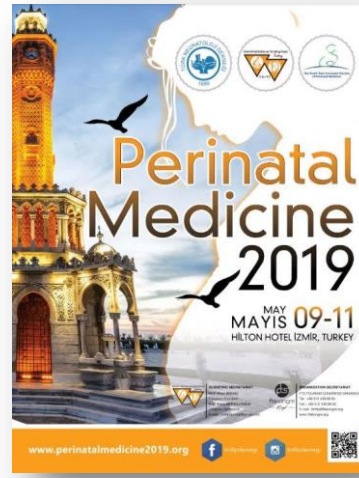




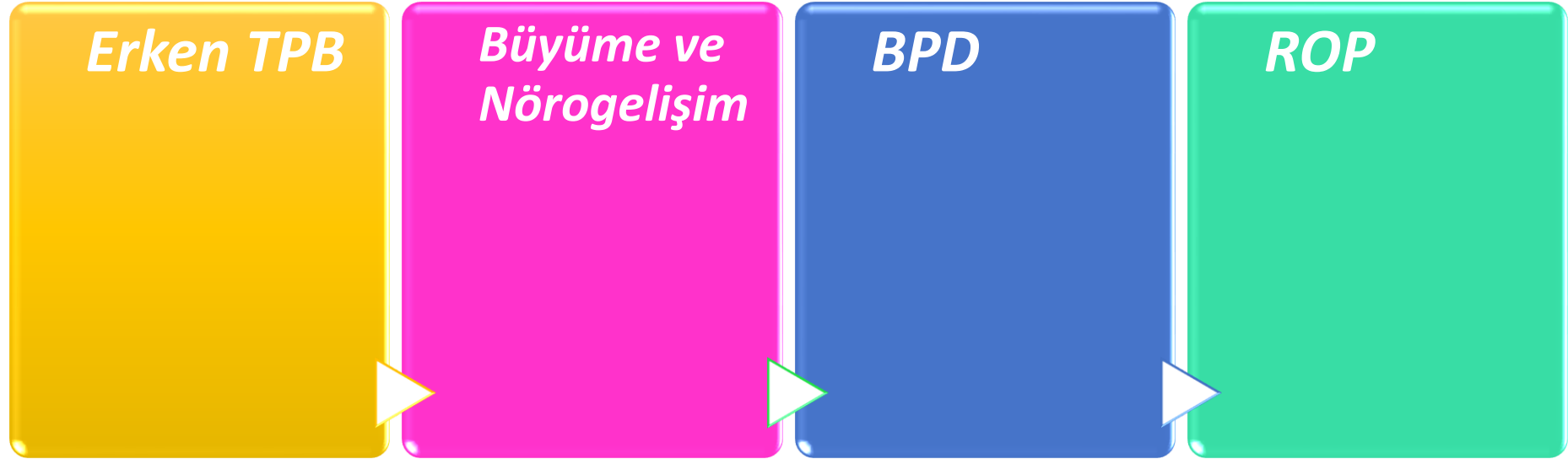
Aşırı Preterm Bebeklerde Erken Enerji ve Protein Alımı

Doç. Dr. Mehmet Yekta ÖNCEL

*İzmir Kâtip Çelebi Üniversitesi Tıp Fakültesi, Neonatoloji Bilim Dalı
Tepecik Eğitim ve Araştırma Hastanesi, Yenidoğan Kliniği*

Aşırı Preterm Bebeklerde Erken Enerji ve Protein Alımı

Sunum Planı



Fetal Growth From 8 to 40 Weeks



Prematüre Bebeklerde Beslenme → **NUTRİSYONEL ACİL**



Prematüre beslenmesinde amaç?

Normal büyüyen fetüsün in utero büyüme hızını yakalamak

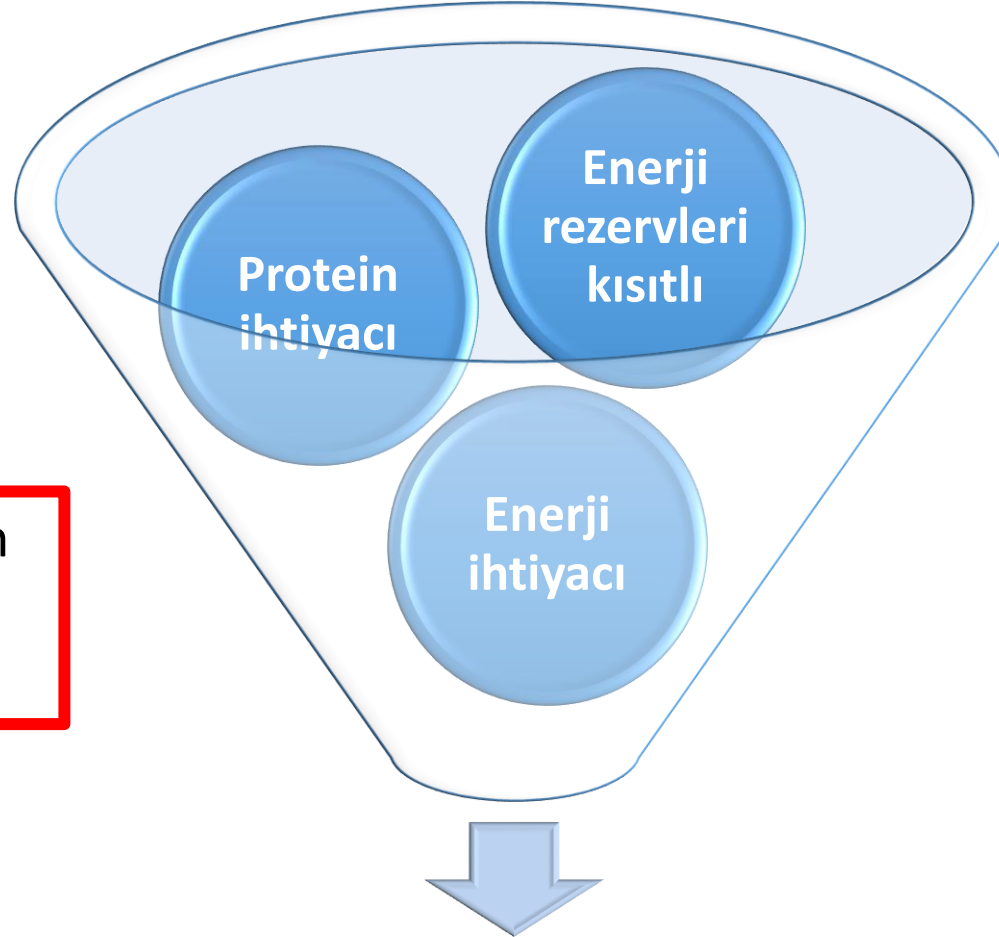


DA <1500 gram bebeklerin %50'si taburculukta ağırlıkça <10 p



Ekstrauterin büyüme geriliğini önlemek için hem parenteral hem de enteral beslenmenin çok erken başlatılması

Erken Parenteral Beslenme

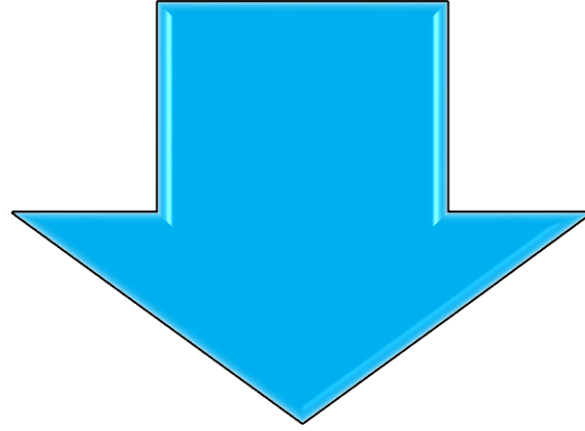


Kord klemplendikten sonra besin transferindeki kesintiyi en aza indirecek destek sağlanmalı

