The need of a third trimester screening

*Impact on fetal programming*

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FIRST TRIMESTER

screening of major pregnancy complications

- Down’s syndrome
- Structural malformations
- Preeclampsia
- IUGR
- Prematurity
screening for PE/IUGR

11-14 wks

early PE/IUGR

late PE/IUGR

COMBINED 1T SCREENING

highly predictive for
EARLY PE/IUGR
DR 60-90%
(PFR 10%)

limited for
LATE PE/IUGR
DR 20-60%
(FPR 10%)

? milder disease heterogeneity (+/- placental disease)

Crispi UOG 2007, Poon Hypertens 209, Scanzochio AJOG 2013, Crovetto UOG 2013
## Importance of Late PE/IUGR

<table>
<thead>
<tr>
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<th>Early-Onset</th>
<th>Late-Onset</th>
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<td><strong>Prevalence</strong></td>
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<td>4-8%</td>
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<td><strong>Maternal Serious Complications</strong></td>
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<td><strong>Cause of Stillbirth</strong></td>
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<td><strong>Fetal Programming</strong></td>
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**Prediction of PE & IUGR**

- Pre-eclampsia
- Preeclampsia + IUGR
- IUGR
Late-onset IUGR (>34w + normal UA Doppler) adverse perinatal outcome in 376 consecutive cases
IMPACT OF ENVIRONMENT

FETAL PROGRAMMING

epigenetics

Fetus

Child

Biological programming and age
1986 Barker (MRC Unit, Southampton, UK):

Coronary heart disease mortality rates

Death rates from Coronary Heart Disease in men 1968-78

Infant Mortality 1901-1910

intrauterine growth restriction
fetal cardiac dysfunction

PRIMARY CARDIOVASCULAR PROGRAMMING

cardiovascular disease in adulthood
hypertension
coronary disease
stroke
obesity
diabetes

FETAL CARDIOVASCULAR PROGRAMMING

impact of mild late IUGR / SGA

Neurocognitive disorders/Learning disabilities
Overall ≥10%
Estimated 2/3 of prenatal origin

Non-specific disorders
5-8%

Attention Deficit Hyperactivity Disorder
2-5%

Autism Spectrum Disorder
0.5-1%

impact of mild late IUGR / SGA

Bayley Score

Satchev, 2012
Figueras 2006-2011
Baschat 2009, 2011
Vohr 2004
Geva 2002-2011
Marsal 00-06
Visser 01-11
fetal programming

IMPACT OF ENVIRONMENT
- placental disease
- prematurity
- infection
- IVF
- twins

OPPORTUNITY FOR CORRECTION
- Fetus
- Child
- Young
- Mature
- Old

coronary disease
hypertension
obesity
diabetes
attention disorders
autism spectrum
Fetus

Child

Problem evident

Functional / structural organ remodeling

IDENTIFICATION OF RISK

INDIVIDUAL BIOMARKERS

INTERVENTION

WINDOW OF OPPORTUNITY

4P medicine
• Predictive
• Preventive
• Personalized
• Participatory
screening for late PE

PE

32-34w

THIRD TRIMESTER APPROACH
maternal OR UtA Doppler OR biomarkers

Detection Rates (for FPR 10%)

Lai et al. Fetal Diagn Ther 2013
(BP, UtA Doppler, sEng)

Chaiworapongsa et al. AJOG 2013
(PlGF, sFlt-1, sEng)

LATE PE
70-75 %
IMPROVING DETECTION: THE DEFINITION OF “RESTRICTION”
IMPROVING DETECTION: THE DEFINITION OF “RESTRICTION”
Birthweight inverse relation with perinatal outcome AND brain-cardiac remodelling

INTEGRATED 3T SCREENING FOR LATE-PREGNANCY COMPLICATIONS
Late-PE, Late-IUGR, Stillbirth
IDENTIFICATION OF RISK

4P (fetal) medicine
INTEGRATED THIRD TRIMESTER
SCREENING FOR THE PREDICTION OF
PERINATAL AND LONG-TERM OUTCOME

Problem evident

Thank you
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towards integrated third trimester screening in pregnancy

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