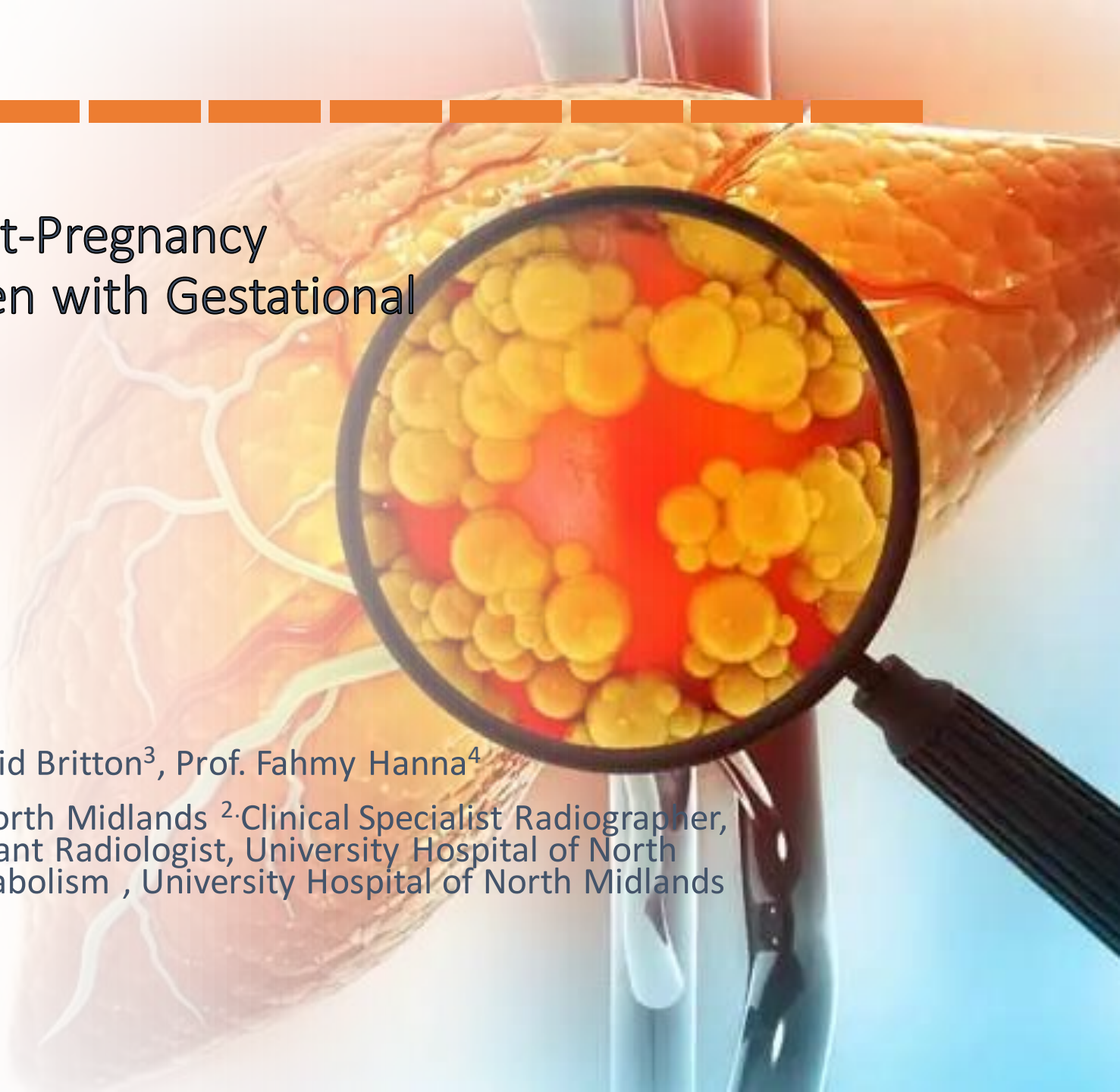
FLiP-GD2 Pilot Study:

Is Fat in the Liver a marker of post-Pregnancy Glycaemic Deterioration in women with Gestational Diabetes?