Doğumdan sonraki

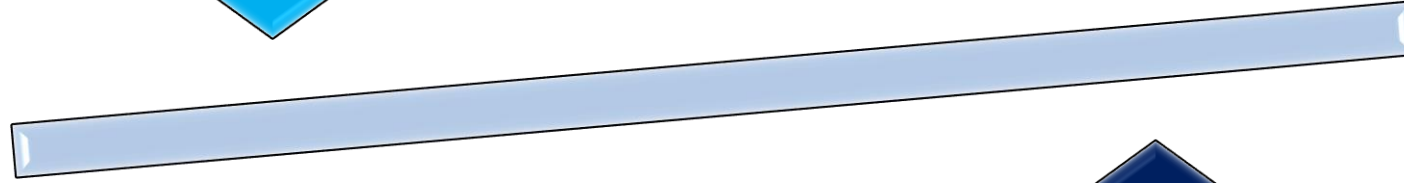
ilk saatten itibaren TPB başlanmalıdır

Optimal Protein ve Enerji



**Bebeklikte çok hızlı
persantil atlama:**

Kötü metabolik sonuç
Vücut yağ oranında artma
ve erişkin hastalıkları

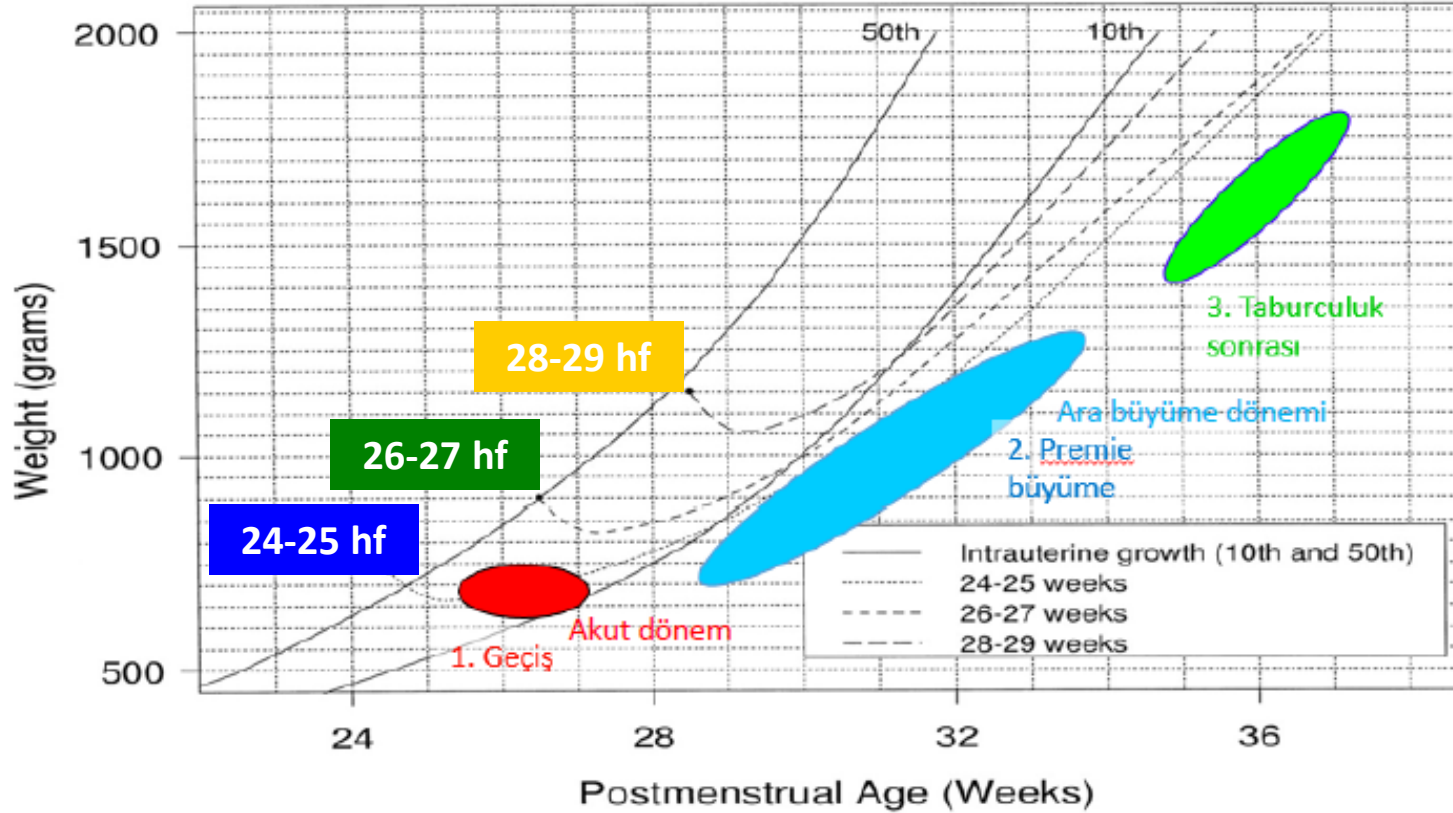


**Erken bebeklikteki
beslenme yetersizliği:**

Kötü nörogelişim



Prematüre bebeklerin postnatal büyümesi



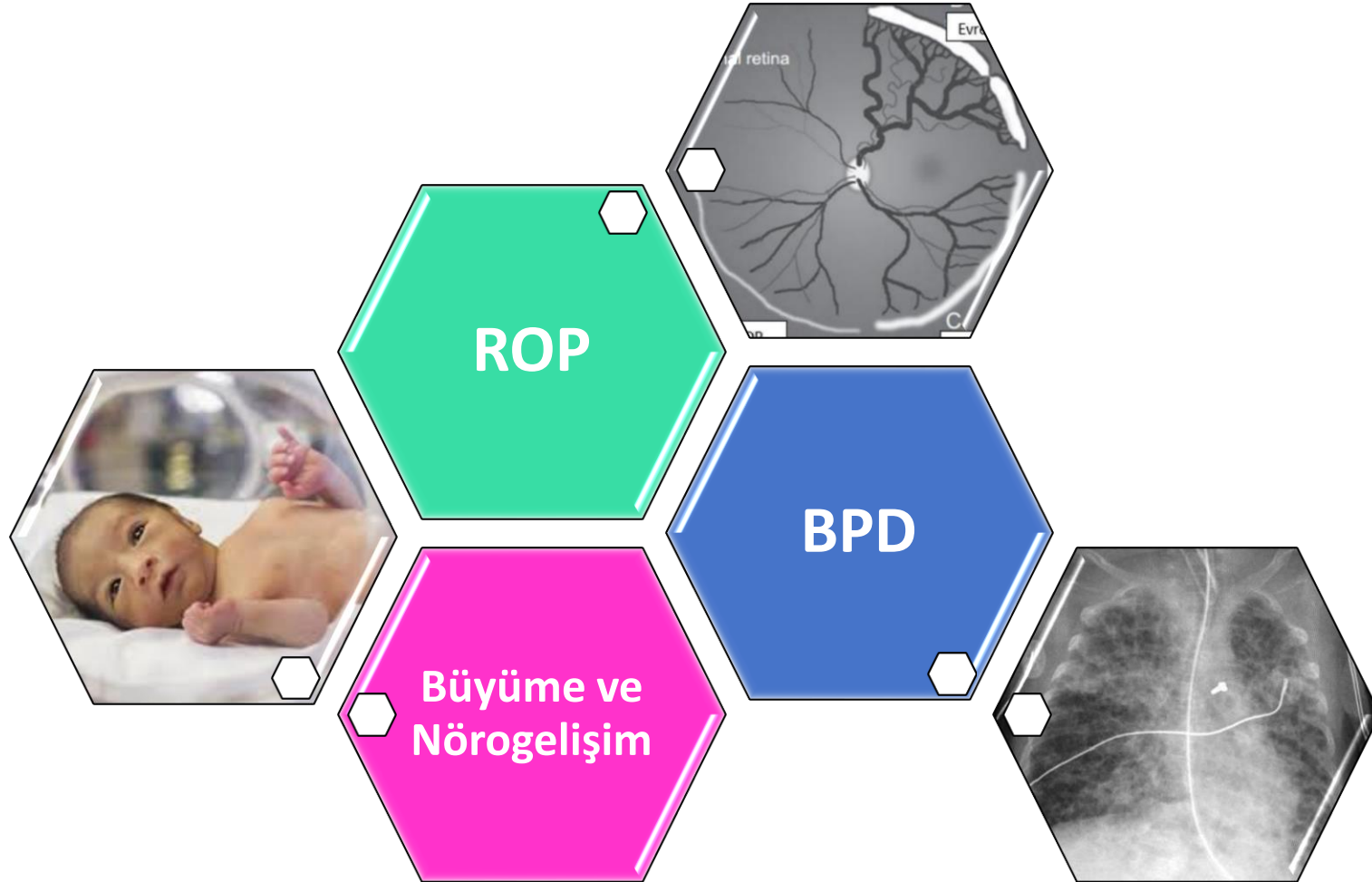
Akut dönem (0-10 gün)

Ara büyüme dönemi (10 gün- 34 hafta)

