Geç Başlangıçlı Fetal Gelişim Kısıtlılığı

Prof Dr Rıza Madazlı

İÜ-Cerrahpaşa Tıp Fakültesi Kadın Hastalıkları ve Doğum ABD

Tanım

- **EFW veya AC < %10 pers**
  - **SGA / FGK**

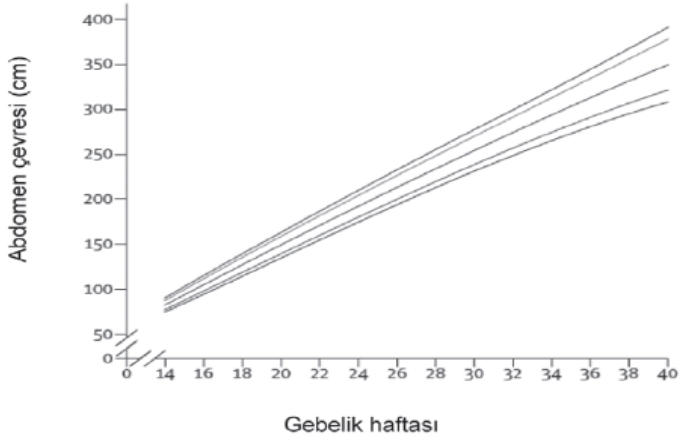
	SGA	FGK	Yüksek Risk-FGK
Birleşik Krallık (RCOG, 2014)	DK<10 pers	EFW veya AC <10 pers	EFW <3 pers
Yeni Zelanda (NZMFMN, 2014)	EFW veya DK <10 pers	EFW <10 pers veya AC ≤5 pers	EFW <3 pers, Anormal UA, UtA, MCA veya CPR
Kanada (SOGC, 2013)	EFW <10 pers	EFW veya AC <10 pers	NS
ABD (ACOG, 2013)	DK<10 pers	EFW <10 pers	NS
Fransa (CNGOF, 2015)	EFW veya DK <10 pers	EFW <10 pers	Gelişim durma ve/veya Anormal UA,MCA, oligo

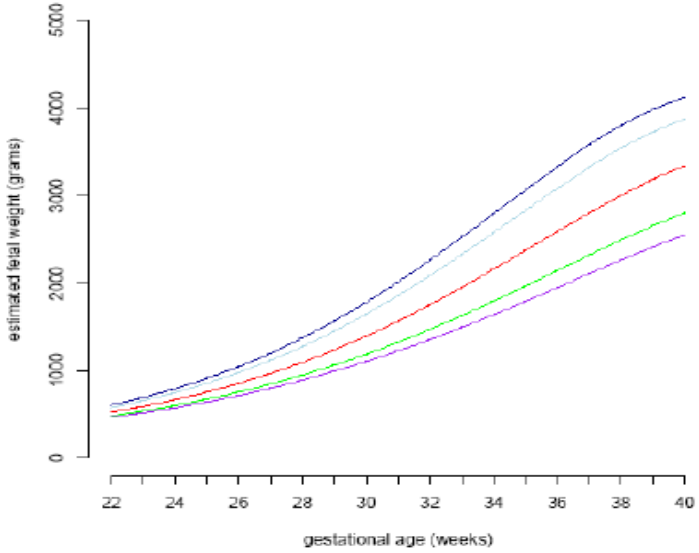
International estimated fetal weight standards of the INTERGROWTH-21st Project

Ultrasound Obstet Gynecol 2017; 49: 478–486

Pelotas (Brazil), Turin (Italy), Muscat (Oman), Oxford (UK) and Seattle (USA); the Shunyi County of Beijing (China); the central area of Nagpur (India); and the Parklands suburb of Nairobi (Kenya). The primary aim

	3rd	10th	50th	90th	97th
22	463	481	525	578	607
23	516	538	592	658	694
24	575	602	668	751	796
25	642	675	756	857	913
26	716	757	856	980	1048
27	800	848	969	1119	1202
28	892	951	1097	1277	1376
29	994	1064	1239	1453	1570
30	1105	1189	1396	1648	1784
31	1226	1325	1568	1861	2017
32	1356	1472	1755	2090	2267
33	1495	1630	1954	2332	2529
34	1641	1796	2162	2582	2798
35	1794	1969	2378	2836	3069
36	1951	2146	2594	3086	3331
37	2109	2323	2806	3324	3578
38	2266	2496	3006	3540	3798
39	2416	2658	3186	3726	3982
40	2554	2805	3338	3871	4121





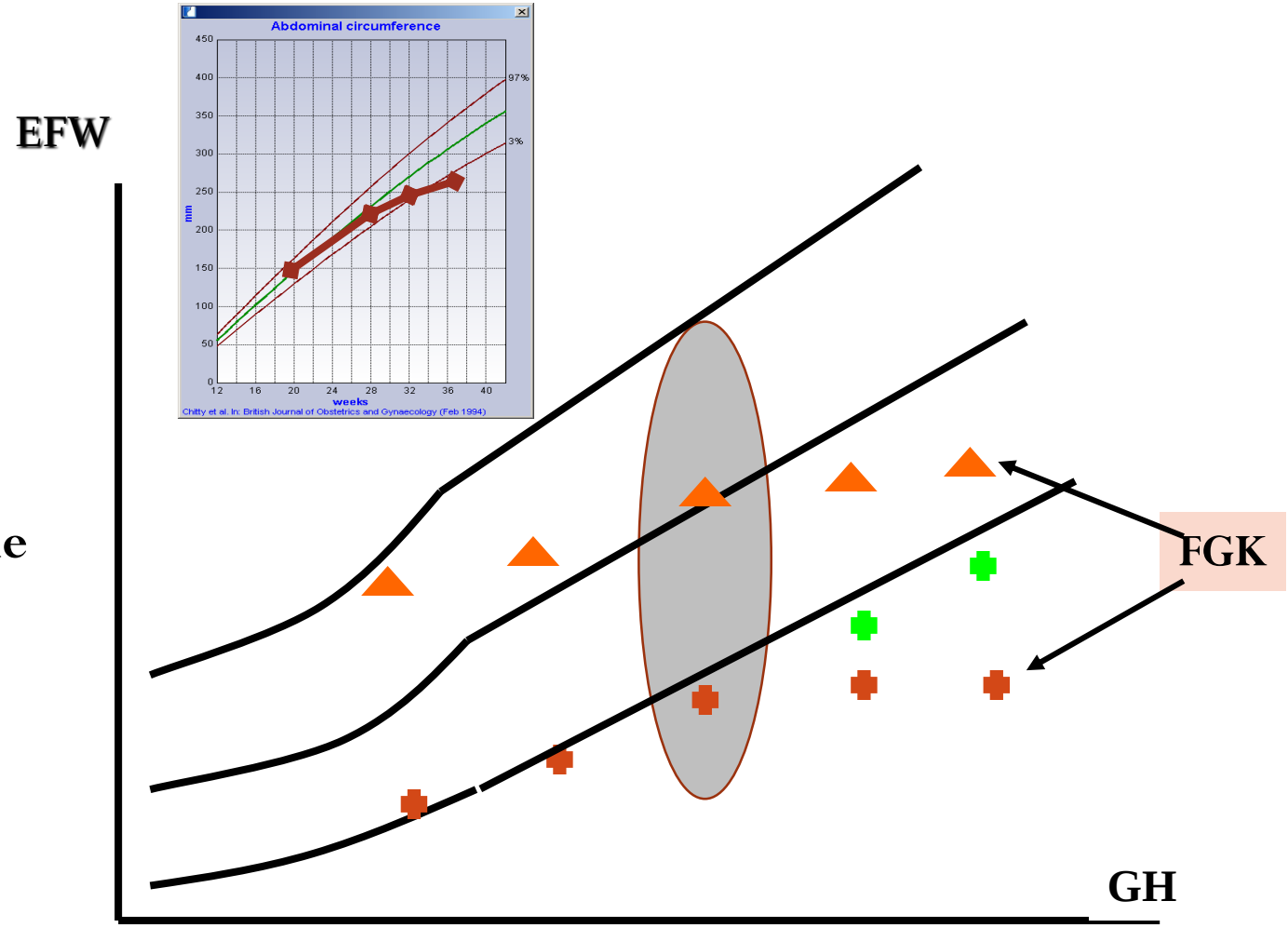
3rd, 10th, 50th, 90th and 97th smoothed centile curves for estimated fetal

