Mesa Redonda: Aspectos prácticos en el manejo ambulatorio de la fibrosis quística

El seguimiento nutricional de un niño con fibrosis quística: ¿es importante?

Dra. Adriana Fernández
Centro de Fibrosis Quística de La Plata

Seguimiento Nutricional

Pediatra

Centro de Fibrosis Quística

Especialista en Nutrición

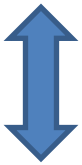
Gastroenterólogos
Hepatólogos
Endocrinólogos
Diabetólogos
Psicólogos

Seguimiento Nutricional

Pediatra

Rol fundamental en los primeros años de vida

Determinantes en el crecimiento



Afectación pulmonar

Nutrición

- Concepto de «riesgo nutricional»
- Afectación del crecimiento temprano
- Beneficios de la pesquisa neonatal
- Intervenciones tempranas
- Nutrición Enteral

Estado nutricional temprano y función pulmonar

- Diferentes estudios han demostrado la asociación entre el estado nutricional en los primeros años de vida y la función pulmonar y/o sobrevida. *Zemel 2000, Peterson 2003*

- Estudios a largo plazo demostraron que:

El mejor estado nutricional temprano se asocia a largo plazo con mejor función pulmonar *Konstan 2003*

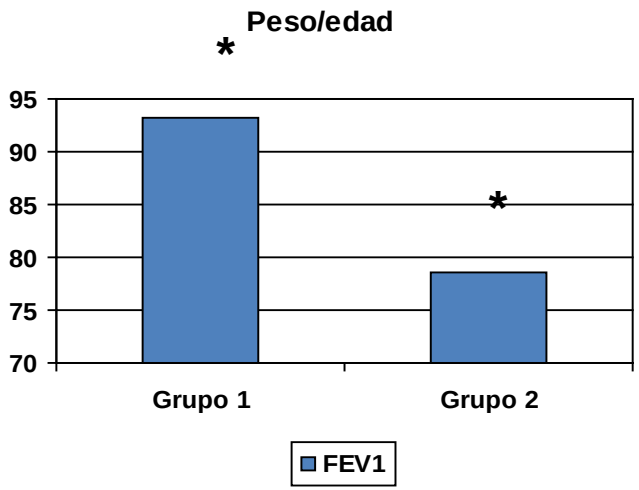
La baja talla se asocia con peor sobrevida *Beker, 2001.*

Los niños que sostienen su Z-score de nacimiento a los dos años mantienen mejor función pulmonar a los 6 años *Lui 2003*

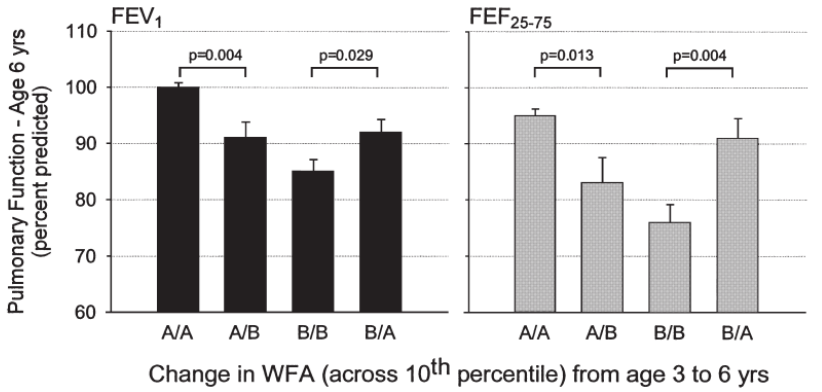
Impacto de la afectación nutricional temprana sobre la función pulmonar en pacientes con fibrosis quística

Finocchiaro, J.; Fernández, A.; Segal, E., y cols., 2008.

FEV1	Grupo 1	Grupo 2	p
P/E	93,2%	78,5%	0,006
T/E	88,5%	85%	0,3
IMC	92%	84%	0,09



* P 0,006



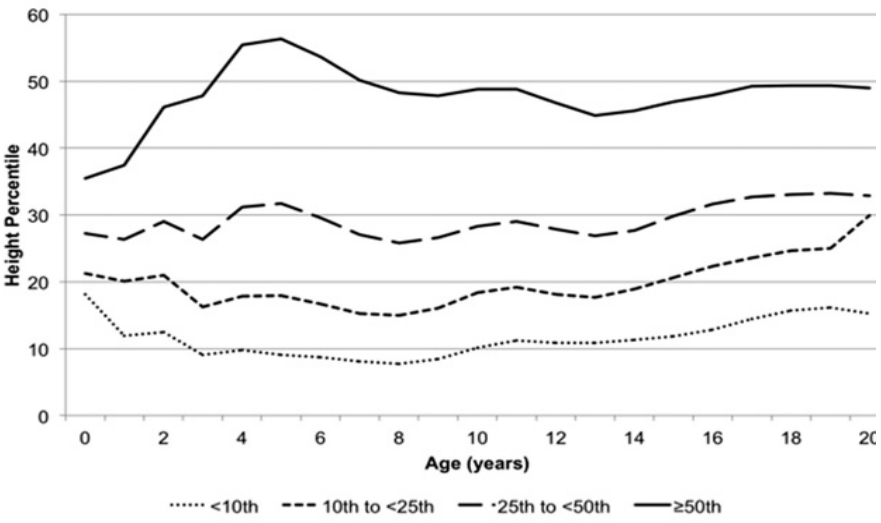
Konstan MW, J Ped 2003

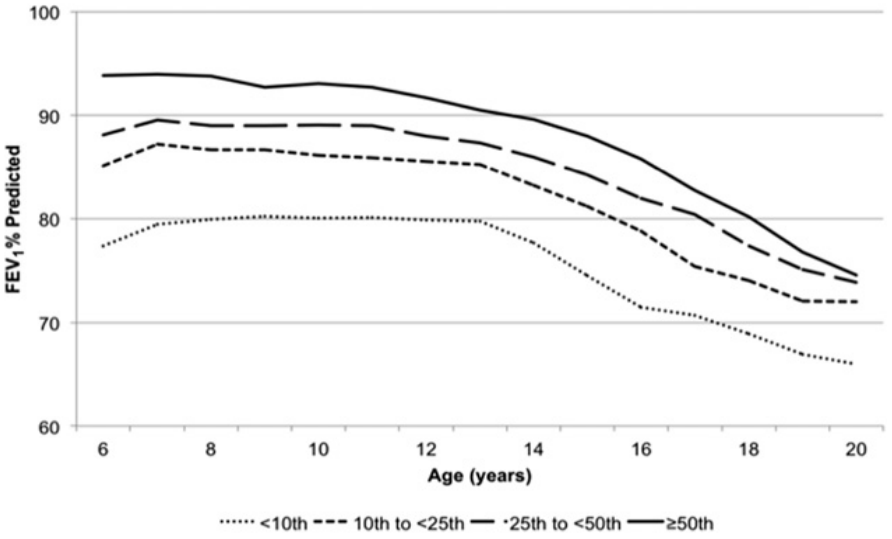
Better Nutritional Status in Early Childhood Is Associated with Improved Clinical Outcomes and Survival in Patients with Cystic Fibrosis

