Controversia en el uso de lípidos ω-3 en NP pediátrica

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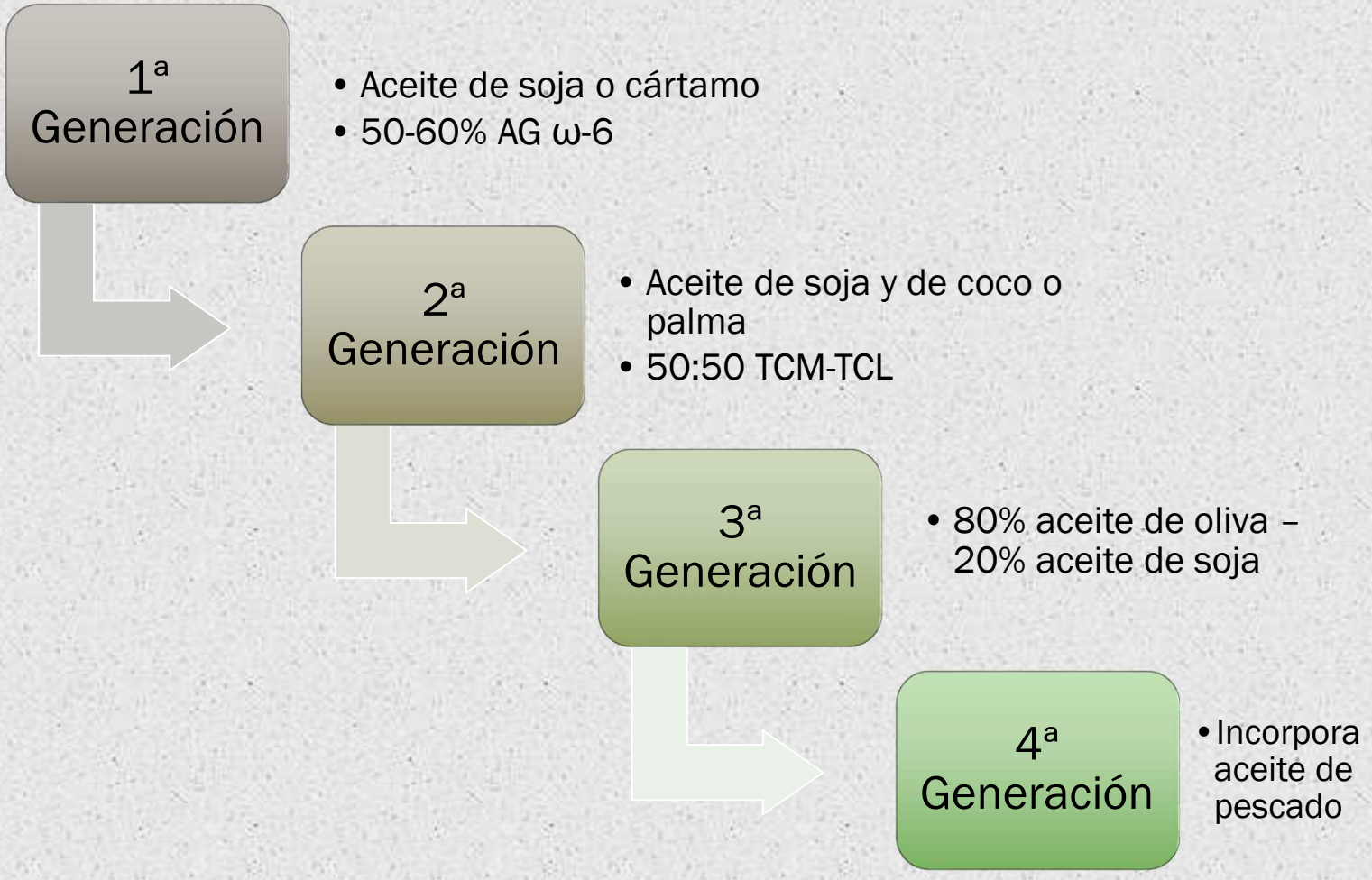
Evolución de las emulsiones lipídicas



APORTE DE LÍPIDOS (IV)

			Concentraciones de los seleccionados Ac.Grasos, % por peso						
Producto	Fabricante Distribuidor	Fuente de Lipidos	Linoleico	α Linoleico	EPA	DHA	n-6 n-3 Ratio	αTocoferol mg/L	Fitosteroles mg/L
IVFE disponible solo en Estados Unidos									
Intralipid	Fresenius Kabi / Baxter	100% Aceite de soja	44-62	4-11	0	0	7:1	38	348±33
Liposyn III	Hospira	100% Aceite de soja	54,5	8.3	0	0	7:1	NA	NA
IVFE disponibles solo fuera de los Estados Unidos									
Intralipid	Fresenius Kabi	100% Aceite de soja	44-62	4-11	0	0	7:1	38	348±33
Ivelip	Baxter/Teva	100% Aceite de soja	52	8,5	0	0	7:1	NA	NA
Lipovenoes	Fresenius Kabi	100% Aceite de soja	54	8	0	0	7:1	NA	NA
Lipovenoes 10% PLR	Fresenius Kabi	100% Aceite de soja	54	8	0	0	7:1	NA	NA
Intralipos 10%	Mitsubishi Pharma	100% Aceite de soja	53	5	0	0	7:1	NA	NA
Lipofundin-N	B.Braun	100% Aceite de soja	50	7	0	0	7:1	180±40	NA
Soyacal	Grifols Alpha Therapeuticas	100% Aceite de soja	46,4	8,8	0	0	7:1	NA	NA
Intrafat	Nihon	100% Aceite de soja	NA	NA	0	0	7:1	NA	NA
Structolipid 20%	Fresenius Kabi	64% Aceite de soja 36% MCT	35	5	0	0	7:1	6,9	NA
Lipofundin MCT/LCT	B.Braun	50% Aceite de soja 50% MCT	27	4	0	0	7:1	85±20	200±40
Lipovenoes MCT	Fresenius Kabi	50% Aceite de soja 50% MCT	25,9	3,9	0	0	7:1	NA	NA
ClinOleic 20%	Baxter	20% Aceite de soja 80% Aceite de oliva	18,5	2	0	0	9:1	32	327±8
Lipoplus	B.Braun	40% Aceite de soja 50% MCT 10% Aceite de pescado	25,7	3,4	3,7	2.5	2.7:1	190±30	NA
SMOFlipid	Fresenius Kabi	30% Aceite de soja 30% MCT 25% Aceite de oliva 15% Aceite de pescado	21,4	2,5	3	2	2.5.1	200	47,6
Omagaven	Fresenius Kabi	100% Aceite de pescado	4,4	1,8	19,2	12,1	1:8	150-296	0

