

Predicting fetal growth restriction using blood biomarkers

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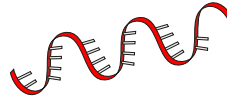
Paula Kaitu'u

Disclosures

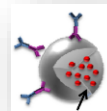
Named inventor on a patent for SPINT1 as a biomarker for placental insufficiency

Named inventor on a provisional patent for composition of matter relevant to SPINT1 antibodies

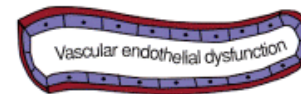
Biomarkers to predict preeclampsia and fetal growth restriction



Treatments for preeclampsia and ectopic pregnancy

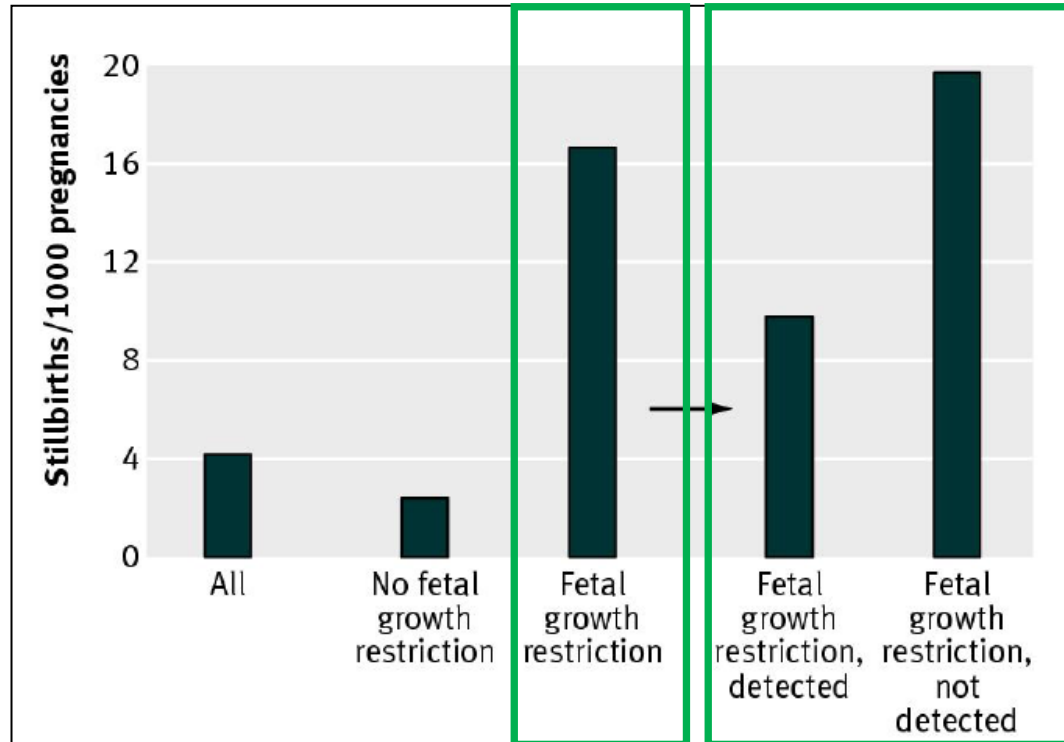


Pathogenesis of preeclampsia and fetal growth restriction



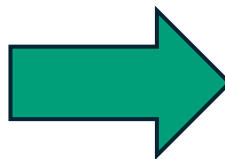
Fetal Growth Restriction is a risk factor for stillbirth