- **Genetik potansiyellerine ulaşamayan fetuslar /Plasenta Disfonksiyonu (SGA FGK / AGA FGK)**

- **Her bir FETUS ait ideal gelişim ?**

Gelişim

- **Süreç**
- **Tanı takip ile ortaya konulabilir**
- **FGK / SGA farklı kavramlar**



Fetal Gelişim Kısıtlılığı

- Tanı ve Doğum Haftası

- **<u>Erken Başlangıçı</u>**
  - **Tanı <32 GH**
  - **Doğum <34 GH**

- **AC,EFW <3pers veya UA AED**
- **AC,EFW <10pers ve UA veya UtA PI>95pers**

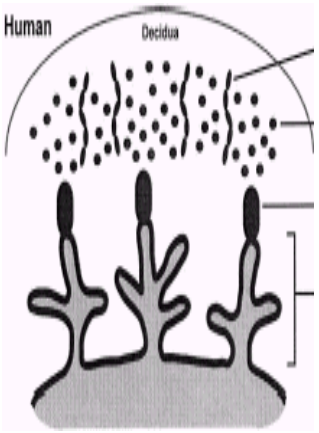
- **<u>Geç Başlangıçlı</u>**
  - **Tanı ≥32 GH**
  - **Doğum ≥ 34 GH**

- **AC,EFW <3pers**
- **AC,EFW <10pers ve CPR<1 veya UAPI>95pers**

Consensus definition of fetal growth restriction: a Delphi procedure Ultrasound Obstet Gynecol 2016.

	Erken-FGK	Geç-FGK
Sıklık	%1	% 3-5
Plasenta Sorun	Ağır, PE sık	Hafif, PE sık değil
Hipoksi	Ağır, Sistemik kardiyovasküler uyum	Hafif, Santral kardiyovasküler uyum
Fetusa Etki	Preterm fetus hipoksi dirençli	Term fetus hipoksiye az tolerans
Perinatal Mort ve Morbidite	Yüksek	Düşük, geç antenatal kayıp
Uzun vade sorunlar	Var	Var
Sorun	Yönetim	Tanı, belirleme

Plasenta



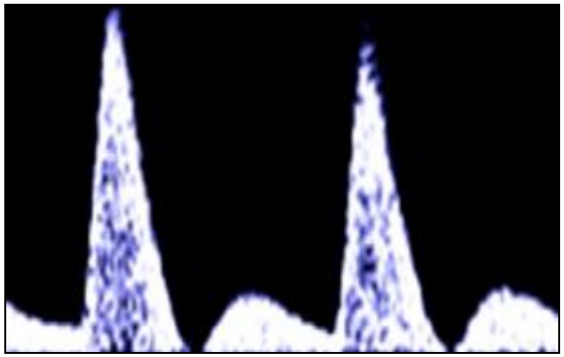
Fetal

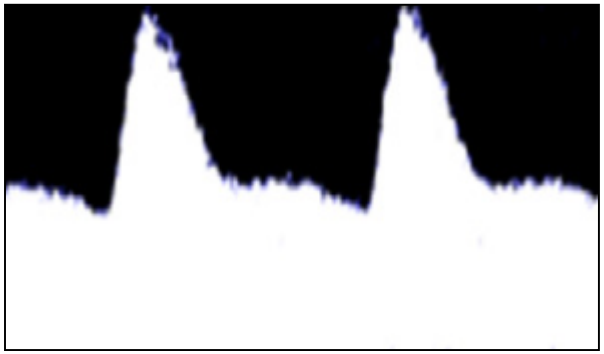
- Umbilikal Arter Doppler
  - Villus damar

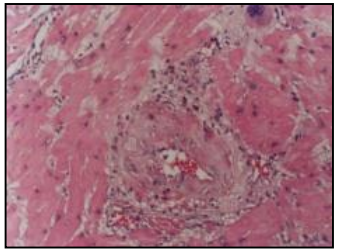
Maternal

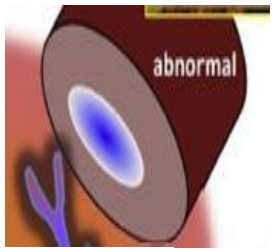
- Uterin Arter Doppler
  - Spiral damar

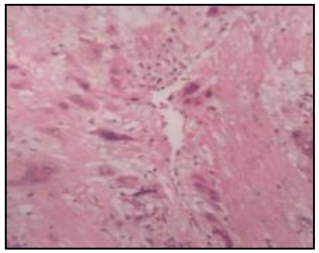
• Uterin Arter Doppler











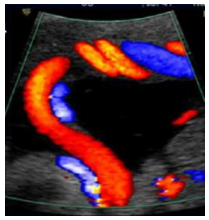
Placenta (2003), **24**, 510–516
doi:10.1053/plac.2002.0945

Histomorphology of the Placenta and the Placental Bed of Growth Restricted Foetuses and Correlation with the Doppler Velocimetries of the Uterine and Umbilical Arteries Madazli et al: Histomorphology of the Placenta

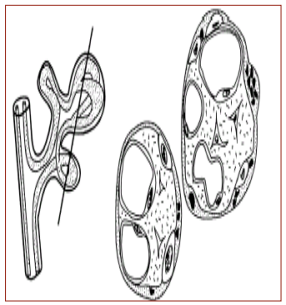
	Abnormal uterine artery doppler flow	
	Placental bed biopsy pathology	Placental pathology
Coefficient	3.51	1.01
Odds ratio	33.7	2.76
95 per cent CI	6.5–173.6	0.6–11.8
Significance	<0.001	0.171

		IUGR (study group) Uterine artery doppler flow		
	AGA (control group)	Normal	Abnormal	*P*
N	25	18	29	
Inadequate trophoblastic invasion	0 (0)	3 (16.6)	22 (75.9)	<0.001
Acute atherosis	0 (0)	3 (16.6)	21 (72.4)	<0.001
Trombosis or luminal obliteration of spiral arteries	0 (0)	1 (5.5)	16 (55.1)	<0.001
Increased extravillous trophoblasts	0 (0)	2 (11)	9 (31)	0.005