COMPOSICIÓN DE LA NP

Macronutrienes	Micronutrientes
• Hidratos de carbono • Lípidos • Aminoácidos	• Electrolitos • Vitaminas • Oligoelementos

APORTE DE LÍPIDOS (I)

LIPIDOS			
	Dosis inicio	Incremento	Dosis máx.
Pretérmino	0,25-0,5 g/kg	0,25-0,5 g/kg	3 g/kg/día
Neonato	0,5-1 g/kg	0,5-1 g/kg	4 g/kg/día
Infantil	1 g/kg	0,5-1 g/kg	4 g/kg/día
Niños	1 g/kg	1 g/kg	100 g

- Su administración previene la aparición de déficit de ácidos grasos esenciales
- Los ác. grasos libres desplazan la bilirrubina ligada a la albúmina. Para evitar aumentar el riesgo de **Kernicterus**, se limitará el aporte a **2 g/kg/día** en prematuros en rango de fototerapia

Funciones de los lípidos

Energética

- Principal combustible energético
- Suministra AG esenciales: ác. Linoleico y ác. α-linolénico

Estructural

- Formación de membranas biológicas
- Defensa de órganos internos, y termorregulación corporal
- Ayuda en la absorción y transporte de vitaminas liposolubles y otros micronutrientes esenciales

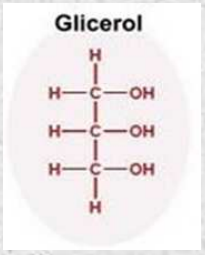
Reguladora

- Señalización intercelular e intracelular
- Regulación en la expresión de ciertos genes

Proceso metabólico

Triglicéridos

Lipoproteinlipasa capilar



B-oxidación (hígado)

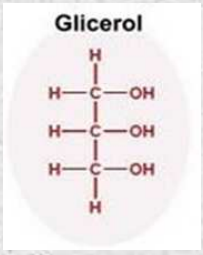
Re-esterificación a TG

- Energía (ATP)
- CO2
- Agua
- Cuerpos cetónicos

- Depósito en el tejido adiposo como reserva energética

Triglicéridos

Lipoproteinlipasa capilar



B-oxidación (hígado)

Re-esterificación a TG

- Energía (ATP)
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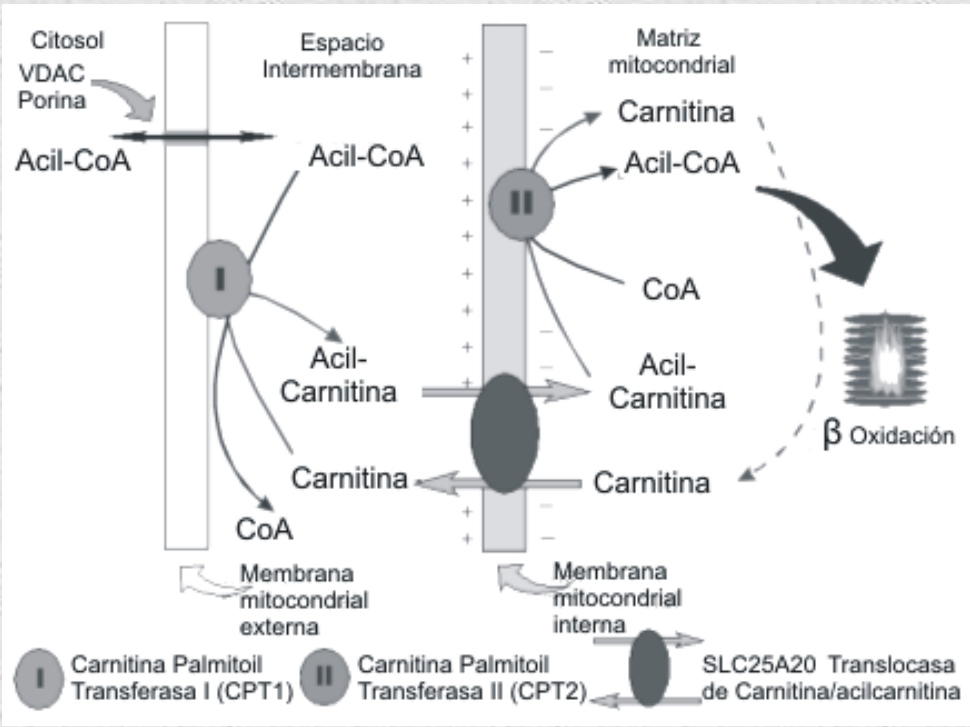
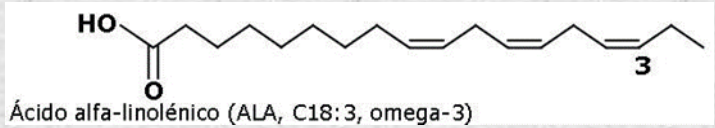
- Agua
- Cuerpos cetónicos

- Depósito en el tejido adiposo como reserva energética

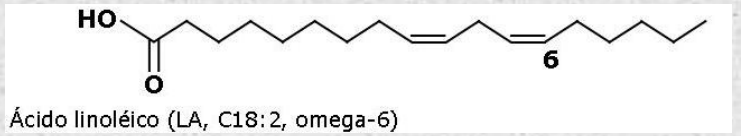
Papel de la carnitina en el acalaramiento de los lípidos