91,829 live births, 389 stillbirths

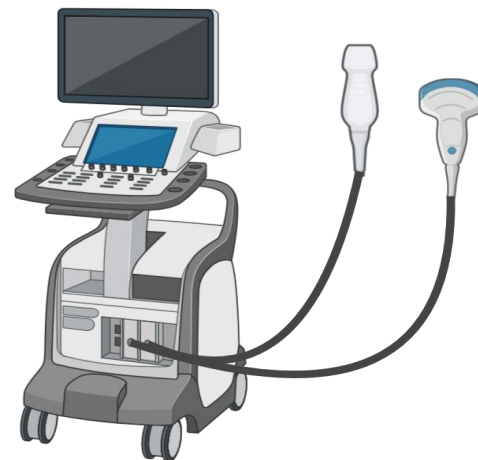


Selective ultrasound to predict FGR

Fundal height
measurements



Ultrasound
investigation



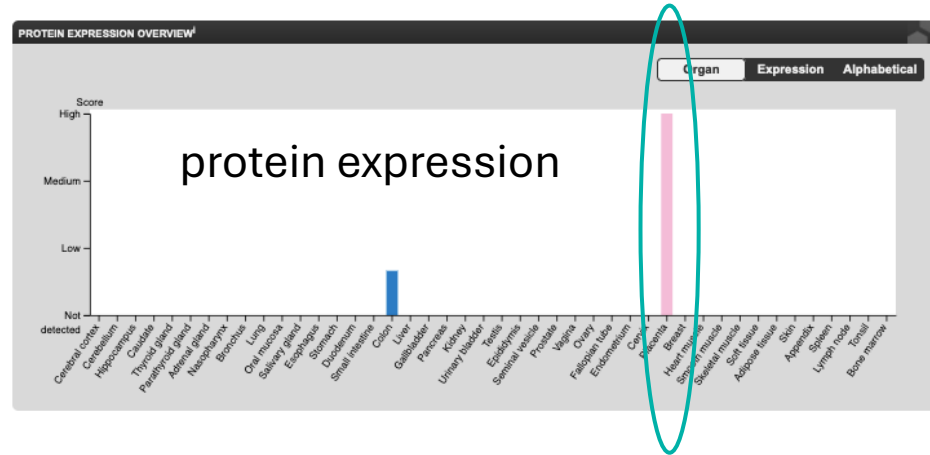
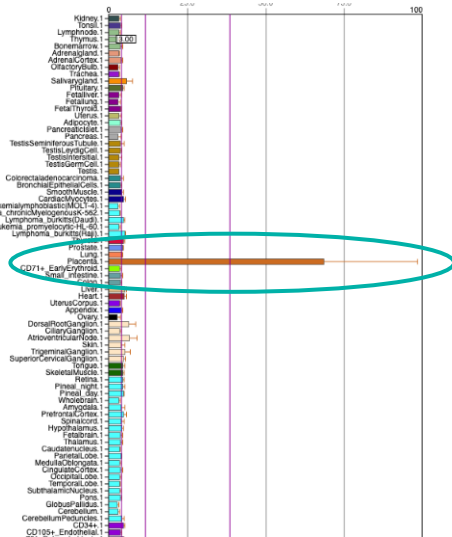
Picks up 14-32% of FGR (<3rd centile)

Sparks et al, 2011 JMFM
Aderoba et al, 2023, BJOG
Sovio et al, 2015, Lancet



SPINT1 is highly expressed in placenta

mRNA expression



Animal studies suggest it is critical for normal placental development

SPINT1 is reduced with FGR



Study Design

Developed a pathology grade assay

Measured SPINT1 at 36 weeks gestation

Melbourne samples
(n=3566)

Cambridge samples
(n=1454)

Research Questions

1. How well does SPINT1 predict FGR?
2. Does SPINT1 add to the accuracy of ultrasound?
3. Can SPINT1 predict adverse neonatal outcomes?
4. Can we improve access to testing?

Low SPINT1 (<10th centile) as a biomarker of placental health

Detects small

Sensitivity of **36-45%** for a fetus <3rd centile (10% false positive rate)

Sensitivity of **53-57%** for a fetus <3rd centile (20% false positive rate)

High levels are reassuring (risk of <3rd centile: **1 in 11** low SPINT1 **vs** **1 in 333** high SPINT1)



SPINT1 and risk of fetal growth restriction (<3rd centile weight)

Relative SPINT1 levels	Melbourne cohort (n=3566)	Cambridge cohort (n=1454)	
Population risk	~1:33	~1:33	
Lowest 10 th centile SPINT1	1 in 10 risk	1 in 11 risk	➡ Very high risk - Actively manage
10-24 th centile SPINT1	1 in 21 risk	1 in 55 risk	➡ Higher risk - Actively manage
25-75 th centile SPINT1	1 in 59 risk	1 in 77 risk	➡ Slightly lower risk - Usual care
76-90 th centile SPINT1	1 in 167 risk	1 in 143 risk	➡ Very low risk - Reassure, low risk care model
Highest 10 th centile SPINT1	1 in 333 risk	1 in 333 risk	➡ Exceptionally low risk - Reassure, low risk care models