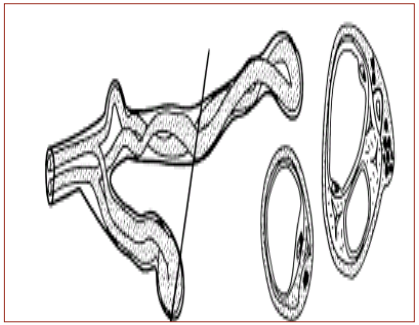
Umbilikal Arter Doppler

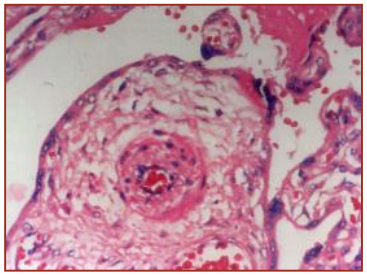


- **Normal**



- **FGK**





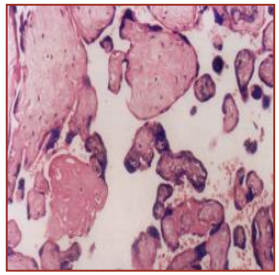
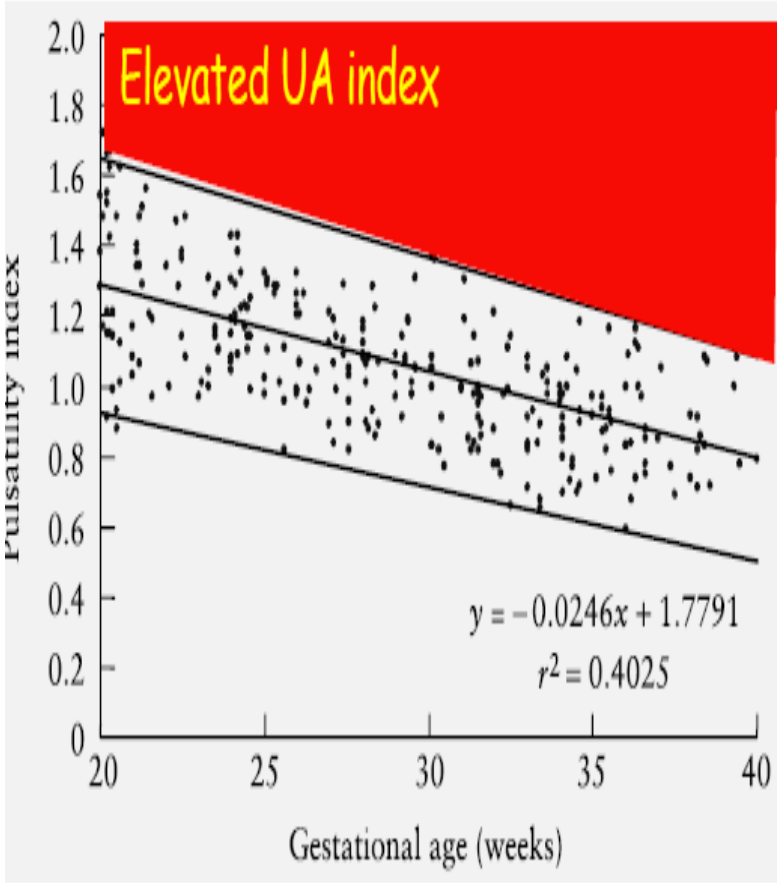


Table 3. Frequencies of placental lesions in AGA and IUGR cases with normal and abnormal umbilical artery doppler velocimetry. Data are expressed as the *n* with percentages in parentheses

	AGA (control group)	IUGR (study group) Umblical artery doppler flow Normal	Abnormal	*P*
N	25	19	28	
Villous infarct	2 (8)	6 (31.5)	23 (82.1)	<0.001
Villous fibrosis	0 (0)	14 (73.7)	23 (82.1)	<0.001
Villous hypovascularity	0 (0)	1 (5.2)	4 (14.3)	0.113
Syncytiotrophblast knots	5 (20)	11 (57.9)	21 (75)	<0.001
Cytotrophblast proliferation	2 (8)	5 (26.3)	19 (67.8)	<0.001
Thickening villous trophoblastic basal membrane	0 (0)	7 (36.8)	22 (78.6)	<0.001
Obliterative endarteritis	0 (0)	3 (15.7)	5 (17.8)	0.066
Perivillous fibrin deposition	10 (40)	13 (68.4)	22 (78.7)	0.008

Table 4. Relationship of abnormal uterine and umbilical artery doppler velocimetries with placental and placental bed biopsy pathologies

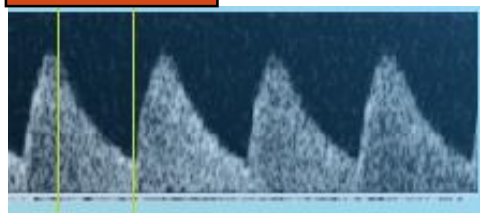
	Abnormal uterine artery doppler flow		Abnormal umbilical artery doppler flow	
	Placental bed biopsy pathology	Placental pathology	Placental bed biopsy pathology	Placental pathology
Coefficient	3.51	1.01	0.83	3.04
Odds ratio	33.7	2.76	2.2	21.04
95 per cent CI	6.5–173.6	0.6–11.8	0.46–11.2	3.8–115.9
Significance	<0.001	0.171	0.305	<0.001



Baschat AA, Gembruch U, UOG 2003; 21: 124-7

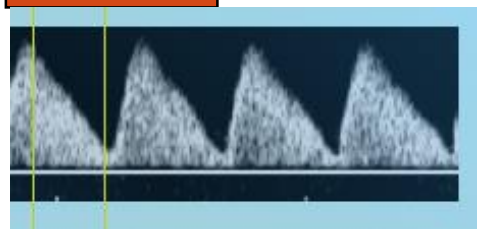
Trudinger BJ, Giles WB, Br J Obstet Gynaecol, 1996; 105: 487-9

UA PI N



- Villöz damar perfüzyon Normal

UA PI ↑

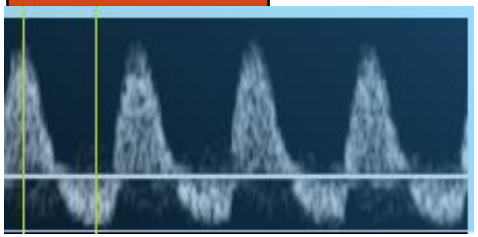


- Villöz damar perfüzyon %30 Azalmış

UA AED

- Villöz damar perfüzyon %50 Azalmış

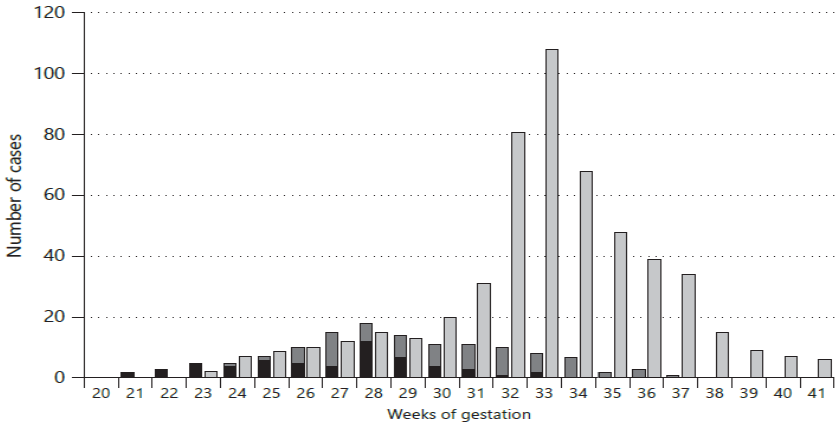
UA REDV



- Villöz damar perfüzyon %70 Azalmış

- **EB-FGK**
  - Yetersiz trofoblastik invazyon
  - Villöz vasküler yapısında sorun
  - Preeklampsi
  - Umb A ve UtA PI yüksek
  - Ağır plasenta yetmezliği ve kronik fetal hipoksi ile ilişkili

(Mifsud ve Sebire, Fetal Diagn Ther 2014;36:117–128)