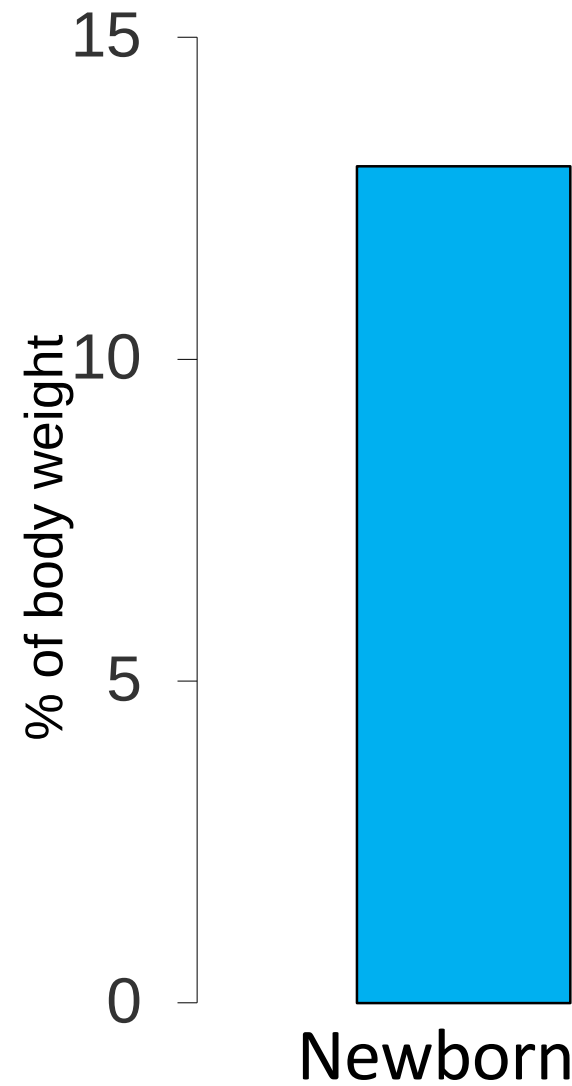
Taburculuk sonrası (>34 hafta)

Her dönemde farklı bir metabolik fizyoloji ve farklı beslenme gereksinimleri söz konusudur

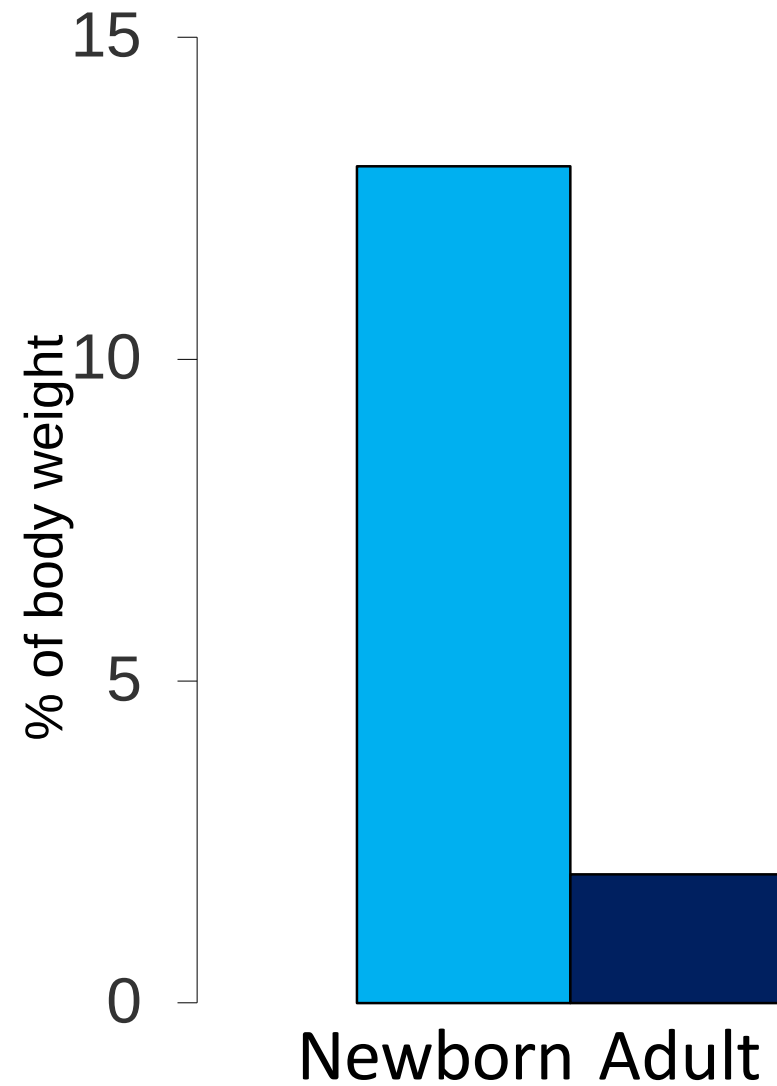
Aşırı Preterm Bebeklerde Erken Enerji ve Protein Alımı