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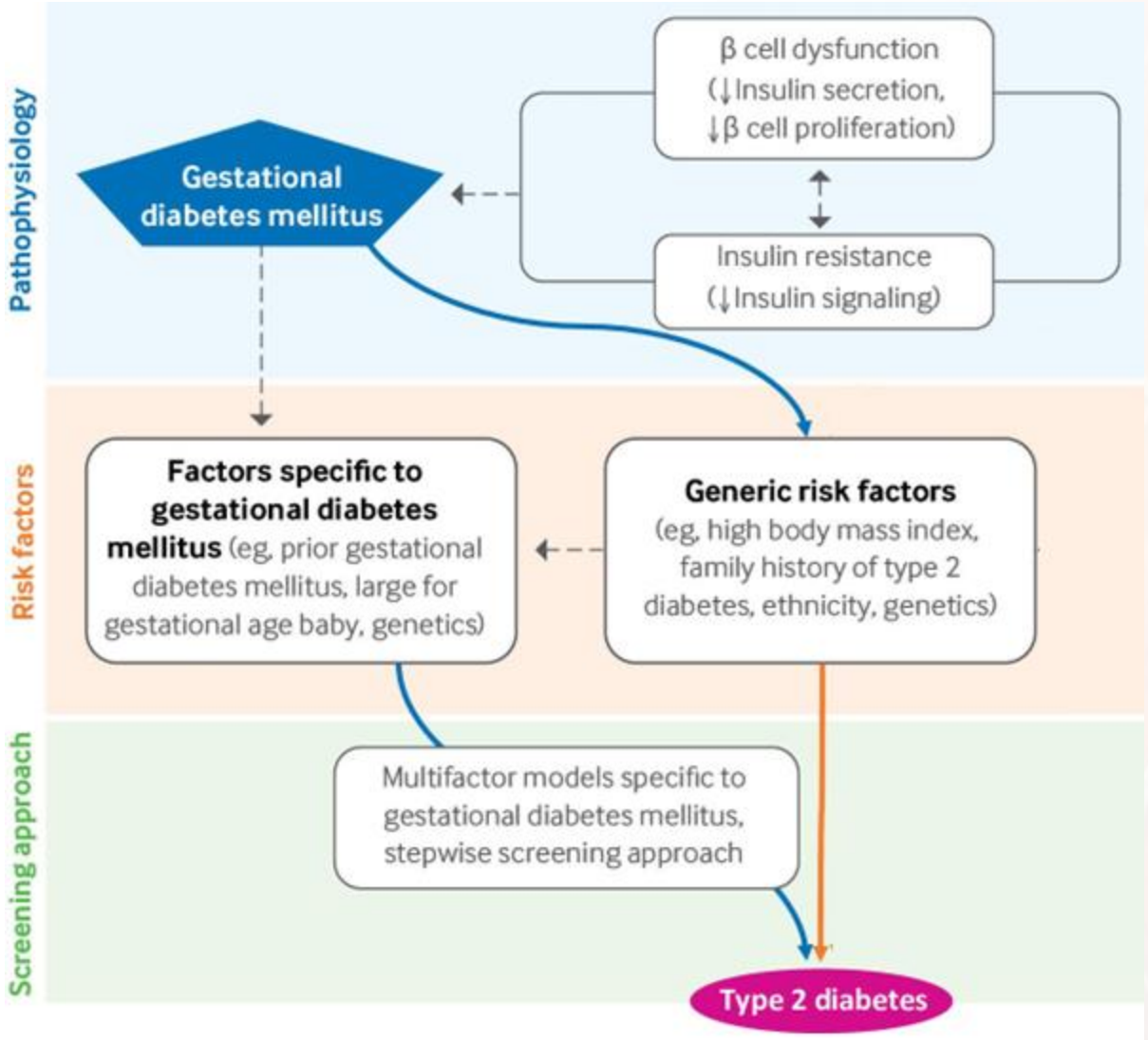
Gestational diabetes mellitus



Background: Gestational diabetes and fatty liver

•**NAFLD is s**trongly associated with obesity, insulin resistance, and T2DM. The general population prevalence: 46%, rising to 74% in T2DM.