Low SPINT1 (<10th centile) as a biomarker of placental health



Detects small

Sensitivity of **36-45%** for a fetus <3rd centile (10% false positive rate)

Sensitivity of **53-57%** for a fetus <3rd centile (20% false positive rate)

High levels are reassuring (risk of <3rd centile: **1 in 7** low SPINT1 **vs 1 in 142** high SPINT1)

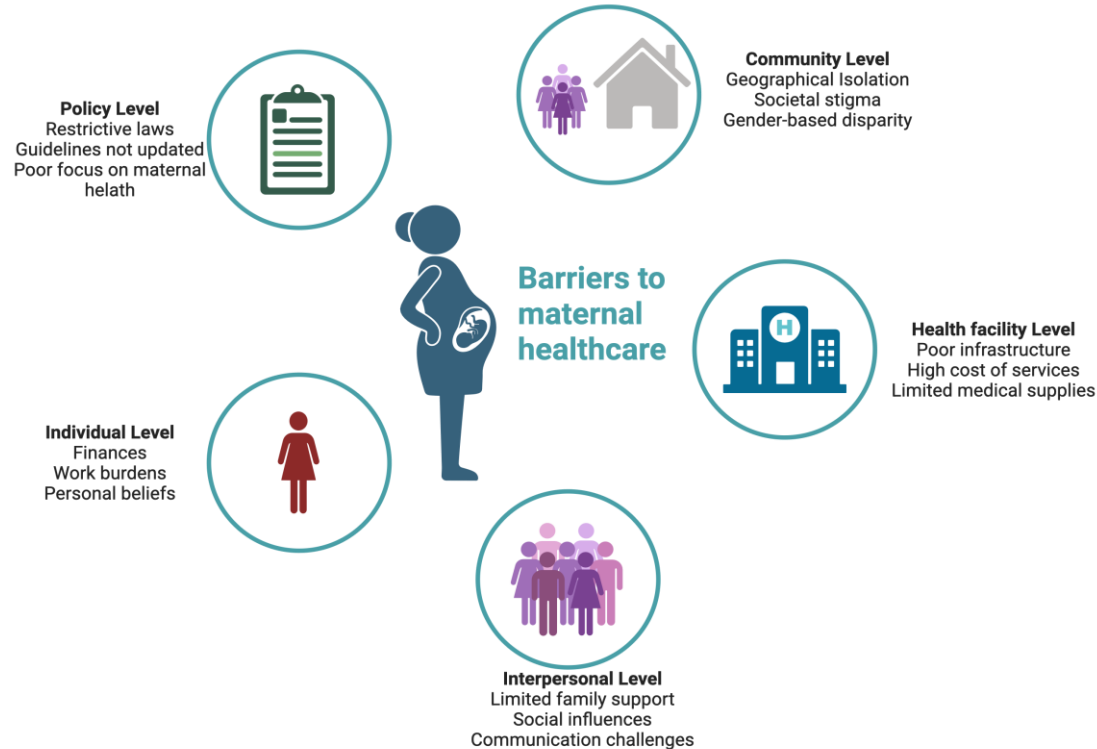
Detects sick

Neonatal outcomes are worse for babies <3rd centile detected by SPINT1 than those not detected

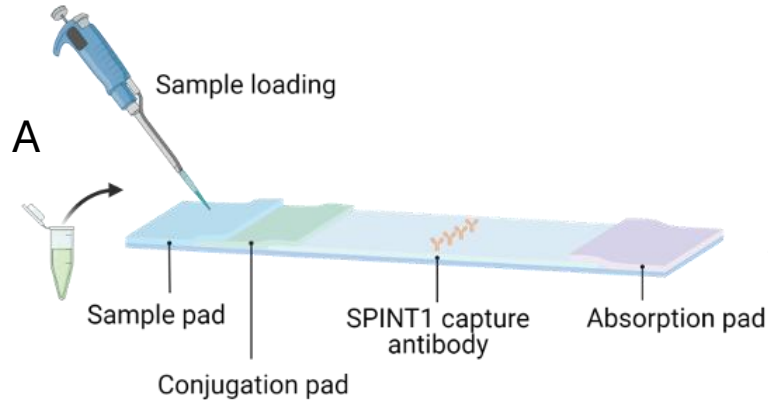
Positive predictive value of **26%** of poor neonatal outcomes

If the SPINT1 is low and the ultrasound estimated fetal weight is <10th centile - Positive predictive value of **62%** of a poor neonatal outcome