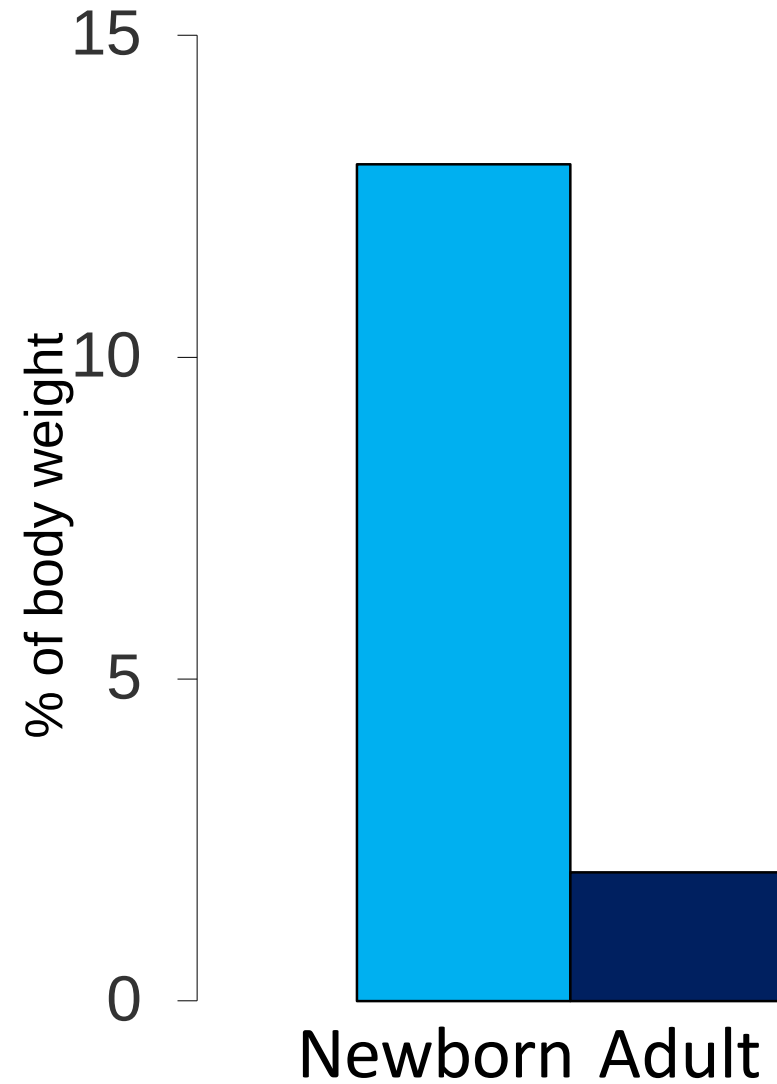
Brain weight



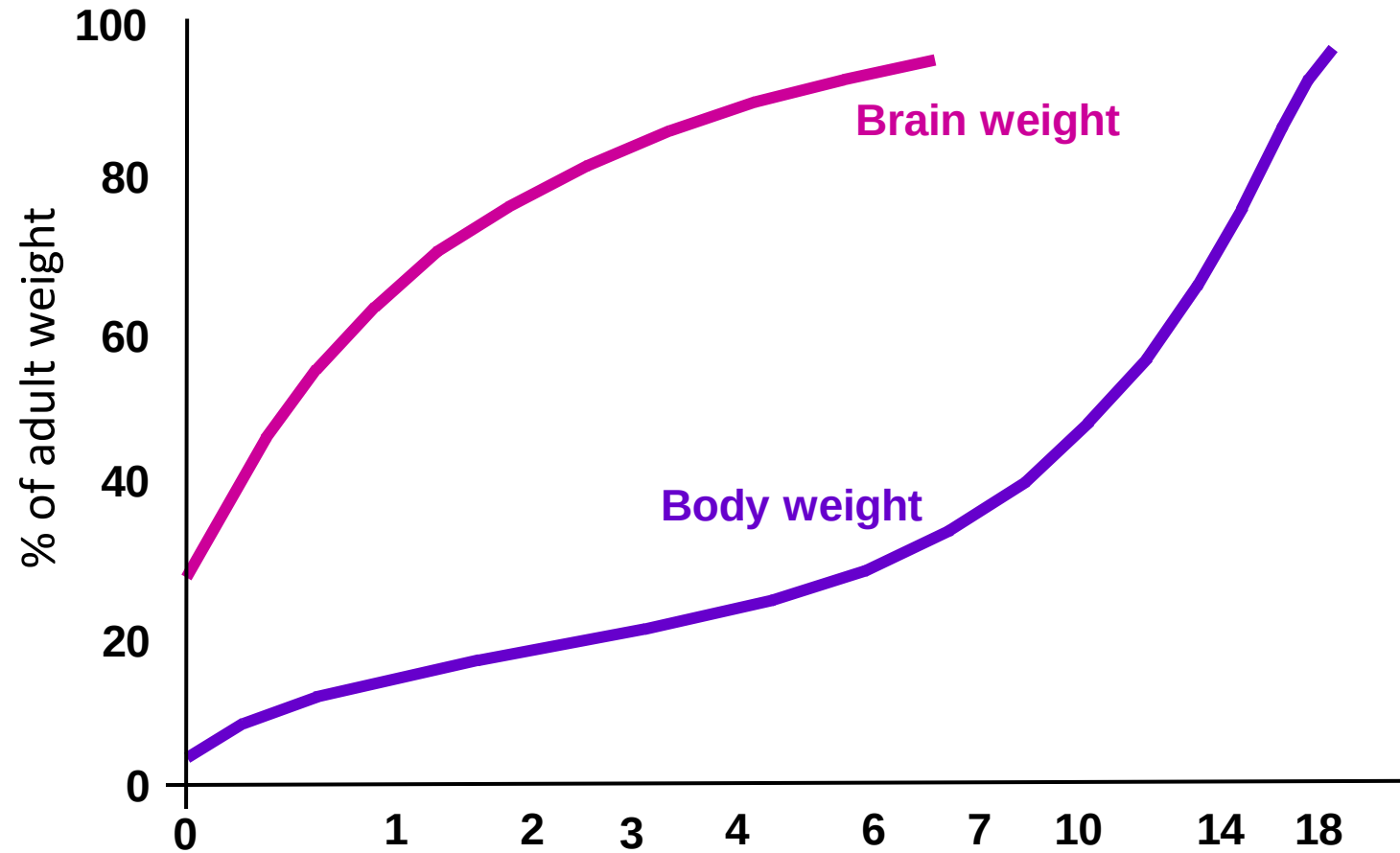
Brain weight



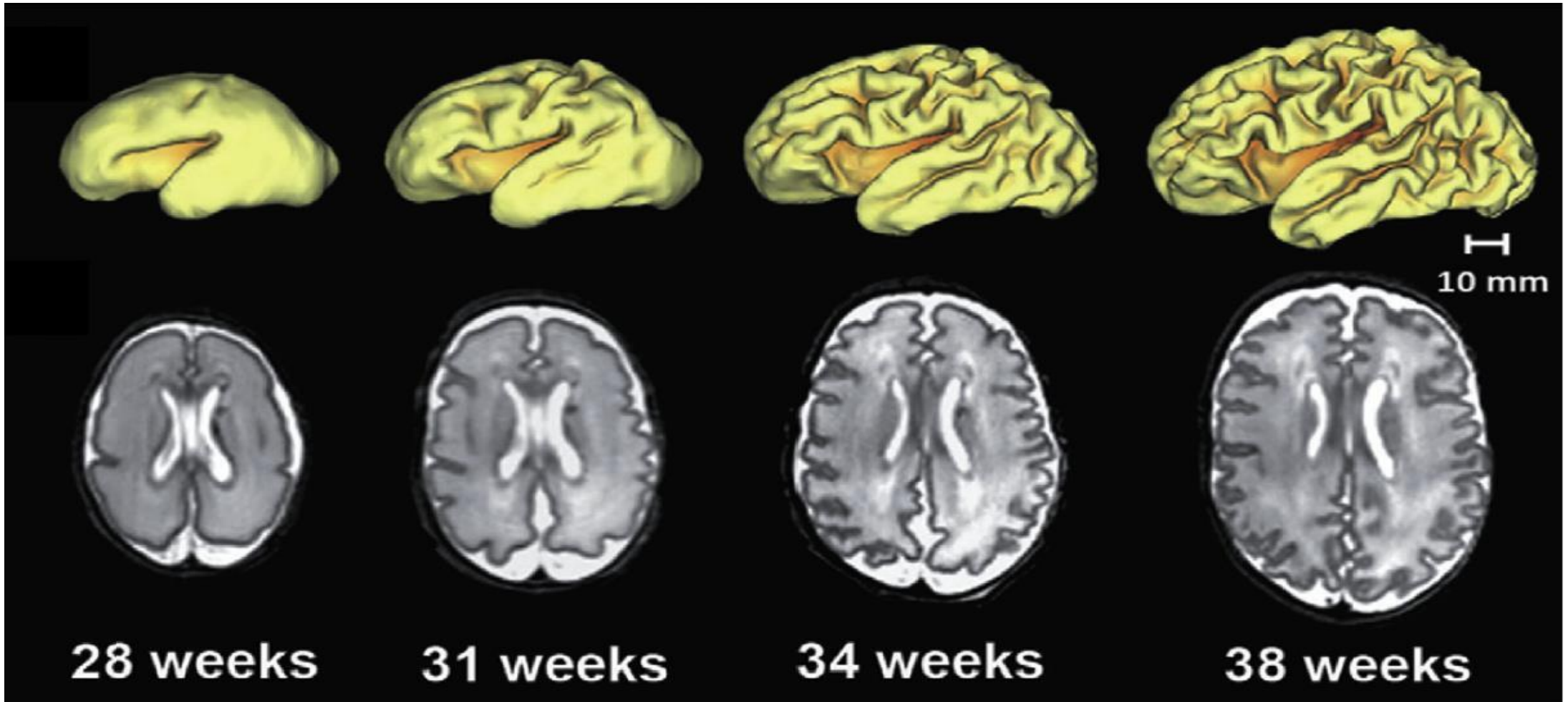
Brain weight



Organ weight



Pretermers: Çok hızlı bir büyüme ve gelişme dönemi



24 w $\approx$ 75 g

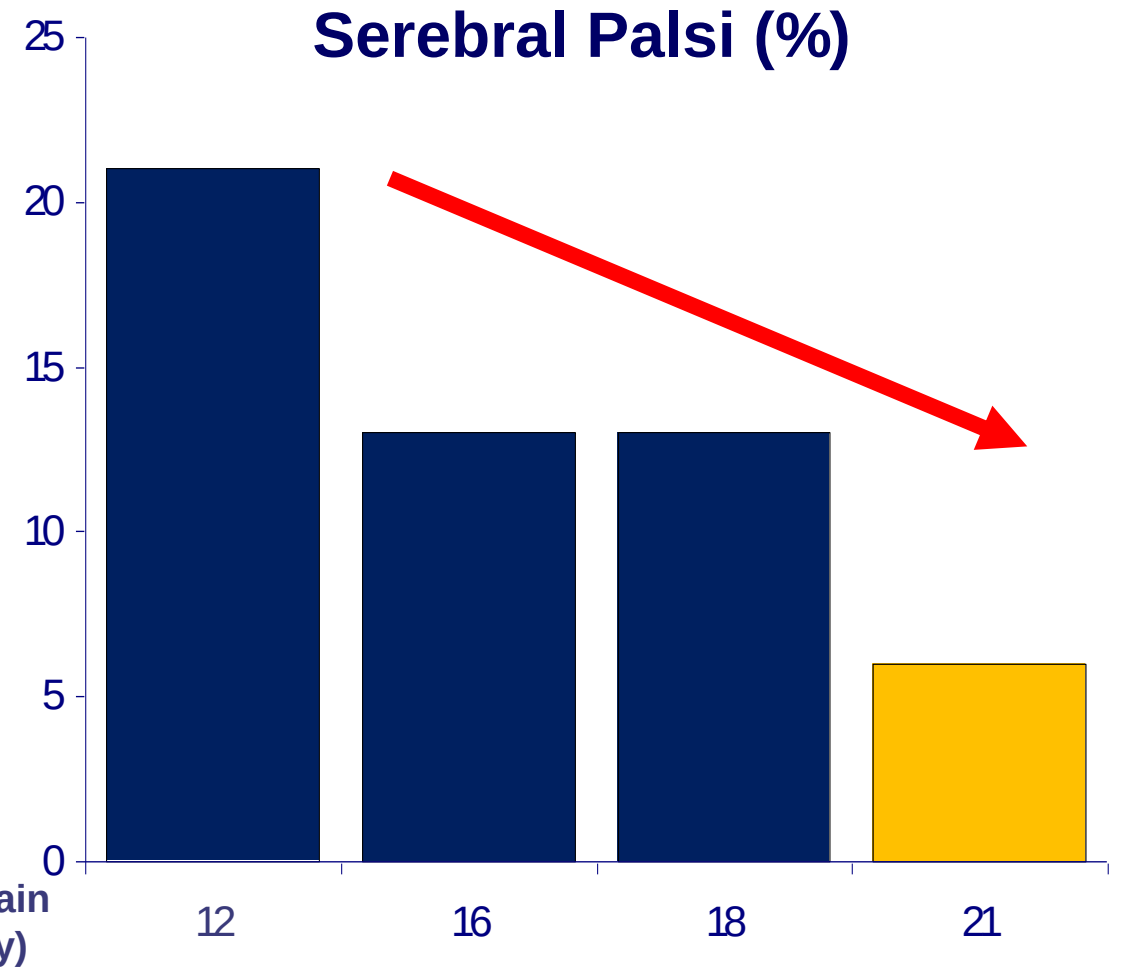
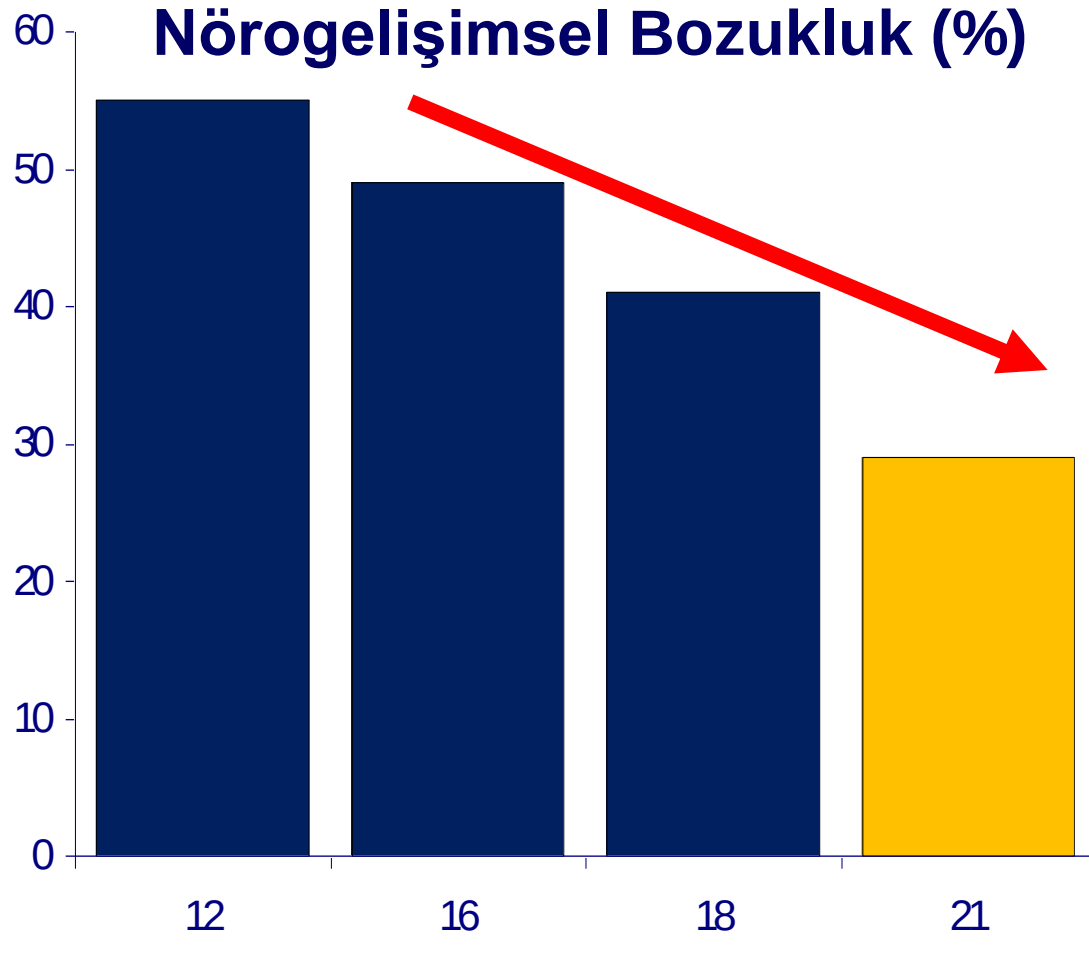


