Perinatal Medicine 2019
9-11 May 2019, Hilton Hotel • İzmir, Turkey

İntrauterin gelişme geriliği erken / geç

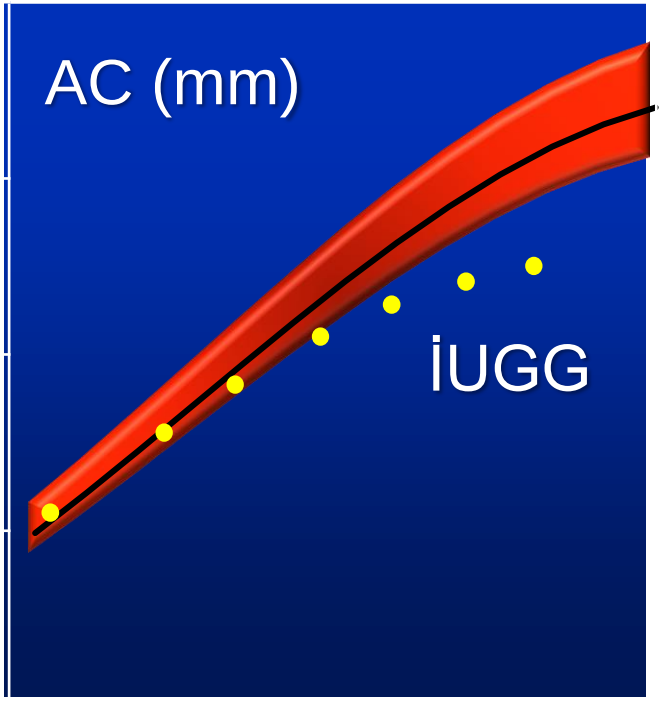
Doç Dr Zeki Şahinoğlu

ANADOLU
In Affiliation with
JOHNS HOPKINS MEDICINE

F E T U S
prenatal

Küçük fetus – ayırıcı tanı

- Yanlış SAT
- Fetal anomali
- SGA
- Fetal büyüme kısıtlılığı (İUGG)



Gebelik haftası

İUGG / SGA – ayırıcı tanı

- Fetal anomalinin ekarte edilmesi
- Ekstrensek nedenlerin ekarte edilmesi
  (enfeksiyon, uterin anomali gibi)

Perinatal morbidite / mortalite Fetal kayıp riski Doppler (fetal adaptasyon) **İUGG** Plasental yetmezlik	Perinatal outcome normal Fetal kayıp riski yok Doppler normal **SGA** Yapısal / diğer

IUGR vs. SGA: yönetim / izlem farklı

İUGG / SGA – ayırıcı tanı

İUGG:

- Perinatal mortalite →120/1000
  - Perinatal mortaliteye yol açan nedenlerde 2. sırada
- Ölü doğum → % 40 İUGG
- İntrapartum asfiksi oranı → % 50
- Erken−uygun perinatal tanı + yaklaşım → PNM/M ↓↓

İUGG – tanı

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

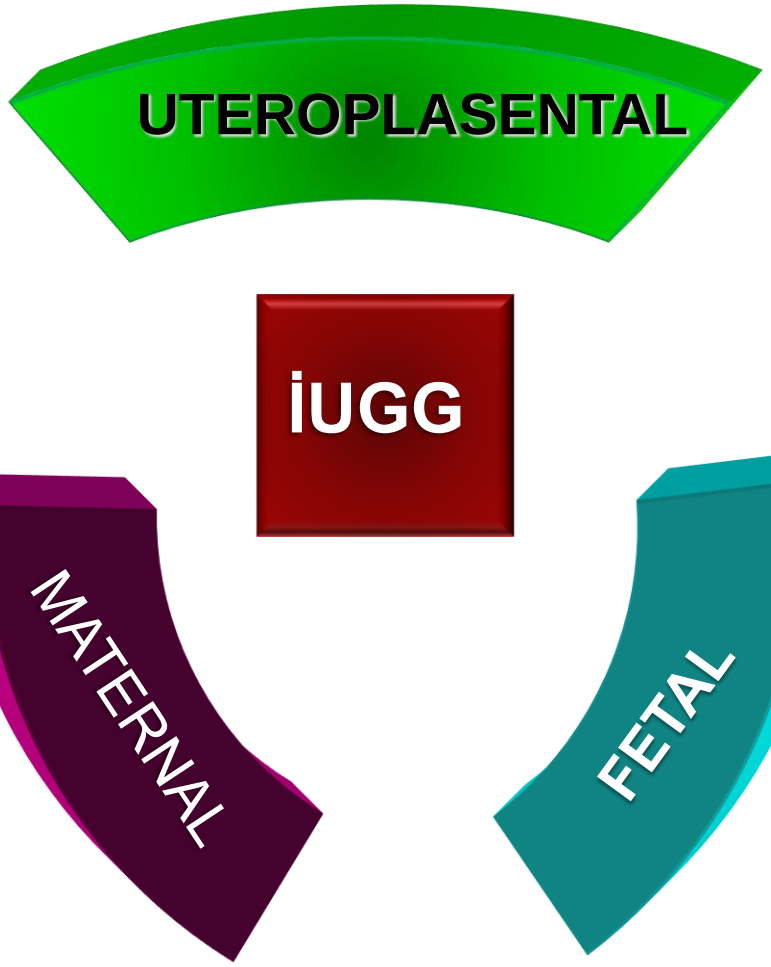
A Uniform Management Approach to Optimize Outcome in Fetal Growth Restriction

Seravalli V, Baschat AA, Obstet Gynecol Clin North Am 2015

Table 1
Implications of diagnostic cutoffs for management of fetal growth restriction

Diagnostic Cutoff	Advantage	Disadvantage
AC <10th percentile	Highest sensitivity for FGR	Lowest specificity for FGR
SEFW <10th percentile	Acceptable sensitivity for FGR	Unnecessary monitoring of normal fetuses
SEFW <3rd percentile	Greater specificity for FGR	Less severe FGR is missed
SEFW <10th percentile & abnormal UA Doppler	Greatest specificity for FGR at risk for adverse outcome	Misses term FGR with normal UA Doppler
SEFW <10th percentile with abnormal UA or MCA	Greatest specificity for FGR at risk for adverse outcome across all gestational ages	Requires interpretation of umbilical and cerebral Doppler studies

İUGG – etyoloji



uteroplas perf ↓
kronik HT
PE
myom
konn. doku hast
uter. anom

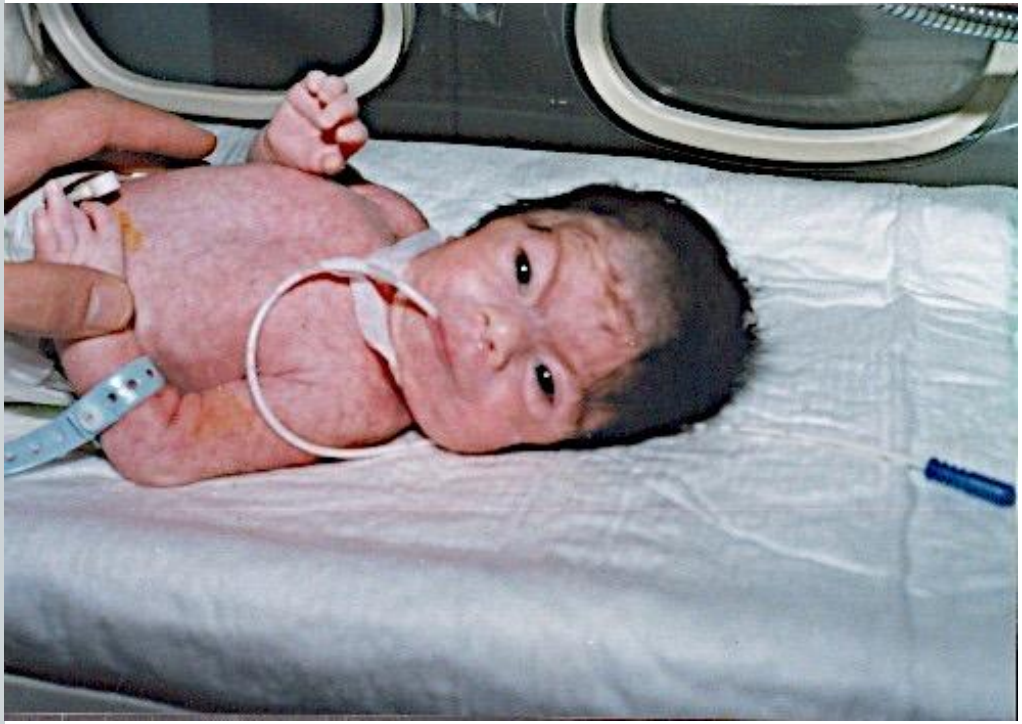
previa / ablasyo
kr inflam
tromboz / infarkt
plasentit / vaskülit
ödem
koryoamnionitis
koranjioma

DM
kalp hast
akciğer hast
böbrek hast
anemi
ilaç kullanımı
sigara, alkol

enfeksiyon
kalp anomalileri
malformasyon
genetik

İUGG – olgu 1

- 21 y, G1 P0
- SAT → 26 hafta
- USG → 23 hafta
- Doppler normal
- AFI normal
- Patolojik u/s bulgusu yok
- Kordosentez: 46, XY
- Fetal seroloji negatif
- Karar: Yakın izlem

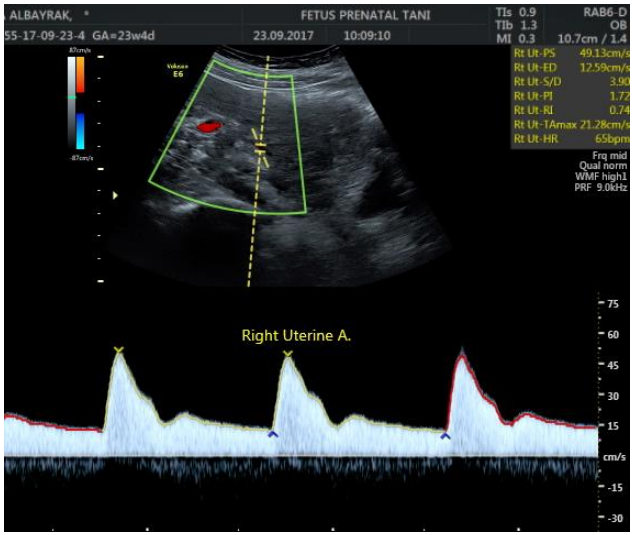


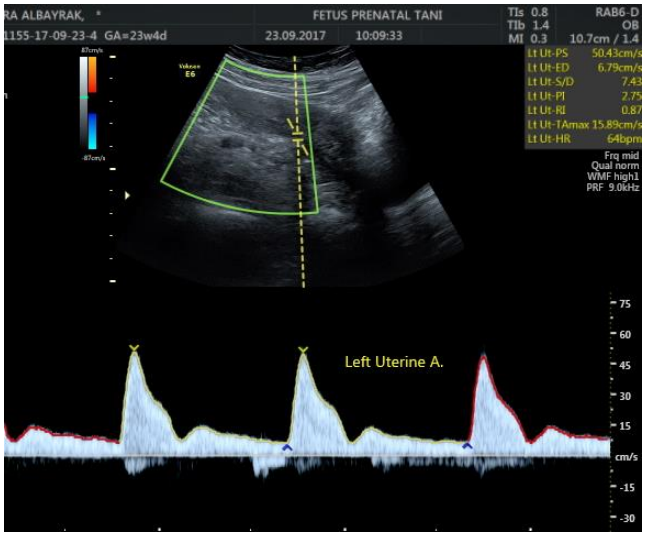
Cornelia de lange

İUGG – olgu 2

Maternal - Fetal Tıp ve Perinatoloji Derneği
Türkiye
23-06-1998

G 1
IVF
SAT 23 hf
USG 20 hf
Amnion normal
Anatomi normal
Plasenta normal
Bilateral notch, PI
UA / ARED, RF
AC < % 1