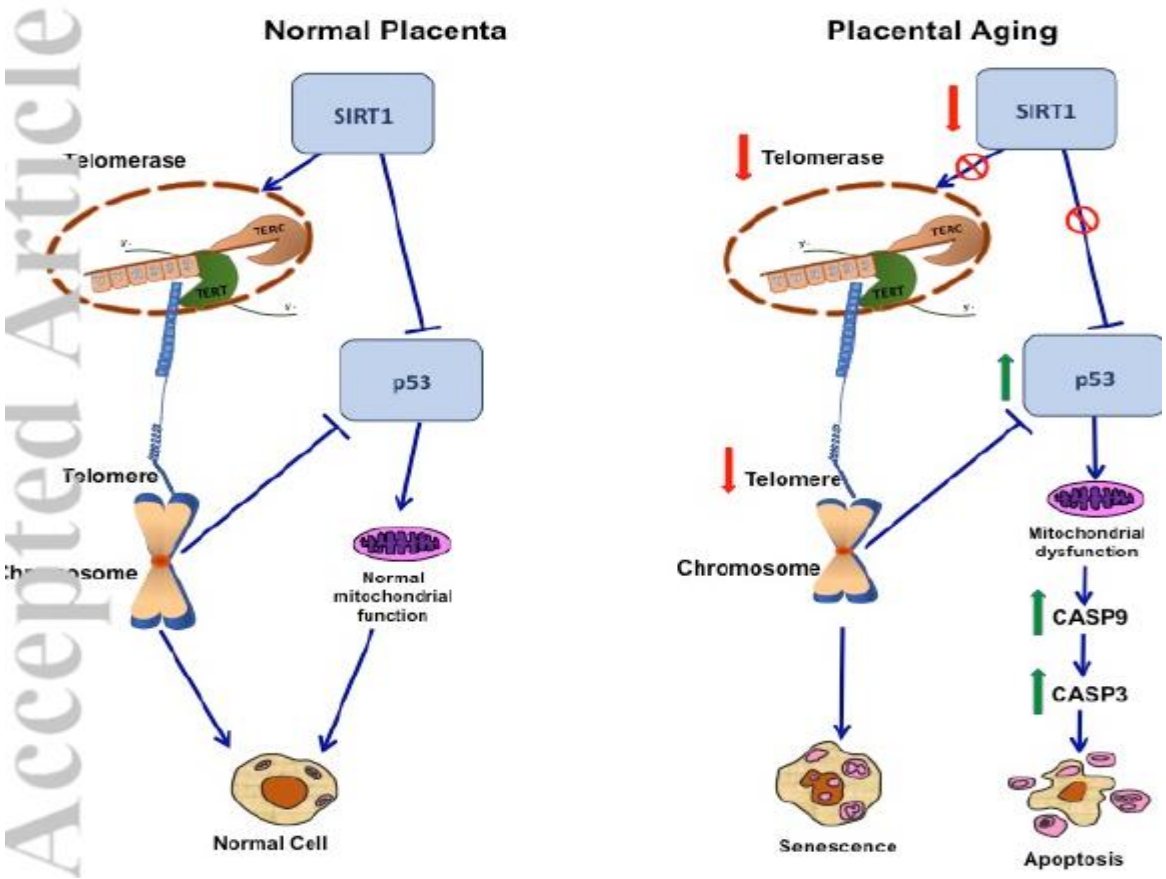


Sachev et al, Fatal Diagn Ther, 2014

- **GB-FGK**
  - Plasenta yatak patolojileri daha hafif veya yok
  - Villus yapısında maturasyon bozukluğu
  - Umb A ve UtA anlamlı direnç artışı yok
  - Maturasyon bozukluğu, gaz ve besin alış-verişinde sorunlar ve fetal hipoksi

(Mifsud ve Sebire, Fetal Diagn Ther 2014;36:117–128)

- Plasenta Yaşlanması
  - Kısa telomer
  - Apoptosis
  - Senescence



Accepted Article

Premature placental aging in term small-for-gestational-age and fetal-growth-restricted fetuses

Fetal i+D Fetal Medicine Research Center

Ultrasound Obstet Gynecol

BCNatal - Barcelona Center for Maternal-Fetal and Neonatal Medicine

Sorun

- İleri Gebelik Haftalarında Fetus Hipoksiye Duyarlı
- Özellikle Beyin Hassas
  - Frontal Lob (Entelektüel Fonks)
- Fetusun Cevabı Öngörülebilir Değil
- Antenatal Testler EB-FGK belirli bir seyir izlemiyor

Riskler

- Antenatal kayıp

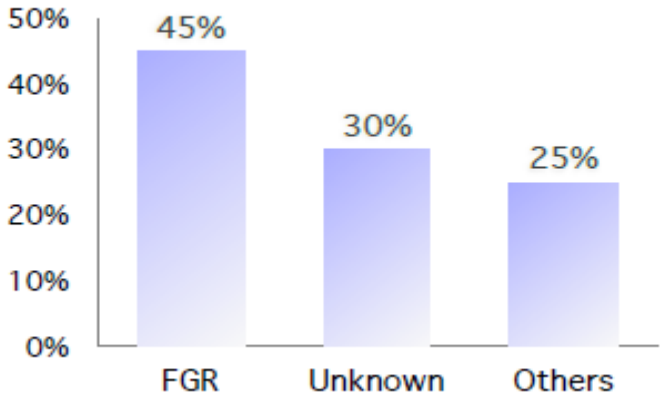
Table 3. Association between fetal growth restriction and antepartum stillbirth in a population of 59 792 babies in the INTERGROWTH-21st Project

Variable	Prevalence (%)		Adjusted HR	Population-attributable risk (%)
	Liveborn (*n* = 59 445)	Stillborn (*n* = 347)		
FGR suspected during pregnancy	4.4	10.1	2.1 (1.4–3.1)	
SGA at birth	3.5	16.7	4.6 (3.4–6.2)	11.1
SGA at birth: FGR suspected during pregnancy	0.9	3.5	3.5 (1.9–6.4)	2.2
SGA at birth: FGR not suspected during pregnancy	2.6	13.3	5.0 (3.6–7.0)	9.4

INTERGROWTH-21st Project. BJOG 2016;

fetal iD

IMPACT OF NON-DETECTED IUGR ON LATE FETAL MORTALITY
Barcelona
2005-2010



- Fetal Distres C/S↑

- Neonatal ölüm (5416 doğum)
  - 1.1 vs 0.4/1000 doğum (**OR 2.56**; 95% CI 1.83-3.57) (Mendez- Figueroa et al , AJOG 2106)

- Neonatal hipoksik sonuçlar (115 502 dog)
  - 1.1 vs 0.7 / 1000 doğum (**RR 1.44**, 95% CI 1.07-1.93) (Chauhan et al, Obstet Gynecol,2017)

- Nöromotor Gelişim (Meta-analiz,28 çalış)
  - Skorları 0.32 SD (95%CI, 0.25-0.38) düşük (Arcangeli et al, Ultrasound Obstet Gynecol 2012)

- Uzun Vade
  - Kalp Hastalıkları
  - Metabolik Sendrom (49,927 kohort)
  - Tip 2 Diabet (**OR, 2.42**; 95% CI, 1.44 - 4.07 (Katanoda et al J Epidemiol 2017)

Term small-for-gestational-age infants from low-risk women are at significantly greater risk of adverse neonatal outcomes

Jessie V. Madden, BSc; Christopher J. Flatley, MClinEpi; Sailesh Kumar, FRCS, FRCOG, FRANZCOG, DPhil(Oxon)

95,900 infants.