Term $\approx$ 400 g



Yetersiz Büyüme → Kötü Nörogelişim

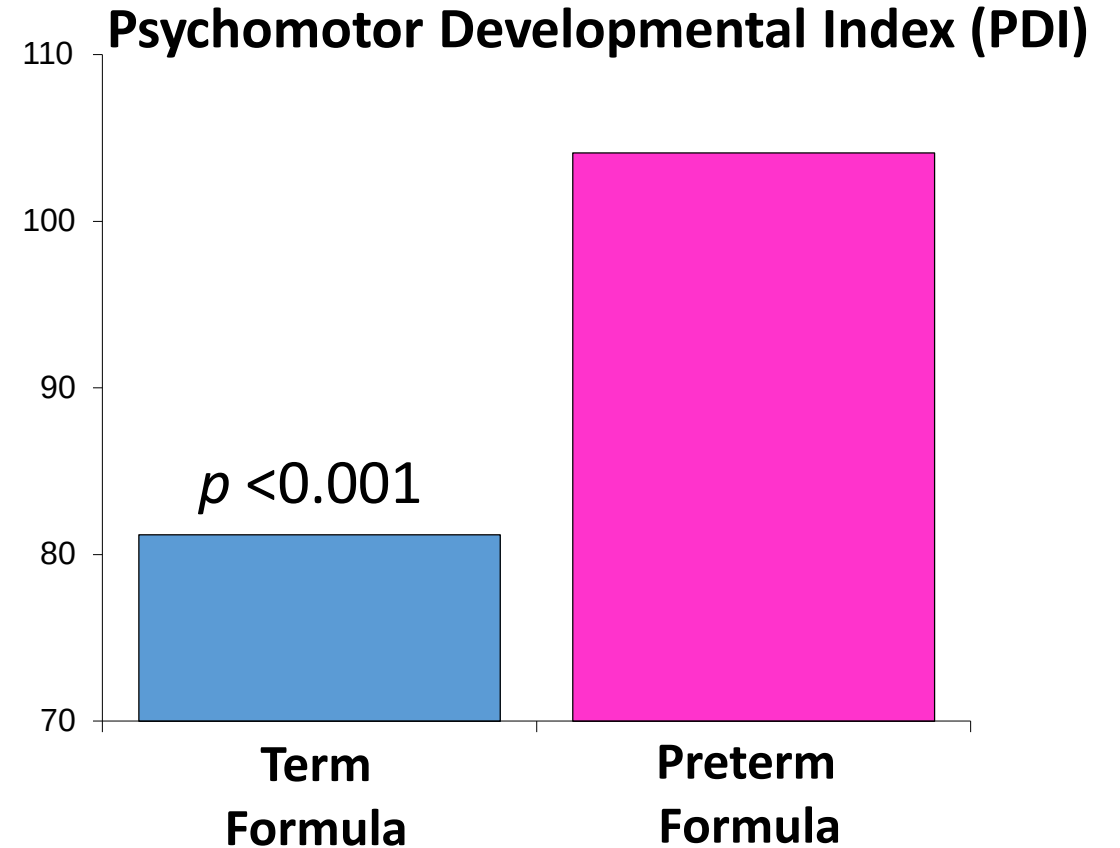
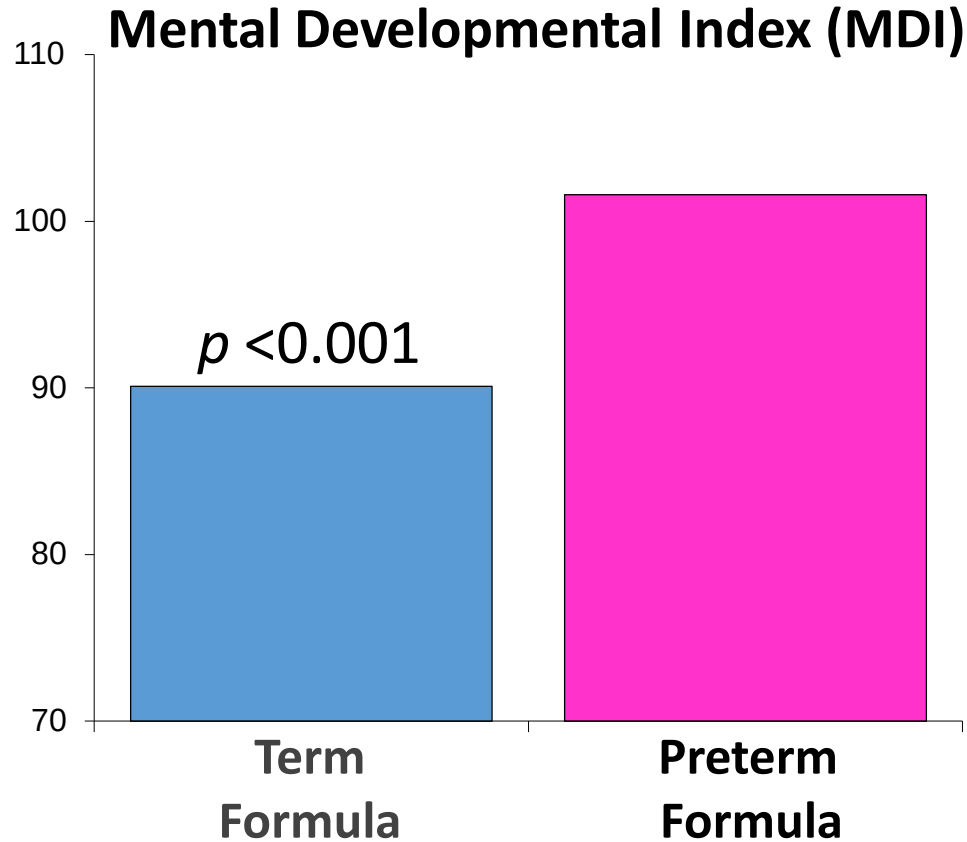
490 preterm, düzeltilmiş 18-22 ay. izlem