İUGG – olgu 2

SAT 25 hf

USG 22 hf

Oligohidramnios

Plasenta ödem

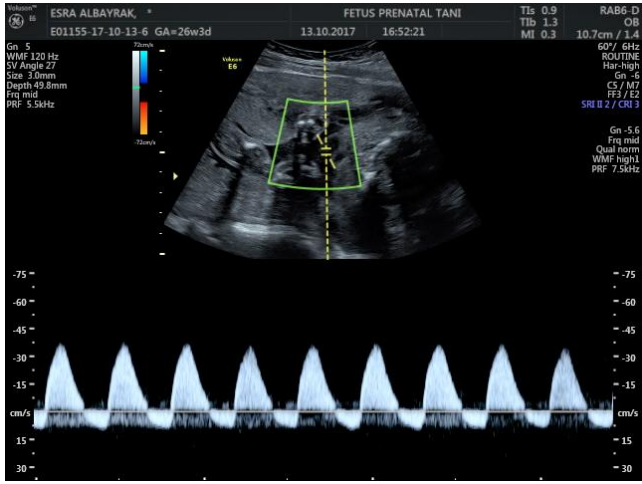
Hiperekojen barsak

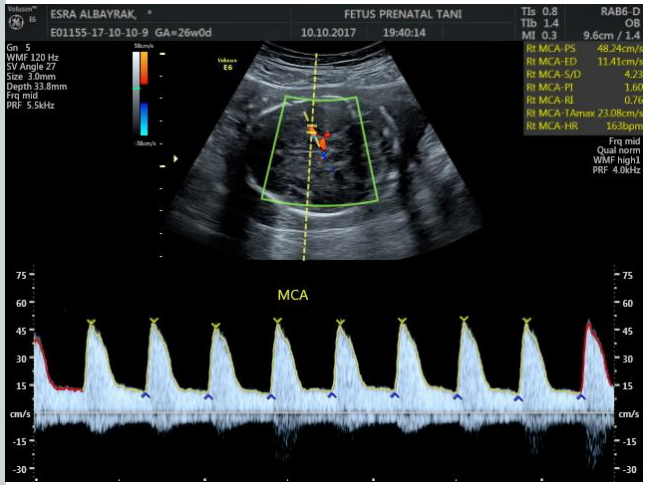
UA / AREF

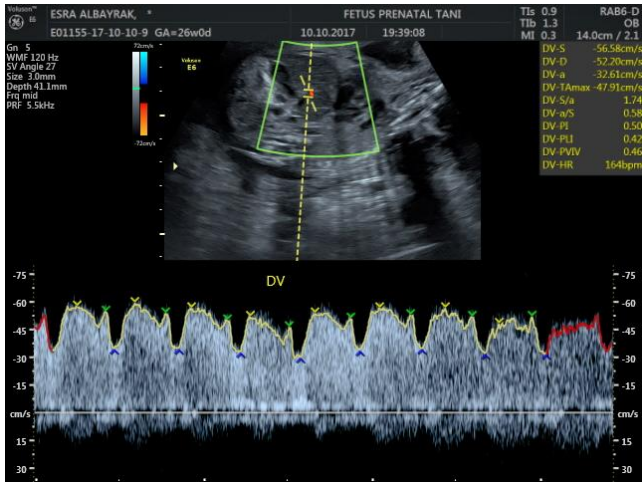
MCA PI

AC < % 1

DV normal

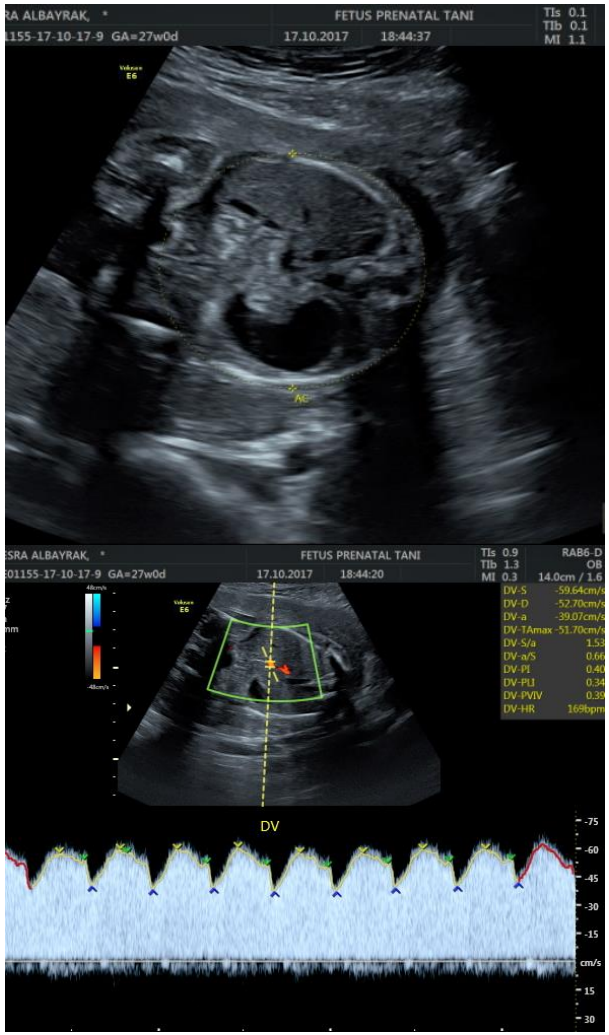


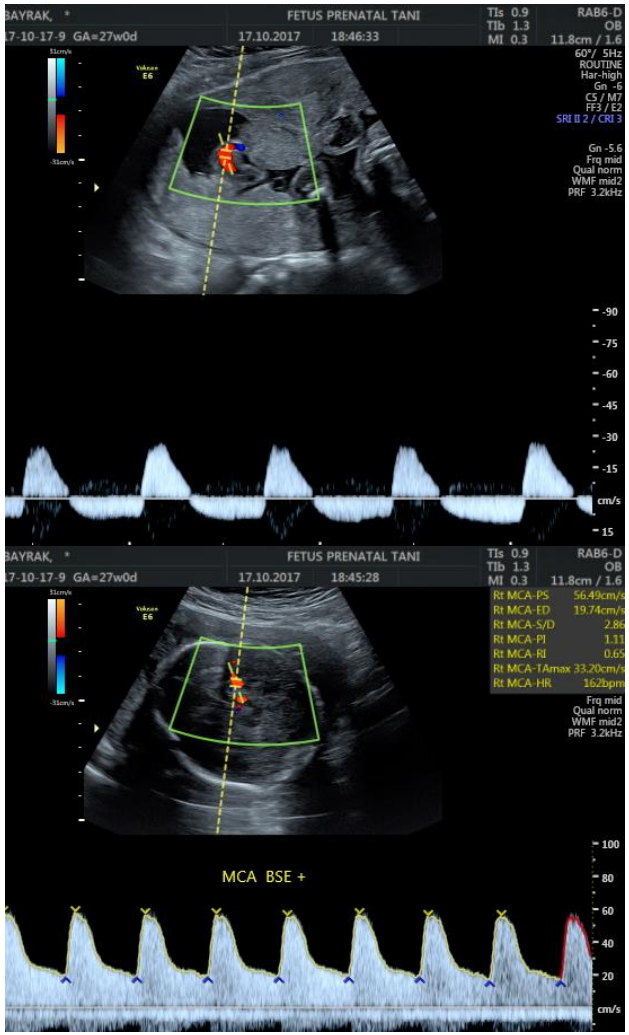




İUGG – olgu 2

SAT 27 hf
USG 22 hf
Oligohidramnios ↑
Plasenta ödem ↑
Hiperekojen barsak ↑
UA / AREF
MCA PI ↑
AC < % 1
DV normal
+ Preeklampsi
+ Dekolman
Neonatal kayıp





İUGG – olgu 3

SAT 21 + 5 hf

USG 20 + 3 hf

Amnion normal

Sirkumvallat plasenta

Hiperekojen barsak

UA / ADEF

MCA PI normal

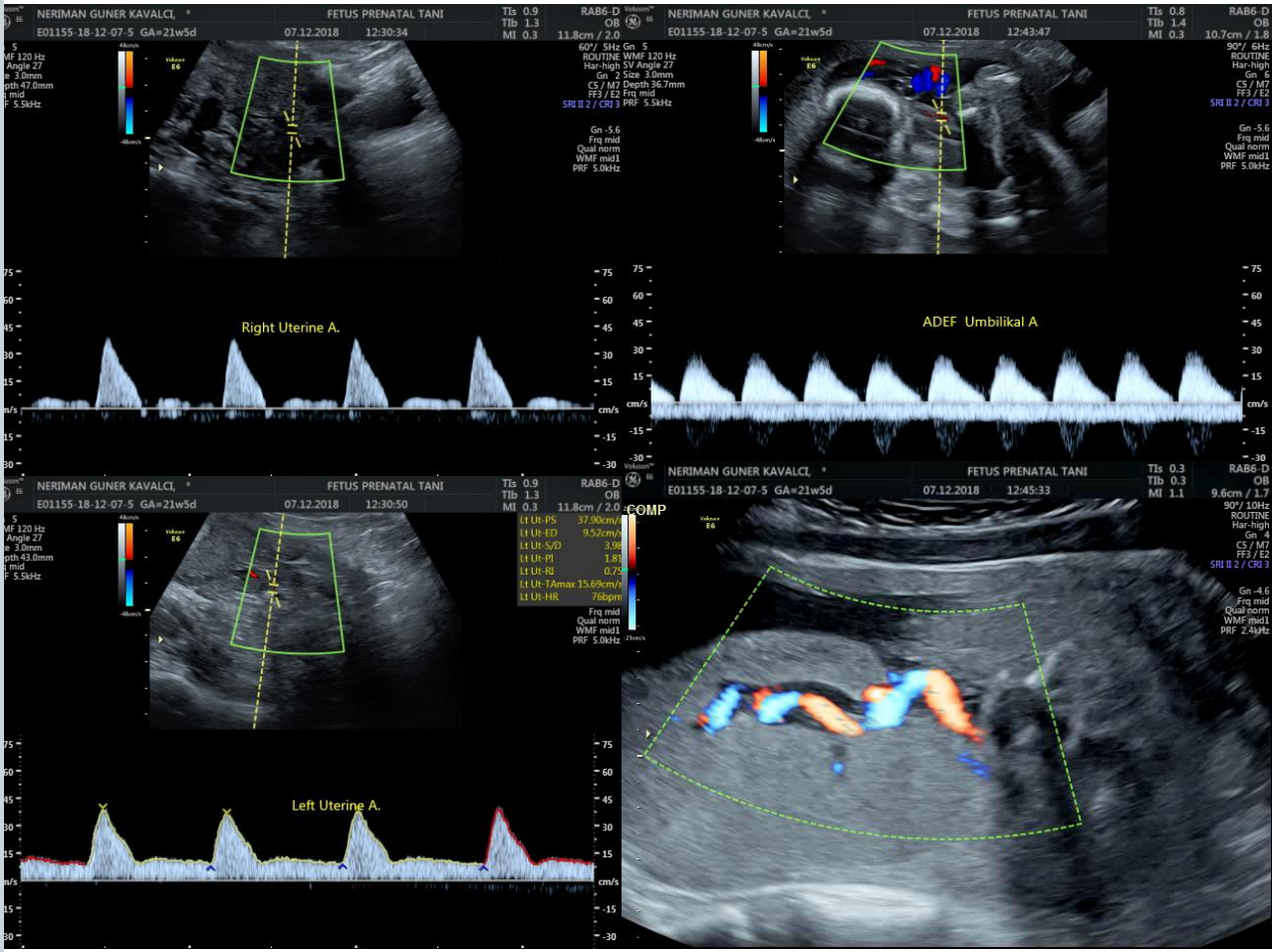
AC 21 + 1

DV normal

27. hafta:

+ Preeklampsi

+ Fetal kayıp



İUGG – olgu 4

31 y, G3 P1 A1 Y1

SAT → 30+6 hafta

USG → 25+5 hafta

Oligohidramnios

UA → AEDF + RF

MCA → PI ↑

DV → PI ↑

İUGG – etyoloji

uteroplas perf ↓

PLASENTA

myom
konn. doku hast
uter. anom

UTEROPLASENTAL

previa / ablasyo
kr inflam
tromboz / infarkt
plasentit / vaskülit
ödem
koryoamnionitis
koranjioma

Plasenta anomalileri / patolojileri

DM
kalp hast
ak
bö
an
ila
sigara, alkol

- farklı klinik tablo
- farklı neonatal kompozit morbidite

enfeksiyon
kalp anomalileri
malformasyon
genetik

İUGG – etyoloji

Plasenta anomalileri

- Plasental dekolman
- Plasental infarkt
- Sirkumvallat plasenta
- Hemanjiom, korioanjiom
- Velamentöz veya marjinal kord insersiyonu

Defining early vs late fetal growth restriction by placental pathology
Amir Aviram et al.
Acta Obstet Gynecol Scand. 2019

İUGG – etyoloji

Fetal vasküler malformasyon = fetal trombotik olaylar

- Vasküler lezyonlar
  - koryonik tabakada tromboz
  - stem villöz hücrelerde artış
- Villöz değişiklikler
  - hipovasküler / fibrotik / avasküler villi yapısı

34. hafta sonrası gelişen geç III. trimester İUGG olgularında sık gözlenen plasenta patolojileri

Kronik villitis

- VUE (villitis unknown etiology)
- Villöz matürasyon bozukluğu

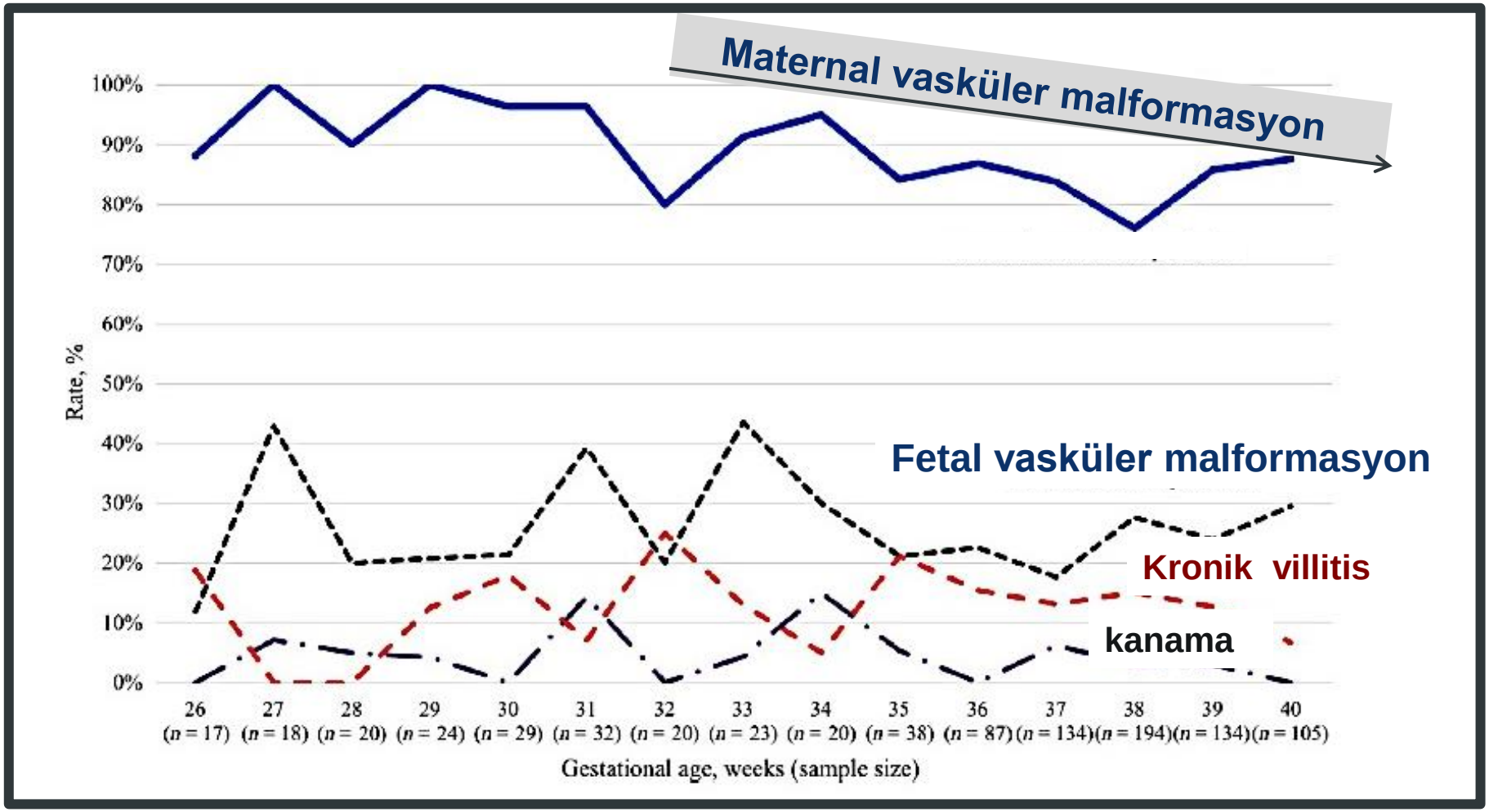
William Mifsud Neil J. Sebire. Fetal Diagn Ther 2014

İUGG – etyoloji

Plasental perfüzyon bozukluğu:

- Fetal vasküler malformasyon
- Villöz anomaliler: kr.villitis, villöz matürasyon bozukluğu
- Plasental kanama
- Maternal vasküler malformasyon

