



DR. CHADI FAKIH
IVF CENTER

EP08.35 Principal component analysis identifies distinct domains of fetal cardiac performance structure and remodeling in natural and IVF pregnancies

Younna Mourad^{1,6}, Fadi Fakh^{4,5}, Chadi Fakh^{2,3}

1. Al Hadi IVF Center,
Haret Hreik, Jabal Lubnan,
Lebanon.

2. Al Hadi IVF Center,
Beirut, Lebanon.

3. FM, Université Libanaise,
Beirut, Lebanon.

4. Centre Hospitalier de
Moulins Yzeure, Yzeure,
Auvergne-Rhône-Alpes, France.

5. Hôpital Edouard Herriot,
Service d'urologie chirurgie
de la transplantation, Lyon,
Auvergne-Rhône-Alpes, France.

6. Lebanese International University,
Beqaa Governorate,
Lebanon.



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Topic: Obstetrics



Sub-topic: 05. Fetal heart



OBJECTIVES

- Characterize multidimensional fetal cardiac phenotype using integrated echocardiographic markers.
- Identify maternal and fetal determinants of principal functional and structural domains in natural and IVF pregnancies.



METHODS

- Cross-sectional study: 120 pregnancies
- Variables: stroke volume, ejection fraction, TEI index, McGoon index, heart sphericity index, septal thickness
- HERA Z 20 Samsung machine
- Standardization + median imputation for missing data
- Principal component analysis (PCA) to derive latent cardiac phenotype dimensions
- Associations tested with:



RESULTS

Three principal components explained **71.2%** of the total variance in fetal cardiac phenotype.

1

FIRST COMPONENT

47.9% of variance



Driven by stroke volume and ejection fraction

Global systolic performance domain



Maternal fat mass was the strongest contributor to the systolic domain.



2

SECOND COMPONENT

62.1% of variance

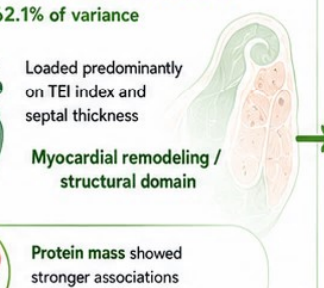


Loaded predominantly on TEI index and septal thickness

Myocardial remodeling / structural domain



Protein mass showed stronger associations with septum thickness.



3

THIRD COMPONENT

61.2% of variance

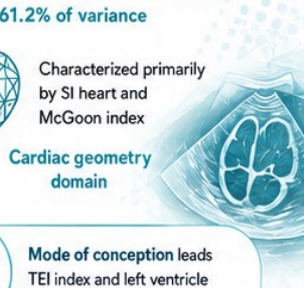


Characterized primarily by SI heart and McGoon index

Cardiac geometry domain



Mode of conception leads TEI index and left ventricle sphericity index.



isuog



Data analytics



Echocardiography



PCA



IVF & Natural pregnancies



CONCLUSIONS



Fetal heart is best understood as a multidimensional phenotype rather than isolated conventional markers.



Maternal and fetal factors relate differently to systolic, structural, and geometric domains.



Findings support phenotype-based assessment of fetal cardiovascular adaptation in IVF and non-IVF pregnancies.