Preterm Beslenme ve Nörogelişimsel Değerlendirme

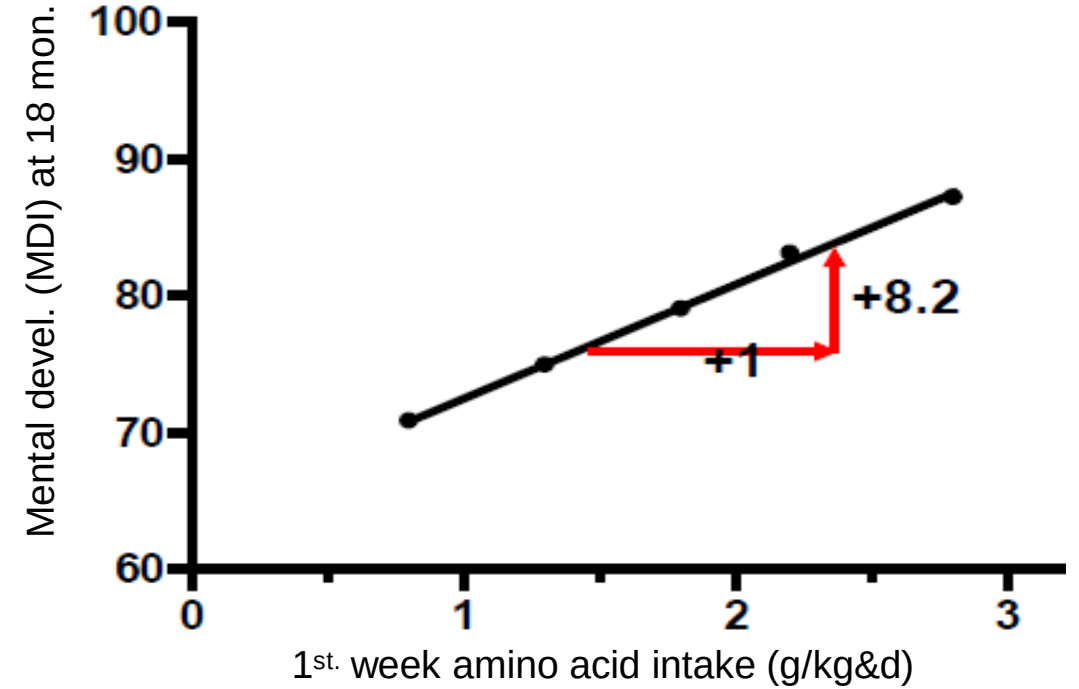
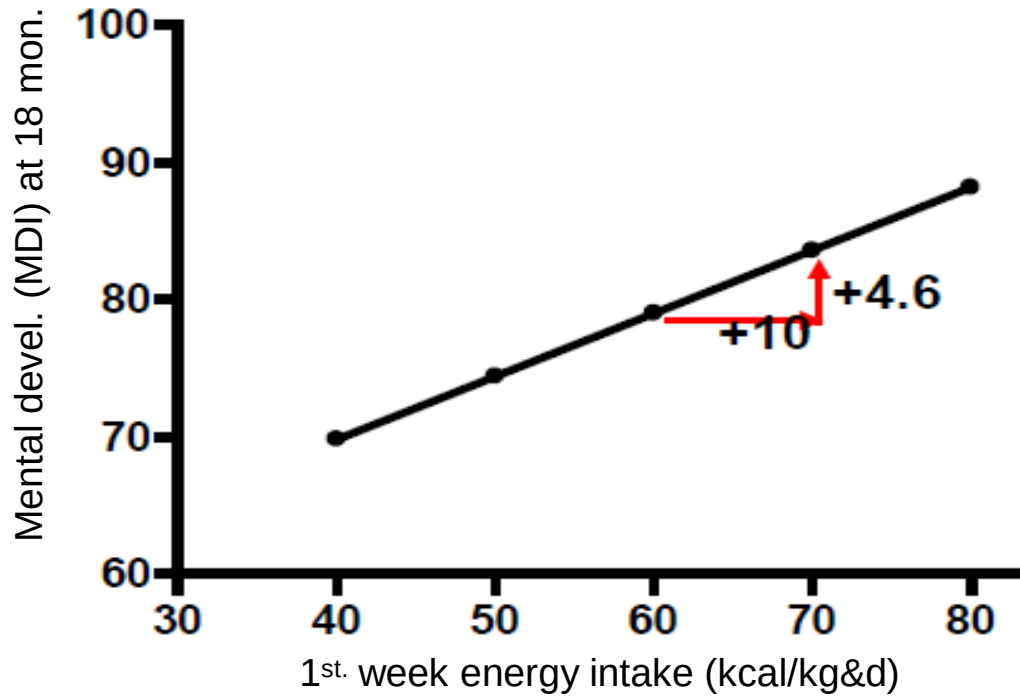
502 preterm (<1850 g), RCT, Düzeltilmiş 18. ay izlem

Term formula (68 kcal, 1.45 g protein/100 ml) vs. Preterm formula (80 kcal, 2.0 g protein/100 ml)



Yaşamın ilk haftasında enerji ve amino asit alımı

124 preterm (<1000 g), düzeltilmiş 18. ay izlem



+ 10 kcal/kg/gün enerji → MDI 4.6 puan
+ 1 g/kg/gün AA alımı → MDI 8.2 puan



EARLY PROVISION OF PARENTERAL AMINO ACIDS IN EXTREMELY LOW BIRTH WEIGHT INFANTS: RELATION TO GROWTH AND NEURODEVELOPMENTAL OUTCOME

BRENDA B. POINDEXTER, MD, MS, JOHN C. LANGER, MSc, ANNA M. DUSICK, MD, AND RICHARD A. EHRENKRANZ, MD,
FOR THE NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT NEONATAL RESEARCH NETWORK*

Objective To determine if postnatal growth failure exerts an adverse effect on subsequent growth and neurodevelopment.

Study design A secondary analysis of 1018 infants who were enrolled in a randomized, clinical trial of glutamine supplementation was performed to determine whether early provision of parenteral amino acids (AA) is associated with better growth and neurodevelopmental outcomes. Infants were stratified by whether they were provided ≥ 3 g/kg per day of AA at ≤ 5 days of life (early; n = 182) or not (late; n = 836).

Results At 36 weeks' postmenstrual age, significant differences were found in weight, length, and head circumference in favor of the infants who received early AA; the odds of having weight less than the 10th percentile for age was 4-fold higher for infants in the late group. At 18 months' CA, there were no differences in weight, length, or measures of neurodevelopment between the groups; however, male infants in the late group were twice as likely to have head circumference less than the 10th percentile.

Conclusions Early AA were associated with significantly better growth outcomes at 36 weeks' postmenstrual age, and fewer infants who received early AA were found to have suboptimal head growth at 18 months' CA. (*J Pediatr* 2006;148:300-5)

PMA 36. hafta değerlendirmesi

Kilo, Boy ve BÇ

Erken AA >>> Geç AA

Düzeltilmiş 18. ay değerlendirmesi

Kilo, Boy ve **NG** fark yok

★ BÇ

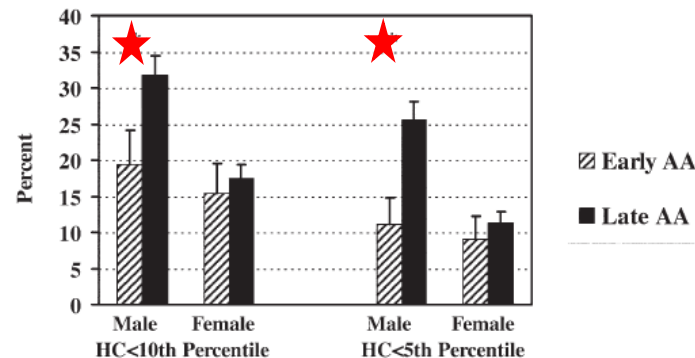


Figure 3. Comparison of head circumference at 18 months' CA according to sex and study group; **P* < .05.