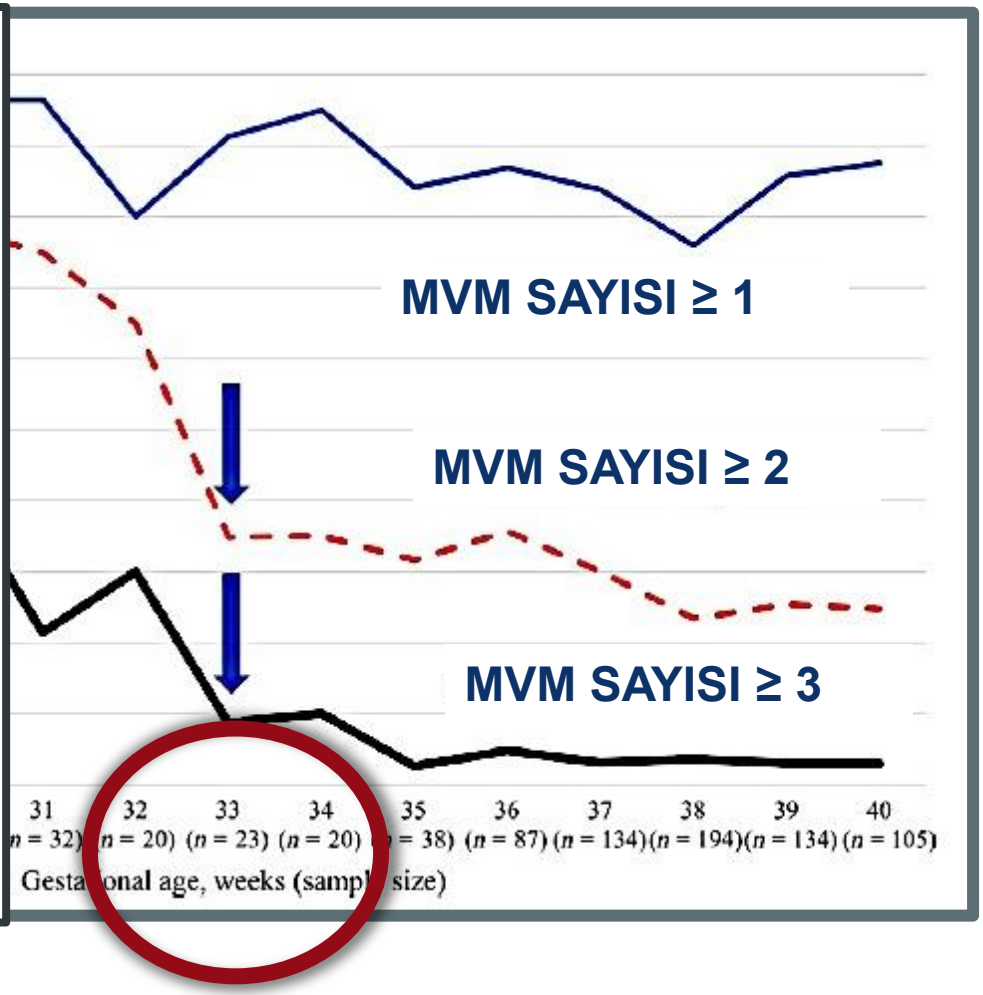
İUGG – etyoloji



Amir Aviram et al.
Acta Obstet Gynecol Scand. 2019

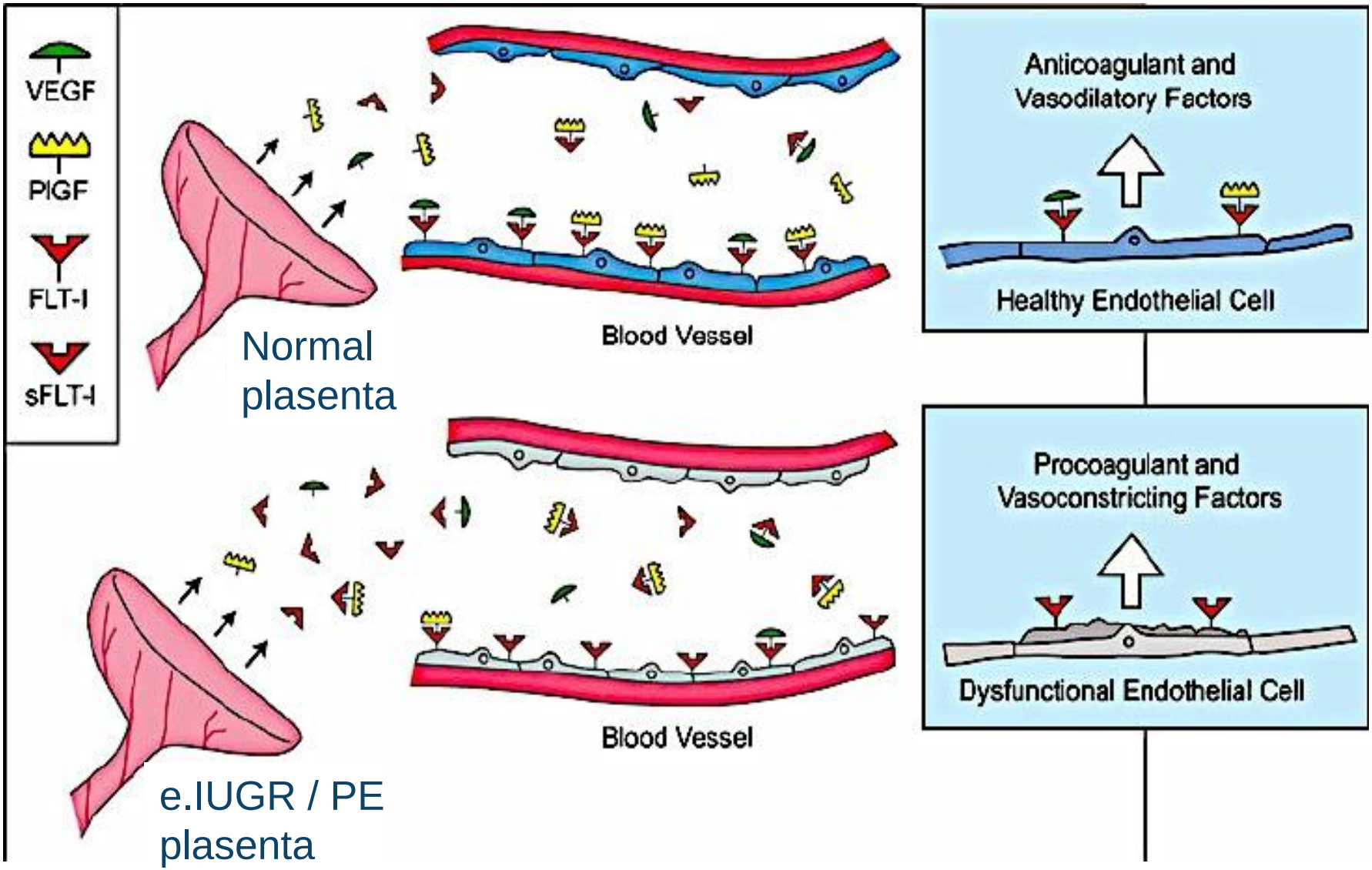
İUGG – etyoloji

MVM (lezyon ♯)	> 33.hf
n ≥ 1	% 89
n ≥ 2	% 33
n ≥ 3	% 5

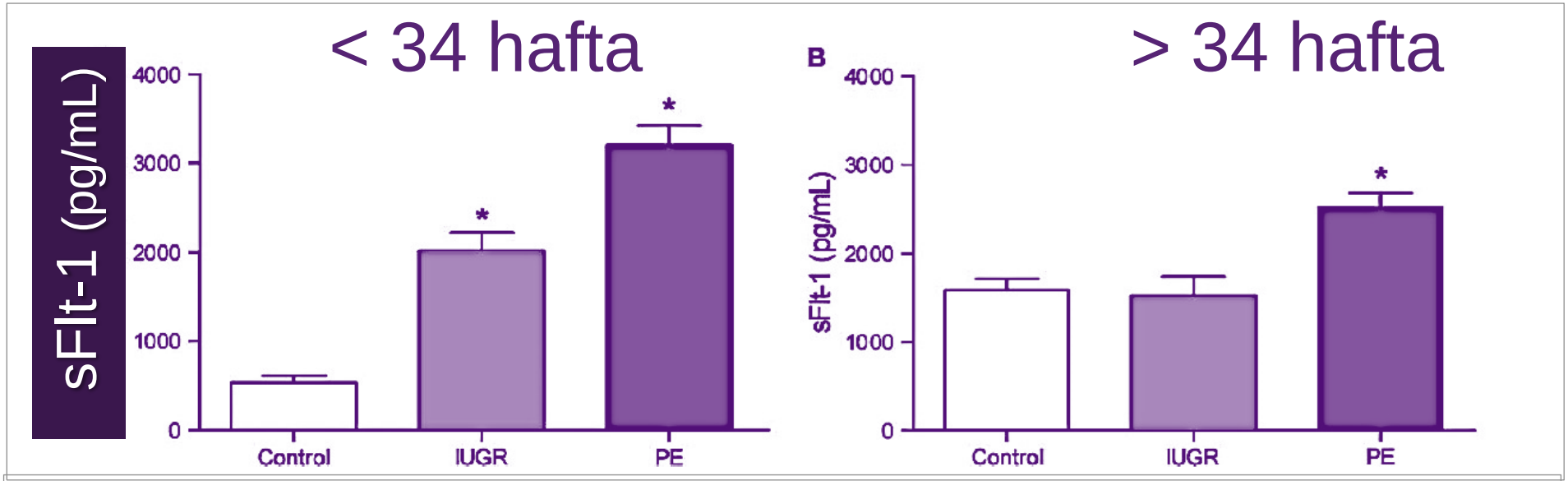


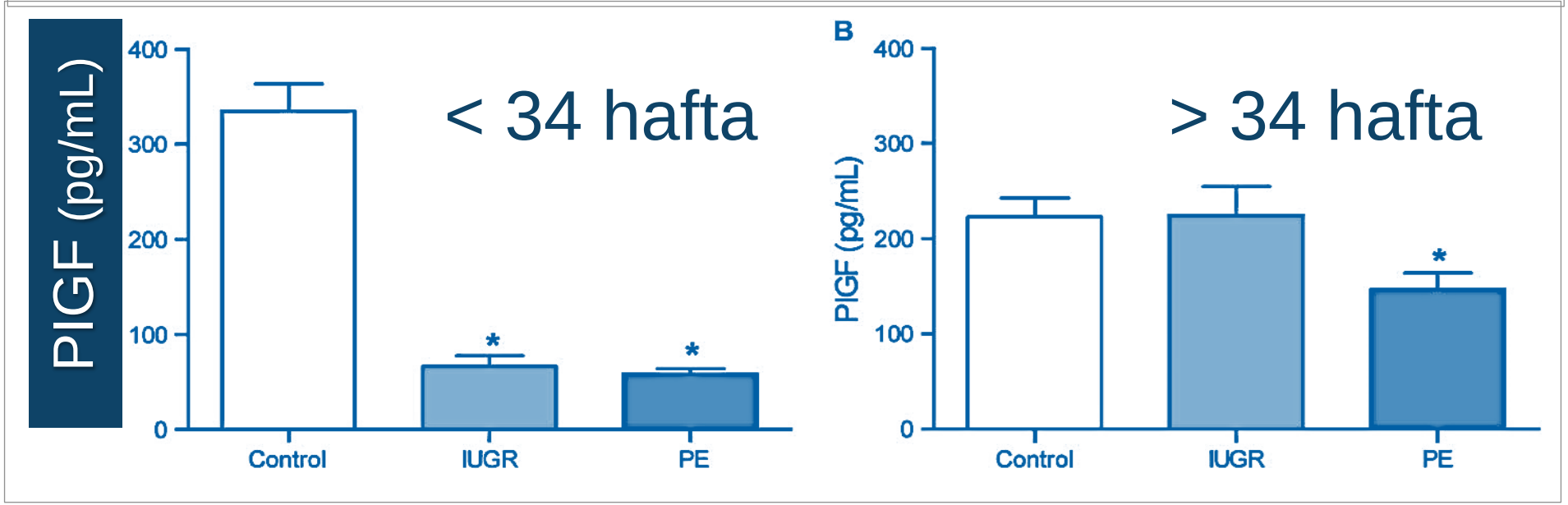
Amir Aviram et al.
Acta Obstet Gynecol Scand. 2019

İUGG – etyoloji



İUGG – etyoloji



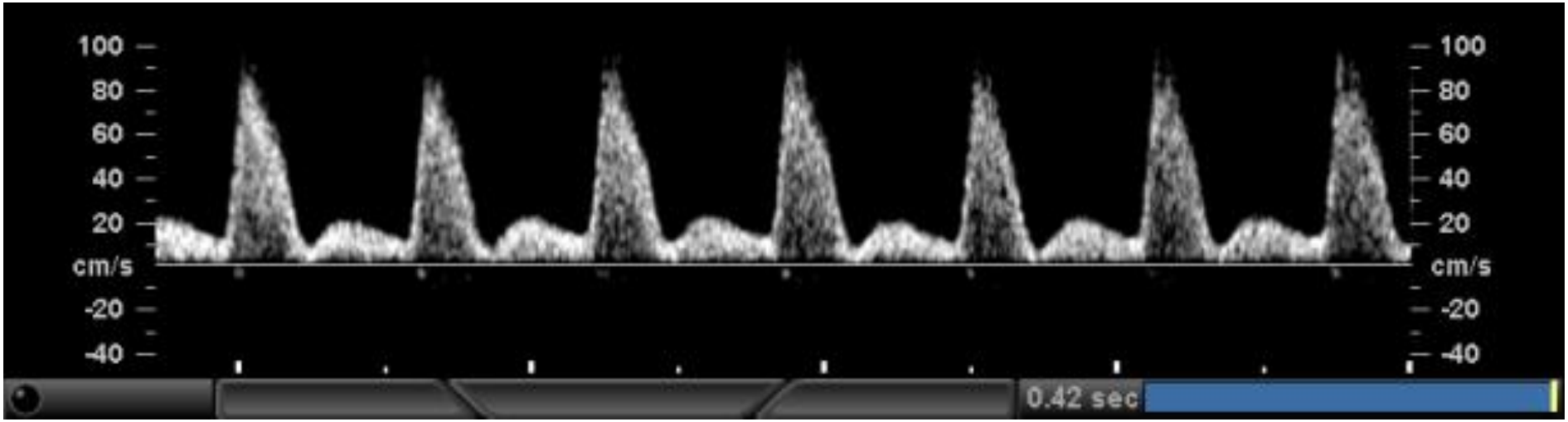


İUGG – etyoloji

erken / geç İUGG

11 – 14 hafta

patolojik uterin arter Doppler % 94 / % 26



İUGG

Perinatal mortalite / morbidite

- Plasenta bulguları
- Doppler bulguları
- Klinik seyir
- Doğum haftası

Farklı İUGG klinikleri

ERKEN İUGG	GEÇ İUGG
32 – 34 hafta	

İUGG: erken / geç

Plasental sendrom

Defektif plasentasyon

IUGR — PE

GEÇ İUGG

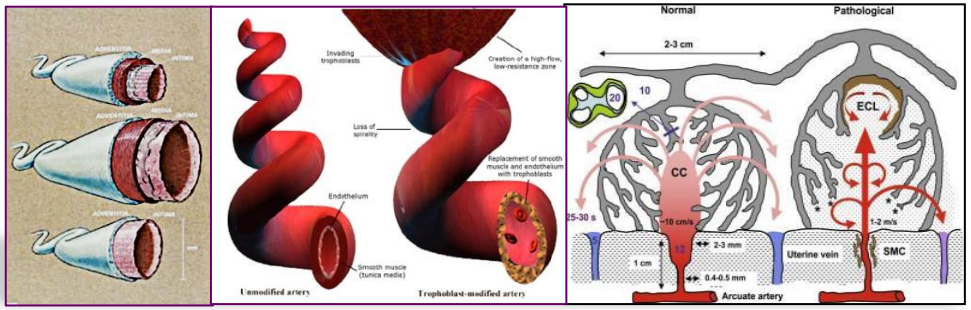
Problem: tanı

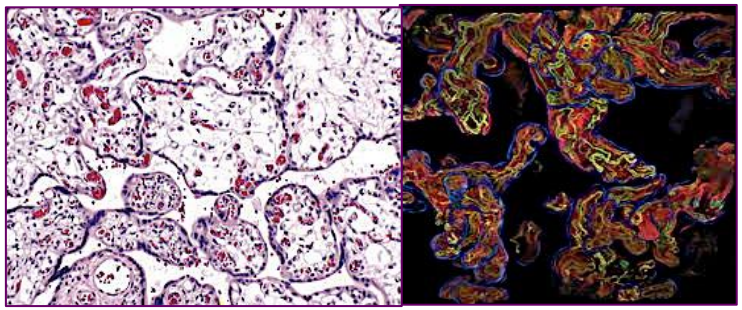
Plasental sorun +

Hafif hipoksi, santral kardiovasküler adaptasyon (+)

Hipoksik ortam (−)

Mortalite düşük, nöromorbidite





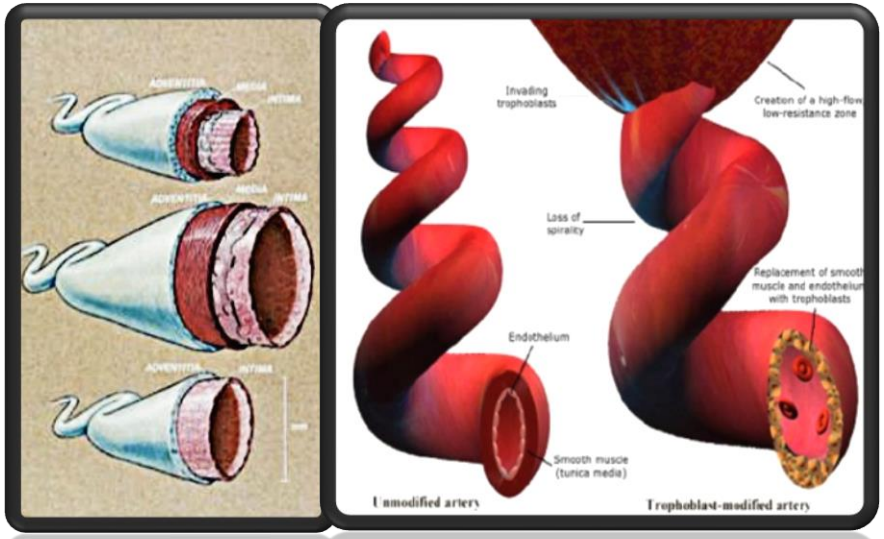
Erken İUGG

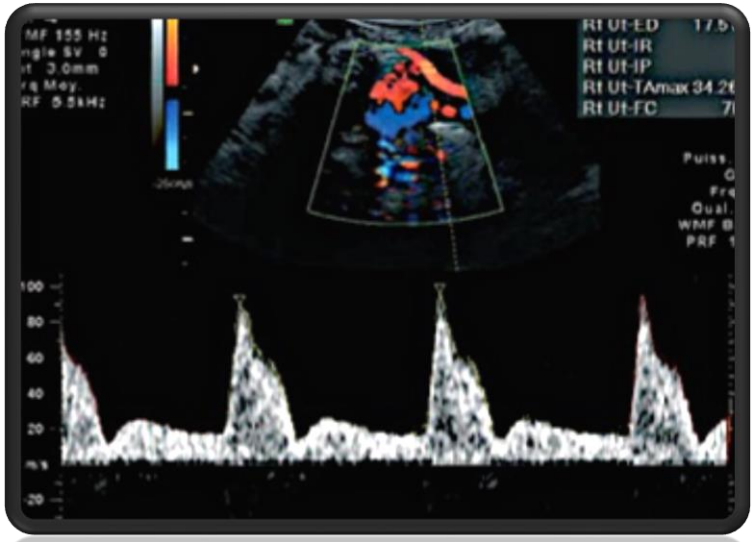
Problemler

Erken İUGG – uterin arter

11-14 hf uterin a. doppler: uteroplasental hipopoperfüzyon
Erken IUGG sensitivite % 39,2 spesifisite % 93,1