•**Relationship Between NAFLD and T2DM**-

- The incidence of T2DM is higher with moderate/severe NAFLD (12.3%) and mild NAFLD (3.4%). 1
- Worsening NAFLD severity linked to the highest T2DM risk (19.2%).
- UK Commission data shows liver disease, including NAFLD, on the rise.
- One-third of overweight individuals have NAFLD; 8% are at risk of fibrosis and have potential for progression to cirrhosis and cancer.

•**NAFLD in Pregnancy**

- Limited assessment of NAFLD in pregnancy and it's link to post-partum glycometabolic status.
- 2002 study, 14/27 (52%) young, obese, non-diabetic women with previous GDM demonstrated NAFLD postnatally that was associated with insulin resistance (3).
- 2011 study on postpartum women, demonstrated NAFLD was more than twice as common in women with previous GDM compared to those without previous GDM (4).

•**Post-Partum NAFLD in Women with Previous GDM**

- NAFLD is twice as common in women with previous GDM.
- It is unclear if NAFLD during pregnancy links to glycaemic abnormalities and insulin resistance post-partum, potentially leading to T2DM.

NAFLD: Non-Alcoholic Fatty Liver Disease, T2DM: Type 2 Diabetes Mellitus,

Study Objectives

	Objectives
PRIMARY	To determine whether the presence of NAFLD during pregnancy in women with gestational diabetes mellitus is a marker of worse metabolic profile (insulin resistance)
SECONDARY	To obtain detailed metabolic profiling in those with NAFLD vs those without NAFLD
	**To validate the performance of Ultrasound guided Fatty Liver Index in women with GDM against MRI as a gold standard as a potential screening tool for NAFLD post-partum**
	**To validate the performance of third trimester ultrasound scan against MRI as a gold standard as a potential screening tool for NAFLD antenatally.**

NAFLD: U/S vs MRI

US

Advantages

- Cost-Effective: Ultrasound is generally more cost-effective compared to MRI.
- Real-time Imaging.
- **Widely Available: Can be done as part of antenatal screening ultrasound**

Limitations

- Operator Dependence.
- Limited Sensitivity: It may **have limited sensitivity in detecting mild to moderate hepatic steatosis.**

MRI

Advantages

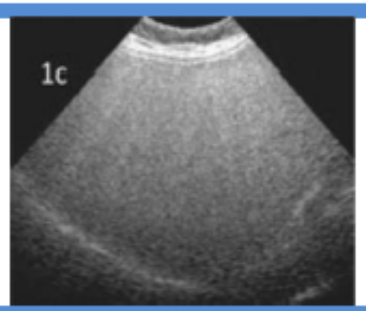
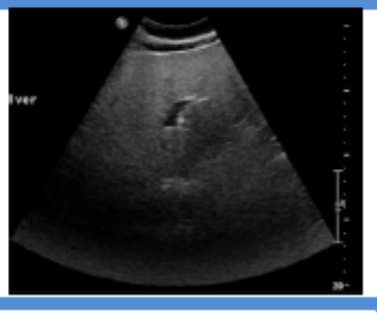
- High Sensitivity: MRI is highly sensitive to the presence of fat, making it **effective in detecting even mild hepatic steatosis.**
- Quantitative Assessment: MRI can provide **quantitative measures** of fat content, such as the proton density fat fraction (PDFF).

Limitations

- Cost and Availability:
- Time-Consuming
- **Not performed in pregnancy.**

Ultrasound: Making the subjective objective

Fatty liver Index

Grading	Criteria	Representative Example
Mild	-Enhanced parenchymal echogenicity -**NORMAL** visualization of the: • Intrahepatic vessel borders • Posterior segments • Diaphragm	
Moderate	- Increased parenchymal echogenicity -**DISTURBED** visualization of the: • Intrahepatic vessels • Posterior segments • Diaphragm	
Severe	- Increased parenchymal echogenicity resulting in - **POOR/ABSENT** visualization of the: • Intrahepatic vessels • Posterior segments • Diaphragm	

Skoczylas, K. and Pawełas, A., 2015. Ultrasound imaging of the liver and bile ducts–expectations of a clinician. *Journal of ultrasonography*, *16*(62), p.292.