Elizabeth H. Yen, MD[1], Hebe Quinton, MS[2], and Drucy Borowitz, MD[3]

J Pediatr 2012

Estudio prospectivo de 3142 pacientes (CFFR)

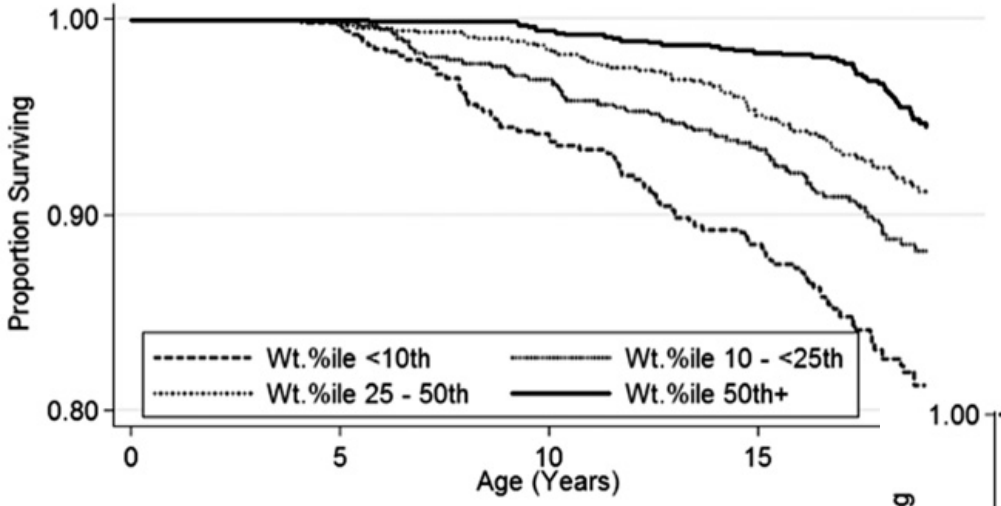


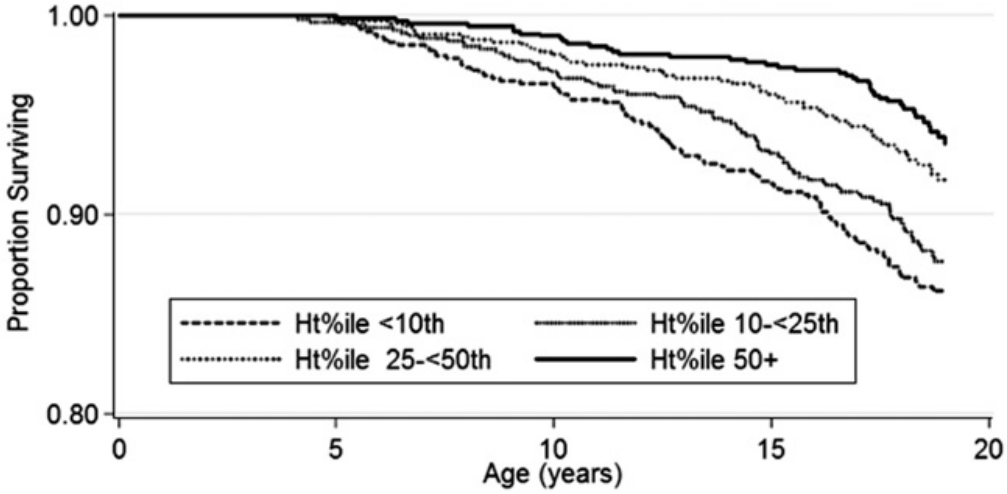


Better Nutritional Status in Early Childhood Is Associated with Improved Clinical Outcomes and Survival in Patients with Cystic Fibrosis

Elizabeth H. Yen, MD[1], Hebe Quinton, MS[2], and Drucy Borowitz, MD[3]