- PE
- Dekolman
- Fetal kayıp
- Preterm doğum

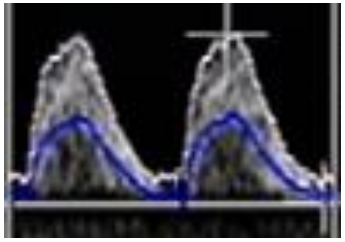


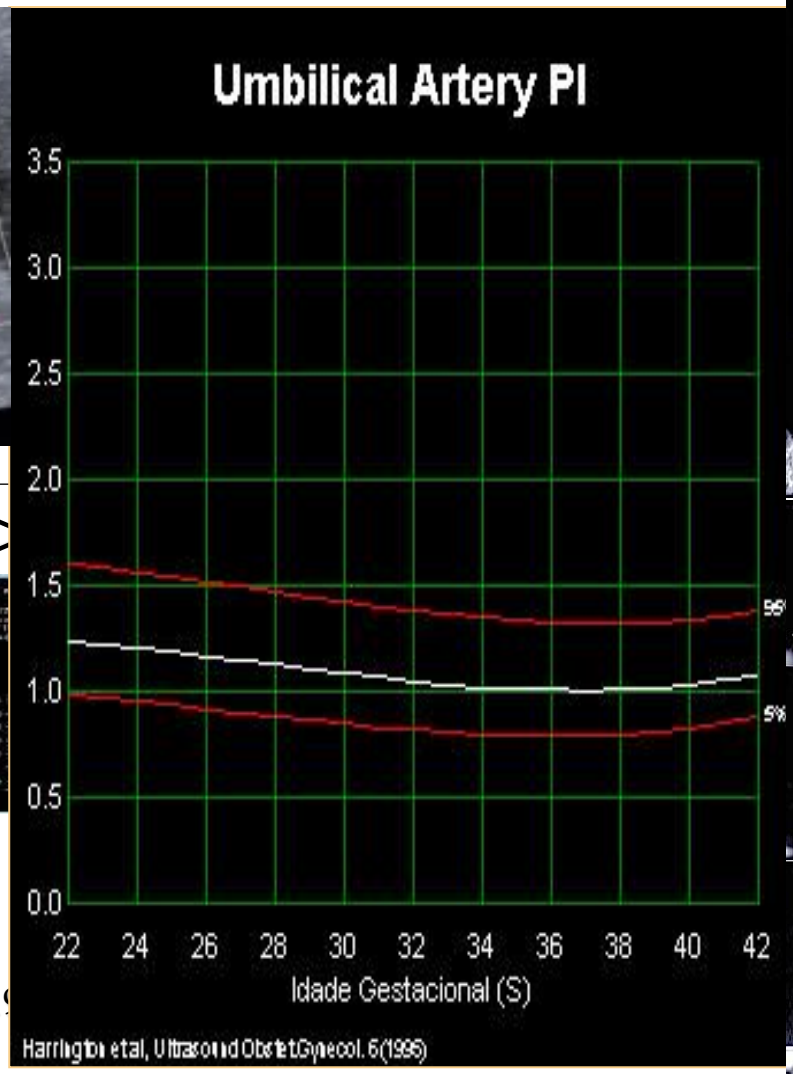


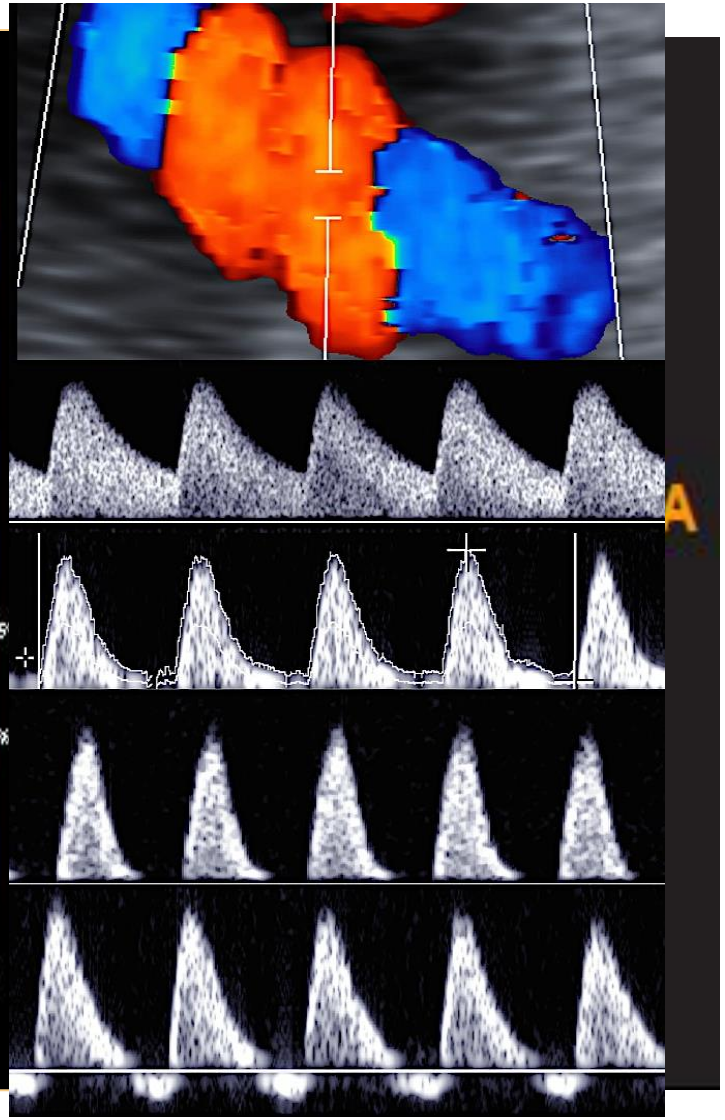
Cosmi at al, Am J Hypertension 2016

Erken İUGG – umbilikal arter

>%30







Giles WB et al. BJOG1

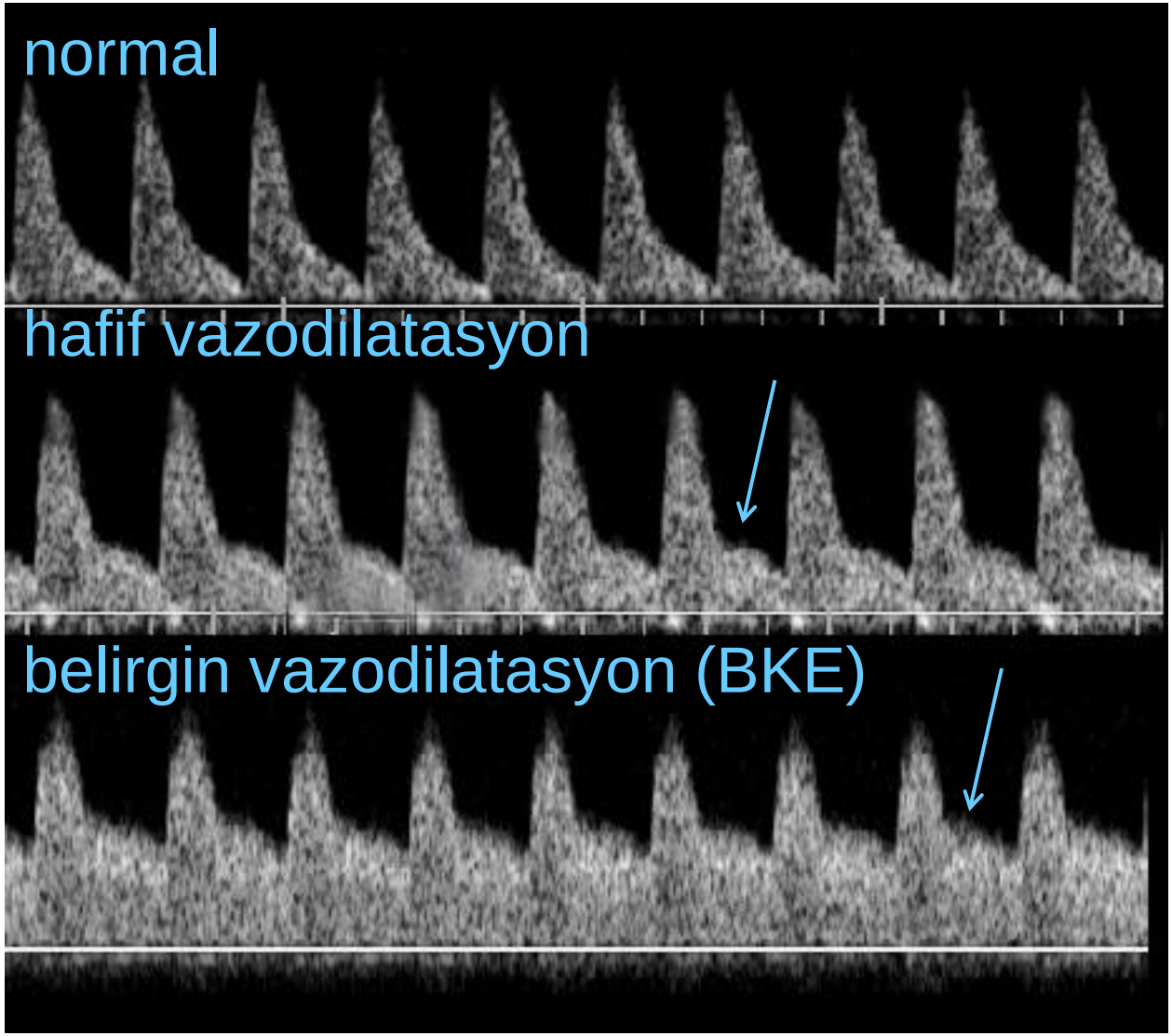
Erken İUGG – MCA

sistemik kardiovasküler adaptasyon (+)

Erken İUGG – MCA

Normal oksijenizasyon

Hipoksi



Erken İUGG – CPR

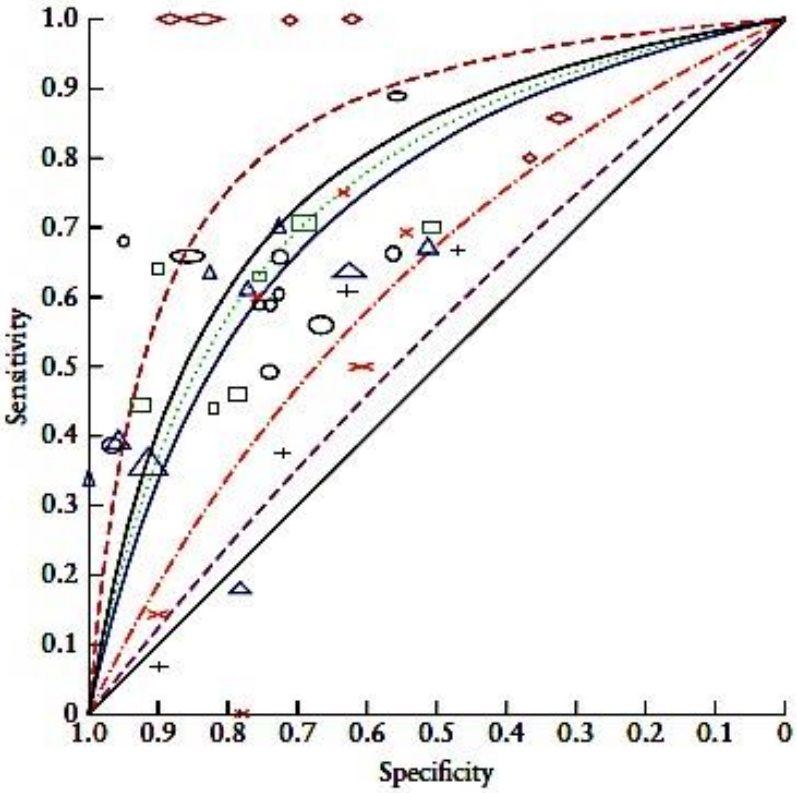


Figure 3 Summary receiver–operating characteristics curves of cerebroplacental ratio for predicting composite of adverse perinatal outcomes (○, ——), perinatal death (◇, – – –), Cesarean delivery for non-reassuring fetal status (□, ·····), admission to neonatal intensive care unit (△, ——), 5-min Apgar score < 7 (×, –·–·) and neonatal acidosis (+, – – –) in singleton pregnancies with fetal growth restriction suspected antenatally.

Erken – İUGG

- perinatal kayıp öngörüsü ✓
- perinatal sonuç öngörüsü ↓

Geç – İUGG

- UA Doppler normal olabilir
- CPR yanıltabilir

Erken İUGG – D.venosus

- Venöz Doppler arteriyel sistemden sonra bozulur

Pulsed Doppler örneği 0.5-1 mm

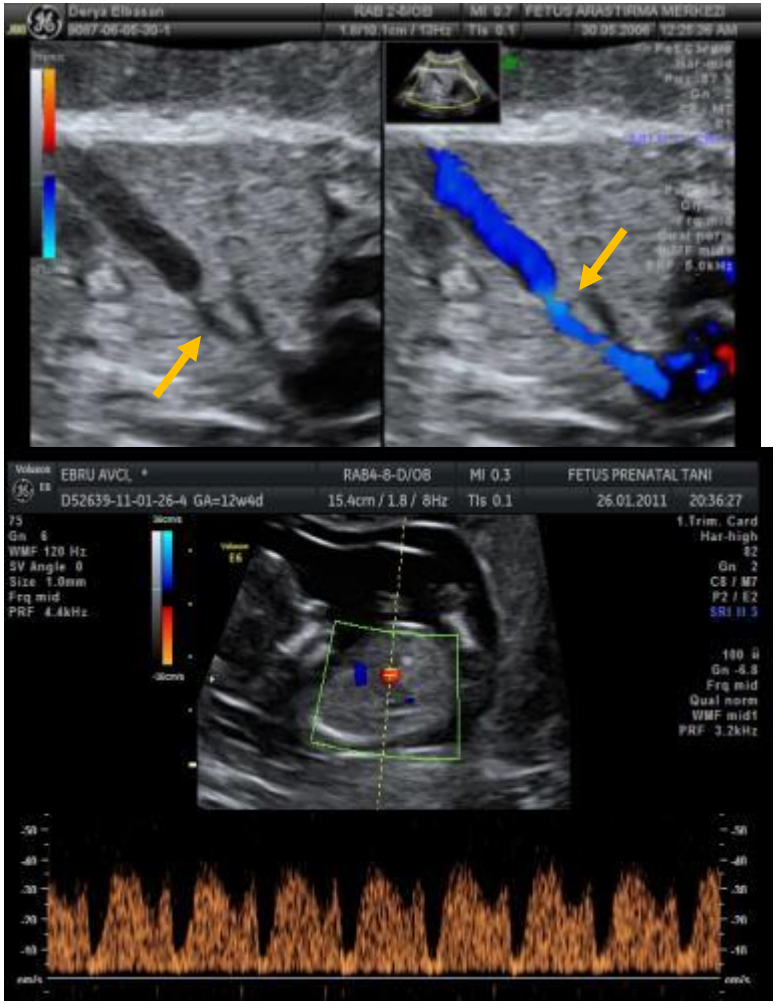
insonasyon açısı < 30 derece

Düşük filtre (50-70 Hz)

Süpürme hızı (2-3cm/sn)

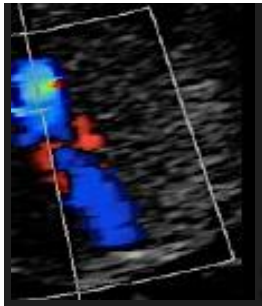
Fetal hareket ve solunumun olmadığı dönemlerde

- Ventriküler fonksiyon ve sağ kalp kompliansı azalmasını yansıtır
- Anormal DV = myokardial İskemi, asidemi ve kötü perinatal akibet



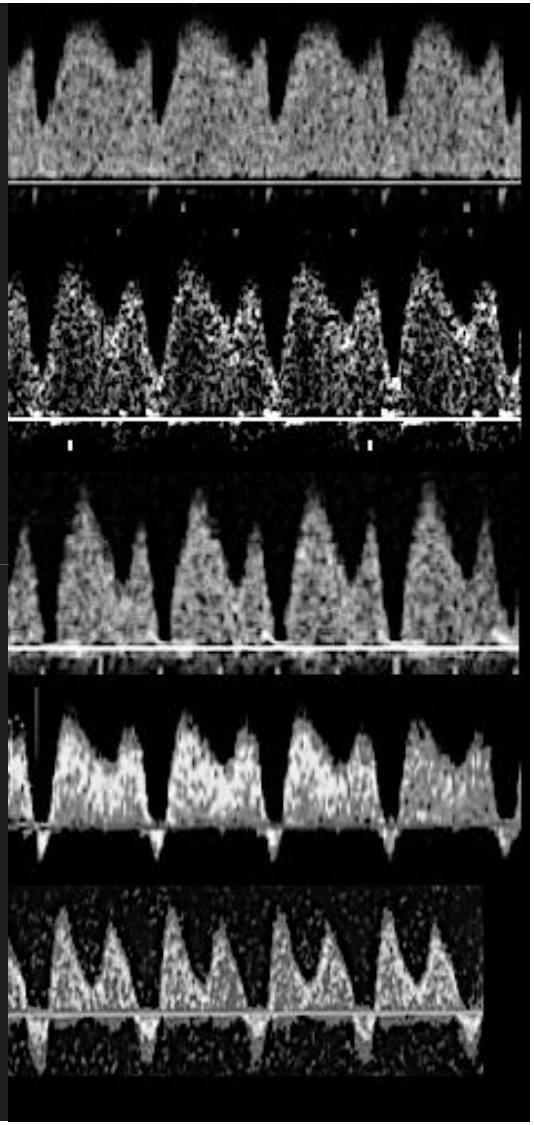
Baschat AA, 2000, Hecher K, 2001

Erken İUGG – D.venosus



Sağ kalpte kompliyans normal
Myokardial iskemi yok

Sağ kalpte kompliyans azalması
Myokardial iskemi bulgusu



Erken İUGG – D.venosus

DV a dalgası yokluğu ……. veya ters a dalgası …….	tüm gebelik haftalarında IU fetal kayıp riski (% 40 – 70)
DV PI > 95. ps ……	olumsuz perinatal sonuçlar

Dall'Asta et al.
Maternal Health, Neonatology, and Perinatology 2017.

