeha Hoque, Siobhan Young, Christopher Bentley, Hin-Fai Kwok, Timothy Plant, Ian Litchfield, Felicity Boardman, Sheila M. Greenfield, Parth Narendran, Alex G. Richter

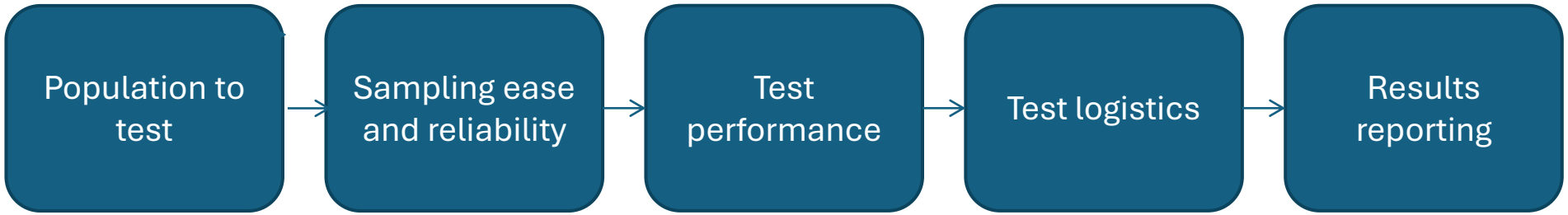
Comparison of performance characteristics for the 3-Screen using serum and dried blood spot (DBS) sampling

Performance characteristic	Serum	DBS
Clinical sensitivity	86.0% (n=85/99)	89.1% (n=90/101)
Clinical specificity	97.0% (n=31/32)	100.0% (n=27/27)



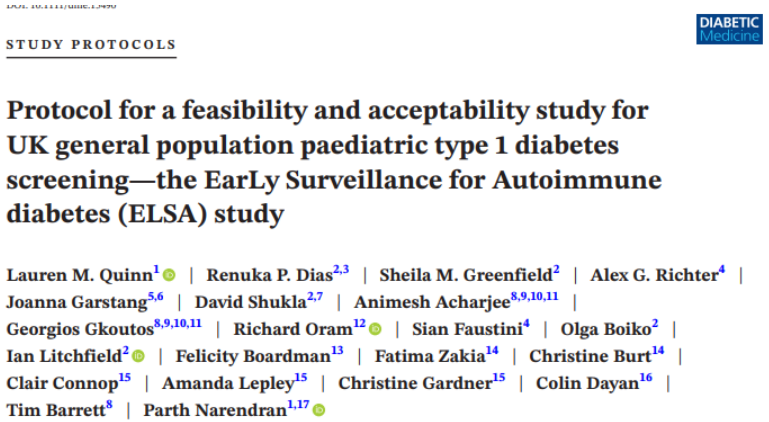
Designing tests for a clinical pathway

- All current T1D autoantibody tests have been devised for detection rather than screening
- Need to focus on:
  - Specificity
  - High throughput testing (short run time, easy for operator etc)
  - A new clinical pathway
  - Developing an assay on screening samples in unknown T1D patients



Working to ensure end to end process for diagnostic test is optimised

Having the right samples to build the right tests

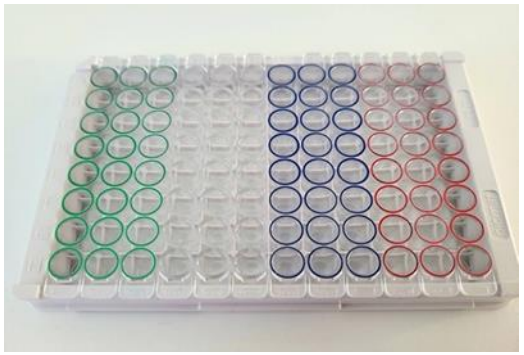


STUDY PROTOCOLS

DIABETIC Medicine

Protocol for a feasibility and acceptability study for UK general population paediatric type 1 diabetes screening—the EarLy Surveillance for Autoimmune diabetes (ELSA) study

Lauren M. Quinn[1] | Renuka P. Dias[2,3] | Sheila M. Greenfield[2] | Alex G. Richter[4] | Joanna Garstang[5,6] | David Shukla[2,7] | Animesh Acharjee[8,9,10,11] | Georgios Gkoutos[8,9,10,11] | Richard Oram[12] | Sian Faustini[4] | Olga Boiko[2] | Ian Litchfield[2] | Felicity Boardman[13] | Fatima Zakia[14] | Christine Burt[14] | Clair Connop[15] | Amanda Lepley[15] | Christine Gardner[15] | Colin Dayan[16] | Tim Barrett[8] | Parth Narendran[1,17]



- ✓ Unique opportunity to build tests specifically for T1D Aab screening
- ✓ Validated in correct population supports regulatory approvals and adoption

- We developed single and multiplex ELISAs for GAD, IA-2, ZnT8 ± insulin autoantibodies
- Laboratory processing and testing reduced from 2 days to 4 hours
- With the right proteins and detection antibodies, we found that we could further enhance sensitivity

From a simple ELISA building block, we were then able to move to automated platforms , but were also considering rapid point of care testing.