Ácidos grasos esenciales



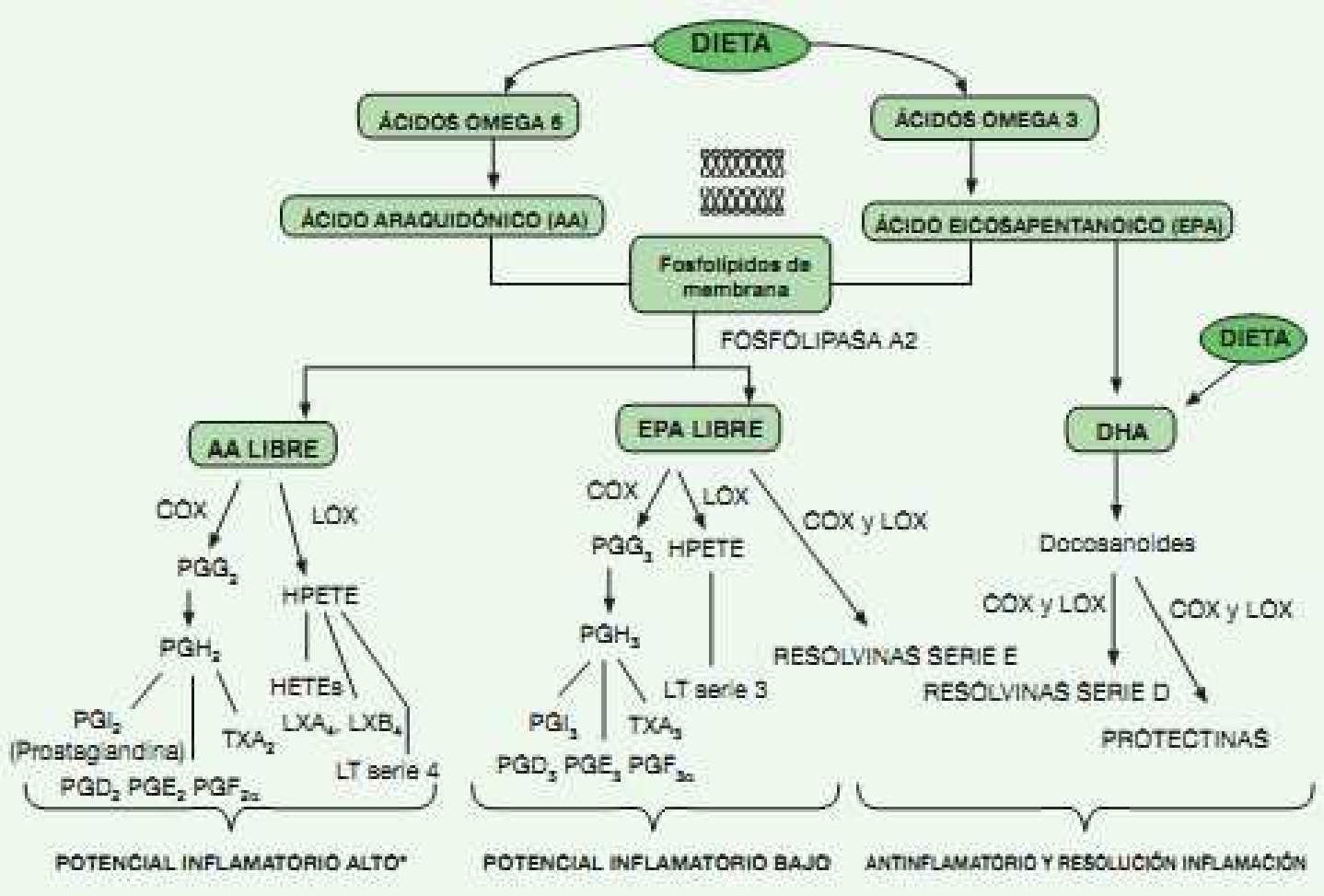
Ácido alfa-linolénico (ALA, C18:3, omega-3)



Ácido linoléico (LA, C18:2, omega-6)

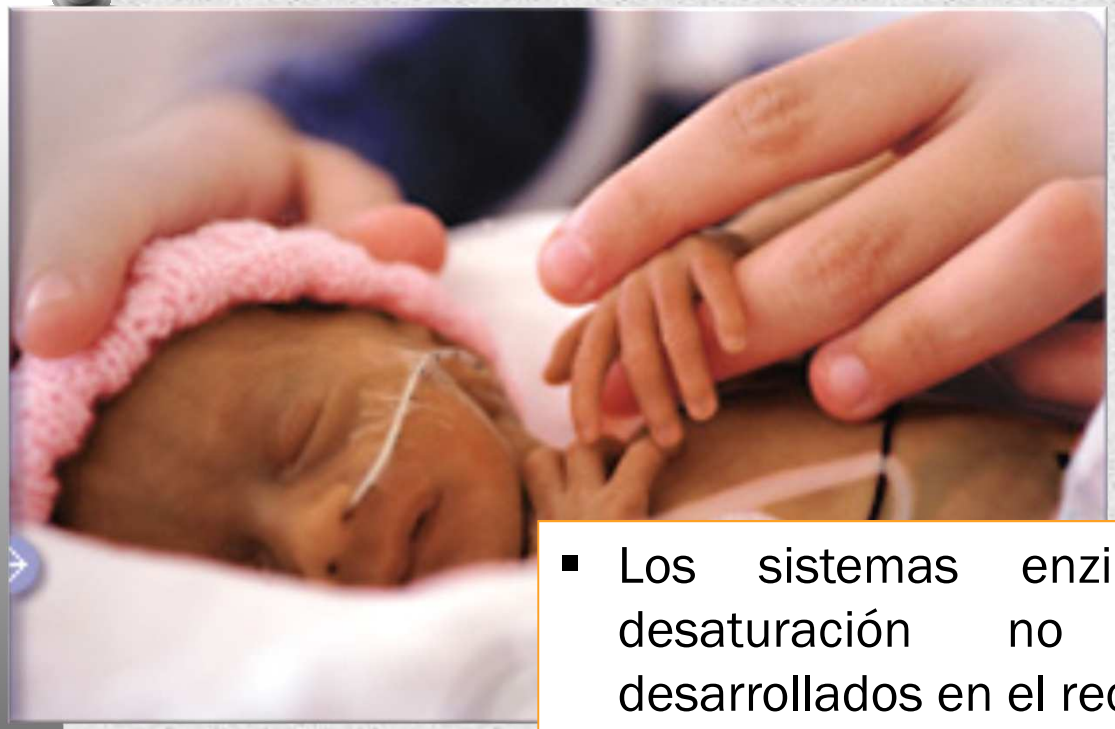
- No pueden ser sintetizados por el feto, los recibe a través de la placenta
- Durante las últimas etapas de la gestación se acumulan
- La grasa blanca representa el mayor reservorio de ω-6 y ω-3

Biosíntesis del ARA, EPA y DHA



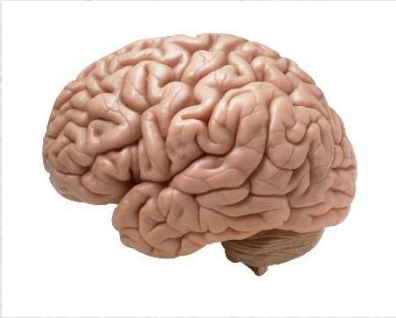
Funciones de los ω-3 en el desarrollo del feto

- Favorecen la fluidez, la estabilidad y la función de las membranas celulares y del cerebro y la retina
- Estimulan la expansión de la membrana celular
- Estimulan las proteínas de membrana: receptores, canales iónicos, enzimas
- Regulan vías de señales de transducción
- Modulan la neurotransmisión dopaminérgica, serotoninérgica y colinérgica
- Influyen en la expresión de genes
- Estimulan la plasticidad sináptica
- Estimulan la función de los conos y bastones
- Favorecen el neurodesarrollo y la función cerebral y visual
- Inhiben la apoptosis neuronal. Inhiben la respuesta inflamatoria y el estrés oxidativo