J Pediatr 2012

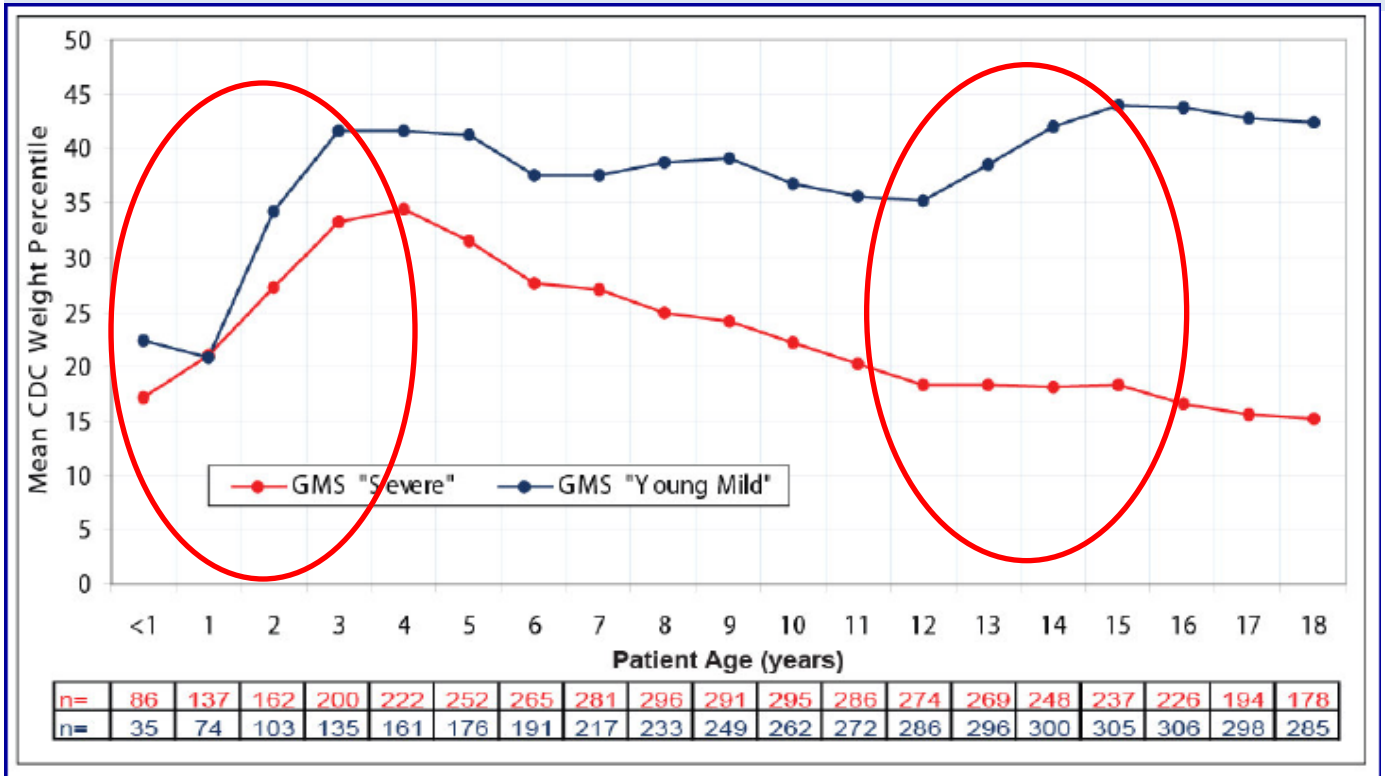




Riesgo nutricional

- Alteraciones nutricionales al momento del diagnóstico
- Mutaciones severas
- Enfermedad pulmonar precoz (P. aureginosa)
- Deficiencias nutricionales tempranas
- Manejo de la malabsorción
- Alteraciones en el metabolismo de la glucosa

FIBROSIS QUÍSTICA



Intervenciones Nutricionales
Dieta
Conducta Alimentaria
Nutrición Enteral

Trastornos funcionales int.
Alteraciones glucémicas
Enfermedad ósea
Trastornos psicológicos

FQ: seguimiento nutricional

Efectos de la pesquiza sobre la nutrición

EVALUACIÓN CLÍNICA-FUNCIONAL DE NIÑOS CON FIBROSIS QUÍSTICA (FQ) DETECTADOS POR PESQUISA NEONATAL O POR SÍNTOMAS CLÍNICOS: CUATRO AÑOS DE SEGUIMIENTO

		2005			2006			2007			2008	
	z IMC	z T/E*	VEF_1	z IMC*	z T/E*	VEF_1	z IMC	z T/E*	VEF_1	z IMC	z T/E	VEF_{1*}
P	0,18	-0,21	96%	0,44	-0,28	86%	0,12	0,07	95%	-0,07	0,06	93%
S	-0,17	-0,95	88%	-0,50	-1,01	76%	-0,50	-0,80	83%	-0,45	-0,80	76%

**P 0.05*

Variables	Grupo P	Grupo S	p
Edad al diagnóstico (años)	0,16 ± 0,13	1,03 ± 1,23	0,002
Edad derivación (años)	0,98 ± 1,69	1,28 ± 1,25	0,5

Arch Argent Pediatr 2009;107(5):430-435

JAMA Pediatrics | Original Investigation

Effects of Diagnosis by Newborn Screening for Cystic Fibrosis on Weight and Length in the First Year of Life

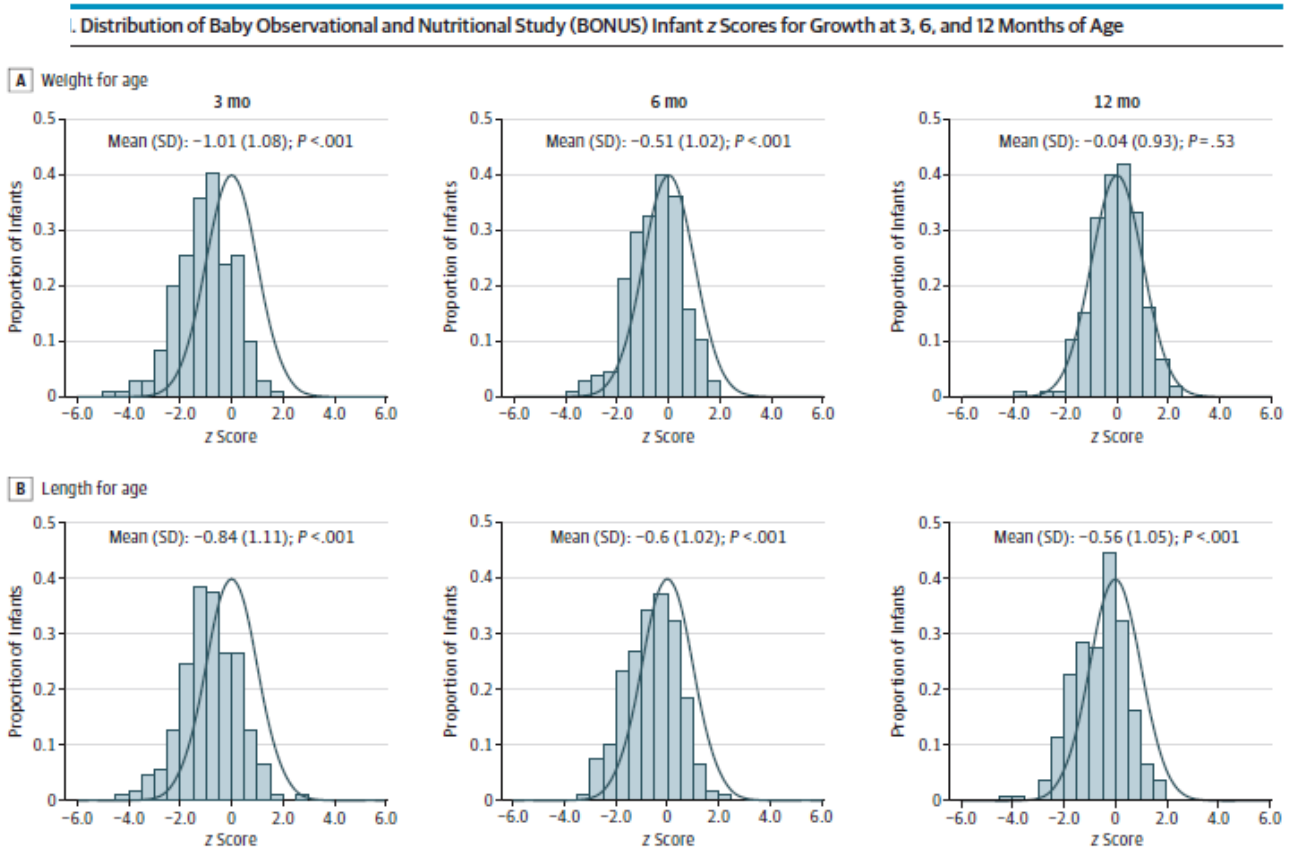
Daniel H. Leung, MD; Sonya L. Heltshe, PhD; Drucy Borowitz, MD; Daniel Gelfond, MD; Margaret Kloster, MS; James E. Heubi, MD; Michael Stalvey, MD; Bonnie W. Ramsey, MD; for the Baby Observational and Nutrition Study (BONUS) Investigators of the Cystic Fibrosis Foundation Therapeutics Development Network

JAMA Pediatr. 2017;171(6):546-554.