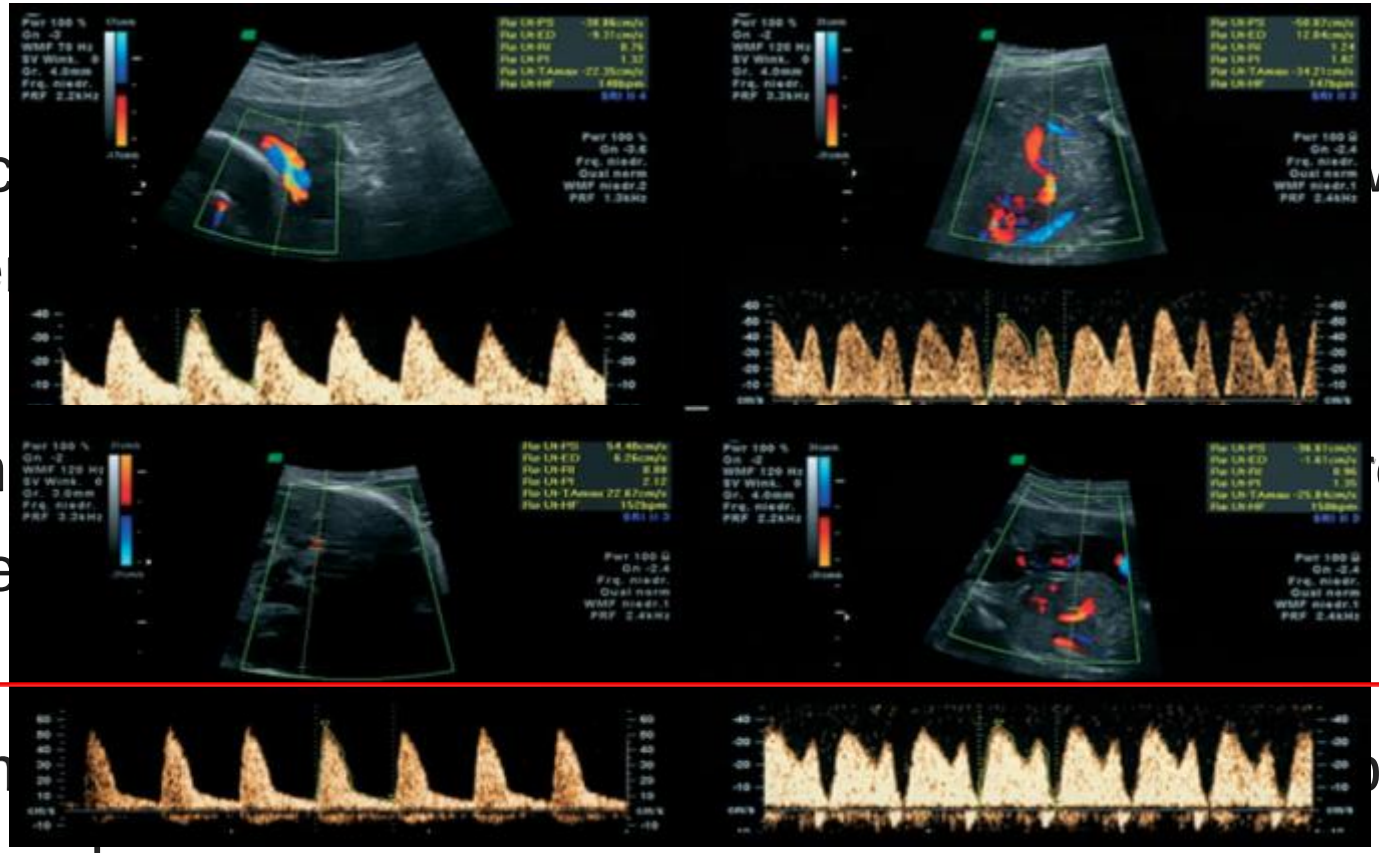
Large variations in DV waveforms ranging from positive to reversed flow during atrial contraction

While we strongly believe that flow measurement in the DV is an important indicator of fetal condition.

Iatrojenik prematurite vs fetal hasar / kayıp

These c vas not represe

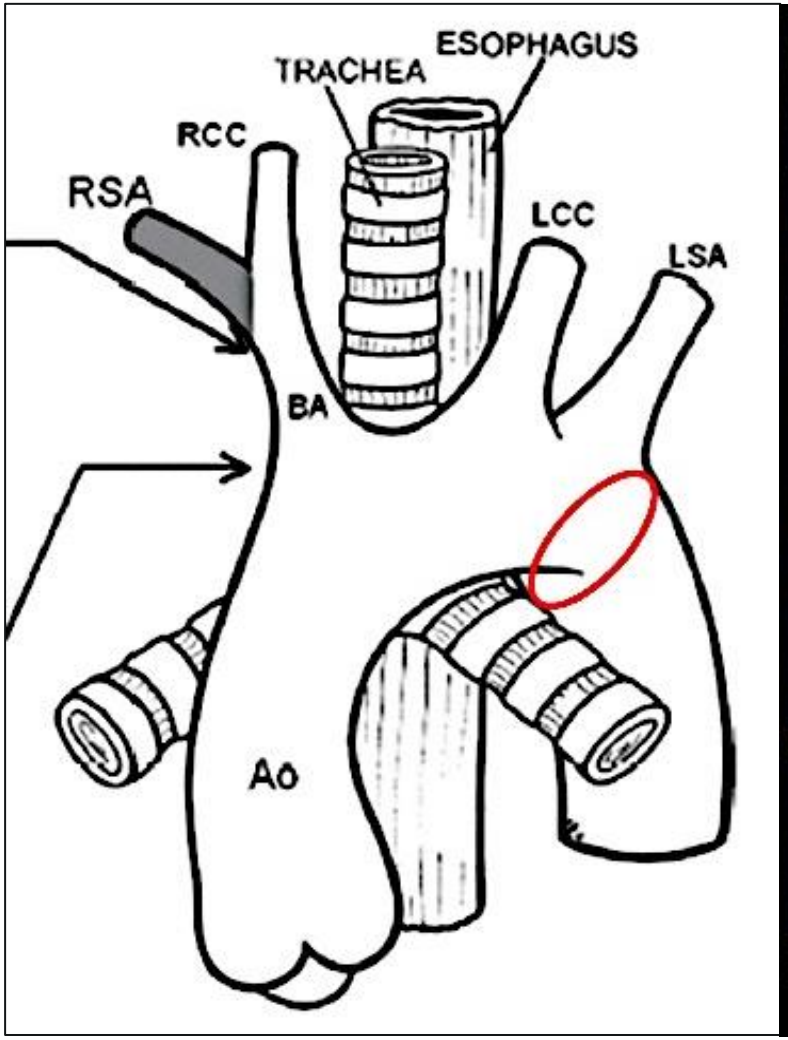
Caution rements to trigge

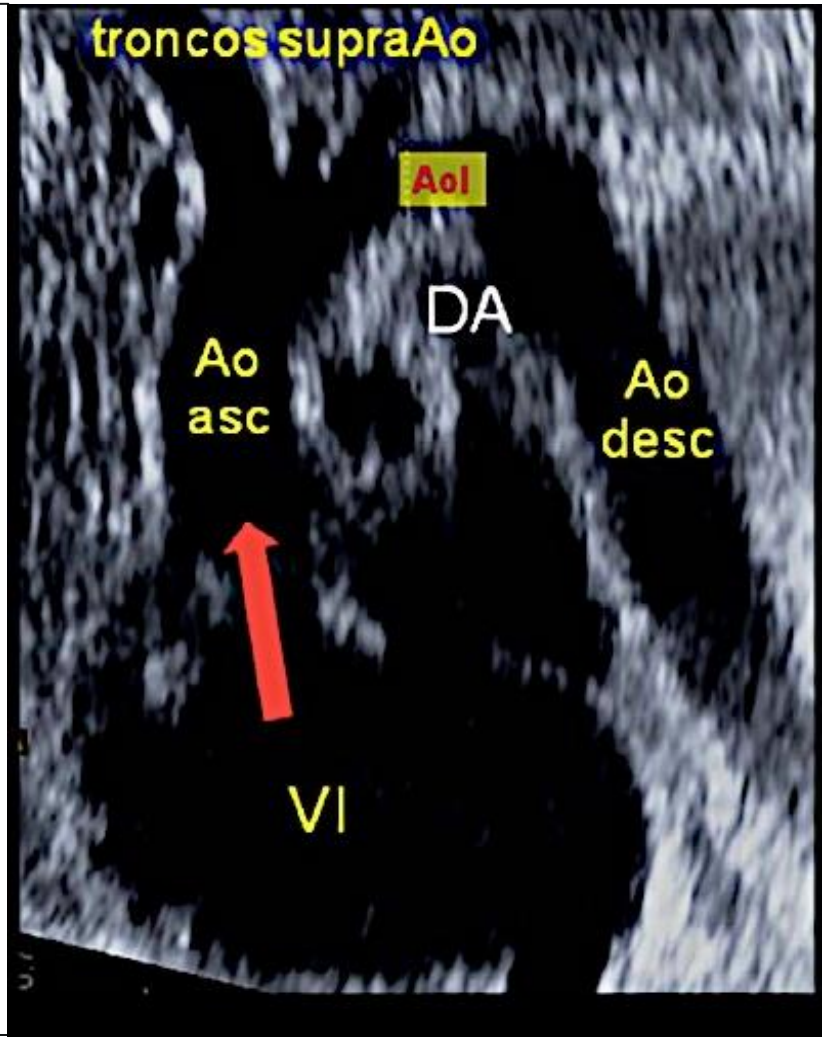


- A con best approach.

A. Diemert and K. Hecher
Ultrasound Obstet Gynecol 2009; 34: 605–608.

Erken İUGG – aortik istmus





Fouron AJOG 2001
Del Rio UOG 2006

Erken İUGG – aortik istmus

- Aol kan akımı indeksi (IFI)

Aortik istmus

Sol subklavien arter ↔ D.arteriosus

Serebral impedans ↔ plasental impedans farkını yansıtır

- RV dolaşım ≈ LV dolaşım

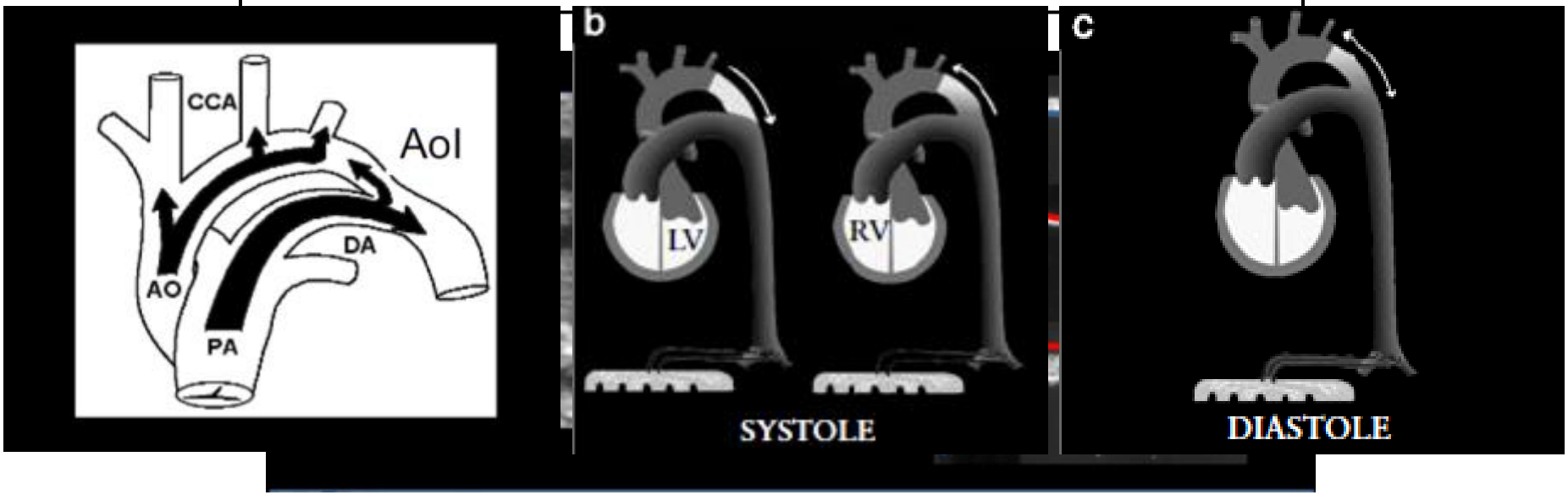
Normal koşullarda

$$IFI = \frac{\text{sistolik velosite + diastolik velosite}}{\text{sistolik velosite}}$$

serebral impedans > plasental impedans

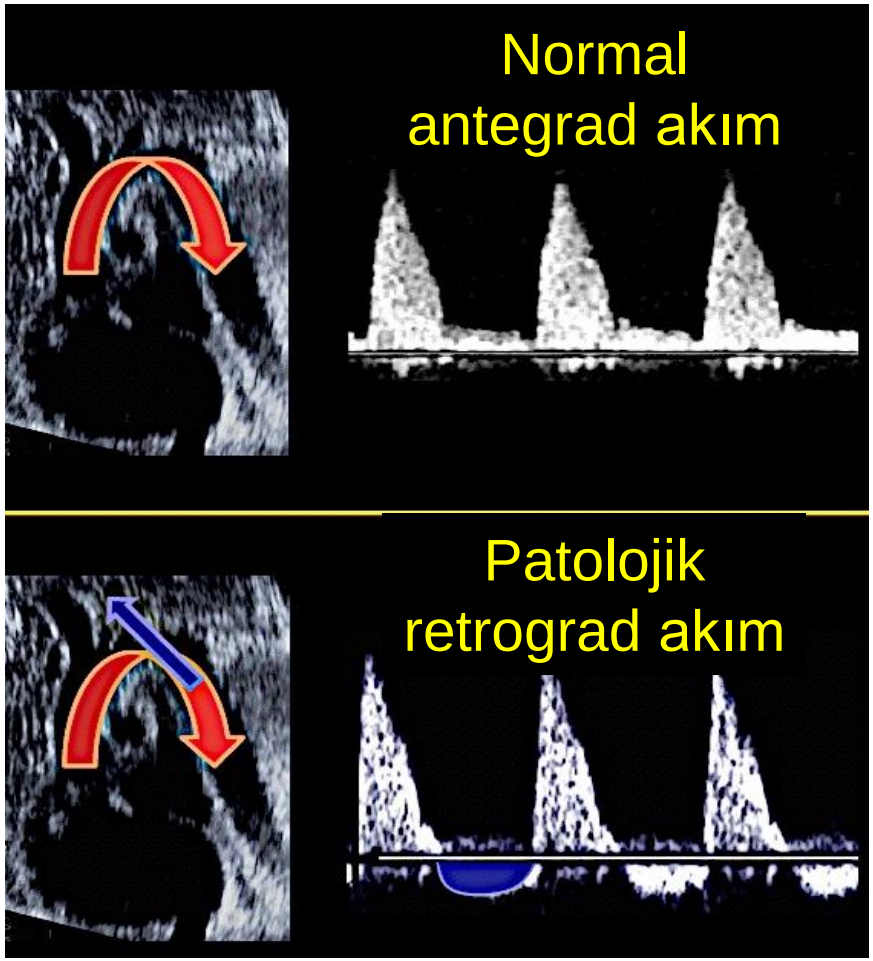
RV – LV paralel outflow sistemi arasında dengeleyici link