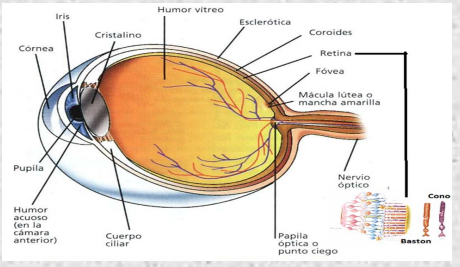


- Los sistemas enzimáticos de elongación-desaturación no están completamente desarrollados en el recién nacido
- Los recién nacidos pretérmino con mínimas reservas de grasa se hallan en peores condiciones, ya que no han recibido en el tercer trimestre los ácidos grasos esenciales y los AGPI a través de la placenta
- Tras el nacimiento, la dieta es la que influye en la composición de AG en los tejidos

AGPIs en los recién nacidos



- Los ω-3 y ω-6 para el desarrollo cerebral y cognitivo
- El DHA y el ARA son los principales componentes del cerebro



- Los bastones de la retina tienen más de 50% de ω-3, principalmente DHA

- Limitada capacidad para elongar y desaturar AL y ALN y para producir ARA y DHA

→

- Leche materna o formulas enriquecidas en AGPI

Contenido graso de la leche humana

Calostro → Leche de transición → Leche materna

AG esenciales y sus derivados de cadena más larga

Los recién nacidos pretérmino alimentados con leche de su propia madres reciben 140 mg/día de AG ω-3, la mitad como AGPI ω-3, cantidad más que suficiente para cubrir las necesidades

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Consensus Statement

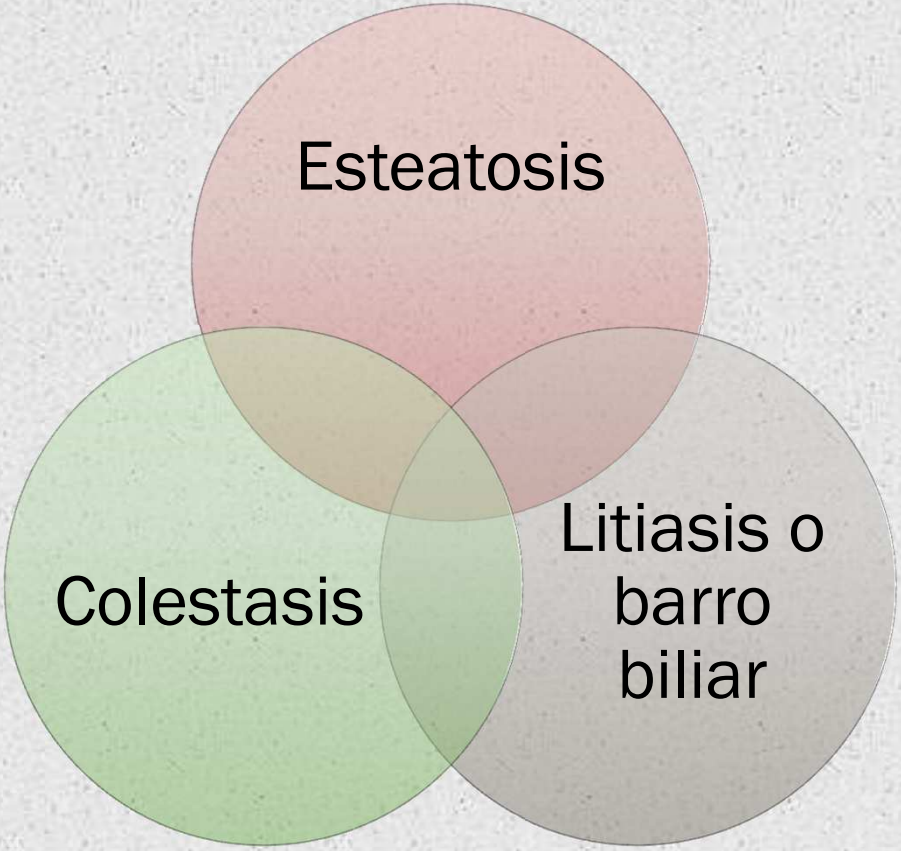
Dietary fat intakes for pregnant and lactating women

Berthold Koletzko[1]*, Irene Cetin[2] and J. Thomas Brenna[3] for the Perinatal Lipid Intake Working Group

[1]*Dr. von Hauner Children's Hospital, University of Munich, Germany*
[2]*Department for the Health of Woman, Child and Neonate, IRCCS Foundation Po.Ma.Re., University of Milan, Italy*
[3]*Division of Nutritional Science, Cornell University, Ithaca, NY, USA*

Enhanced maternal dietary intakes of DHA increase fetal supply and lead to higher DHA concentrations in cord blood[16]. A higher DHA supply to the fetus during pregnancy and to the infant after birth was associated with beneficial effects on the development of visual acuity, cognitive functions and attention, maturity of sleep patterns, spontaneous motor activity, immune phenotypes in cohort studies and in a limited number of randomized clinical trials[17–28]. Further randomized trials with large sample sizes of pregnant women are currently in progress, which should provide more information on the extent of benefits. Based on the information available at this time, it is advisable that pregnant women aim at achieving an average intake of at least 200 mg DHA/d. Supplementation of lactating women with 200 mg DHA/d increased human milk DHA content by

Trastornos hepatobiares asociados a la NP



Trastornos hepatobiares asociados a la NP

Esteatosis

- Acumulación de grasa en el hígado
- Predomina en adultos
- Se manifiesta con un elevación de las transaminasas
- Sobrealimentación
- Aunque es una enfermedad benigna, es posible que progrese a fibrosis o cirrosis