Conclusión:

“Desde que se inició la realización de la pesquisa neonatal se ha observado una normalización del peso durante el primer año de vida pero la baja talla continúa siendo frecuente en esta población”

Effects of Diagnosis by Newborn Screening for Cystic Fibrosis on Weight and Length in the First Year of Life



Lactantes en “riesgo nutricional”

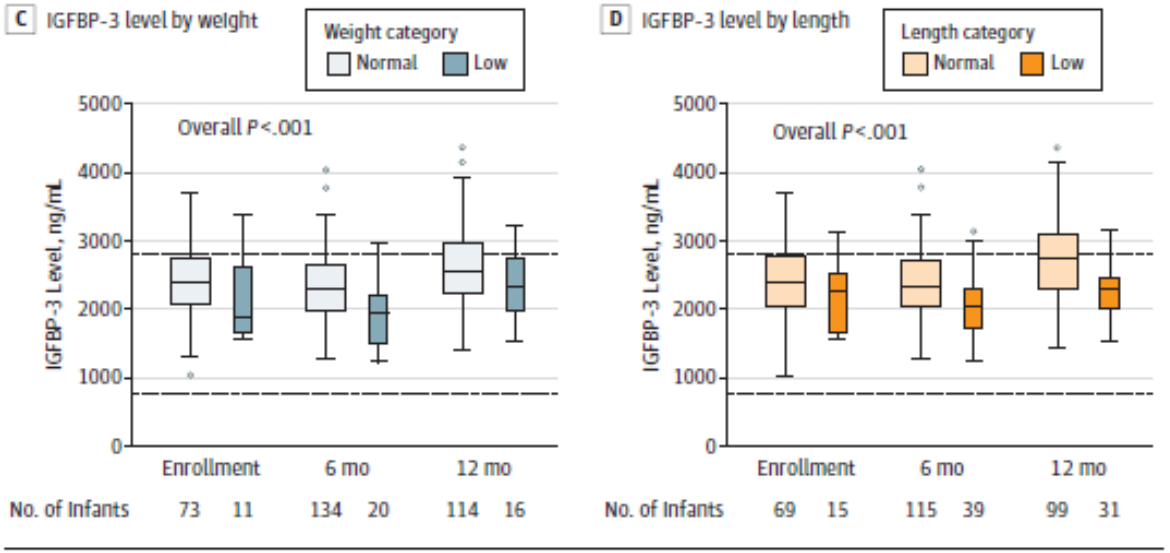
JAMA Pediatr. 2017;171(6):546-554.

Effects of Diagnosis by Newborn Screening for Cystic Fibrosis on Weight and Length in the First Year of Life

Observaciones del estudio BONUS:
Riesgo para fallo de crecimiento: 13% BP, 24% BT

- **Riesgo de bajo peso asociado a colonización temprana con P aureginosa**
- **Identificación de la Inflamación como causa común tanto del fallo de crecimiento como sobre el impacto en la la función pulmonar**

Effects of Diagnosis by Newborn Screening for Cystic Fibrosis on Weight and Length in the First Year of Life



- **Efecto de la Inflamación como disruptor del axis del IGF-1**
- **Deficiencia del IGF-1 asociada con las mutaciones mas severas del CFTR, incluso en neonatos.** *(Rogan 2010)*

JAMA Pediatr. 2017;171(6):546-554.

Nutritional status the first two years of life in cystic fibrosis

Diagnosed by newborn screening

Journal of Pediatric Gastroenterology and Nutrition, Publish Ahead of Print

DOI : 10.1097/MPG.0000000000001956

- **A pesar de la pesquisa, 25 % de baja talla y 15 % de bajo peso se observó en niños con IP**
- **El mejor estado nutricional a los dos años se asoció con el comienzo del tratamiento antes de 1.2 meses y la no presencia precoz de síntomas respiratorios**
- **Los diferentes parámetros nutricionales se normalizaron salvo la excreción de Sodio y los niveles de Vitamina D**

Recomendaciones de ingesta de Sodio

- *12.6 mEq (1/8 cucharada de té)/día desde el nacimiento a los 6 meses*
- *25.2 mEq (1/4 cucharada de té)/día a partir de los 6 meses hasta garantizar una buena ingesta de sal con la alimentación*

El Sodio es un nutriente Tipo II, su deficiencia es una limitante importante del crecimiento

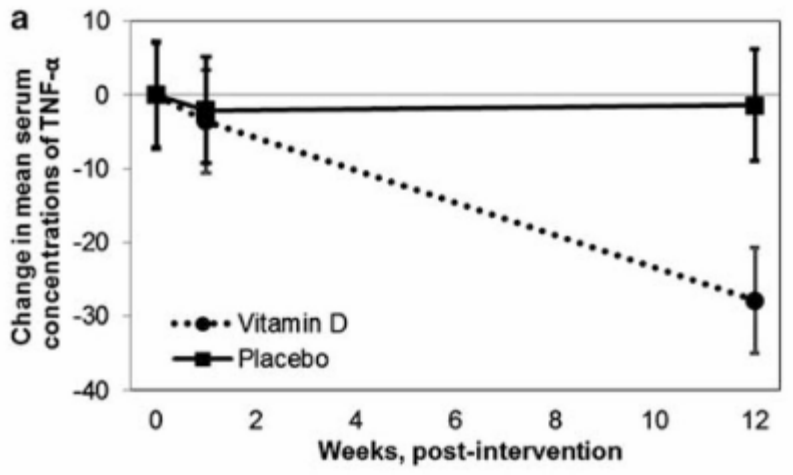
Vitamin D: efectos anti-microbianos y anti-inflammatorios in vitro

