

43085 1483

43065 10583

43081-3175 6001

43026 - 8567

(74)

:

(54)

(DHA) (PUFA), (AA) n-
 6 n-3 PUFA, / n-6 n-3 PUFA

(PUFA) (enteral)
 PUFA (AA) PUFA (DHA)

PUFA 4,670,285('Clandinin')
 , Clandinin
 C₂₀ C₂₂ n-6 C₂₀ C₂₂ n-3
 0.13 5.6 %
 0.013 3.33 %
 , Clandinin
 75 95
 Clandinin
 (C₁₆ -C₂₂)

WO 93/20717

가

4,918,063(Lichtenberger)

WO 96/10922(Kohn)

0 376 628 B1(Tomarelli)

rm infants)(: low birth weight infants) (pre-te
arelli . Tom

(MCT)
가
가

PUFA

가
(term infants) /

PUFA가

, NEC (NEC) 1500g . NEC 가 30 . NEC

Clin. North. Am., April, 1996, 43(2): 409-32]. [: Nue, Pediatr.

- Flageole et al., Necrotizing Enterocolitis of the Newborn, Review for the Clinician. Union-Med-Can. 1991 Sep-Oct; 120(5): 334-8, suggest the pathogenesis of NEC includes mesenteric ischemia, gastrointestinal immaturity, enteral feedings and even possibly infection;
- Caplan et al., Role of Platelet Activating Factor and Tumor Necrosis Factor -Alpha in Neonatal Necrotizing Enterocolitis, Journal of Pediatrics, June, 1990, 960-964, report platelet activating factor and tumor necrosis factor-alpha are elevated in patients with NEC;
- Kliegman et al., Clostridia as Pathogens in Neonatal Necrotizing Enterocolitis, The Journal of Pediatrics, August, 1979, 287-289, reports the isolation of Clostridia perfringens from children with neonatal NEC;
- Ostertag et al., Early Enteral Feeding Does Not Affect the Incidence of Necrotizing Enterocolitis, Pediatrics, Vol. 77, No. 3, March 1986, 275-280, reports that dilute, early enteral calories do not adversely affect the incidence of NEC;
- Bell et al., Neonatal Necrotizing Enterocolitis, Annals of Surgery, Vol. 187, January 1978, No. 1, 1-7, suggests the use of combination antimicrobial therapy for the treatment of infants with NEC;
- Eyal et al., Necrotizing Enterocolitis in the Very Low Birth Weight infant: Expressed Breast Milk Feeding Compared with Parenteral Feeding, Archives of Disease in Childhood, 1982, 57, 274-276 reports that the incidence of NEC in low birth weight infants was reduced by delaying the initiation of enteral feeding.
- Finer et al., Vitamin E and Necrotizing Enterocolitis, Pediatrics, Vol. 73, No. 3, March 1984 suggests that administration of vitamin E to reduce the incidence of severe sequelae from retrolental fibroplasia may be associated with an increased incidence of NEC.
- Brown et al., Preventing Necrotizing Enterocolitis in Neonates, JAMA, Nov. 24, 1978, Vol. 240, No. 22, 2452-2454 reports that NEC can be virtually eliminated by the use of a slowly progressive feeding regimen.
- Kosloske, Pathogenesis and Prevention of Necrotizing Enterocolitis: A Hypothesis Based on Personal Observation and a Review of the Literature, Pediatrics, Vol. 74, No. 6, Dec. 1984, 1086-1092, hypothesizes that NEC occurs by the coincidence of two of three pathological events: (1) intestinal ischemia; (2) colonization by pathogenic bacteria; and (3) excess protein substrate in the intestinal lumen.

, Kosloske() NEC가

(Bifidobacterium)

, NEC 가 /

22 -3 . 1 , C 20 n-6 , C 22 n-6 , C 20 n-3 C
 PUFA , n-6 , n-6
 가 , n-6 kg
 n-3 , 1
 n-6 1.0mg . 2:1 4:1 n-6 n-3

1 n-6 5.0mg 0.25 35mg/kg/
 1.0 60mg/kg/ 1.5 20mg/kg/
 5.0 40mg/kg/ 2 4 가 n
 -3 0.5mg/ 가 n
 2400 μ mol/kg/ 200 1500 μ mol/kg/ ,가 400 60
 kg/ 1000 μ mol/
 n-6 1.0mg/ , n-6 n-3
 LCPUFA
 800 μ mol/kg/ 150 1200 μ mol/kg/ 60 1
 , n-6 / n-3 n-6 1.0mg/
 / n-6 n-3
 LCPUFA
 가 가 가
 (a)
 (b)
 (c)
 20 50 가 2 15 %
 1 40 % 가
 5 30 % 10 31mg/100kcal
 4:1 3 16mg/100kcal
 2:1
 6 6 18 20
 PUFA' 2 가 () 20

n-3 n-6 , / PUFA

(Pfanstiehl, Inc., Waukegan, IL, Catalog No. P-123).