Trastornos hepatobiares asociados a la NP

Litiasis o barro biliar

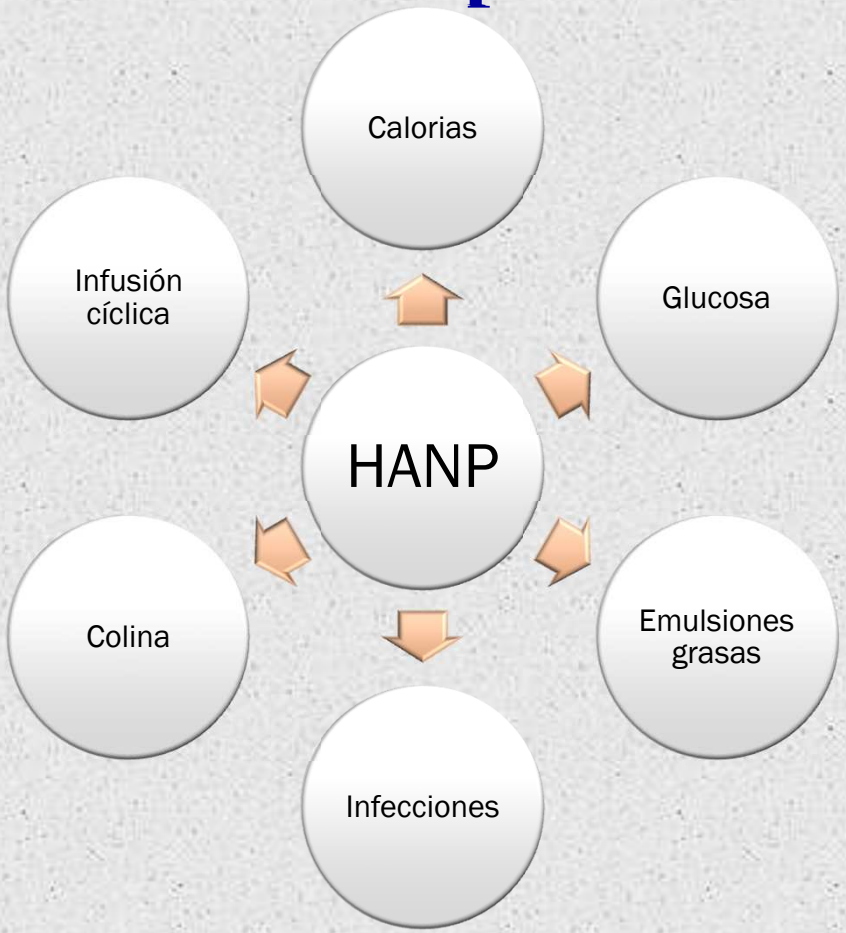
- Relacionado con la falta de estimulación enteral
- La ausencia de ingesta oral da lugar a la disminución de la colecistocinina (CCK), a la disminución del flujo biliar y la contractilidad de la vesicula biliar
- Guarda relación con la duración de la NP

Trastornos hepatobiares asociados a la NP

Colestasis

- Transtono caracterizado por una disfunción de la secreción biliar u obstrucción biliar
- Predomina en niños
- Se presenta generalmente como una elevación de FA, GGT y la concentración de la bilirrubina conjugada, acompañada o no de ictericia
- Diagnóstico: Bilirrubina directa mayor de 2mg/dl o mayor del 20% de la bilirrubina total

Factores relacionados con los trastornos hepatobiares



Emulsiones grasas

Fuente de lípidos

- Los TCM se metabolizan a mayor velocidad que los TCL
- B-oxidación de los TCM tiene baja dependiente de la carnitina

Fitosteroles

- Se obtienen de los aceites vegetales
- No se metabolizan eficazmente a ac. biliares
- Dificultan el flujo biliar

Dosis

- Velocidad de infusión excesiva
- Dosis elevadas de lípidos

Clinical Research

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Nutrition in Clinical Practice
Volume 27 Number 6
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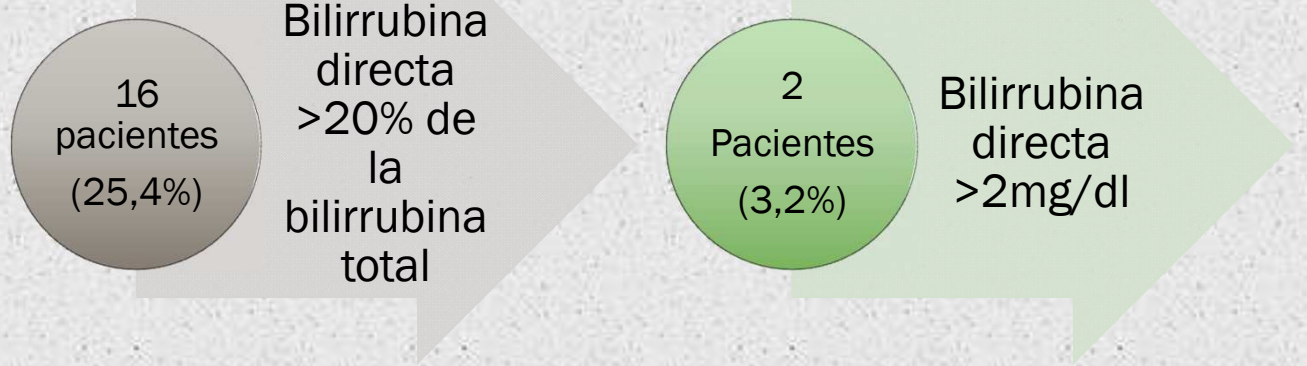
Cholestasis, Bronchopulmonary Dysplasia, and Lipid Profile in Preterm Infants Receiving MCT/ω-3–PUFA–Containing or Soybean-Based Lipid Emulsions

Maria Skouroliakou, PhD[1]; Dimitris Konstantinou, MD[2]; Charalampos Agakidis, MD[3]; Natalia Delikou, RD[3]; Katerina Koutri, RD[2]; Marina Antoniadi, MD[2]; and Thomais Karagiozoglou-Lampoudi, MD[3]

Colestasis

Prematuros 2012 (64 pacientes)

- Se considera que la elevación de la concentración de **bilirrubina conjugada** es el principal indicador, con el umbral establecido en 2 mg/dl o mayor del 20% de la bilirrubina total



La duración media de la NP fue de 17,8 días (rango 5-47) en pacientes que desarrollaron colestasis, y de 9,0 días (rango 3-23) en aquellos que no manifestaron ninguna complicación hepatobiliar

Position Paper

A.S.P.E.N. Position Paper: Clinical Role for Alternative Intravenous Fat Emulsions