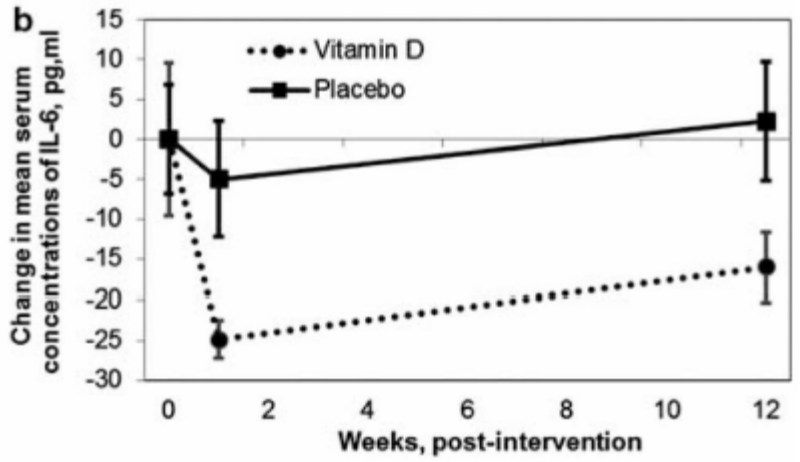
Efectos antimicrobianos	Efectos anti-inflammatorios
Incrementa la producción de péptidos antimicrobianos (LL-37, b-defensins)	Disminuye la producción de citoquinas proinflamatorias TNF-a, IL-6 y IL-8
Induce la producción de oxido nítrico (NO)	Induce la producción de citoquina anti-inflammatoria IL-10
	Potencia los efectos anti-inflamatorios de los corticoides.

Herscovitch K et al. Paed Resp Reviews 15 (2014) 154–162 157

Impact of vitamin D supplementation on markers of inflammation in adults with cystic fibrosis hospitalized for a pulmonary exacerbation

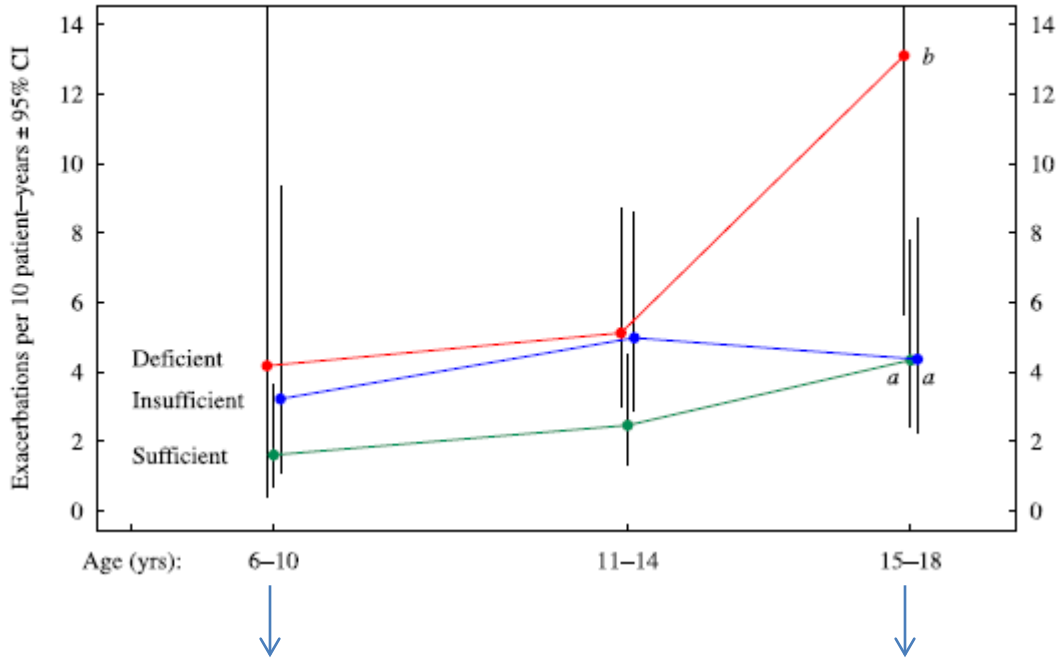
Eur J Clin Nutr. 2012 September ; 66(9): 1072–1074.





Megadosis de 250.000UI Vitamina D disminuyó en un 50% el α-TNF y en un 64% la IL-6.

Vitamin D Deficiency Is Associated with Pulmonary Exacerbations in Children with Cystic Fibrosis



Def. 5%
Insuf. 10-20%

Def.10%
Insuf. 30%

Suficiente ≥ 30ng/L
Insuficiente e/ 20-29ng/L
Deficiente < 20ng/L

AnnalsATS Volume 11 Number 2 | February 2014

Vitamina D en FQ: Guías de la CFF

- **Monitoreo anual**
- **Preferentemente al final del invierno**
- **Nivel deseado de 25-hydroxyvitamina D: > 30 ng/ml (75 nmol/litro)**
- **Uso preferente de Vitamina D3**

Vitamin D intakes and treatment recommendations of vitamin D deficiency in children and adults with CF