Access to healthcare can be limited

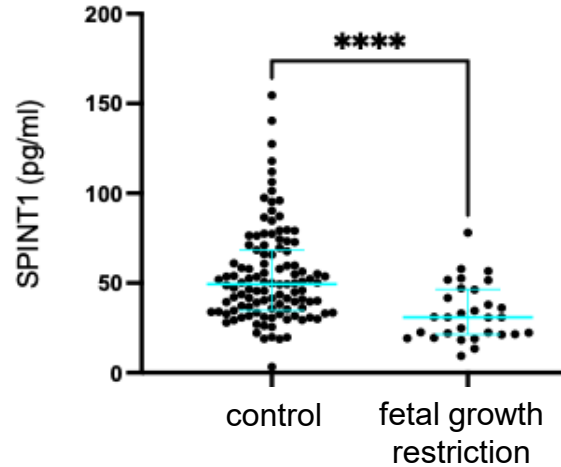
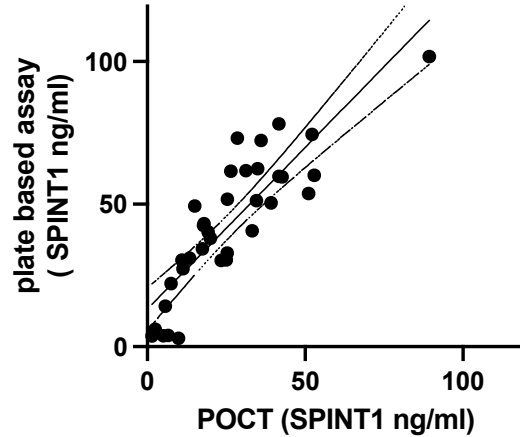


Developing a SPINT1 point-of-care test prototype



Prof Dayong Jin
Dr Jiayan Liao
UTS, Australia

Our SPINT1 point-of-care test prototype



Small blinded
case cohort

42% sensitivity
90% specificity

Ongoing RnD

- Stability of the nanoparticles
- Replace standard curve with 2-point calibrators
- Replicability of the strip tests (batch to batch)

Summary and future work

SPINT1 at 36 weeks can help triage those at risk of FGR

SPINT1 can also help identify babies at risk of adverse outcomes

SPINT1 at 36 weeks can add to ultrasound precision

We have developed a SPINT1 POCT to improve access

Surveying families and healthcare providers

Working to find an industry partner

Acknowledgements

Translational Obstetrics Group

Stephen Tong, Ping Cannon, Vi Nguyen

Mercy Perinatal

Sue Walker, Teresa MacDonald, Danica Idzes, Roxanne Hastie,
Alex Roddy-Mitchell, Natalia Wysocki, Brooke Henshall

Mercy Research Midwife team

Mercy Hospital for Women (MHW) patients, and Pathology, Perinatal Unit, Health Information Services, Birth Suite & Theatre Staff

POPs cohort – Cambridge University

Gordon Smith

Ulla Sovio

Steve Charnock- Jones

Funding

NHMRC

MRFF

ARC

Foresight Health

Mercy Foundation

Stillbirth Foundation

UTS

Dayong Jin

Jiayan Liao

Libing Fu

GOLD 2026

BROADWAY

WEST 35 ST

STARRING:

- Prof Catherine Williamson (Imperial College London, UK)
- Prof Cathy Spong (UT Southwestern Medical Centre, Texas, USA)
- Prof Christoph Lees (Imperial College London, UK)
- A/Prof Andrea Edlow (Harvard Medical School, USA)
- Prof Cathy Cluver (Stellenbosch Uni, South Africa)
- Prof Margherita Turco (Friedrich Miescher Institute, Switzerland)
- Prof Nadia Badawi AM (University of Sydney)
- Prof Kirsten Palmer (Monash University)
- A/Prof Rod Hunt (Monash University)
- Dr Sarah Price (University of Melbourne)

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FEATURING:

- A Special Event: 22-23 Weeks as the New Threshold for Viability.
- Caesar Scar Niche.
- Special Session on Cerebral Palsy.
- A Focus on Birth.
- Should we be precisely timing steroids?
- Journal Club on the Run - The Hottest Papers of 2026.
- Anxiety and Depression in Pregnancy.
- Caring for Pregnant Women with Obesity.
- Preconception Care.
- Timing of Birth for Fetal Growth Restriction

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