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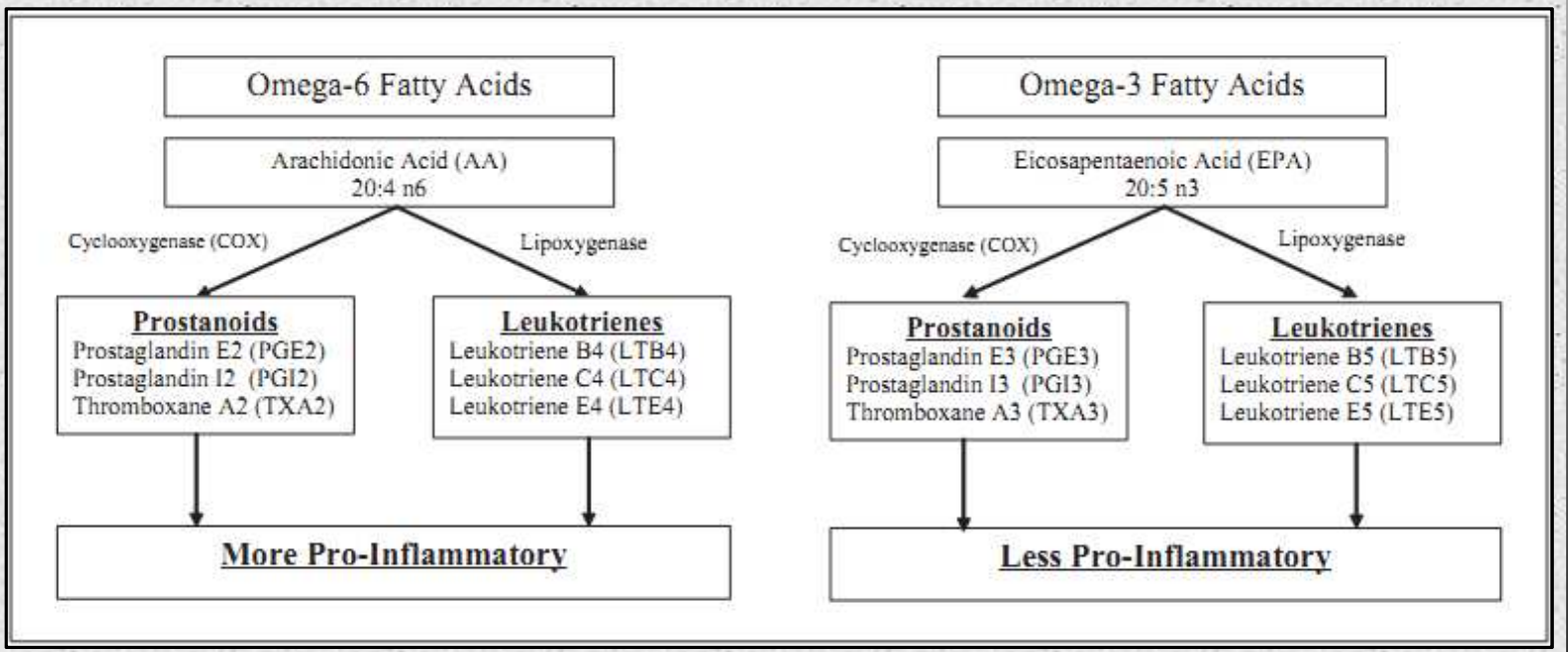

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Randomized control trials

Pre-treatment with an intravenous lipid emulsion containing fish oil (eicosapentaenoic and docosahexaenoic acid) decreases inflammatory markers after open-heart surgery in infants: A randomized, controlled trial☆,☆☆

Bodil M.K. Larsen[a,b,c], Laksiri A. Goonewardene[d,e], Ari R. Joffe[f,g], John E. Van Aerde[f,g], Catherine J. Field[b,c,d], Dana Lee Olstad[b,d], Michael T. Clandinin[b,c,d,*]

Table 4
Clinical outcomes of infants in the control (Intralipid) and treatment (MCT/LCT/FO) groups.

Clinical Outcome	Intralipid (n = 16)	MCT/LCT/FO (n = 16)	Significance
Ventilator Days	7.4 ± 1.1	9.5 ± 1.1	NS
PICU Days	7.8 ± 5	15.2 ± 5	NS
Hospital Days	41.7 ± 5.3	46.8 ± 5.3	NS
Days to Sternal Closure	3.3 ± 0.5	3.5 ± 0.5	NS
Steroids Post-Operatively	62%	87%	NS
Antibiotic Days	2.8 ± 0.9	3.0 ± 0.9	NS
PRISM III Score	12.1 ± 1.0	14.4 ± 1.0	NS
Inotrope Score on Day 1 Post-Operatively	11.5 ± 3.8	9.1 ± 3.8	NS
Sepsis Total (n)	6	6	NS
Culture + Positive (n)[a]	4	4	NS
Culture + Negative (n)	2	2	NS

Data are unadjusted mean ± SEM.
MCT = medium chain triglyceride; LCT = long chain triglyceride; FO = fish oil.
[a] There were 3 bloodstream infections, 4 urinary tract infections, and 1 ventilator associated pneumonia confirmed by culture.

Original Communication

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Short-Term Use of Parenteral Nutrition With a Lipid Emulsion Containing a Mixture of Soybean Oil, Olive Oil, Medium-Chain Triglycerides, and Fish Oil: A Randomized Double-Blind Study in Preterm Infants

Maissa Rayyan, MD[1]; Hugo Devlieger, MD, PhD[1]; Frank Jochum, MD, PhD[2]; and Karel Allegaert, MD, PhD[1]

Financial disclosure: The clinical research of Karel Allegaert is supported by the Fund for Scientific Research, Flanders (Belgium) by a Fundamental Clinical Investigatorship (1800209 N) and a research grant (1506409 N). The study was conducted for registration purposes and therefore was sponsored by Fresenius Kabi, Bad Homburg, Germany. Hugo Devlieger and Frank Jochum have received speaking honoraria and consulting fees from Fresenius Kabi. The publication of the supplement in which this article appears is sponsored by Nestlé Nutrition Institute.

Original Communication

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http://online.sagepub.com

A New Intravenous Fat Emulsion Containing Soybean Oil, Medium-Chain Triglycerides, Olive Oil, and Fish Oil: A Single-Center, Double-Blind Randomized Study on Efficacy and Safety in Pediatric Patients Receiving Home Parenteral Nutrition

Olivier Goulet, MD, PhD[1]; Helena Antébi, MD, PhD[2]; Claude Wolf, PhD[3]; Cécile Talbotec, MD[1]; Louis-Gérald Alcindor, MD, PhD[2]; Odile Corriol, PhD[4]; Michèle Lamor, RN[1]; and Virginie Colomb-Jung, MD, PhD[1]

Financial disclosure: This study was supported by Fresenius Kabi, Bad Homburg, Germany.

ORIGINAL ARTICLE: HEPATOLOGY AND NUTRITION

Safety and Efficacy of a Lipid Emulsion Containing a Mixture of Soybean Oil, Medium-chain Triglycerides, Olive Oil, and Fish Oil: A Randomised, Double-blind Clinical Trial in Premature Infants Requiring Parenteral Nutrition

*Erika Tomsits, *Margit Pataki, *Andrea Tölgyesi, *György Fekete, †Katalin Rischak, and †Lajos Szollár

Recomendaciones

ESPEN
The European Society for Clinical Nutrition and Metabolism

- The use of commercial lipid emulsions based on LCT (soybean oil or olive oil/soybean oil), or physical mixtures of MCT and LCT can be considered generally safe in infants and children. **LOE 1**
- There is currently no evidence (based on clinical outcome data) supporting the advantage of any of the lipid emulsions that are currently available.

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Position Paper

A.S.P.E.N. Position Paper: Clinical Role for Alternative Intravenous Fat Emulsions

Critical Care Nutrition

There are no new randomized controlled trials since the 2009 update and hence there are no changes to the following summary of evidence.