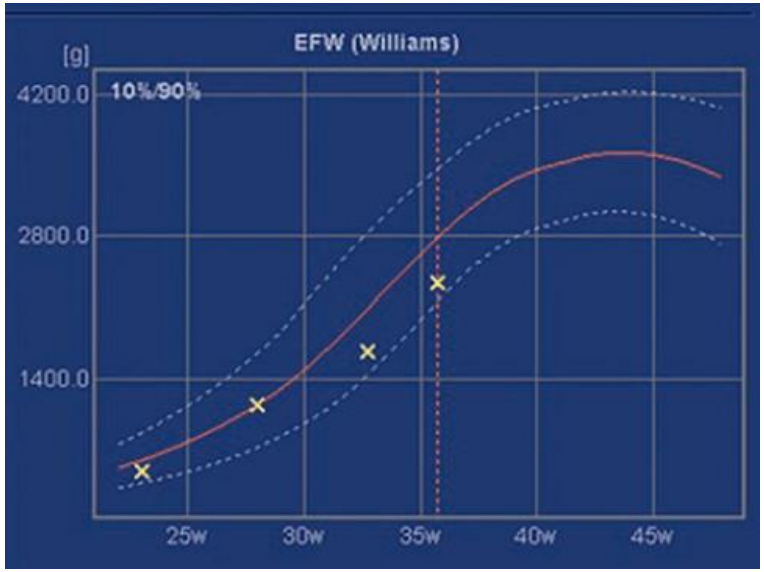
Am J Obstet Gynecol 2018;218:525.e1-9.

TABLE 3
Neonatal outcomes

Neonatal outcome	AGA (n = 87,017)	SGA (n = 8883)		SGA1 vs AGA[a]	SGA2 vs AGA[a]	SGA2 vs SGA1[a]
		SGA1 (n = 4748)	SGA2 (n = 4135)			
Gestational age, wks	39 (38–40)	39 (38–40)	39 (38–40)	NA	NA	NA
Birthweight, g	3450 (3210–3690)	2870 (2730–2980)	2630 (2470–2785)	NA	NA	NA
Apgar score ≤3 at 5 min	142/86865 (0.2%)	16/4734 (0.3%)	19/4124 (0.5%)	1.93 (1.12–3.33)[b]	2.22 (1.29–3.81)[c]	1.24 (0.60–2.57)
Respiratory distress	6301/87017 (7.2%)	345/4748 (7.3%)	405/4135 (9.8%)	1.04 (0.93–1.17)	1.41 (1.26–1.58)[d]	1.32 (1.12–1.54)[c]
Perinatal death	94/87017 (0.1%)	15/4748 (0.3%)	20/4135 (0.5%)	2.62 (1.45–4.72)[c]	3.91 (2.27–6.73)[d]	1.46 (0.69–3.09)
Neonatal death	19/86942 (0.02%)	5/4738 (0.1%)	6/4121 (0.2%)	4.34 (1.46–12.95)[c]	5.70 (2.03–16.01)[c]	1.22 (0.32–4.63)
Stillbirth	75/87017 (0.1%)	10/4748 (0.2%)	14/4135 (0.3%)	2.22 (1.10–4.49)[b]	3.45 (1.82–6.53)[d]	1.56 (0.64–3.80)
Acidosis	2442/87017 (2.8%)	225/4748 (4.7%)	257/4135 (6.2%)	1.48 (1.28–1.72)[d]	1.80 (1.56-2.07)[d]	1.21 (0.99–1.47)
NICU	3740/87017 (4.3%)	285/4748 (6.0%)	562/4135 (13.6%)	1.41 (1.24–1.61)[d]	3.25 (2.94–3.61)[d]	2.22 (1.90–2.60)[d]
SCNM	9660/87017 (11.1%)	650/4748 (13.7%)	933/4135 (22.6%)	1.25 (1.15–1.37)[d]	2.20 (2.03–2.39)[d]	1.71 (1.52–1.92)[d]

Tanı

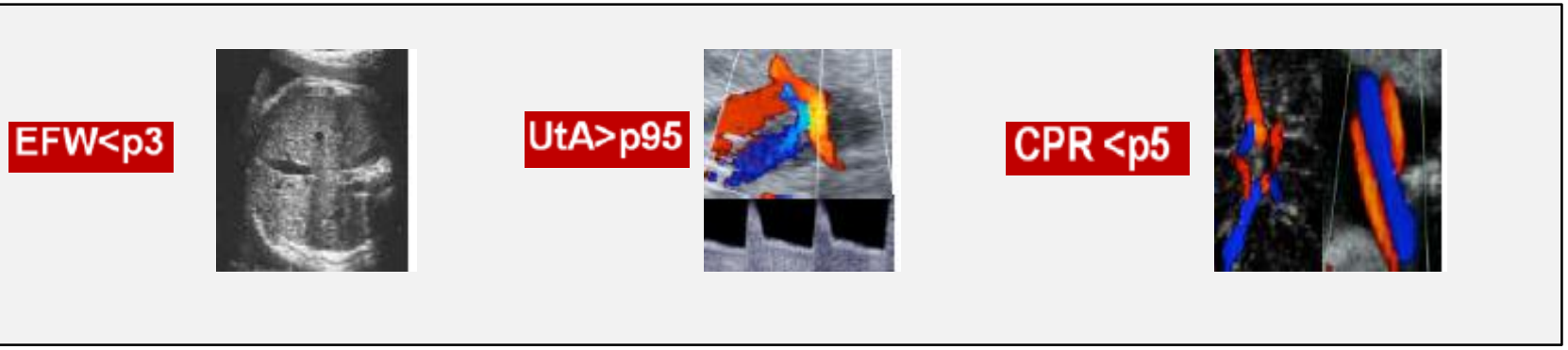
- Belirlenmesi zor
- Fetal Gelişim Eğrisinin Çıkarılması gerekli
  - Gelişim değerlendirilmesi 2 hafta ara
- 3. trimestir USG değerlendirme



Yönetim

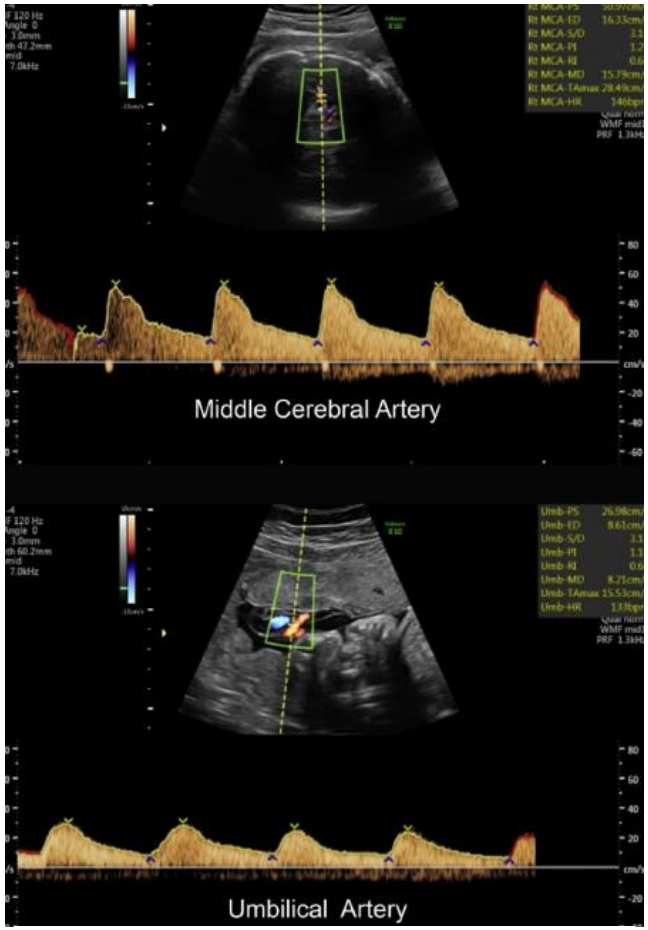
- Sıkıntıda Olanı Belirleme / Risk Belirleme
  - %18-22 Yapısal küçük, sorun yok
- Doğumu Zamanlama
- Doğum Yöntemini Belirleme

- Sıkıntıda Olanı Belirleme



- EFW veya AC < 3 pers (İleri derecede küçük)
- Uterin arter Doppler PI > 95 pers
- **CPR< 5 pers**

Cerebroplasental ratio (CPR)



Reference ranges for Doppler indices of umbilical and middle cerebral arteries and cerebroplacental ratio: a systematic review