Report template:

FliP – GD2

Parenchymal echogenicity: Normal / Enhanced / Increased

Visualization:

Intrahepatic vessels - YES/ DISTURBED/ POOR /ABSENT

Posterior Segments- YES / DISTURBED / POOR / ABSENT

Diaphragm- YES/ DISTURBED / POOR / ABSENT

Steatosis grading: No observable fatty changes / Mild / Moderate / Severe

Methods:

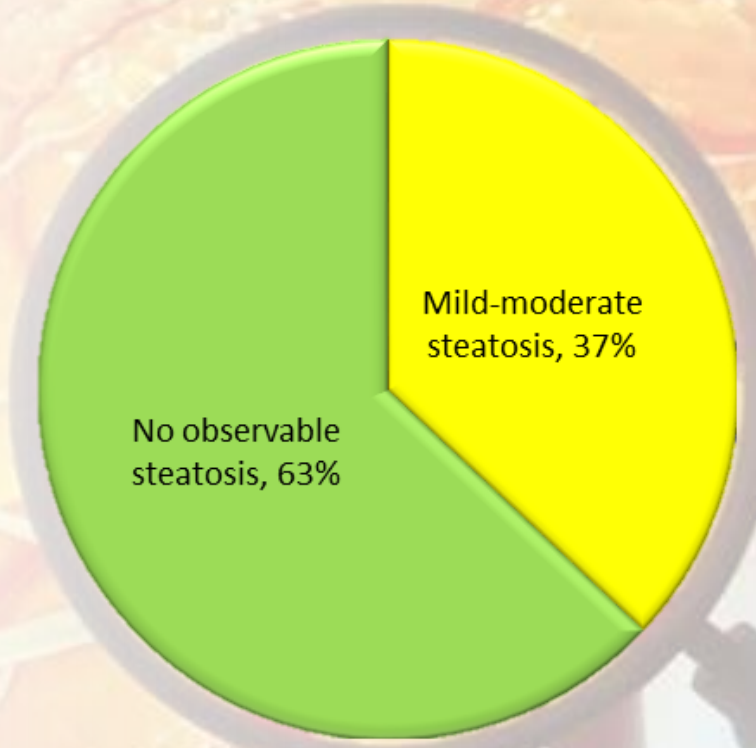
- 27 patients were included in the pilot study between 1st July 2019 to 8th September 2023

- **Inclusion criteria:**
  - Pregnant women aged 18 and above diagnosed with GDM through oral glucose tolerance testing.

- **Exclusion criteria:**
  - Pre-existing diabetes history of liver disease unwillingness to participate.