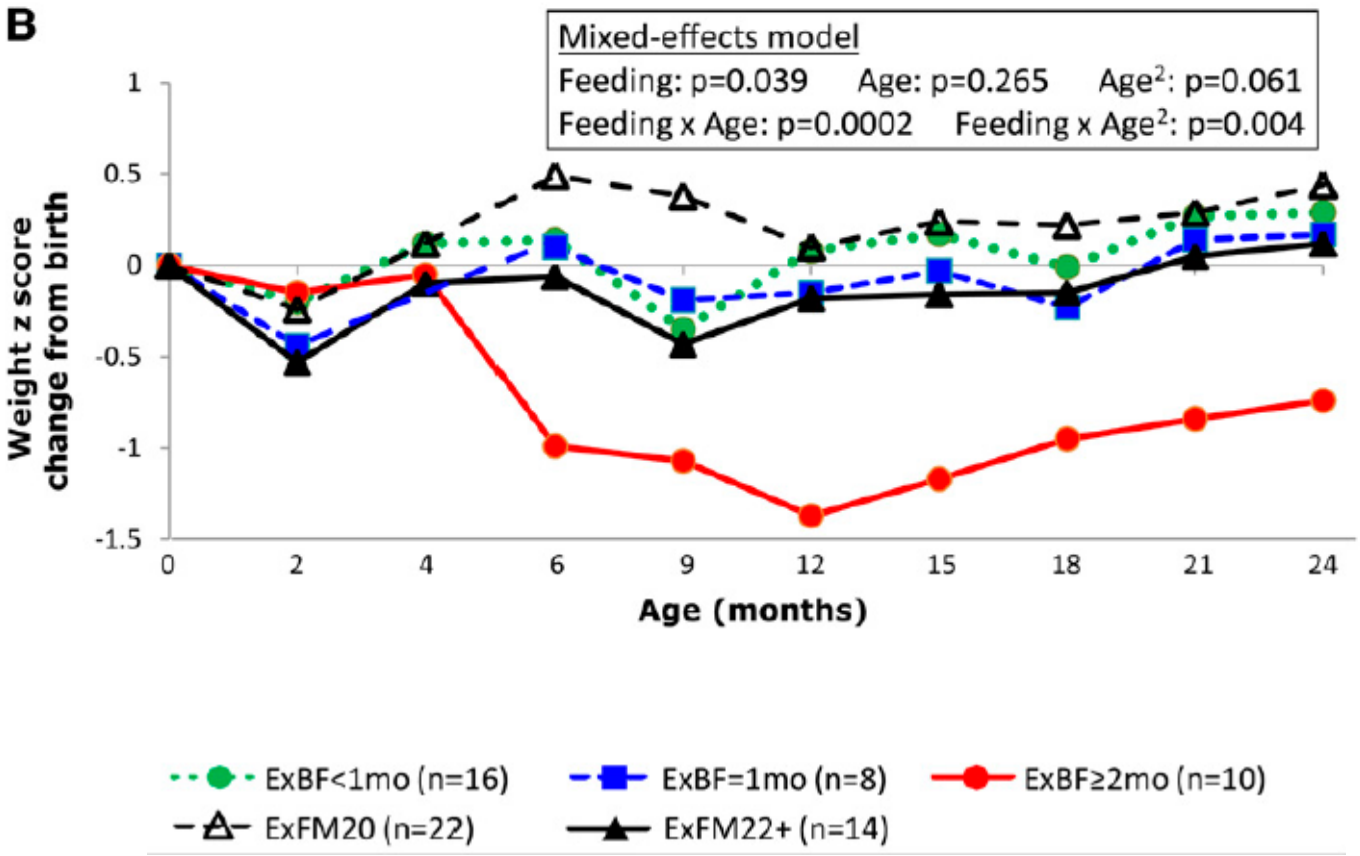
Age	Routine dosing with CF-specific vitamins (IU)	Step 1: dose increases (IU)	Step 2: dose titration maximum (IU)	Step 3
Birth to 12 months	400–500	800–1,000	Not more than 2,000	Refer
>12 months to 10 yr	800–1,000	1,600–3,000	Not more than 4,000	Refer
>10 yr to 18 yr	800–2,000	1,600–6,000	Not more than 10,000	Refer
>18 yr	800–2,000	1,600–6,000	Not more than 10,000	Refer

Tangpricha, J Cl Endoc Metab2012

Nutrición: Intervenciones tempranas

- **Lactancia vs. fórmulas**
- **Suplementos: Vitaminas, Sodio, Zinc**
- **Adecuada alimentación complementaria (calorías, proteínas)**
- **Manejo de la conducta alimentaria**

Crecimiento durante los dos primeros año de vida de acuerdo al tipo de alimentación



Jadin SA, Am J Clin Nutr. 2011; 93: 1083

Growth and pulmonary outcomes during the first 2 y of life of breastfed and formula-fed infants diagnosed with cystic fibrosis through the Wisconsin Routine Newborn Screening Program

- **Conclusiones:**

  Lactantes con IP con LH exclusiva < 2 m:

  - Ganaron peso adecuado
  - Tuvieron menor numero de infecciones a PA durante los primeros 2 años de vida comparados con los alimentados a formula

  Lactantes con IP con LH exclusiva > 2 m:

  - Ganaron menor peso
  - No tuvieron beneficios respiratorios

Jadin SA, Am J Clin Nutr. 2011; 93: 1083

Aspectos prácticos del manejo de lactantes FQ alimentados con leche materna

La leche humana es baja en calorías, en proteínas, rica en grasas

- Dificultades en la administración de de enzimas en todas las tomas
- Dificultades en la administración de la suplementación de sodio
- Vigilancia estricta en la ganancia de peso
- El reemplazo o la suplementación debe asegurar la provisión de una fórmula

Fibrosis Quística

Vitaminas

Vitamin	0-12 months	1-3 years	4-9 years	+10 years
A (UI)	1500	5000	5000-10000	10000
D (UI)	400-500	800-1000	800-1000	800-2000
E (UI)	40-50	80-150	100-200	200-400
K (mcg)	300-500	300-500	300-500	300-500

Adapted from:

Consensus report on nutrition for patients with cystic fibrosis.Borowitz D, Baker RD, Stallings V. J Ped Gastroenterol Nutr. 2002 Sep; 35 (3): 246-59.

An update on the screening, diagnosis,management and treatment of vitamin D deficiency in individuals with cystic fibrosis: evidence-based recommendations from the Cystic Fibrosis Foundation. Tangpricha V, Kelly A, Stepherson A, Maguiness K, Enders J, Robinson KA, Marshall BC, Borowitz D. J Clin Endocrinol Metab.2012 Apr; 97 (4): 1082-93.

Recomendaciones de ingesta de Zinc

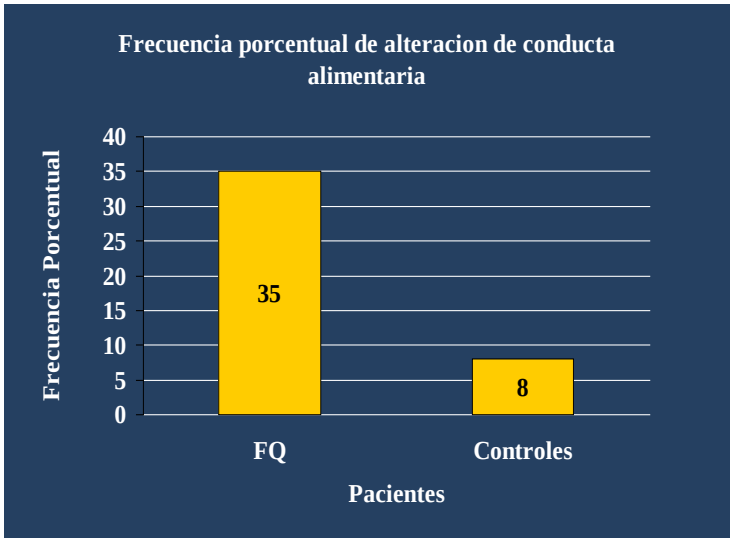
TABLE 7. Recommendations for zinc supplementation in children with cystic fibrosis