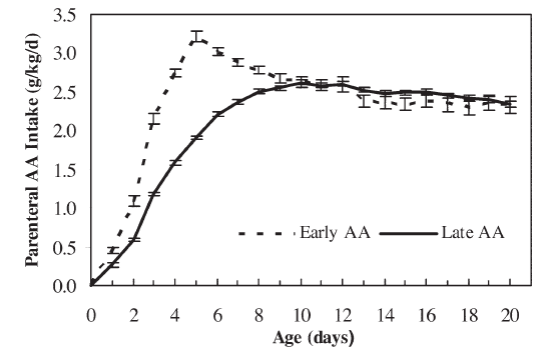
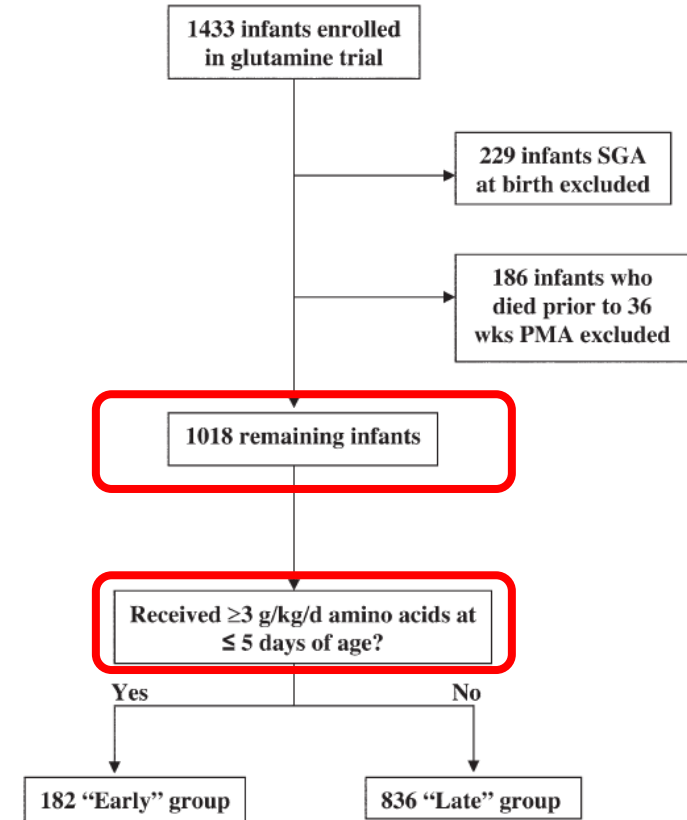
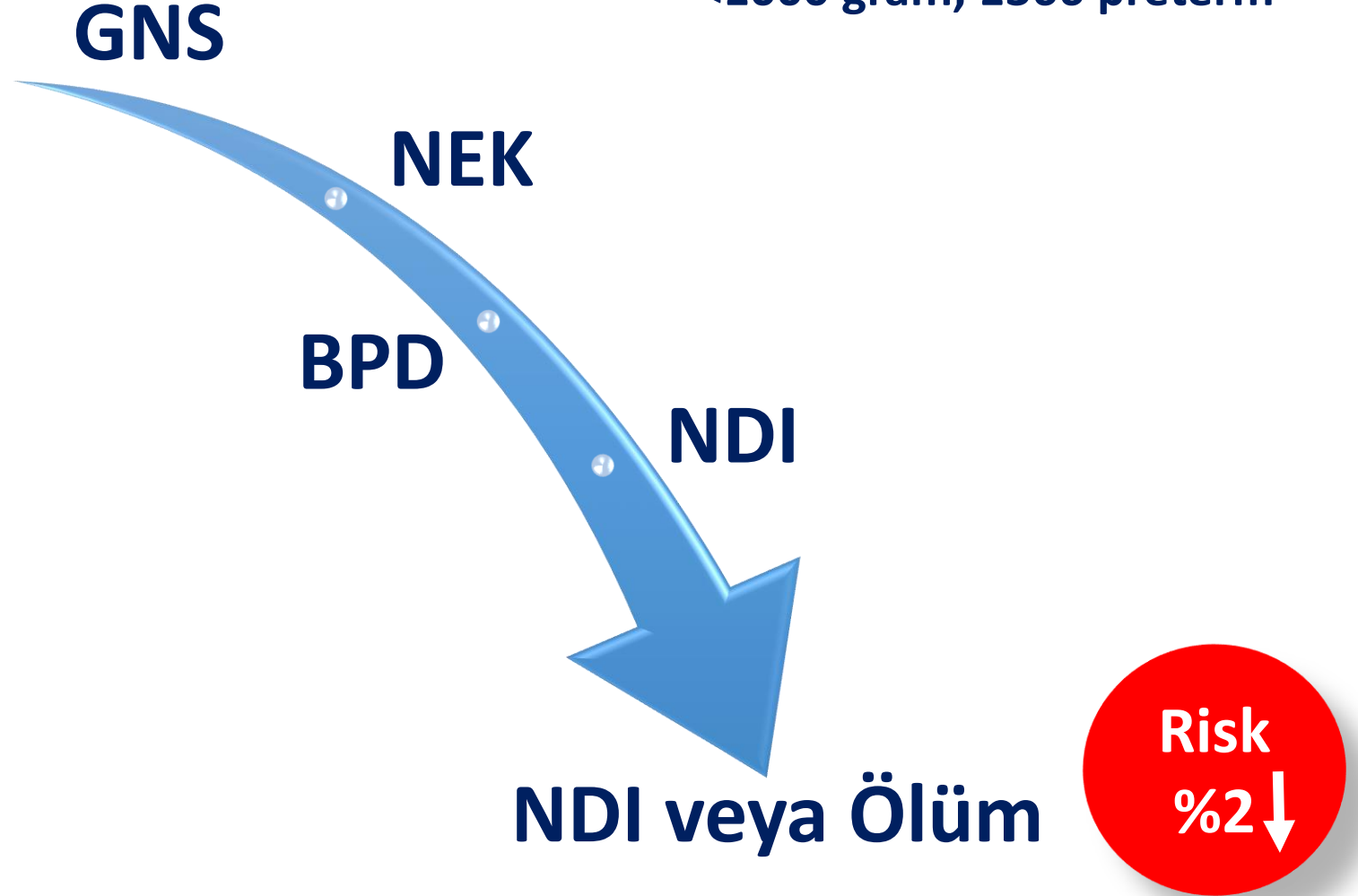


Figure 2. Mean daily quantity of parenteral AA given over the first 20 days of life for subjects with daily parenteral feeding.

Yaşamın ilk haftasında kritik hasta bebeklerde

Total enerji alımındaki
her 1 kcal/kg/gün'lük artışın

<1000 gram, 1366 preterm



Original article

Online May 2018

Early energy and protein intakes and associations with growth, BPD, and ROP in extremely preterm infants

Susanna Klevebro ^{a,b,*}, Vera Westin ^{a,c}, Elisabeth Stoltz Sjöström ^d, Mikael Norman ^{a,e}, Magnus Domellöf ^f, Anna-Karin Edstedt Bonamy ^{b,g}, Boubou Hallberg ^{a,e}

- Extremely Preterm Infants in Sweden Study (EXPRESS)
- 2004-2011
- 22-26 ^{6/7} hafta
- 296 preterm bebek

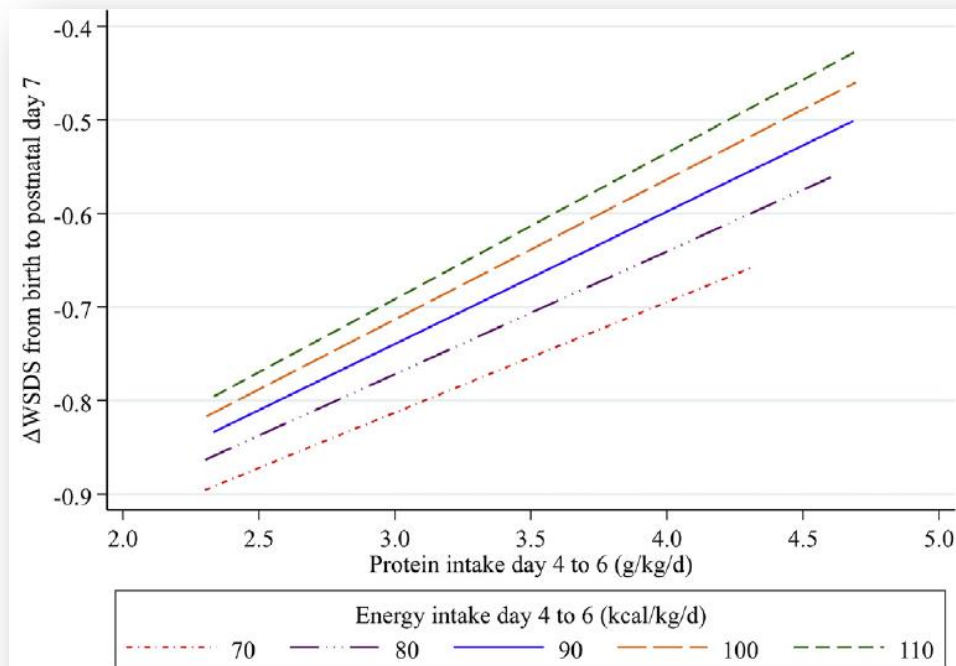


Fig. 2. Illustration of energy and protein intake and association with change in WSDS

Table 3

Association between energy intake on days 7–27 and risk of BPD and ROP (n = 249).