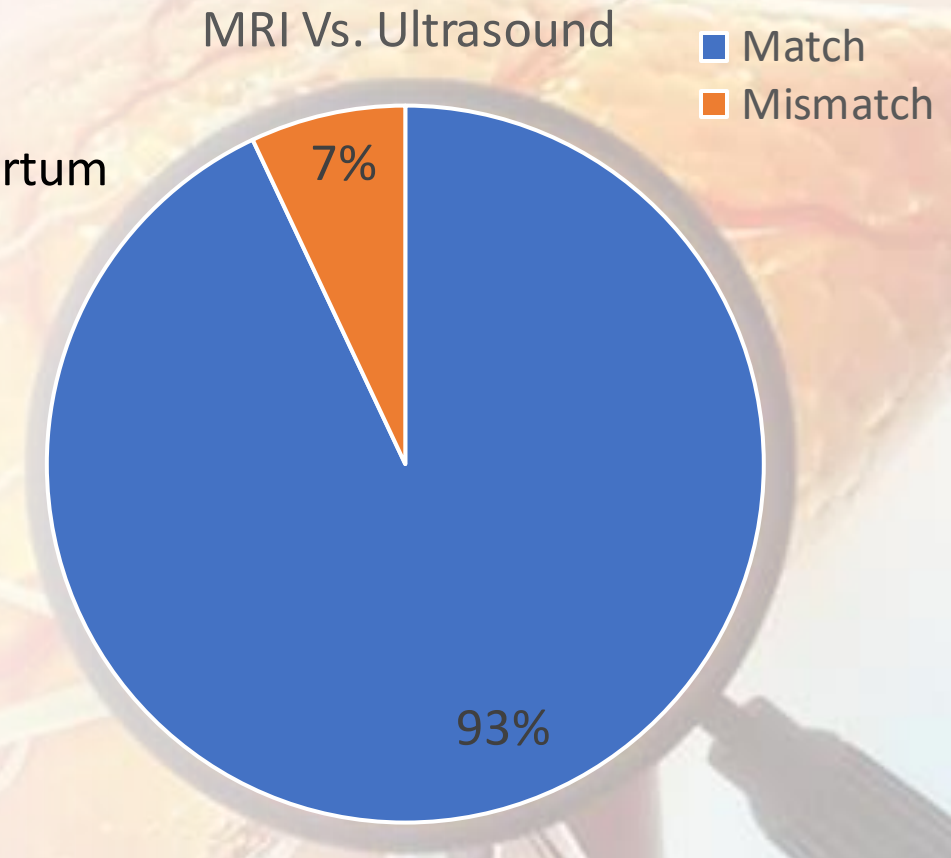
Results: 3rd Trimester Ultrasound Screening

37% of GDM females screened in the third trimester showed positive NAFLD on ultrasound.



Results: Postpartum MRI

- Correlating ultrasound with MRI- 26 patients underwent postpartum MRI
- Correlation coefficient was 0.901 (Strong positive concordance between ultrasound and MRI



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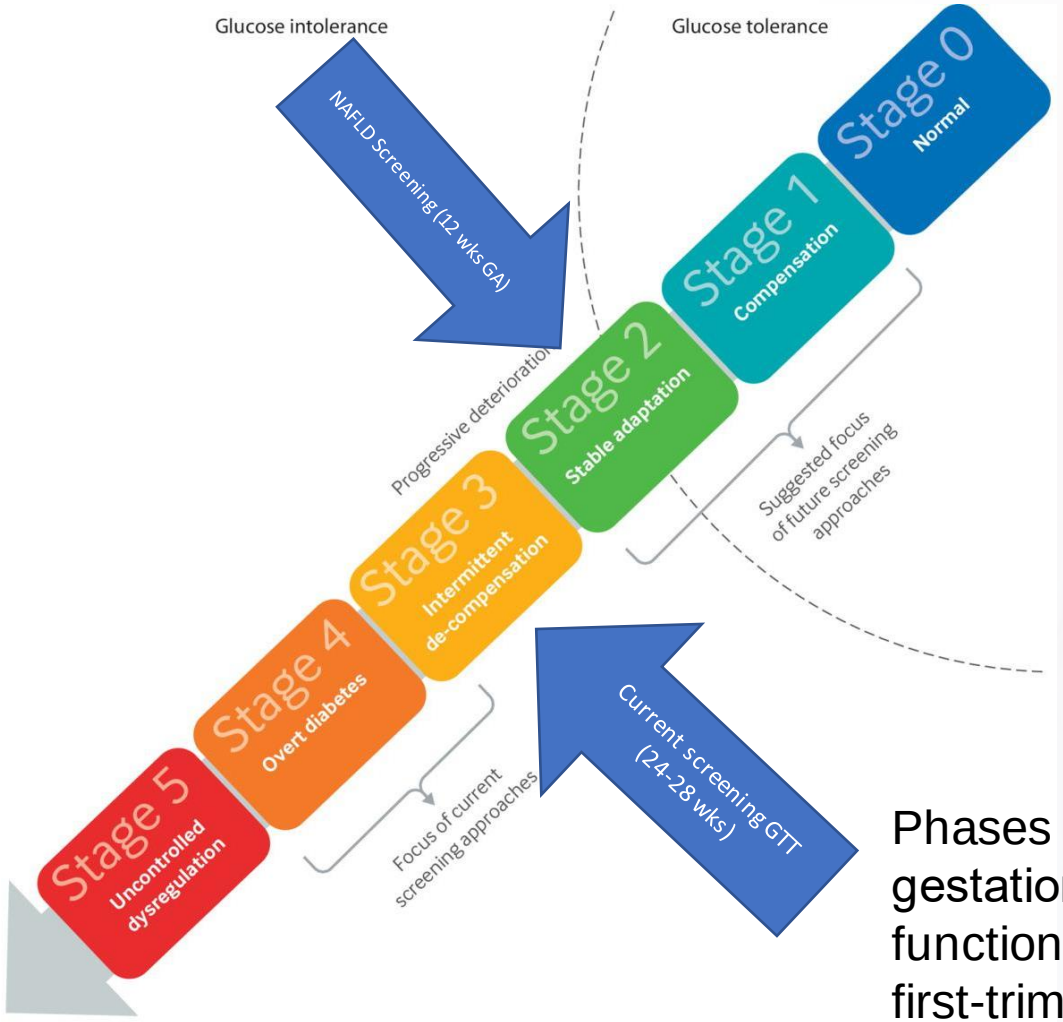