가 (:) 가
 8 % (20 25) 2 15 %, 3
 130 140 가 (), 15inch Hg 가
 (III).

가

AA DHA 가 / PUFA, n-6 n-3 , 가

(a) n-6 n-3 : PUFA,
 (b) ,
 (c) ,

NEC NEC , NE
 C (AA, 20:4 n-6) (DHA, 22:6 n-3)
 -3) AA C₂₀ n-6 , C₂₂ n-6 , C₂₀ n-3 C₂₂ n-3
 PUFA n-3 1.0mg/ kg/
 , n-6 1.0mg/ 2:1 4:1 n-6 n-3
 AA 가 DHA / n-6
 AA DHA 가 AA / DHA
 kg 1 mg A

[A]

1 (kg)

AA, mg	1	2 60	5 40	10 30	
DHA, mg	0.25	0.5 35	1.5 20	3 15	
AA/DHA	0.25	0.5 10	1 8	2 4	
, μ mol	50	60 2400	200 1500	400 1000	

, μ mol	50	60	1800	150	1200	300	900
---------	----	----	------	-----	------	-----	-----

가

100kcal
A 가 AA가 DHA 2 4 가

(: ,)

AA / DHA (: , , ,)
()

PUFA 가 AA DHA

가 II

(Similac Special Care[®] : Ross Products Division of Abbott Laboratories, Columbus, Ohio)
가 AA DHA 가

NEC PUFA NEC 가 NEC NEC

가 NEC NEC

I

(Pfanstiehl, Inc., Waukegan, IL, Catalog No. P-123)
I n-3 n-6 ' PUFA

[I]
난황 레시틴의 지방산 프로파일 및 콜레스테롤 함량

지방산	g / 샘플 100 g	
C14:0	0.08	
C16:0	18.83	
C16:1 n-7	0.82	
C16:4	0.21	
C18:0	6.72	
C18:1 n-9	17.36	
C18:2 n-6	9.8	
C20:1 n-9	0.11	
C20:2 n-6	0.24	
C20:3 n-6	0.3	
C20:4 n-6 - 아라키돈산	4.93	
C22:0	0.07	
C22:4 n-6	0.3	
C22:5 n-6	1.45	
C22:5 n-3	0.09	
C22:6 n-3 - 도코사헥사엔산	1.24	
콜레스테롤	<0.05	
전체 LCPUFA n-6	7.22	
전체 LCPUFA n-3	1.33	

가 Pfanstiehl

가

II

(Ross Products Division of Abbott Laboratories, Columbus, Ohio)
II IV :

(Kosher), 가 ()

, 3 , , 1 , m- , , L

- , - , 1 , 1 , , ,

A , D 3 ,

8%

20kcal

1 / 'kcal'

[II]
대조 및 실험용 분유의 조성

영양소	바람직한 범위	
	단위/ℓ*	단위/100 kcal
단백질, g	21.9 - 23.4	2.61 - 2.88
지방, g	40.0 - 46.0	5.24 - 5.67
(하기 표 III에 기술)		
탄수화물, g	84.0 - 88.0	10.00 - 10.84
[Ash, g]	6.7 - 8.0	0.80 - 0.99
전체 고체성분, g	158.6 - 165.0	18.88 - 20.32
리놀레산, g	5.6 - 12.2	0.67 - 1.50
칼슘, mg	1300 - 1700	154.76 - 209.36
인, mg	720 - 970	85.71 - 119.46
마그네슘, mg	100 - 170	11.90 - 20.94
나트륨, mg	349 - 389	41.55 - 47.91
칼륨, mg	1000 - 1420	119.05 - 174.88
클로라이드, mg	650 - 770	77.38 - 94.83
철, mg	3.0 - 5.5	0.36 - 0.68
아연, mg	12.0 - 14.6	1.43 - 1.80
구리, mg	2.0 - 3.0	0.24 - 0.37
망간, mcg	100 - 500	11.90 - 61.58
요오드, mg	0.05 - 0.30	0.01 - 0.04
셀레늄, mcg	12 - 29	1.43 - 3.57
비타민 A, IU	6000 - 8000	714.29 - 985.22
비타민 D, IU	1200 - 1580	142.86 - 194.58
비타민 E, IU	35.0 - 45	4.17 - 5.54
비타민 K ₁ , mcg	100 - 140	11.90 - 17.24
비타민 C, mg	350 - 450	41.67 - 55.42
티아민(B ₁), mg	2.66 - 4.6	0.32 - 0.57
리보플라빈(B ₂), mg	5.03 - 9.0	0.60 - 1.11
피리독신(B ₆), mg	2.6 - 3.4	0.31 - 0.42
비타민 B ₁₂ , mcg	4.47 - 9.5	0.53 - 1.17
판토텐산, mg	15.4 - 24.0	1.83 - 2.96
폴산, mcg	340 - 450	40.48 - 55.42
니아신, mg	40.6 - 65	4.83 - 8.00
비오틴, mcg	350 - 460	41.67 - 56.65
콜린, mg	81 - 243	9.64 - 29.93
m-이노시톨, mg	44.7 - 61	5.32 - 7.51
L-카르니틴, mg	35 - 60	4.17 - 7.39
타우린, mg	60 - 80	7.14 - 9.85
에너지(kcal)	812 - 840	