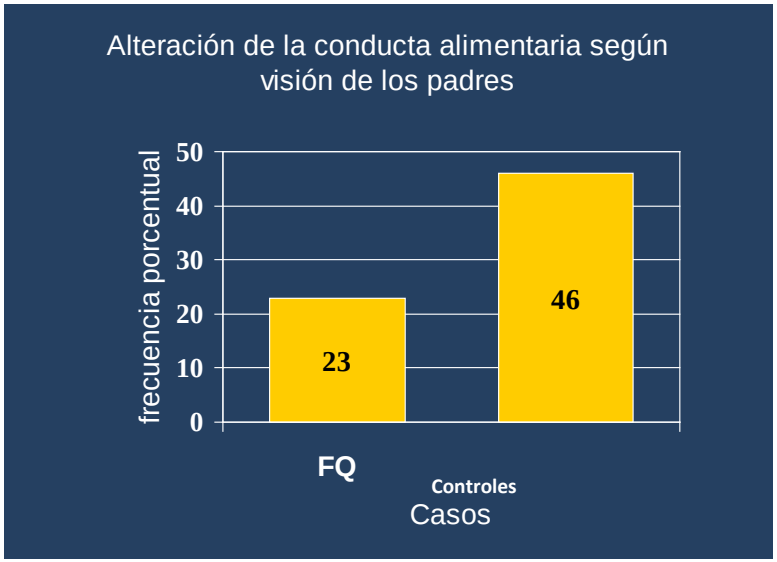
Age	Recommended supplementation	Recommended dosing period, mo
Infants and children younger than 2 year and at risk of zinc insufficiency	1 mg · kg^{-1} · day^{-1} (max 15 mg/day)	6
Children 2–18 years and at risk of zinc insufficiency	15 mg/day	6

El Zinc es un nutriente Tipo II, su deficiencia es una limitante importante del crecimiento

EVALULACIÓN DE LA CONDUCTA ALIMENTARIA EN NIÑOS CON FIBROSIS QUÍSTICA

Finocchiaro, J; Vercesi, S; Hernández, J; Fernández, A; Segal, E





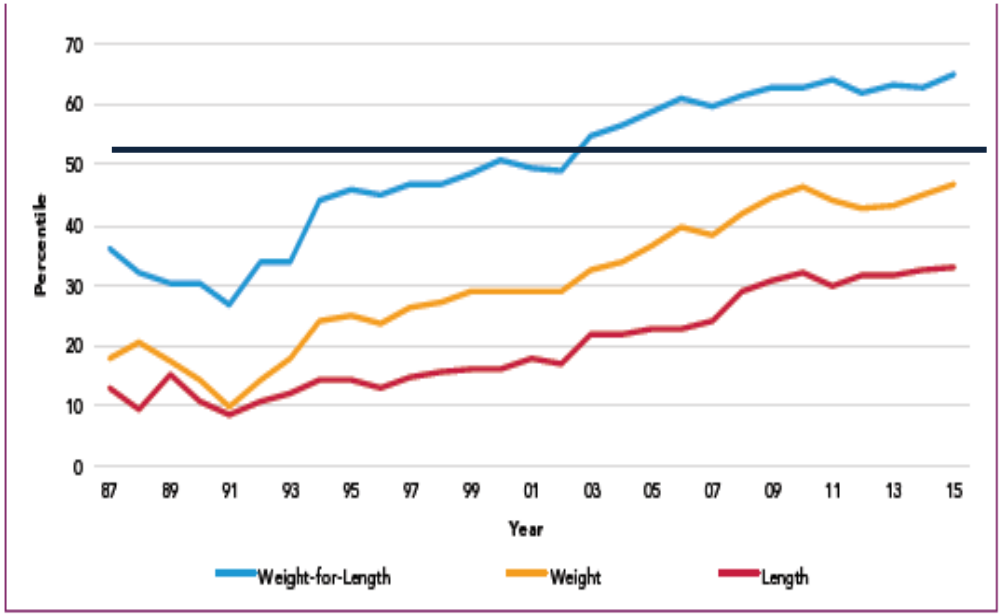
Crist W, McDowell P,Beck M,Gillespie CT,Banet P,Mathew J.

Behavior at meal times and the young child with CF . Dev Behav Pediatr 1994.

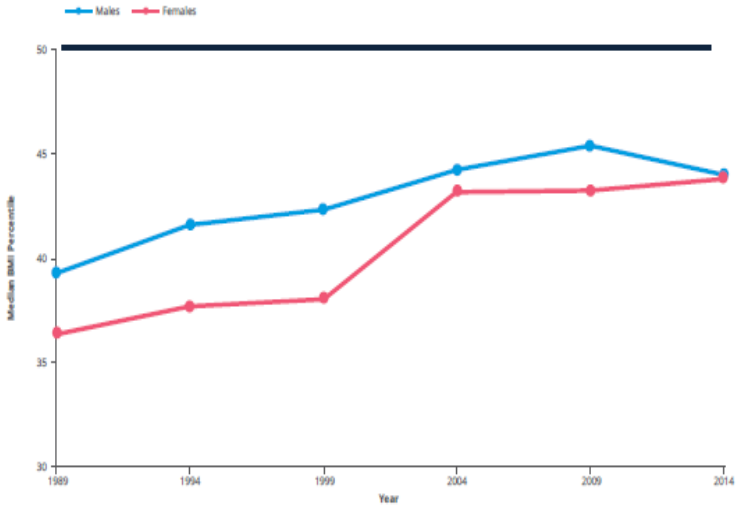
CYSTIC FIBROSIS FOUNDATION
ADDING TOMORROWS