D Oros MD;PhD[1,2], S Ruiz-Martinez MD[1], E Staines-Urias MD;PhD[3], A Conde-Agudelo MD;PhD[4,5], J Villar MD;PhD[3], E Fabre MD;PhD[1], AT Papageorghiou

- CPR =MCA PI / UA PI
  - Beyin- MCAPI ↓
  - Plasenta- UAPI ↑
- **CPR ↓**

- CPR < 1, 1.08
  - <5 pers
  - < 0.6765 MoM

Gestational age, weeks	Cerebroplacental ratio					
	Morales-Rosello		Ebbing		Baschat	
	50th centile	5th centile	50th centile	5th centile	Mean	5th centile
28	1,73	1,23	2,14	1,47	2,13	1,28
29	1,76	1,25	2,21	1,53	1,86	1,15
30	1,79	1,25	2,28	1,58	2,34	1,44
31	1,81	1,26	2,32	1,62	2,29	1,73
32	1,82	1,26	2,35	1,64	2,03	1,24
33	1,82	1,25	2,36	1,65	2,1	1,44
34	1,81	1,24	2,35	1,63	2,1	1,36
35	1,79	1,22	2,32	1,6	2,01	1,45
36	1,77	1,2	2,27	1,55	2,01	1,26
37	1,73	1,17	2,19	1,48	2,25	1,17
38	1,69	1,14	2,09	1,4	1,9	1,23
39	1,64	1,1	1,97	1,29	1,64	1,16
40	1,58	1,06	-	-	1,8	1,08

The importance of the cerebroplacental ratio in the evaluation of fetal well-being in SGA and AGA fetuses

Greggory R. DeVore, MD

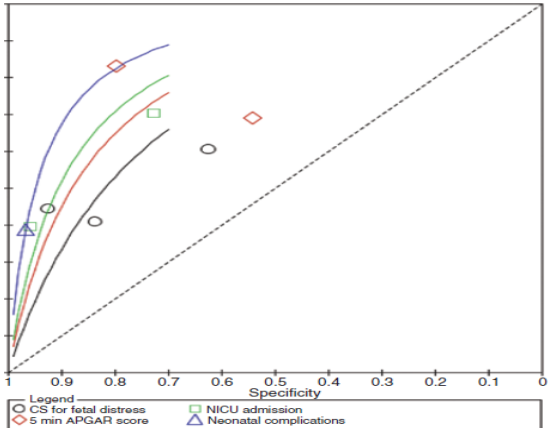
American Journal of Obstetrics & Gynecology JULY 2015

Variable	Cruz-Martinez et al (2011)[26]	Prior et al (2013)[19]	Figueras et al (2014)[27]	Morales-Rosello et al (2015)[20]	Khalil et al (2015)[17]	Khalil et al (Part I) (2015)[18]
Gestational weeks ultrasound studies were obtained	>37	37–42	34–40	37–41.9	34^{+0} to 35^{+6}	>37
Type of CPR measurement (abnormal Value)	PI less than fifth centile[9]	PI <10th centile (<1.24)	PI (<10th centile)[9]	PI MoM <0.6765	PI MoM <0.6765	PI MoM <0.6765
Abnormal fetal heart rate monitoring during labor	—	86% vs 31% ($P < .001$)	—	—	—	—
Operative delivery for fetal distress (cesarean delivery, instrumental delivery)	CPR less than fifth: 37.8% (14/37) CPR more than fifth: 20.4% (29/142) ($P < .001$)	36.4% vs 10.1% ($P < .001$)	79.1% vs 10.7% ($P < .001$)	—	—	13.1% vs 9.4% ($P < .01$)
Meconium stained liquor	—	22.7% vs 9% ($P = .02$)		—	—	—
Apgar <7 at 5 minutes	—	Not significant	0.7% vs 1.3% (not significant)	—	—	—
Abnormal cord pH	—	Not significant	UA 7.17 vs 7.25 ($P < .001$)	UA and UV	—	—
Newborn intensive care unit admission	—	Not significant			All patients 12.6% vs 6.1% ($P < .001$) SGA 22.5% vs 8.4% ($P < .001$) AGA 9.8% vs 5.5% Not significant	14.3% vs 9.7% ($P = .004$)
Neonatal complications	—	Not significant	11.25% vs 5.6% ($P = .03$)	—	—	—

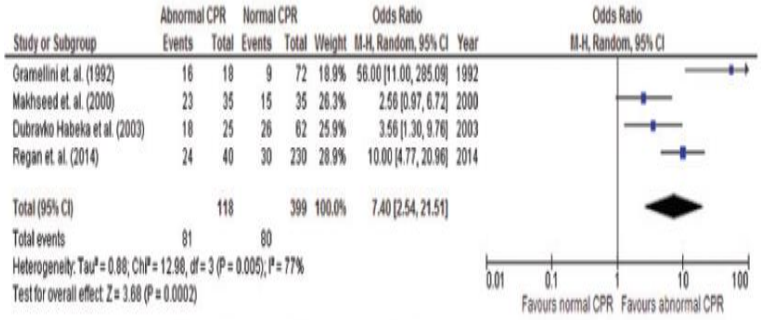
Fetal cerebro-placental ratio and adverse perinatal outcome: systematic review and meta-analysis of the association and diagnostic performance

Ahmed Abobakr Nassr*, Ahmed M. Abdelmagied and Sherif A.M. Shazly

J. Perinat. Med. 2016; 44(2): 249–256



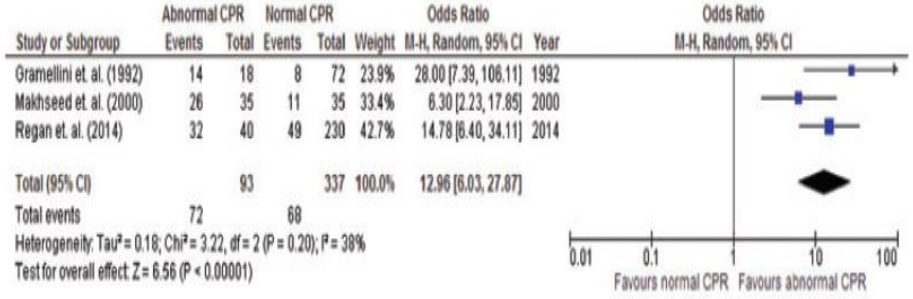
CS for fetal distress



Study or Subgroup	Abnormal CPR Events	Abnormal CPR Total	Normal CPR Events	Normal CPR Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Gramellini et. al. (1992)	16	18	9	72	18.9%	58.00 [11.00, 285.09]	1992
Makhseed et. al. (2000)	23	35	15	35	26.3%	2.56 [0.97, 6.72]	2000
Dubravko Habeka et al. (2003)	18	25	26	62	25.9%	3.56 [1.30, 9.76]	2003
Regan et. al. (2014)	24	40	30	230	28.9%	10.00 [4.77, 20.96]	2014
Total (95% CI)		118		399	100.0%	7.40 [2.54, 21.51]	
Total events	81		80				

Heterogeneity: Tau² = 0.88; Chi² = 12.98, df = 3 (P = 0.005); I² = 77%
Test for overall effect: Z = 3.68 (P = 0.0002)