Discussion: The committee noted a large reduction in infectious complications associated with withholding lipids albeit this effect maybe due to reduced calories or the absence of lipids. The feasibility and cost favoured withholding lipids. One of the studies excluded malnourished patients (McCowen) while the other excluded patients with essential fatty acid deficiency (Batistella). The committee expressed concerns over the effects of long term fat free parenteral nutrition and the paucity of data in malnourished patients. The committee decided that while the concerns regarding withholding lipids (i.e. hypocaloric nutrition and essential fatty acid deficiency) were probably minimal for those patients tolerating some EN and requiring PN for short term (< 10 days), this cannot be extrapolated to those who have an absolute contraindication to EN and need PN for a longer duration. Given the emerging evidence around the potential benefits of omega 3 fatty acids, it was agreed that this recommendation be made specific to withholding lipid emulsions that were high in soybean oil.

INTRAVENOUS LIPID EMULSIONS CONTAINING FISH OIL (FO-LE) ARE NOT ASSOCIATED WITH IMPAIRED GROWTH IN PRETERM INFANTS (PI) ON PARENTERAL NUTRITION (PN).

C. Biagetti (1), R. D'Ascenzo (1); M. P. Bellagamba (1); C. Spagnoli (1); M. Malatesta (1); P. E. Cogo (2); V. P. Carnielli (1)

(1) Division of Neonatology, Polytechnic University of Marche; (2) Cardiac Anaesthesia/Intensive Care Unit, Bambino Gesù Children'S Hospital

Background And Aims: Long chain n-3 fatty acids (n-3 LCPUFA) play a pivotal role during CNS development and the provision of docosahexaenoic acid (DHA) is recommended for the PI. However there is a concern that oral FO, rich in DHA, may adversely affect growth of PI (Carlson et al. Lipids 1992) as it decreases arachidonic acid (ARA). Over the past 2 decades no new data became available to confirm or refute this finding as FO is often used in association with a source of ARA. In very recent years FO was added to the fat blend of intravenous lipid emulsions (LE) for the PN of the PI and information on growth is lacking. We studied the effect of FO-LE on the growth of PI on PN.

Methods: We retrospectively reviewed the growth data of 235 PI (BW<1250g) consecutively admitted to our NICU between 2008 and 2012 who received routine PN starting within 1h of life, according to a well-defined PN scheme. As part of several clinical trials, study patients received one of 5 LE. LE were 1=FMS (10% FO, 40:50 MCT:Soybean oil), 2=MOSF (15% FO, 30:30:25 MCT:Soybean oil:Olive oil), 3=S (100% Soybean oil), 4=MS (50% MCT and 50% Soybean oil) and 5=OS (80% Olive oil and 20% Soybean oil). In this study we grouped the patients who received the FO containing LE, FMS and MOSF (FISH) (n=101, GA 199±15 d, BW 960±176 g) and those without FO, S MS and OS (CONTR) (n=134, GA 198±15 d, BW 961±192 g). We compared macronutrient and energy intakes during PN and enteral feeding (EF), anthropometry at birth and at 36 weeks post-menstrual age (36w-PMA) and growth velocity.

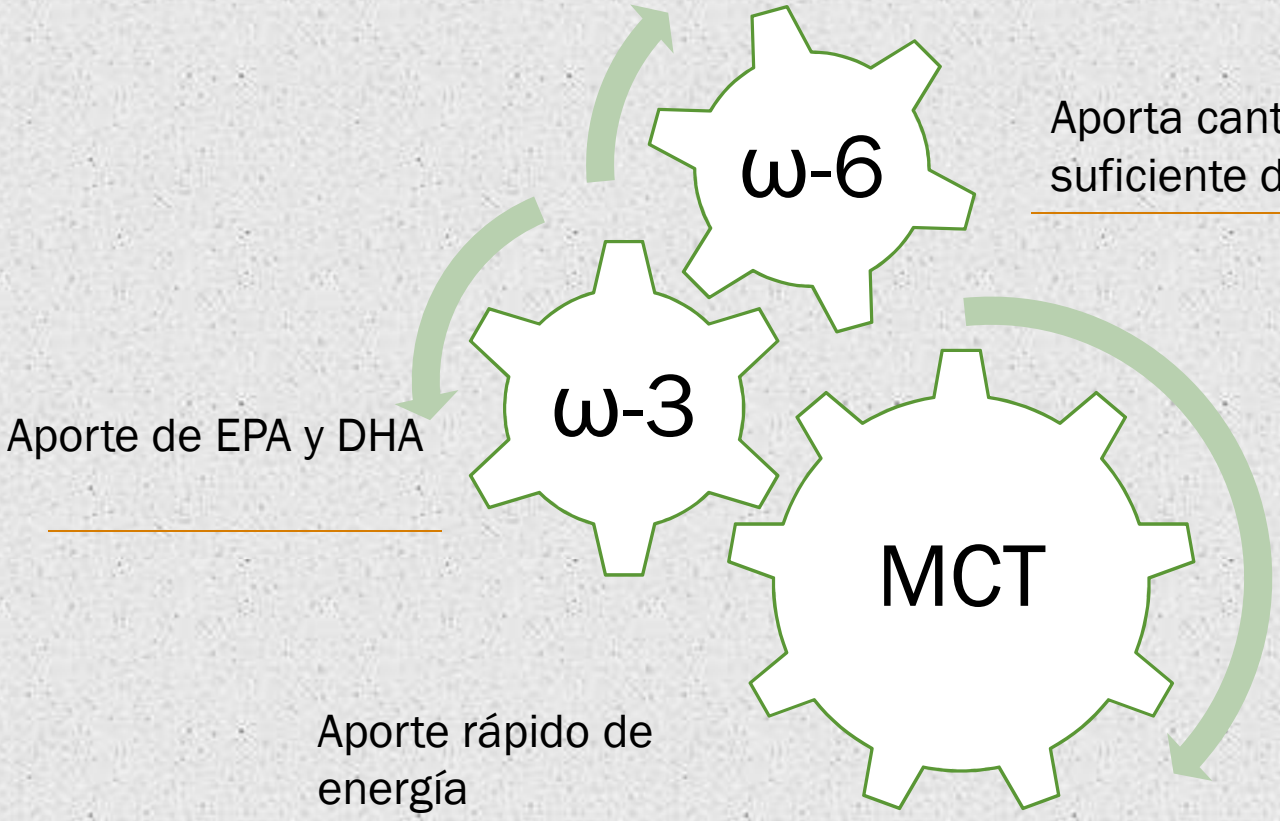
	FISH (n=101)	CONTR (n=134)	p
PN-Non-Protein Energy (Kcal/kg)	893±396	946±582	0.4
PN-Amino Acid (g/kg)	41±18	44±26	0.4
EF-Non-Protein Energy (Kcal/kg)	4530±1713	4510±1577	0.9
EF-Protein (g/kg)	153±54	154±54	0.9
MM (ml/kg)	3723±3197	3402±2960	0.4
IMF (ml/kg)	3081±2640	2871±2559	0.5

Results: Anthropometry at birth was similar between groups. No differences were found between the two study groups in PN and EF macronutrient and energy intakes from birth to 36w-PMA, as well as in mother's milk (MM) and infant milk formula (IMF) volumes (Table 1). Anthropometry at 36w-PMA and weight gain from birth to 36w-PMA are shown in the Table 2. There were no significant differences in the main complications of prematurity (not shown).