Funding from

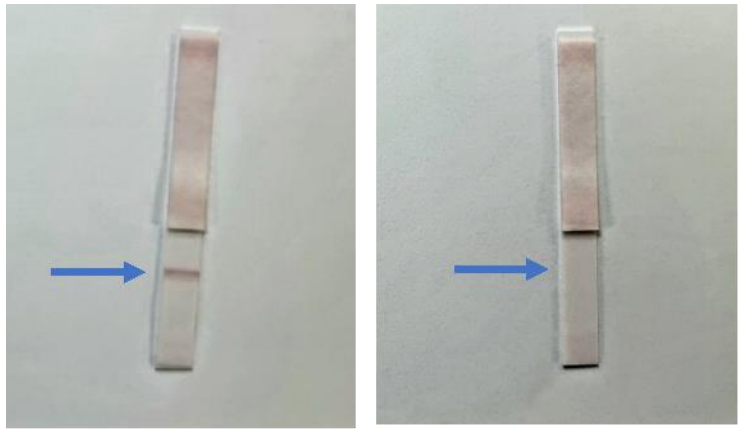
Breakthrough T1D™ Formerly JDRF

Providing testing options for T1D screening

No reason why a point of care device can't be as good as a laboratory test

Lateral Flow Device – these are prototype "dipsticks"

- Fingerpick blood
- Rapid result
- Equipment & cold chain free
- Low cost



Positive line

Negative

- ✓ Built prototype: single and multiplex LFAs (2024)
- ✓ Ensure product is scalable for commercialisation (2025/6)
- ✓ Finalise product: Capillary blood, control lines, housing (2025/6)
- ✓ Aiming for market launch in 2027, but hoping to use prototypes in clinical studies before.

ELSA

Breakthrough T1D™ Formerly JDRF

MEDTECH TO MARKET

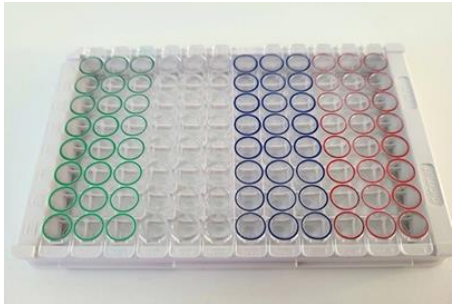
UNIVERSITY OF BIRMINGHAM | Clinical Immunology Services

Testing solutions for T1D that we can offer

DBS

Establishing the performance and acceptability of dried blood spot sampling to screen for islet-specific autoantibodies

Sian E Faustini[1,4*] PhD, Lauren M Quinn[2*] MRCP, MBChb, Madeeha Hoque[1,4] BSc, Siobhan Young[1,4] PhD, Christopher Bentley[1,4] BSc, Hin-Fai Kwok[1,4] MPhil, Timothy Plant[1,4] MSc, Ian Litchfield[5] PhD, Felicity Boardman[6] PhD, Sheila M Greenfield[5] PhD, Parth Narendran[2,3] FRCP, PhD, Alex G Richter[1,4] MRCP, MRCPath, MD
*Joint first authors



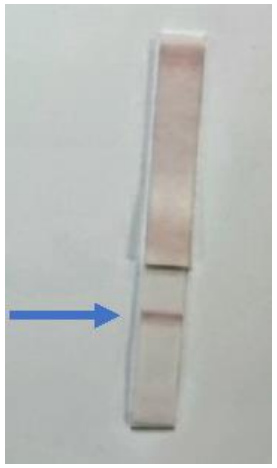
Multiplex ELISA solutions

- Multi-antigen
- Multiplex format

LFA

1 year JDRF grant (2022-23)/2-year Breakthrough T1D grant (2024-26):

- Single plex LFA
- Multi-antigen LFA



- **We can take any 3 of these platforms and adapt them for different biomarkers**

In summary

- Screening will only be practical and affordable if we get the diagnostic test right

‘Cross the Divide
Rick Kirby

- ✓ We believe we have a clear value proposition
- ✓ Prototype and first clinical validation complete
- ✓ Funding in place for next 12 months
- ✓ Collaborating closely with Business Partner to complete grant
- ✓ Key resources identified and able to provide at scale
- ✓ IP under consideration with University team

MEDTECH TO MARKET

Thank you for listening and looking forward to everyone’s expert opinion