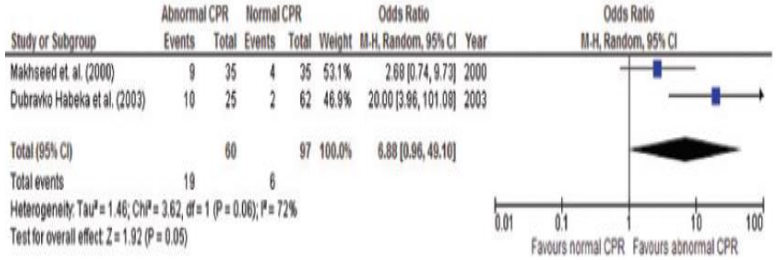
NICU admission



Study or Subgroup	Abnormal CPR Events	Abnormal CPR Total	Normal CPR Events	Normal CPR Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Gramellini et. al. (1992)	14	18	8	72	23.9%	28.00 [7.39, 106.11]	1992
Makhseed et. al. (2000)	26	35	11	35	33.4%	6.30 [2.23, 17.85]	2000
Regan et. al. (2014)	32	40	49	230	42.7%	14.78 [6.40, 34.11]	2014
Total (95% CI)		93		337	100.0%	12.96 [6.03, 27.87]	
Total events	72		68				

Heterogeneity: Tau² = 0.18; Chi² = 3.22, df = 2 (P = 0.20); I² = 38%
Test for overall effect: Z = 6.56 (P < 0.00001)

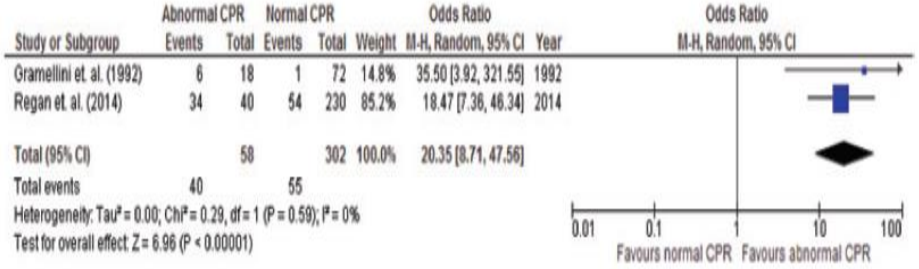
5-minute APGAR scores



Study or Subgroup	Abnormal CPR Events	Abnormal CPR Total	Normal CPR Events	Normal CPR Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Makhseed et. al. (2000)	9	35	4	35	53.1%	2.69 [0.74, 9.73]	2000
Dubravko Habeka et al. (2003)	10	25	2	62	46.9%	20.00 [3.96, 101.08]	2003
Total (95% CI)		60		97	100.0%	6.88 [0.96, 49.10]	
Total events	19		6				

Heterogeneity: Tau² = 1.46; Chi² = 3.62, df = 1 (P = 0.06); I² = 72%
Test for overall effect: Z = 1.92 (P = 0.05)

Neonatal complications



Study or Subgroup	Abnormal CPR Events	Abnormal CPR Total	Normal CPR Events	Normal CPR Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Gramellini et. al. (1992)	6	18	1	72	14.8%	35.50 [3.92, 321.55]	1992
Regan et. al. (2014)	34	40	54	230	85.2%	18.47 [7.36, 46.34]	2014
Total (95% CI)		58		302	100.0%	20.35 [8.71, 47.56]	
Total events	40		55				

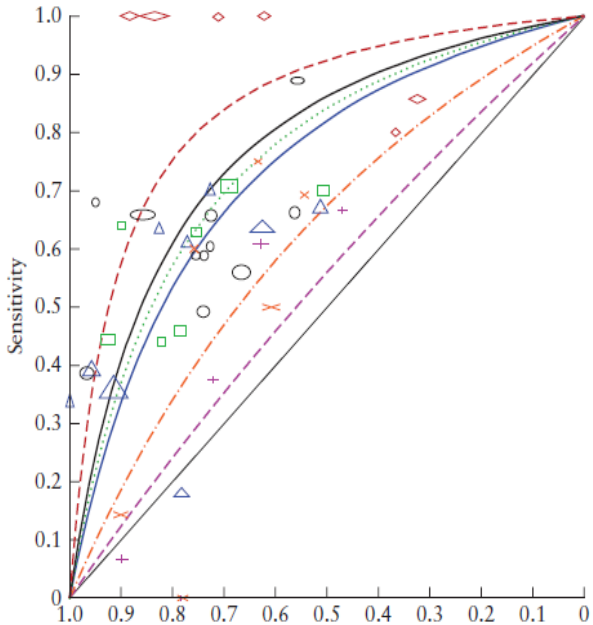
Heterogeneity: Tau² = 0.00; Chi² = 0.29, df = 1 (P = 0.59); I² = 0%
Test for overall effect: Z = 6.96 (P < 0.00001)

Predictive accuracy of cerebroplacental ratio for adverse perinatal and neurodevelopmental outcomes in suspected fetal growth restriction: systematic review and meta-analysis

A. CONDE-AGUDELO[1], J. VILLAR[2,3], S. H. KENNEDY[2,3] and A. T. PAPAGEORGHIOU[2,3]

Ultrasound Obstet Gynecol 2018; 52: 430–441

Outcome	*Studies (n)*	*Women (n)*	*Pooled sensitivity (% (95% CI))*	*Pooled specificity (% (95% CI))*	*LR+ (95% CI)*	*LR− (95% CI)*
Perinatal death	6[45,52,55,56,58,60]	1495	93 (78–98)	76 (74–78)	3.9 (3.4–4.5)	0.09 (0.0–0.3)
Any composite of adverse perinatal outcomes	11[43,44,47,53,54,56–60,62]	2658	57 (53–61)	77 (75–79)	2.5 (2.3–2.8)	0.6 (0.5–0.6)
CD for NRFS	7[43,45,50,58–60,62]	1339	59 (54–64)	74 (72–77)	2.3 (2.0–2.6)	0.6 (0.5–0.6)
5-min Apgar score < 7	6[43,44,51,58,59,64]	1148	54 (42–66)	72 (69–74)	1.9 (1.5–2.4)	0.6 (0.5–0.8)
Admission to NICU	9[43–45,51,56,58–60,62]	2206	45 (41–49)	79 (77–81)	2.2 (1.9–2.5)	0.7 (0.6–0.8)
Neonatal acidosis	5[50,51,59,62,64]	1283	48 (38–58)	70 (68–73)	1.6 (1.3–2.0)	0.7 (0.6–0.9)
Neonatal brain lesion	5[45,48,52,55,63]	352	56 (43–67)	48 (43–54)	1.1 (0.8–1.4)	0.9 (0.7–1.2)
Neonatal morbidity other than brain lesion	4[43,45,46,49]	547	78 (67–86)	33 (29–37)	1.2 (1.0–1.3)	0.7 (0.4–1.1)
Use of mechanical ventilation	1[55]	176	90 (77–96)	39 (31–47)	1.5 (1.2–1.7)	0.3 (0.1–0.7)
SGA at birth*	2[43,59]	554	43 (39–47)	94 (84–98)	7.4 (2.5–22.4)	0.6 (0.5–0.7)
Onset of FGR						
Early (< 32 or < 34 weeks at diagnosis or delivery)	3[47,56,61]	784	64 (56–71)	85 (82–88)	4.2 (3.4–5.3)	0.4 (0.3–0.5)
Late (≥ 32 or ≥ 34 weeks at diagnosis or delivery)	6[47,54,56,57,59,62]	1915	56 (51–61)	76 (74–78)	2.3 (2.0–2.6)	0.6 (0.5–0.7)

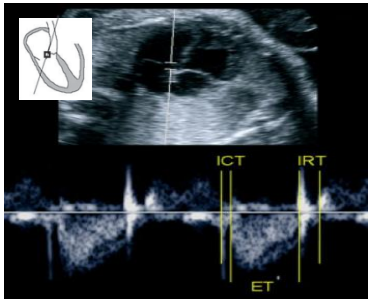


cerebroplacental ratio for predicting composite of adverse perinata outcomes (○, ——), perinatal death (◇, - - -), Cesarean delivery for non-reassuring fetal status (□, ·····), admission to neonatal intensive care unit (△, ——), 5-min Apgar score < 7 (×, —·—·) and neonatal acidosis (+, - - -) in singleton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