Table 1. Cumulative Nutritional Intakes from birth to 36w-PMA FISH (n=101) CONTR (n=134) p PN-Non-Protein Energy (Kcal/kg) 893±396 946±582 0.4 PN-Amino Acid (g/kg) 41±18 44±26 0.4 EF-Non-Protein Energy (Kcal/kg) 4530±1713 4510±1577 0.9 EF-Protein (g/kg) 153±54 154±54 0.9 MM (ml/kg) 3723±3197 3402±2960 0.4 IMF (ml/kg) 3081±2640 2871±2559 0.5 Table 2. Anthropometry at 36w-PMA and growth FISH (n=101) CONTR (n=134) p Weight (g) 1941±326 1899±320 0.3 Total Length (cm) 42.9±2.3 42.9±2.3 0.8 Head Circumference (cm) 30.8±1.5 30.6±1.4 0.2 Weight-SDS variation [Birth-36w-PMA] -1.1±0.6 -1.2±0.6 0.03 Weight gain [Regained-BW-36w-PMA] (g/kg/d) 17.1±2.5 16.5±2.6 0.06 Weight gain [Regained-BW-1800 g] (g/kg/d) 17.5±2.8 16.8±2.8 0.04

Conclusions: In this large cohort of PI on PN the use of FO-LE was not associated with impaired growth. Further work is needed to investigate other safety aspects of FO-LE in PI and their impact on long term neurodevelopment.

APORTE DE LÍPIDOS



Aporta cantidad suficiente de AGE

Aporte de EPA y DHA

Aporte rápido de energía

Aporte de lípidos

			Concentraciones de los seleccionados Ac.Grasos, % por peso						
Producto	Fabricante Distribuidor	Fuente de Lipidos	Linoleico	α Linoleico	EPA	DHA	n-6 n-3 Ratio	αTocoferol mg/L	Fitosteroles mg/L
IVFE disponible solo en Estados Unidos									
Intralipid	Fresenius Kabi / Baxter	100% Aceite de soja	44-62	4-11	0	0	7:1	38	348±33
Liposyn III	Hospira	100% Aceite de soja	54,5	8.3	0	0	7:1	NA	NA
IVFE disponibles solo fuera de los Estados Unidos									
Intralipid	Fresenius Kabi	100% Aceite de soja	44-62	4-11	0	0	7:1	38	348±33
Ivelip	Baxter/Teva	100% Aceite de soja	52	8,5	0	0	7:1	NA	NA
Lipovenoes	Fresenius Kabi	100% Aceite de soja	54	8	0	0	7:1	NA	NA
Lipovenoes 10% PLR	Fresenius Kabi	100% Aceite de soja	54	8	0	0	7:1	NA	NA
Intralipos 10%	Mitsubishi Pharma	100% Aceite de soja	53	5	0	0	7:1	NA	NA
Lipofundin-N	B.Braun	100% Aceite de soja	50	7	0	0	7:1	180±40	NA
Soyacal	Grifols Alpha Therapeuticas	100% Aceite de soja	46,4	8,8	0	0	7:1	NA	NA
Intrafat	Nihon	100% Aceite de soja	NA	NA	0	0	7:1	NA	NA
Structolipid 20%	Fresenius Kabi	64% Aceite de soja 36% MCT	35	5	0	0	7:1	6,9	NA
Lipofundin MCT/LCT	B.Braun	50% Aceite de soja 50% MCT	27	4	0	0	7:1	85±20	200±40
Lipovenoes MCT	Fresenius Kabi	50% Aceite de soja 50% MCT	25,9	3,9	0	0	7:1	NA	NA
ClinOleic 20%	Baxter	20% Aceite de soja 80% Aceite de oliva	18,5	2	0	0	9:1	32	327±8
Lipoplus	B.Braun	40% Aceite de soja 50% MCT 10% Aceite de pescado	25,7	3,4	3,7	2.5	2.7:1	190±30	NA
SMOFlipid	Fresenius Kabi	30% Aceite de soja 30% MCT 25% Aceite de oliva 15% Aceite de pescado	21,4	2,5	3	2	2.5.1	200	47,6
Omagaven	Fresenius Kabi	100% Aceite de pescado	4,4	1,8	19,2	12,1	1:8	150-296	0

Intravenous lipid emulsions for infants: when and which?

Berthold Koletzko

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TABLE 1
Typical content of major PUFAs in mature human milk and in commercial LEs currently registered for pediatric parenteral nutrition in most parts of the world[1]

	PUFAs				
	Linoleic (18:2n–6)	α-Linolenic (18:3n–3)	Arachidonic (20:4n–6)	EPA (20:5n–3)	DHA (22:6n–3)
	% of total fatty acids				
Mature human milk (European women)[2]	11.0	0.9	0.5	0.2	0.3
Lipid emulsions based on					
SO 100%	53.2	7.8	Trace	Trace	Trace
SO 50%/MCT 50%	27	3.5	Trace	Trace	Trace
SO 20%/olive oil 80%	12.2	2.4	Trace	Trace	Trace
SO 30%/MCT 30%/olive oil 25%/fish oil 15%	18.6	2.4	Trace	2.4	2.2
SO 40%/MCT 50%/fish oil 10%	21.9	2.9	Trace	3.3	2.5

[1] Variation of fatty acid composition of LEs may occur from batch to batch. Modified from references 10 and 11. LE, lipid emulsion; MCT, medium-chain triglyceride; SO, soybean oil.
[2] Values for human-milk fatty acids are medians.

Emulsiones recomendadas

Soja

- Fitosteroles
- Desequilibrio pro-oxidante (déficit de vit E) y pro-inflamatorio (exceso de w-6)

Soja-coco

- Bien tolerado y adecuada Vit E

Aceite de oliva

- Beneficiosa por AG monoinsaturados
- Déficit de w-3 y vit E

Soluciones mixtas

- Beneficiosa por equilibrio MCT, w-3, soja (y oliva)

Lipoplus 20%® vs SMOFlipid 20%®

Aceite	Lipoplus 20% ®	SMOFlipid 20% ®
Soja	40%	30%
MCT	50%	30%
Oliva	0%	25%
Pescado	10%	15%
Fitosteroles		

Existe controversia en el uso de w-3

MUCHAS GRACIAS