→ IFI > 1



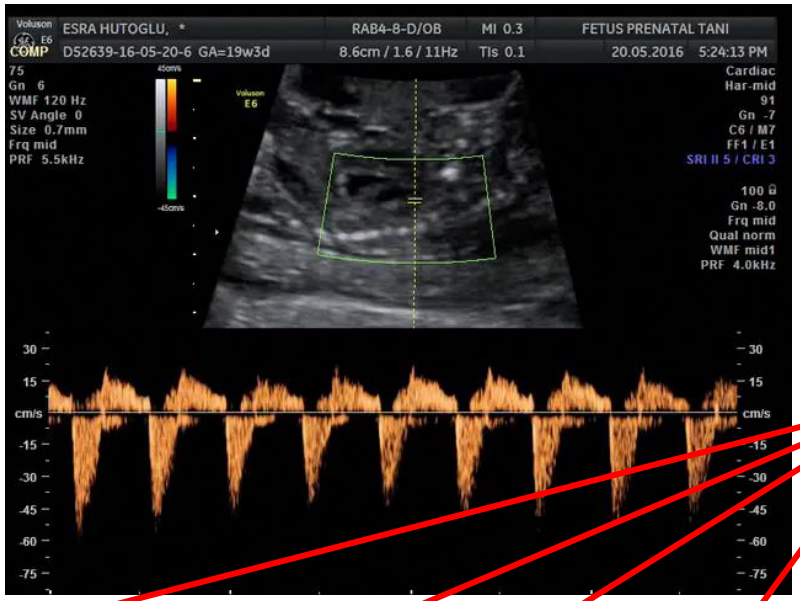
Erken İUGG – aortik istmus

GA (weeks)	Mean	95% CI	SD
18	1.327	1.263–1.392	0.033
19	1.323	1.247–1.399	0.039
20	1.318	1.230–1.406	0.045
21	1.313	1.213–1.413	0.045
22	1.309	1.197–1.420	0.057
23	1.304	1.180–1.428	0.063
24	1.299	1.164–1.435	0.069
25	1.295	1.147–1.442	0.075
26	1.290	1.130–1.449	0.081
27	1.285	1.114–1.456	0.087
28	1.280	1.097–1.464	0.094
29	1.276	1.081–1.471	0.100
30	1.271	1.064–1.478	0.106
31	1.266	1.047–1.485	0.112
32	1.262	1.031–1.493	0.118
33	1.257	1.014–1.500	0.124
34	1.252	0.997–1.507	0.130
35	1.247	0.981–1.514	0.136
36	1.243	0.964–1.521	0.142
37	1.238	0.948–1.529	0.148
38	1.233	0.931–1.536	0.154
39	1.229	0.914–1.543	0.160

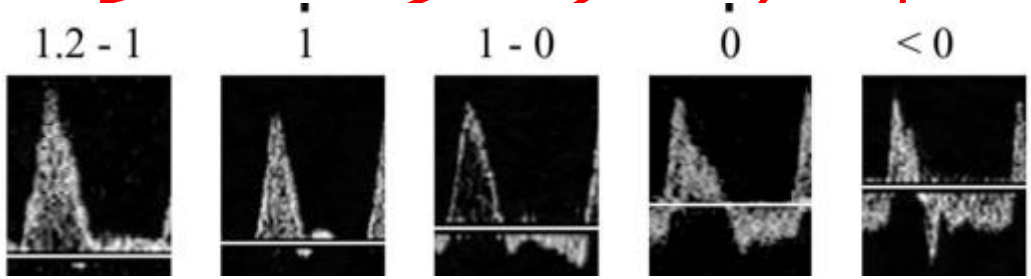


Erken İUGG – aortik istmus

The unrecognized physiological and clinical significance of the fetal aortic isthmus J.-C. FOURON



IFI



İUGG

Plasental impedans ↑↑

Umbilikal akım ↓

Aol akım retrograd → **IFI < 1**

- myokard O_2 ↓↓
- LV fonksiyonu ↓↓
- serebral perf. ↓↓
- nöromorbidite ↑↑

İUGG: dekompanse

	dekompanse
UA	ARED
MCA	PI azalmış, PSV artmış
DV	Ters a
AoI	Retrograd
NST / BPP	Anormal
Sonuç	Asidemi Nörolojik Hasar

Fetal Hipoksi - pl yetmezlik → UA - PI artışı, Fetal hipoksi ve asidoz

REDİSTRİBÜSYON

Fetal aritmi

Be alp, adrenal perfüzyon ↑ → MCA PI ↓, UA - AEDF, Myokard depresyonu

Be barsak hipoperfüzyon → AFİ ↓

Variabilite ↓ Baseline ↓ Deselerasyon

Erken İUGG – değerlendirme

	Fetus adapte + kompanse	Fetus dekompanse	Fetus dekompanse PNM / M
Umblikal A. Doppler	Anormal	Anormal	Anormal
MCA Doppler	Anormal	Anormal	Anormal
Venöz + Ao I Doppler	Normal	a dalga kaybı	a dalgası ters
NST * / BPP	Normal	Normal	Anormal
Sonuç	İYİ	hafif–orta asidemi ağır hasar riski ↓	Ağır asidemi Nörolojik Hasar ↑

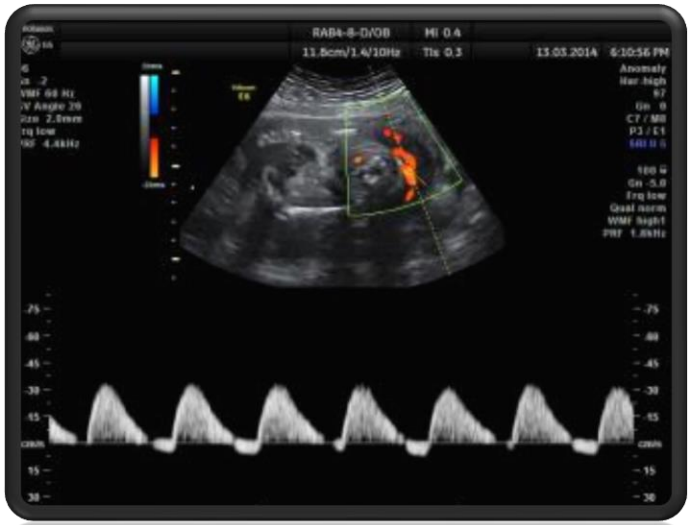
*c KTG

Erken İUGG – diğer bulgular

oligohidramnios

AFI < 5.0cm

En büyük cep < 2.0cm



hiperekojen ve dilate barsak ansı

Magann EF. 2000

Erken İUGG – diğer bulgular

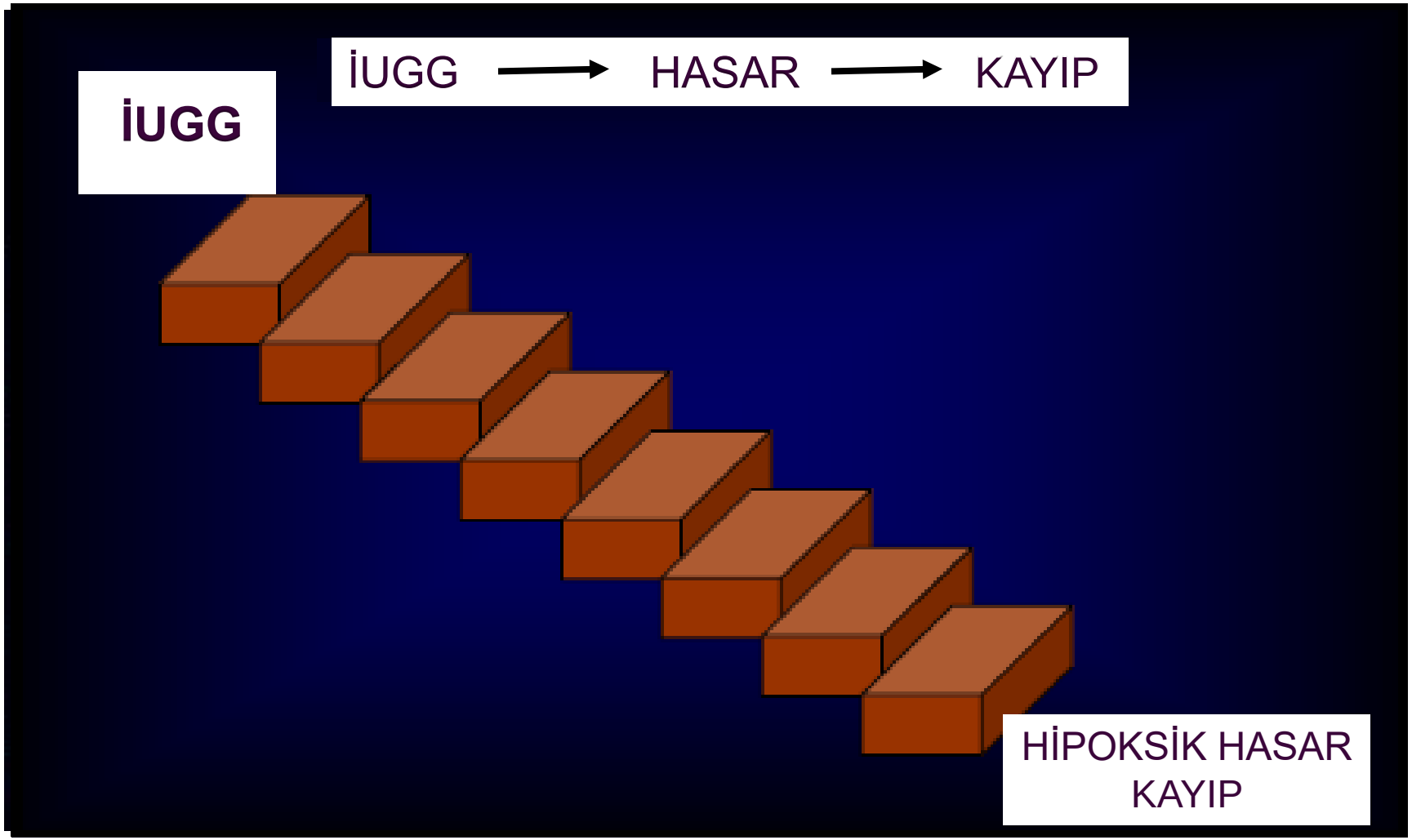
Biofizik profil

Skor	Perinatal Mortalite (/1000)
8-10	1.86
6	9.76
4	26.3
2	94.0
0	285.7

Manning FA; 1990

Erken İUGG – diğer bulgular

KTG / CST / cKTG



Erken İUGG – diğer bulgular

KTG

Normal fetus → fetus iyilik hali ✔

> 26 hafta İUGG

- Perinatal akibet konusunda c KTG ≅ DV
- Birinde bozulma olursa ⟶ **doğum**

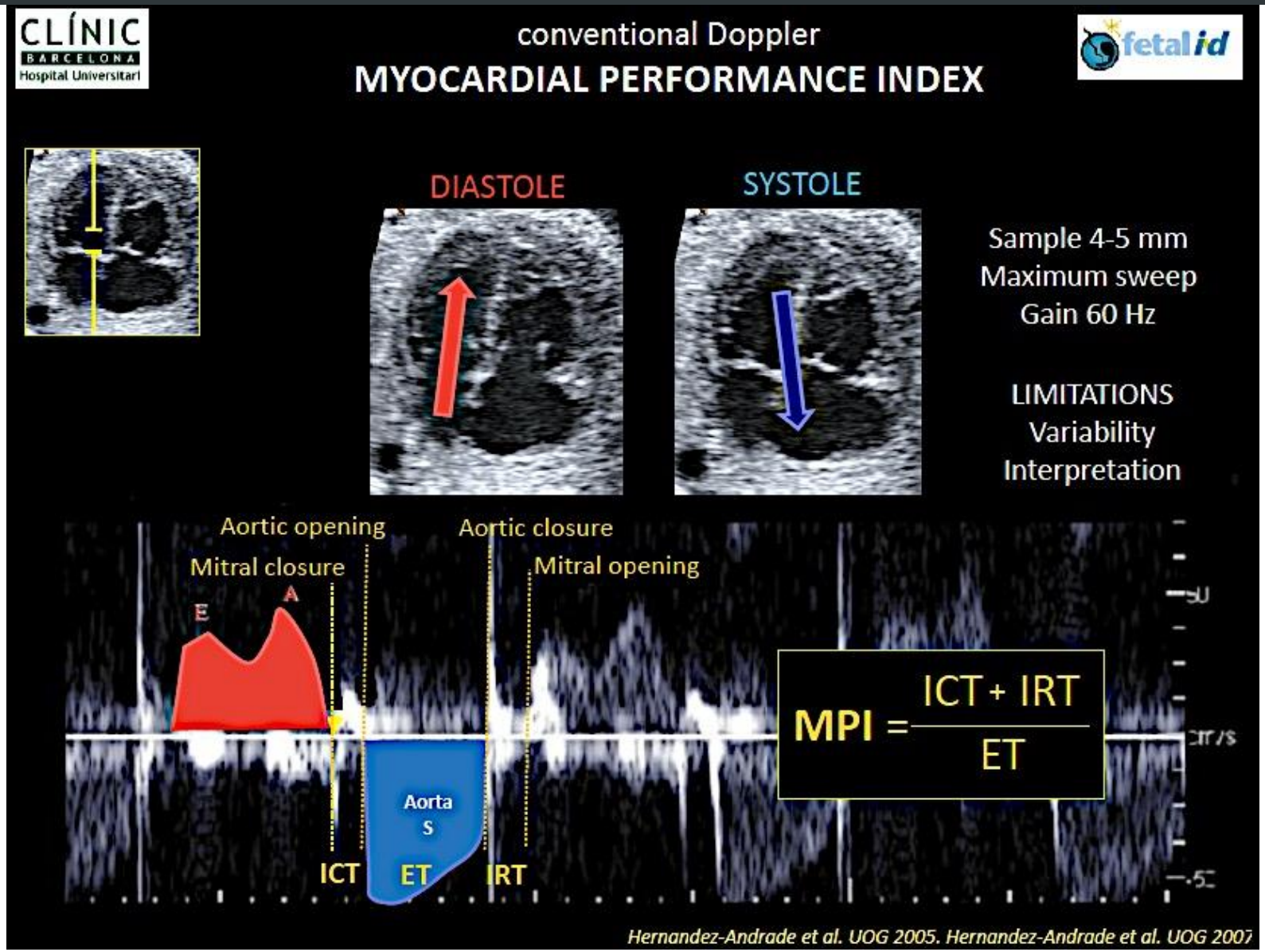
- Fetal kalp hızı

cKTG ⟶
- STV

IUGG fetus
Perinatal mortalite / morbidite bilgisi ✔
(DV ters a dalgası ile eşdeğer)

Dall'Asta et al.
Maternal Health, Neonatology, and Perinatology 2017.

Erken İUGG – MPI



Erken İUGG – MPI

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

CLÍNIC BARCELONA Hospital Universitari

limitations of fetal cardiac function

fetalid

- Fetal position
- Fetal movement
- Fetal size
- Fetal heart rate and high frame rate
- Imposibility of fetal ECG
- Understanding requirements and rationale
- Differences in algorithms/processing
- Fetal differences with postnatal life:
  - Cardiomyocyte maturation
  - Geometry/deformation

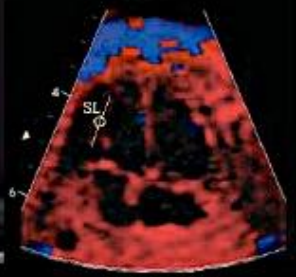
Strict criteria

Definition of fetal physiology

Understanding limitations

Application to clinical conditions

Paladini 2000



Larsen 2006

Crispi 2012

Erken İUGG – yönetim

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

Erken IUGR (< 32 hafta)

Artmış UA Doppler PI	D 2 hf + BPS x 1 / hf
MCA – BKE	1 / hf + BPS x1 / hf
UA – AEDV	e yatış, oppler x 2 / hf + BPS x 1 / hf
UA – REDV	Kliniğe yatış
DV - PI artı	Doppler x 3 / hf + BPS x 2 / hf
± oligo	NST / gün
(vertik 2 cm)	
DV a dalgası yok / ters a	Kliniğe yatış + Doppler / gün + BPS, doğuma hazırlık

Doğum Kararı ?