Modified myocardial performance index and its prognostic significance for adverse perinatal outcome in early and late onset fetal growth restriction

Ebru Alici Davutoglu[a], Aysegul Ozel[a], Funda Oztunc[b] and Riza Madazli[a]

THE JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE (2018)



MPI = ICT+ IRT / ET

Table 1. The clinical characteristics and perinatal outcomes of the study populations.[a]

	Early-onset	Late-onset	Controls	*p* Value
	FGR	FGR		
N	22	51	66	
Maternal age (y)	29.7 ± 8.2	27.5 ± 4.6	28.8 ± 4.8	.216
Parity	0.5 ± 0.7	0.7 ± 0.7	0.8 ± 0.9	.290
Gestational age at delivery (weeks)	30.2 ± 2.5	37.4 ± 1.2	39.2 ± 1.2	.000
Birth weight (g)	1071 ± 490	2320 ± 284	3366 ± 357	.000
Cesarean section rate	20/20, 100	13, 22.5	16, 25.4	.000
Pathologic uterine artery Doppler	12, 54.5	6, 11.8	7, 10.6	.000
5-min Apgar score <7	8/20, 40	2/51, 3.9	–	.000
NICU admission	19/20, 95	2/51, 3.9	–	.000
Intrauterine death	2, 9.1	–	–	–
Neonatal death	2, 9.1	–	–	–

Table 2. Cardiac and peripheral Doppler measurements of early and late onset FGR cases compared with their appropriate gestational aged controls.[a]

	Early onset	Controls	*p* Value	Late onset	Controls	*p* Value
	FGR			FGR		
N	22	34		51	32	
Gestational age at ultrasound (weeks)	27.9 ± 2.9	28.6 ± 2.6	.328	35.3 ± 2.5	35.9 ± 1.7	.167
Modified myocardial performance index	0.66 ± 0.20	0.42 ± 0.09	.000	0.55 ± 0.13	0.37 ± 0.09	.000
Isovolumetric contraction time (ms)	43.8 ± 1.9	33.5 ± 0.7	.000	38.7 ± 7.7	37.5 ± 4.1	.848
Ejection time (ms)	147.7 ± 22.1	167.5 ± 15.1	.000	156.5 ± 20.2	170.1 ± 17.1	.001
Isovolumetric relaxation time (ms)	49.8 ± 1.0	37.4 ± 1.1	.000	47.5 ± 1.1	31.8 ± 0.1	.000
E/A wave peak velocity ratio	0.63 ± 0.14	0.74 ± 0.12	.01	0.75 ± 0.12	0.73 ± 0.12	.452
Umbilical artery PI	1.39 ± 0.52	0.90 ± 0.20	.000	0.97 ± 0.31	0.89 ± 0.20	.222
Middle cerebral artery PI	1.53 ± 0.43	1.56 ± 0.30	.788	1.66 ± 0.36	1.61 ± 0.24	.430

(Pearson's $r = 0.391$, $p = .088$) in the EO-FGR fetuses. There was a significant negative correlation between Mod-MPI values and cerebroplacental ratio (CPR) values (Pearson's $r = -0.288$, $p = .041$); however no significant correlation between Mod-MPI values and 5-min Apgar score < 7, and fetal distress during labor (Pearson's $r = 0.149$, $p = 0.297$) in the LO-FGR fetuses was noted.

- # Doğum Zamanı ve Yöntemi

- **The Disproportionate Intrauterine Growth Intervention Trial At Term (DIGITAT)** /Hollanda 2004-2008
  - AC ve/veya EFW < %10
  - 36+ ve 41+ GH
  - 321 İndüksiyon / 329 Bekleme

- Neonatal Sonuçlar ve Müdahaleli doğum açısından anlamlı fark yok

Induction versus expectant monitoring for intrauterine growth restriction at term: randomised equivalence trial (DIGITAT)

BMJ 2010;341:c7087

	Induction of labour group (n=321)	Expectant monitoring group (n=329)	Difference in mean or percentage (95% CI)
Composite adverse neonatal outcome	17 (5.3)	20 (6.1)	−0.8 (−4.3 to 2.8)
Fetal deaths	0	0	—
Neonatal deaths	0	0	—
Apgar score after five minutes <7	7 (2.2)	2 (0.6)	1.6 (−0.2 to 3.4)
Arterial pH <7.15‡	34 (12.2)	38 (13.2)	−1.0 (−6.5 to 4.5)
Arterial pH <7.10‡	12 (4.3)	19 (6.6)	−2.3 (−6.0 to 1.4)
Arterial pH <7.05‡	4 (1.4)	10 (3.5)	−2.1 (−4.6 to 0.5)
Arterial base excess < −10‡	16 (5.7)	26 (9.0)	−3.3 (−7.6 to 1.0)
Admission to intensive care	9 (2.8)	13 (4.0)	−1.2 (−4.0 to 1.6)
Neonatal admission			
Intermediate care	155 (48.4)	118 (36.3)	12.1 (4.6 to 19.7) *
Maternal ward	89 (27.8)	116 (35.7)	−7.9 (−15.0 to −0.7)*
No admission	67 (20.9)	78 (24.0)	−3.1 (−9.5 to 3.4)
Length of stay (days)			
Infants in the neonatal intensive care unit	9 (6-14)	13 (6-22)	***

Neonatal morbidity after induction vs expectant monitoring in intrauterine growth restriction at term: a subanalysis of the DIGITAT RCT

Am J Obstet Gynecol 2012;206:344.e1-7.

- Neonatal Bakım Ünitesine yatış >38 hafta daha az
- >38 hafta İndüksiyon

Effects on (neuro)developmental and behavioral outcome at 2 years of age of induced labor compared with expectant management in intrauterine growth-restricted infants: long-term outcomes of the DIGITAT trial

Am J Obstet Gynecol 2012;206:406.e1-7.

- İndüksiyon – Bekleme anlamlı fark yok

Caesarean section rates and adverse neonatal outcomes after induction of labour versus expectant management in women with an unripe cervix: a secondary analysis of the HYPITAT and DIGITAT trials

BJOG 2016;123:1501–1508.

- Bishop skor <6 İndüksiyon, Neonatal olumsuz sonuçlar ve C/S oranlarını artırmıyor

- Doğum Zamanı

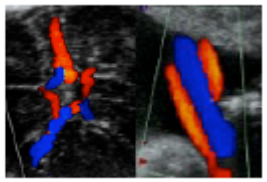
	Anormal Doppler	Normal Doppler
Birleşik Krallık (RCOG, 2014)	37 GH (CPR,UA)	37 GH?
Yeni Zelanda (NZMFMN, 2014)	38 GH (CPR,UA,UtA)	EFW <3 pers 38 GH, EFW 3-10 pers 40 GH
ABD (ACOG, 2013)	37 GH (UA PI)	38+0 - 39+6 GH
Fransa (CNGOF, 2015)	37 GH (UAPI, CPR, Amnios)	>37 bireyselleşmiş

Yönetim

- EFW< 3 pers
  - 38 GH İndüksiyon
- FGK (EFW veya AC<%10)
  - Doppler Sorun var (CPR<5 pers, UA PI>95 pers, UtAPI>95 pers)
    - >37 GH İndüksiyon
  - Doppler Sorun Yok
    - Bireyselleşmiş (38+,39+ GH) Takip /İndüksiyon

- **İndüksiyon**
  - Travayda fetal distres ve CS ↑
  - Sürekli monitorizayon
  - Elektif Sezaryen?
- **Takip**
  - Haftada 2-3 kere Doppler (CPR), KTG, Amnios, Fetal hareketler

CPR <p5



Teşekkürler