	CRUDE			ADJUSTED		
	RR	95% CI	p-value	RR	95% CI	p-value
BPD^a						
O2 @ 36 weeks						
Energy day 7–27 (10 kcal/kg/d)	0.83	0.77–0.90	<0.001	0.91	0.84–0.99	0.029
ROP^b						
mild/severe						
Energy day 7–27 (10 kcal/kg/d)	0.92	0.88–0.96	<0.001	0.94	0.91–0.98	0.005

Abbreviations: bronchopulmonary dysplasia (BPD), retinopathy of prematurity (ROP), risk ratio (RR).

^a Adjusted for gestational age (GA), birth weight standard deviation score (BWSDS), antenatal corticosteroids, transfusions of erythrocytes and plasma (mL/d) the first week and number of days on mechanical ventilation (MV) day 0–28.

^b Adjusted for GA, BWSDS, transfusions of erythrocytes and plasma (mL/kg) the first week and days on MV day 0–28.



Low energy intake during the first 4 weeks of life increases the risk for severe retinopathy of prematurity in extremely preterm infants

Elisabeth Stoltz Sjöström,¹ Pia Lundgren,² Inger Öhlund,¹ Gerd Holmström,³
Ann Hellström,² Magnus Domellöf¹

Arch Dis Child Fetal Neonatal Ed 2016

- Extremely Preterm Infants in Sweden Study (EXPRESS)
- 2004-2007
- 22-26 ^{6/7} hafta
- 498 preterm bebek

Table 1 Intakes of fluids, energy and macronutrients during the first 4 weeks of life in extremely preterm infants born below 27 weeks of gestation

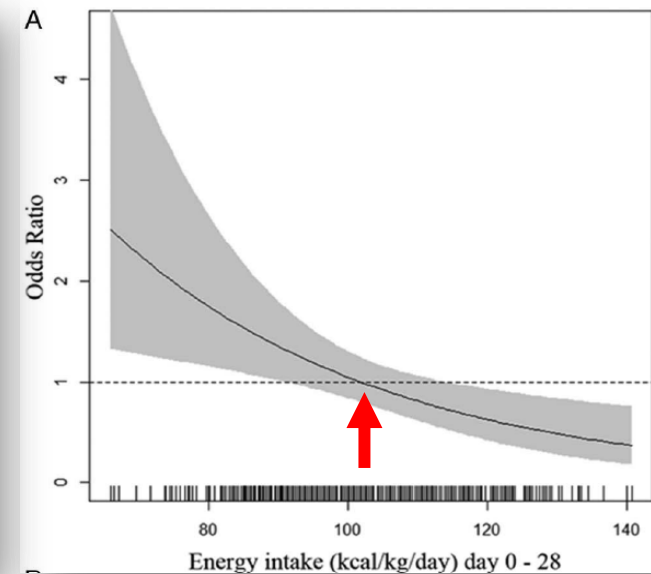
Intakes (kg/day)	No ROP n=137		ROP stages 1-2 n=189		ROP stages 3-5 n=172	
	Mean	SD	Mean	SD	Mean	SD
Fluids* (mL)	154	13.5	149	13.2	149	15.9
Energy (kcal)	108	13.3	102	13.1	97	13.5
Protein (g)	3.0	0.4	3.0	0.4	3.0	0.4
Carbohydrates (g)	11.5	1.0	11.2	1.0	11.0	1.2
Fat (g)	5.2	1.2	4.8	1.2	4.4	1.2

Table 4 Postnatal risk factors associated with retinopathy of prematurity (stages 3-5), n=498

	Unadjusted		Adjusted for hospital†	
	OR	95% CI	OR	95% CI
Energy intake‡ 0-28 days	0.76**	0.65 to 0.90	0.76**	0.62 to 0.92
Blood transfusions§ 0-28 days	1.17*	1.02 to 1.33	1.35**	1.09 to 1.67
Birth weight¶ (g)	0.75***	0.65 to 0.87	0.79*	0.66 to 0.95
Gestational age†† (weeks)	n.s		0.76*	0.59 to 0.98
Mechanical ventilation‡‡	1.03*	1.00 to 1.06	n.s	
R-square for model	0.22		0.26	

Multivariate logistic regression.

*p<0.05, **p<0.01, ***p<0.001.





Incidence, risk factors and severity of retinopathy of prematurity in Turkey (TR-ROP study): a prospective, multicentre study in 69 neonatal intensive care units

Ahmet Yagmur Bas,¹ Nihal Demirel,¹ Esin Koc,² Dilek Ulubas Isik,³
İbrahim Murat Hirfanoglu,² Turan Tunc,⁴ on behalf of the TR-ROP Study Group

- Türk Neonatoloji Derneği
- Nisan 2016-2017, 69 Merkez
- 6115 preterm bebek

Br J Ophthalmol 2018;

Table 2 Univariate analyses of covariates for severe ROP development in infants with a BW≤1500 g

Covariates	Infants BW≤1500 g		Univariate analysis (Severe ROP vs No ROP)		
	No ROP (n=2022)	Severe ROP (n=395)	P value	95% CI	OR
Maternal age (years)*	28.9±6.4	28.7±6.2	0.565	0.979 to 1.012	0.995
Antenatal steroid, two doses	870 (43%)	145 (36.7 %)	0.02‡	0.614 to 0.959	0.767
Preeclampsia	544 (26 %)	83 (21%)	0.015‡	0.556 to 0.938	0.722
Gestational diabetes	106 (5 %)	23 (5.8 %)	0.640	0.702 to 1.777	1.117
Chorioamnionitis	165 (8 %)	56 (14 %)	<0.001‡	1.343 to 2.570	1.858
IVF pregnancy	247 (12%)	41 (10 %)	0.832	0.586 to 1.180	0.832
Age of regain BW (days)*	11.3±5.1	14.5±6	<0.001‡	1.080 to 1.121	1.100
Relative weight gain at 28 days (g)*	382±180	229±135	<0.001‡	0.993 to 0.995	0.994

Table 3 Independent risk factors for severe retinopathy of prematurity in infants with a birth weight≤1500 g

	Adjusted OR	95% CI	P value
Gestational age (weeks)*	0.812	0.726 to 0.910	<0.001
Birth weight (g)†	0.998	0.997 to 0.999	<0.001
Small for gestational age	0.471	0.277 to 0.799	0.005
Total days on oxygen‡	1.025	1.019 to 1.031	<0.001
Late-onset sepsis	1.423	1.016 to 1.994	0.04
Frequency of red blood cell transfusions>twice	2.384	1.389 to 4.092	0.002
Relative weight gain at 28 days (grams)	0.998	0.997 to 0.999	<0.001

P<0.05 represents statistical significance.



Higher versus lower amino acid intake in parenteral nutrition for newborn infants (Review)

Osborn DA, Schindler T, Jones LJ, Sinn JKH, Bolisetty S

21 çalışma analiz edilmiş

Yüksek iv AA ($>2 - \leq 3$ g/kg/gün) vs. Düşük iv AA (≤ 2 g/kg/gün)

- Daha hızlı doğum ağırlığını geri kazanma: -1.14 gün (95%CI -1.73 - -0.56)
- Taburculukta daha az SGA: RR 0.74 (95%CI 0.56-0.97)
- Baş çevresi: +0.09 cm/hafta (95%CI 0.06 -0.13)
- Daha az hiperglisemi: >150 mg/dL, RR 0.69 (95%CI 0.49-0.96)
- Daha az ROP: RR 0.44 (95%CI 0.21-0.93)
- Yan etki yok (mortalite, geç başlangıçlı sepsis, NEK, BPD, İVK, PVL)

TPB Özet

Protein, g/kg/gün	Başlangıç zamanı	İlk saatten itibaren
	Başlangıç dozu	3
	Hedef doz	ADDA; 3.5-4 g/kg/gün ÇDDA; 3-3.5 g/kg/gün
Glukoz, mg/kg/dk	Başlangıç zamanı	Doğumdan hemen sonra
	Başlangıç dozu	4-6
	Hedef doz	10-12
Lipid, g/kg/gün	Başlangıç zamanı	İlk gün
	Başlangıç dozu	2
	Hedef doz	3-4
Enerji, kcal/kg/gün Protein/enerji oranı	Büyümenin sağlanması için	110-130 3-4 g/100 kcal

izlem

Amaç gebeliğin son trimesterindeki intrauterin büyüme hızlarına yakın bir büyüme düzeyinin elde edilmesidir.



BÇ: 0.5-0.8 cm/hf



Boy: 0.8-1.1 cm/hf



VA: 15-20 g/gün

TPB (Erken enerji ve protein alımı)

- Fizyolojik tartı kaybı azalır
- Hastanede yatış süresi kısalır
- Nörogelişimsel prognoz daha iyi
- Prematüre retinopatisi ↓
- Bronkopulmoner displazi ↓
- Mortalite ↓

TÜRK NEONATOLOJİ DERNEĞİ
PREMATÜRE VE HASTA TERM
BEBEĞİN BESLENMESİ
REHBERİ
2018 GÜNCELLEMESİ



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