Seravalli V, Baschat AA, Obstet Gynecol Clin North Am 2015

GRIT Çalışması

GRIT Çalışması: İki yaşa kadar ölüm veya ağır nörolojik bozukluk

	Hemen doğum	İzlem
GH (haftalar)	30-34	29-34
Doğum Ağırlığı (g)	1200 (875-105)	1400 (930-1940)
< 31 hafta	% 13	% 5

“fetusu bir an önce çıkarıp kurtarma” yaklaşımı desteklenmiyor

Neonatal ölüm	23 (%7.8)	12 (%4.1)

Infant wellbeing at 2 years of age in the Growth Restriction Intervention Trial (GRIT): multicentred randomised controlled trial. Thornton JG, et al. Lancet. 2004 7-13; 364: 513-20

TRUFFLE Çalışması

Ultrasound Obstet Gynecol 2013; 42: 400–408
Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.13190

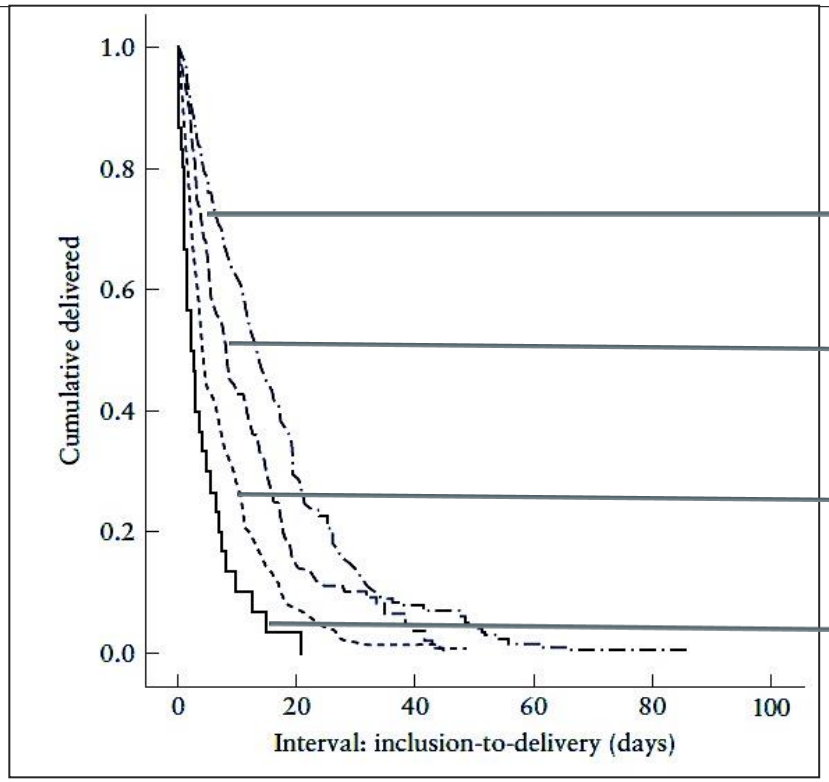
Perinatal morbidity and mortality in early-onset fetal growth restriction: cohort outcomes of the trial of randomized umbilical and fetal flow in Europe (TRUFFLE)

C. Lees, N. Marlow, B. Arabin, C. M. Bilardo, C. Brezinka, J. B. Derks, J. Duvekot, T. Frusca, A. Diemert, E. Ferrazzi, W. Ganzevoort, K. Hecher, P. Martinelli, E. Ostermayer, A. T. Papageorghiou, D. Schlembach, K. T. M. Schneider, B. Thilaganathan, T. Todros, A. Van Wassenaer-leemhuis, A. Valcamonico, G. H. A. VISSER and H. Wolf, on behalf of the TRUFFLE Group

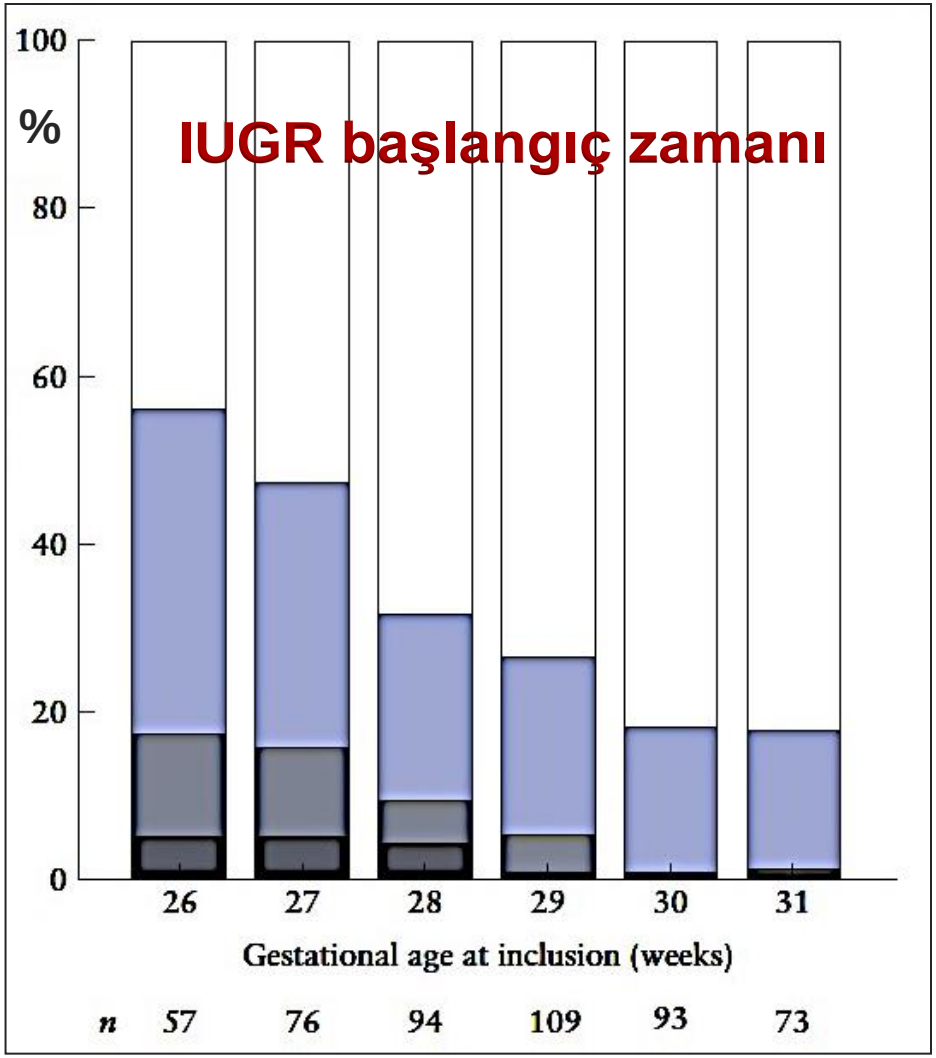
Ultrasound Obstet Gynecol 2013; 42: 400–408

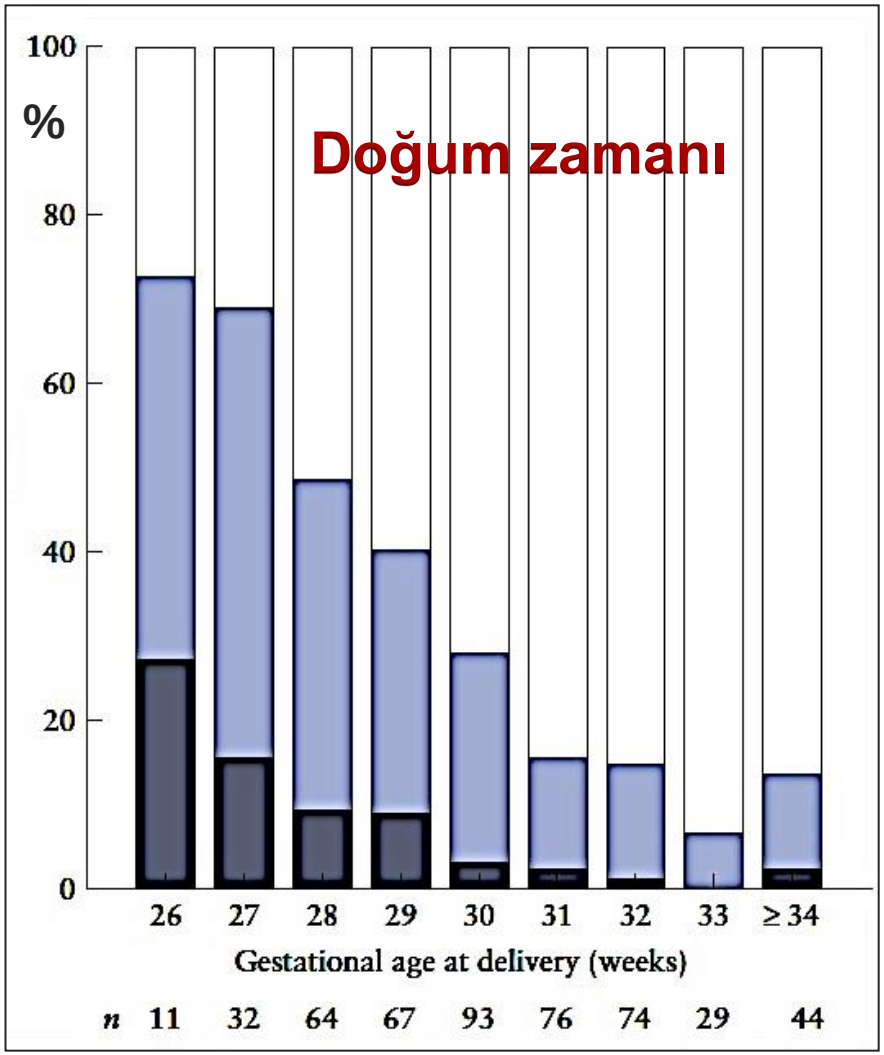
TRUFFLE

- **N = 503 gebe**
- **IUGR tanı zamanı**
- **ortalama hafta** **29 ± 1.6 hafta**
- **ortalama fetal ağırlık** **881 ± 217 g.**



	INTERVAL
Normotansif	13 gün
Gestasyonel HT	8 gün
Preeklampsi	4 gün
HELLP	3 gün





Ciddi morbidite yok

Ciddi morbidite var

Neonatal kayıp

Fetal kayıp

TRUFFLE

Sonuçlar:

- Fetal sonuçlar umulandan daha olumlu
- Perinatal kayıp: % 8
- Ciddi morbiditesiz yaşam: % 70
- Tanı konan ve doğumda gebelik haftası
- Maternal koşullar
- Hipertansiyon +

- Ciddi morbidite: yüksek
- Perinatal kayıp: yüksek
- IUGR – doğum interval: kısa

Erken İUGG – karar (26 – 28 hf)

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

Neonatal sürvi % 50

Sağlıklı sürvi % 30

UA – ARED, doğum kararı?

1. Maternal koşulların olumsuzluğu ⟶ **doğum**
2. Fetal asidemi lehine bulgu varlığı ⟶ **doğum**

- patolojik DV Doppler (ters a dalgası)
- anormal NST (kategori 3), BPS < 6
- asidemi lehine USG bulguları (+)
  - periventriküker ekojenite
  - kardiyomegali - ekojen / dilate barsak ansı

Erken İUGG – karar (28 – 32 hf)

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

Neonatal sürvi	28. hafta % 70	32. hafta % 90
Nöromorbidite riski	< 30. hafta: yüksek	

- Patolojik arteryel Doppler bulgusuna ek olarak
  - DV a dalga kaybı
    ve / veya
  - NST kategori 3 varlığı

  } **doğum**

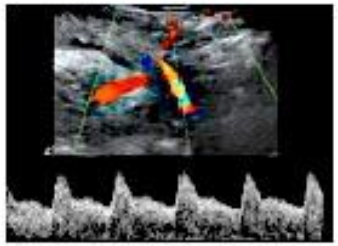
- Kortikosteroid
- MgSO4

> < 34. hafta

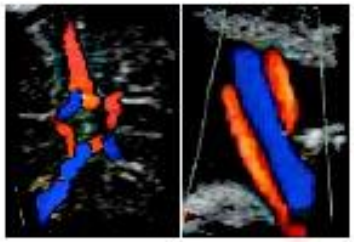
Geç İUGG

> 32 – 34 hafta küçük fetus
ayırıcı tanı
Geç İUGG vs SGA

UtA
>p95



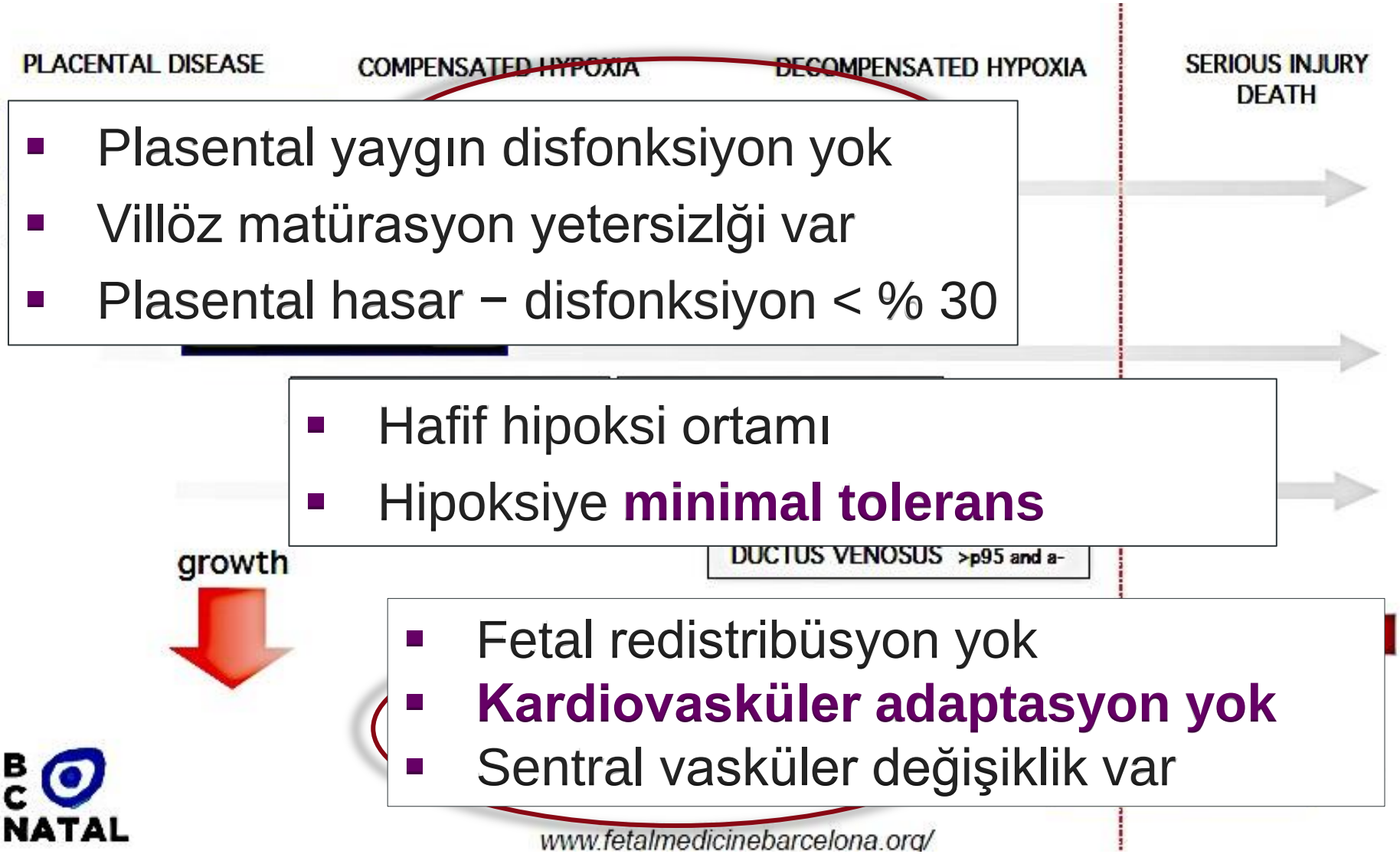
CPR
<p5



EFW CENTILE <3

Gratacos E, 2018

Geç İUGG



- Plasental yaygın disfonksiyon yok
- Villöz matürasyon yetersizlği var
- Plasental hasar − disfonksiyon < % 30

- Hafif hipoksi ortamı
- Hipoksiye **minimal tolerans**

- Fetal redistribüsyon yok
- **Kardiovasküler adaptasyon yok**
- Sentral vasküler değişiklik var

Geç İUGG

- 3. trimesterde plasental disfonksiyon: **villöz immatürite**
- Plasental disfonksiyona bağlı **hipoksi:** ilk hemodinamik değişiklik **serebral vazodilatasyon: MCA – PI azalır**
- **Serebro-plasental oran (CPR):** MCA – PI / UA – PI
- **CPR< 1 :** İUGG fetusun hipoksemiye olan yanıtnıı gösterir
- Sınırlı plasental disfonksiyon nedeniyle UA – PI normal ve **CPR false > 1** olabilir

Geç İUGG - karar

DIGITAT

The Disproportionate Intrauterine Growth Intervention Study at Term

- İUGG 36 – 41 hafta
- **38. haftada doğum indüksiyonu**
  - Minimum neonatal morbidite
  - Minimum fetal kayıp riski
  - Vaginal doğum / sezaryen oranına etkisi yok

Geç İUGG - karar

PORTO

Optimizing the definition of intrauterine growth restriction: the multicenter prospective PORTO Study

Geç - İUGG grup:

- Normal UA Doppler + kötü perinatal sonuçlar
  - olguların % 46'da UA Doppler normal !!!
  - açıklanamayan term kayıp
  - beklenmeyen intrapartum hipoksi
  - serebral palsi