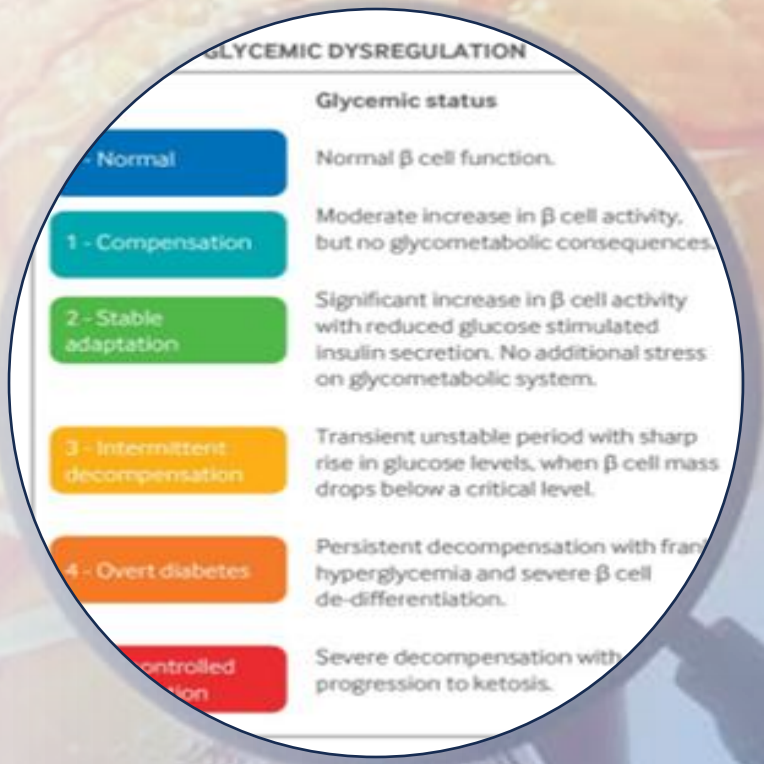

Phases of progressive deterioration in glycaemic status in women with gestational diabetes mellitus in relation to insulin resistance and β cell function. Integrating an NAFLD screening ultrasound into the early 12-week first-trimester ultrasound, instead of the current 24-week gestational age Glucose Tolerance Test (GTT) screening, offers the potential to arrest the progressive deterioration leading to gestational diabetes mellitus.

Conclusion:

This study highlights the potential of antenatal ultrasound as a non-invasive, imaging-focused screening tool for NAFLD in pregnant women with GDM.

The high concordance of U/S with postpartum MRI supports its viability as an antenatal screening tool for NAFLD.

Considering NAFLD as an additional predictor for GDM provides an opportunity for early intervention during routine first-trimester scans→ holding significant implications given that 70% of GDM patients develop diabetes within 10 years postpartum

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