* 24 kcal / 유체 1온스로 가정

III

() .2

가
FA

가 PU

V 가 () 가 .

[V]

	*	
	AA	3 AAL
	AA 1 - 2.5	AAL 2.5
	AA 1.5 - 2	AAL 2.5
/	AA 2	AAL 2.5
	AA 2.5 - 3	AAL 3

* AA =
 AAL = (Lingering)
 + 0.5 ; 1 ; 1.5 ; 2 ;
 2.5 ; 3
 () 가
 IV
 II III [: Neonatal Nursery of the University of Tennessee Newborn Center under the direction of Dr. Susan E. Carlson with financial support from Ross Products Division of Abbott Laboratories (Study AE78), NICHD grant RO1-HD31329, and National Eye Institute grant RO1-EY08770].
 PUFA

PUFA 1500g (750 137
 5g)
 7
 120 7
 (), (n-119) 1 3 (II)
) , 2 , (II)
 2
 : (NEC)
 VI () NEC가
 (heme positive stool),
 ≥ 0.5mg/dL C- [: Pourcyrous et al., 'Significance of Serial C-reactive Protein Responses in Neonatal Infection and Other Diseases', *Pediatr.*, 1993, 92:431-435]
 NEC가 NEC . NEC 15
 1

[VI]

NEC *	15	1
NEC	70	33
	85	34

* NEC

Fisher (: two tailed) () NEC (p=0.039).

V , () AA DHA 가 AA DHA AA DHA

DHA , AA DHA AA DHA

2g/kg/ DHA 3 15mg/kg/ AA DHA AA 10 30mg/kg/ VI

VI , II 10

II , (18:3 n-3-DHA 가 , (18:2 n-6-AA VII))

VII , AA DHA AA DHA AA DHA II AA DHA

가 가 AA DHA AA DHA AA DHA AA DHA

DHA 가 AA DHA , AA DHA AA DHA

가 가 가 가

- (57)
1. n-6 ,
 2. , n-6
 - 1 3. ,
 - 2 4. ,
 - 2 5. , n-6 n-3
 - 1 6. , n-3
 - 5 7. , n-6 , n-3
 - 5 8. , 1.0 60mg/kg/ 0.25 35mg/kg/
 - 7 9. , 가 2 4
 - 8 10. , n-6 n-3 , , , (marine oil)
 - 5 11. , n-6 n-3
 - 5 12. ,

4	13.	,	20	200mg/	10	50mg/	
1	14.	,	n-6	2.0	60mg/kg/		,
14	15.	,	n-3	0.5	35mg/kg/	가	.
15	16.	,	2.0	60mg/kg/	0.5	35mg/kg/	
16	17.	,					
1	18.	,					
18	19.	,	60	2400 μ mol/kg/			.
19	20.	,	200	1500 μ mol/kg/			.
18	21.	,					
19	22.	,					
22	23.	,	5.0	40mg/kg/	1.5	20mg/kg/	200 1500 μ mol/kg/ ,
1	24.	,					
24	25.	,	60	1800 μ mol/kg/			.
25	26.	,	150	1200 μ mol/kg/			.
24	27.	,					
27	28.	,					
25	29.	,					
29	30.	,	0	40mg/kg/	1.5	20mg/kg/	150 1200 μ mol/kg/ , 5
(a)	31.	,	0.1	%			,
(b)		,					,
(c)		,					,
31	32.	,	2	15	%		.
32	33.	,	20	50		가	.
	34.	,					

- (a) 2 15 % ,
- (b) ,
- (c) , , ,
- (d) ,

35. 가 1 40 %
 , 0.1 % ,

36. 35 , 5 30 % .

37. 35 , 10 31mg/100kcal 가 .

38. 37 , 3 16mg/100kcal 가 .

39. 38 , 4:1 2:1 .