Unterscheider J, Daly S, Geary MP, et al.. Am J Obstet Gynecol 2013

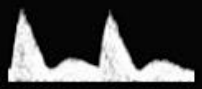
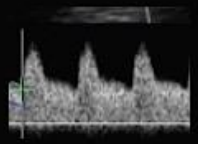
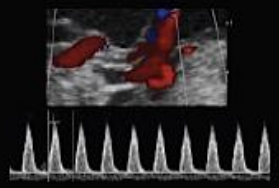
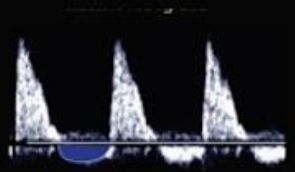
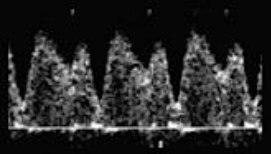
İUGG – evreleme / karar

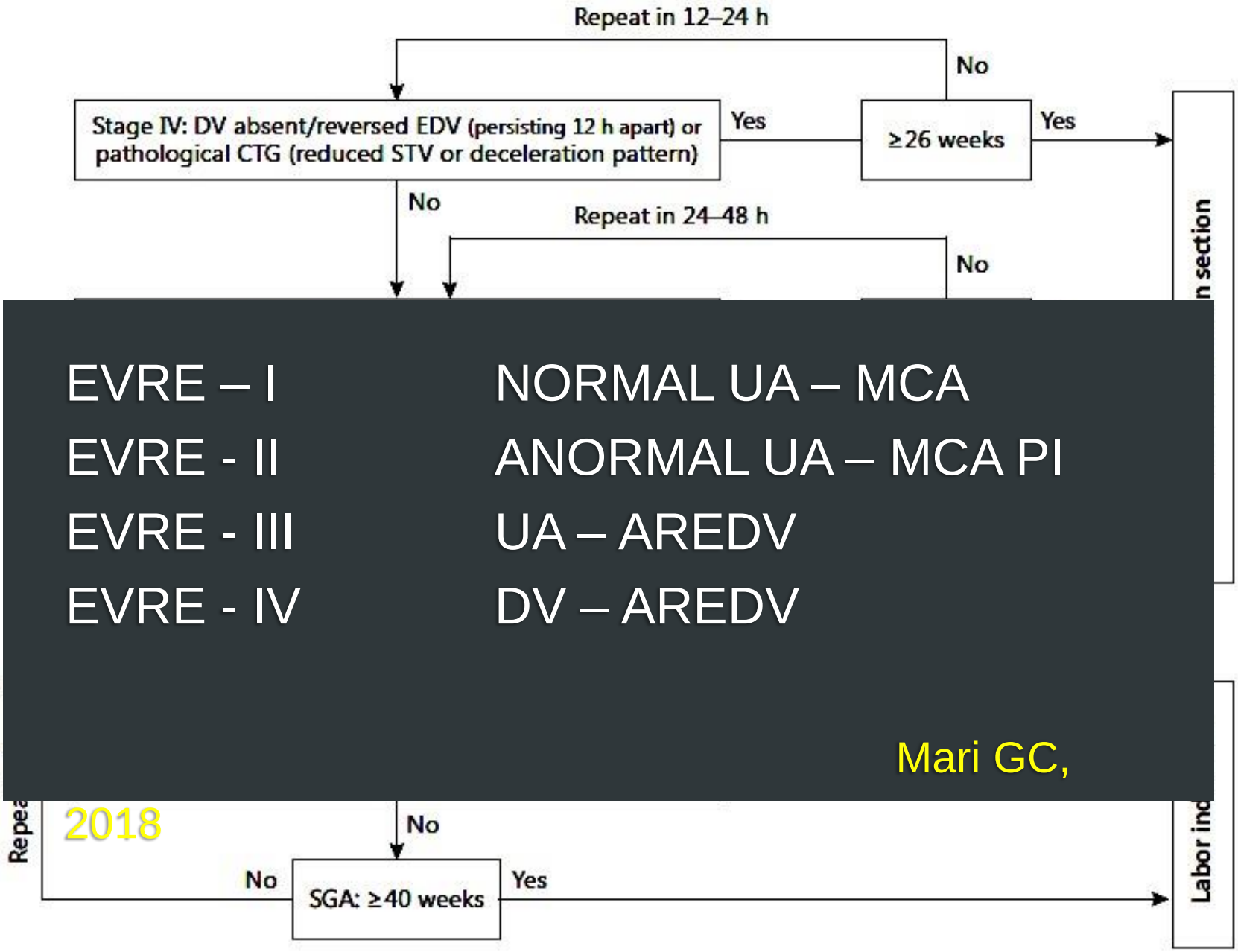
Gratacos E, Barcelona

fetal iD

Protocol IUGR

First step: UtA + CPR + EFW = SGA or IUGR

I low EFW (<p3) or mild placental resistance / redistribution	CPR <p5  Ut A >p95  MCA <p5 
II Severe placental resistance / redistribution	AEDV  AoI >p95 
III Severe hemodynamic adaptation - Low suspicion acidosis	DV >p95  REDV 



EVRE – I NORMAL UA – MCA

EVRE - II ANORMAL UA – MCA PI

EVRE - III UA – AREDV

EVRE - IV DV – AREDV

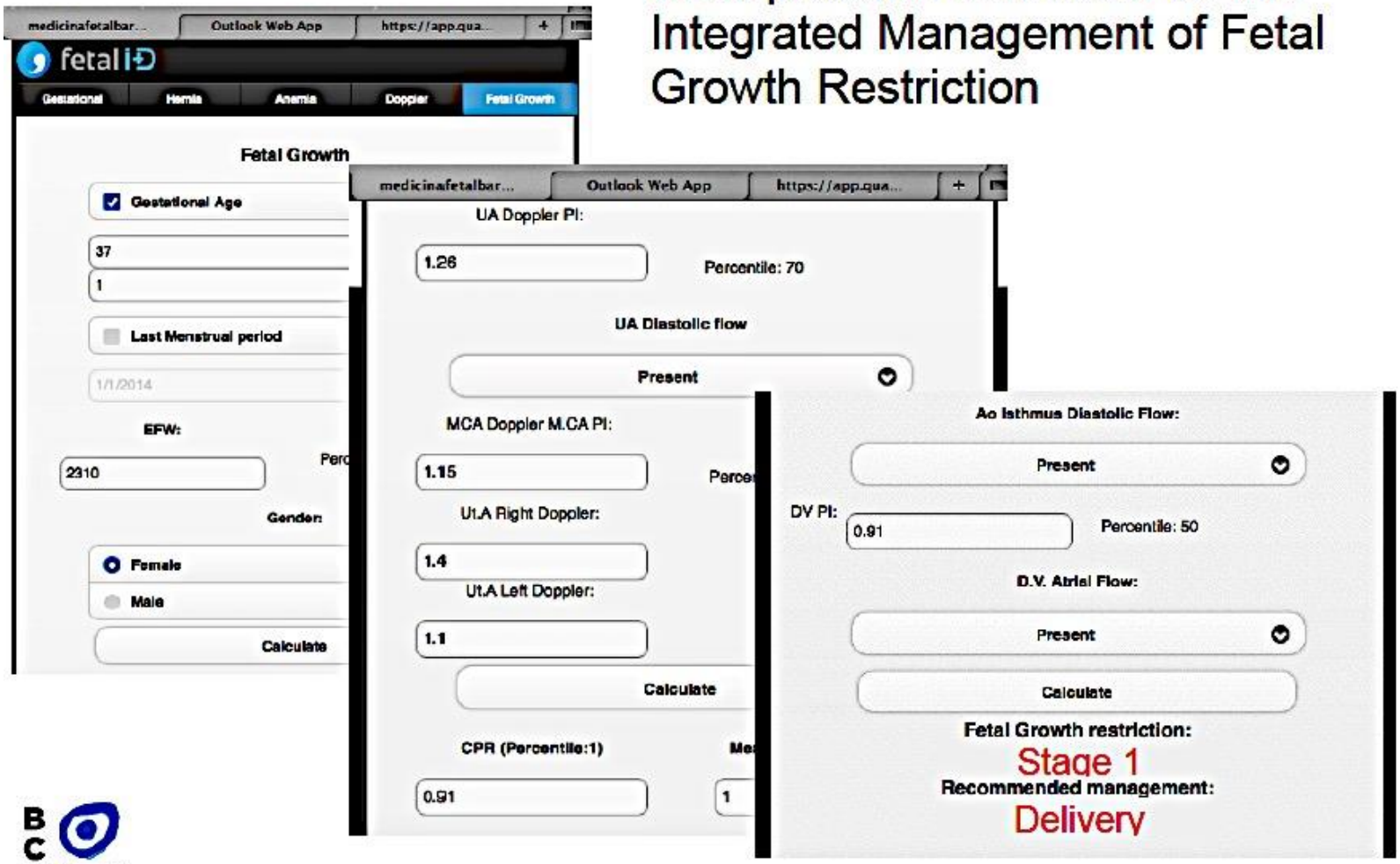
Mari GC, 2018

İUGG – evreleme / karar

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

fetal iD

Multi-platform calculator for the Integrated Management of Fetal Growth Restriction



BC NATAL

www.fetalmedicinebarcelona.org/

İUGG – yönetim

Geç IUGR (> 32-34 hafta, < 37. hafta)

Artmış UA Doppler PI	Doppler x 1 / hf + BPP x 1
MCA – BKE	Doppler x 2-3 / hf + BPS x 1
UA – ARED veya	**Doğum**
evre III (Barcelona)	

- **Vazodilatasyon** nöroproteksiyon içim olsa da hipoksinin tüm olumsuzluklarını **kompanse edemeyebilir**

Seravalli V, Baschat AA, Obstet Gynecol Clin North Am 2015

İUGG – doğum zamanlaması

Maternal - Fetal Tıp ve Perinatoloji Derneği Türkiye 23-06-1998

Impact of cerebral redistribution on neurodevelopmental outcome in small-for-gestational-age or growth-restricted babies: a systematic review

Ultrasound Obstet Gynecol 2015

S. MEHER*†, E. HERNANDEZ-ANDRADE‡, S. N. BASHEER§ and C. LEES¶**

IUGR – serebral kan akımı değişikliği:

- **ACA kan akımı artışı** frontal lob kanlanmasında artış
- **MCA kan akımı artışı** bazal ganglia kanlanmasında artış

beyin koruyucu etkinlik sürecinin ileri evresi

→ MCA kan akımı > ACA kan akımı

→ frontal lob kanlanmasında relatif azalma

kognitif fonksiyonlarda olumsuzluk

İUGG – doğum zamanlaması

- Although *cerebral redistribution* has generally not been used as a criterion for delivery of preterm fetuses, recent guidelines **recommend delivery of term fetuses with cerebral redistribution** as it is predictive of acidosis at birth.

- Accumulating evidence suggests that cerebral redistribution may be associated with *increased risk of* adverse neurodevelopmental *outcomes*.

Meher S, Ultrasound Obstet Gynecol 2015; 46: 398–404

Ultrasound Obstet Gynecol 2015; 46: 452–459
Published online 25 August 2015 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.14920

Risk of ultrasound-detected neonatal brain abnormalities in intrauterine growth-restricted fetuses born between 28 and 34 weeks' gestation: relationship with gestational age at birth and fetal Doppler parameters

R. CRUZ-MARTINEZ*†, V. TENORIO*, N. PADILLA*, F. CRISPI*, F. FIGUERAS* and E. GRATACOS*

Nörolojik morbidite öngörü:

Fetal Doppler > gebelik haftası

MCA - BKE vs normal % 48 vs % 13

MCA – BKE + AoI retrograd vs normal % 66 vs % 38

Baschat AA, et al. Ultrasound Obstet Gynecol 2002

Habek D, et al. Eur J Obstet Gynecol Reprod Biol 2004

Middle cerebral artery (MCA) Doppler is considered a surrogate for fetal hypoxemia, but its value in *predicting neurological damage in preterm IUGR remains controversial*

İUGG fetuslarda kranial USG anomalileri (CUA)

- Periventriküler lökomalazi
- İntraventriküler kanama
- Bazal ganglia lezyonu

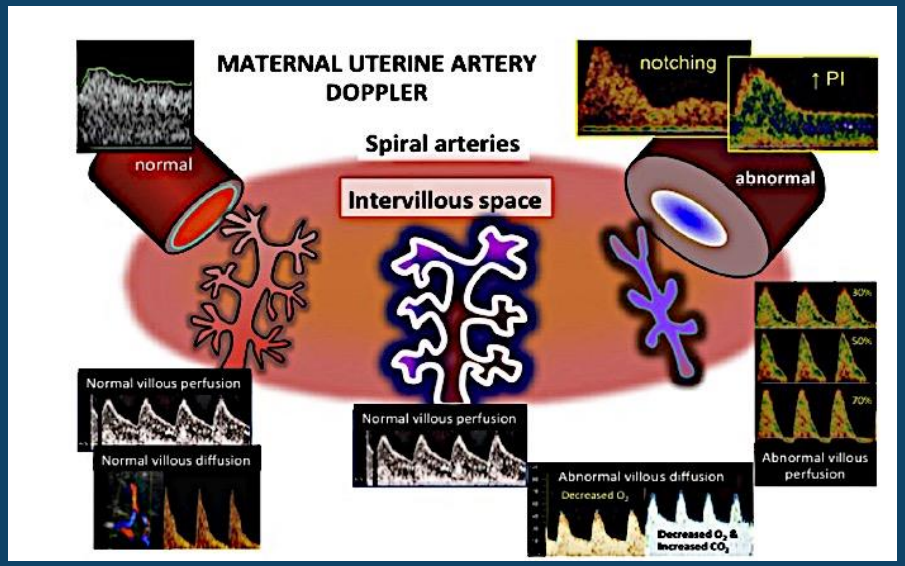
% 40 vs % 12

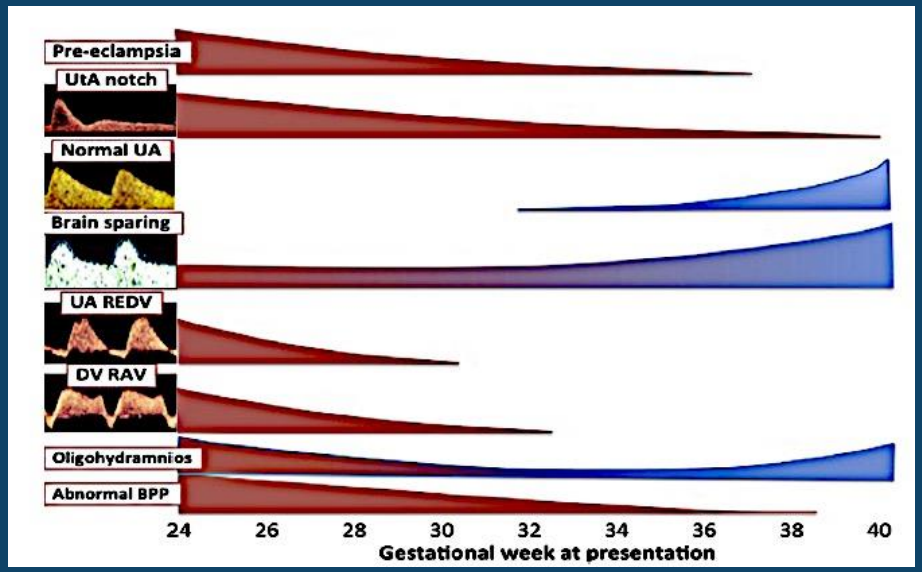
Del Rio M, et al. Ultrasound Obstet Gynecol 2008

Fouron JC, et al. Am J Obstet Gynecol 2005

Preliminary evidence suggests that *AoI flow shows an association with long-term neurological outcome*

İUGG – karar





BİREYSEL DEĞERLENDİRME

İUGG – doğum şekli

Sezaryen önerisi

- Gebelik haftası ≥ 34 + umbilikal arter ARED
- Gebelik haftası ≥ 30 + umbilikal arter REDF veya DV - PI > 95. persantil
- Gebelik haftası ≥ 26 + spontan deselerasyon, STV kaybı veya DV ters a dalgası

Figueras F, Gratacos E. Best Prac Res Clin Obstet Gyencol 2017

- GRIT sezaryen oranı % 85
- TRUFFLE % 97
- Baschat % 98

İUGG – yaşam

Perinatal sorunlar

Hipoksi

Asfiksi

Mekonyum aspirasyonu

Nekrotizan enterokolit

Serebral kanama

Polisitemi

Hipotermi

Hipoglisemi

Enfeksiyon

Uzun dönem sorunlar

Gelişme geriliği

Dikkat eksikliği / hiperaktivite

Nörokognitif fonksiyon azalmas

Endokrinopati

Aterosklerozis

Kardiovasküler hastalık

- HT
- Koroner kalp hastalığı
- İnme

teşekkürler