THE CANADIAN CYSTIC FIBROSIS REGISTRY

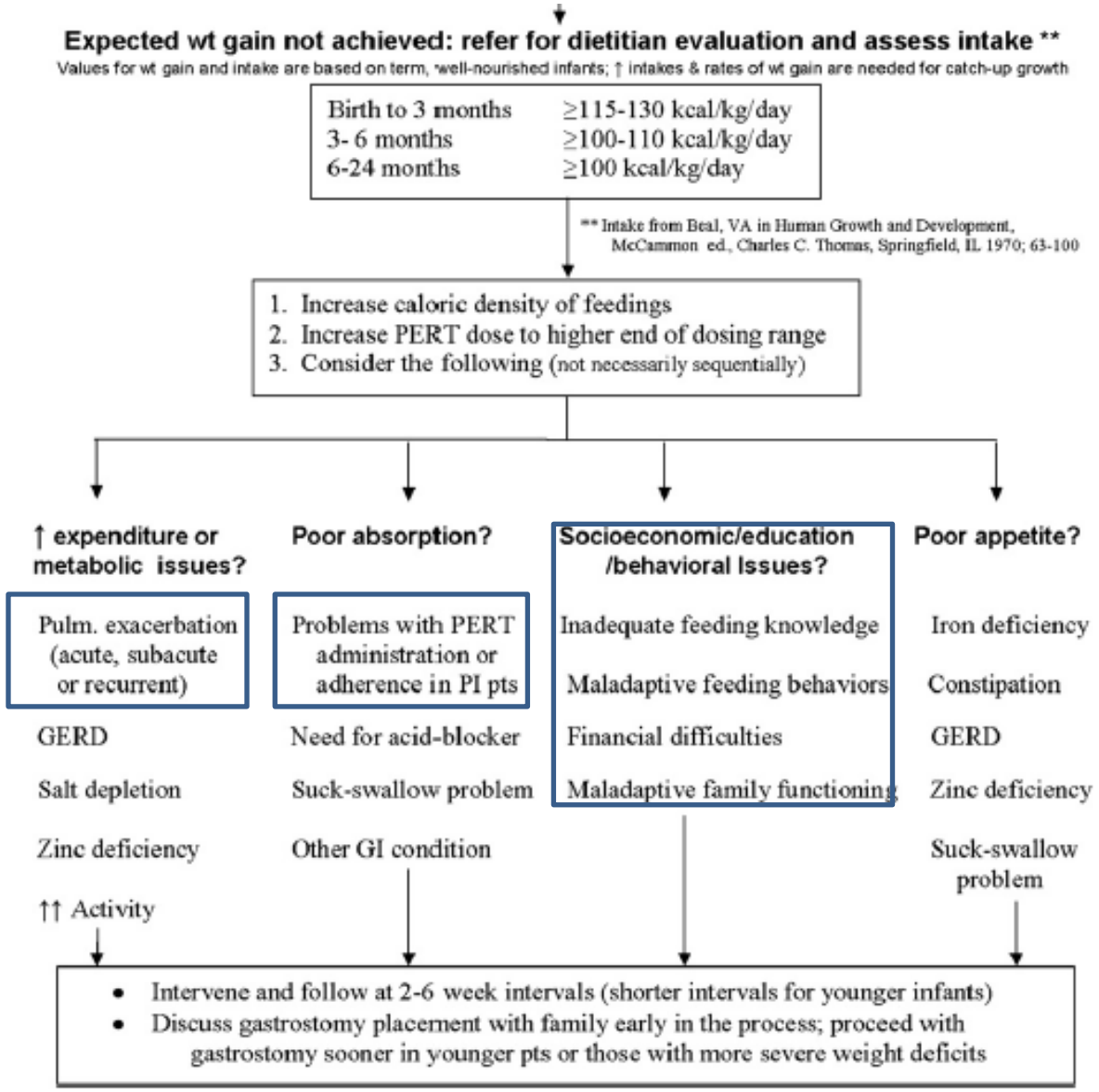
Mediana de Percentiles para niños < 2 años, 1987-2015



Mediana de Percentiles para niños < 2 años, 1989-2014



Cystic Fibrosis Foundation Evidence-Based Guidelines for Management of Infants with Cystic Fibrosis



J Pediatr 2009;155:S73-93,

Guías Clínicas de Nutrición Enteral

- Por equipo interdisciplinario
- Descartar condiciones tratables:

Inadecuada ingesta
Complicaciones gastrointestinales
Diabetes
Inadecuada kinesiología
Exacerbación pulmonar
Alteraciones de la conducta alimentaria

Educación en todas las etapas!!!!!!!

Guías Clínicas de Nutrición Enteral

- La sonda Nasogástrica es recomendada sólo para períodos cortos (menores a 3 meses), no para aquellos pacientes que requieren de NE por un período no definido

Es necesario establecer la cobertura del tratamiento de la NE antes de indicarla.

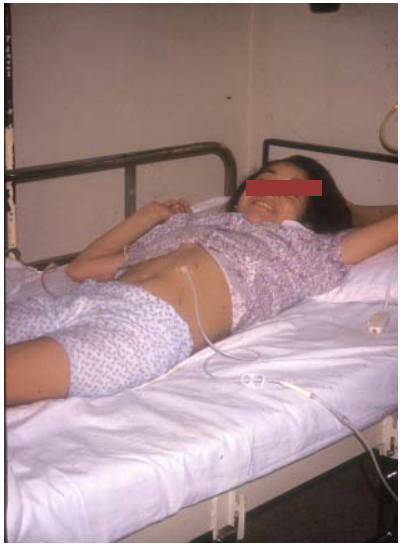
Guías Clínicas de Nutrición Enteral

- Para menores de 2 años el uso de fórmulas será de acuerdo a las Guías de la CFF

- La NE deberá ser aportada durante la noche, en un vol. e/25-60% del total de los requerimientos.

Un solo estudio no encontró diferencias entre una fórmula polimérica con enzimas y una fórmula semielemental. Erskine JM, 1998

El uso continuo y nocturno favorece un mayor aporte de nutrientes, mejora la absorción y la ingesta durante el día. Woestenenk JW, 2015, Braegger C, 2010

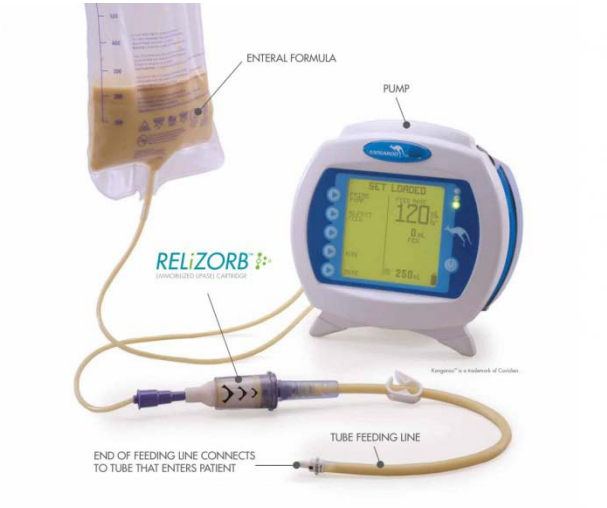


Guías Clínicas de Nutrición Enteral

- No existe un método específico para administrar enzimas durante la NE.

Ausencia de estudios, sin recomendaciones específicas (comienzo, medio, final de la NE?).

No existe evidencia s/mezclarlas en las fórmulas y va contra las guías de uso.



Increased Fat Absorption from Enteral Formula Through an In-Line Digestive Cartridge in Patients with Cystic Fibrosis.

Freedman, Steven; Orenstein, David; Black, Phillip; Brown, JPGN

Guías Clínicas de Nutrición Enteral

- La CFF recomienda monitorear el desarrollo de aversión oral y otras alteraciones de la conducta alimentaria en pacientes que reciben NE

Diagnóstico y derivación oportuna

Guías Clínicas de Nutrición Enteral

- Se debe elegir el momento adecuado en relación a la enfermedad pulmonar

- No se recomienda el uso del FEV1 como una contraindicación absoluta para la realización de una gastrostomía percutánea o quirúrgica

Cochrane Library

Cochrane Database of Systematic Reviews

Enteral tube feeding for cystic fibrosis (Review)

Morton A, Wolfe S

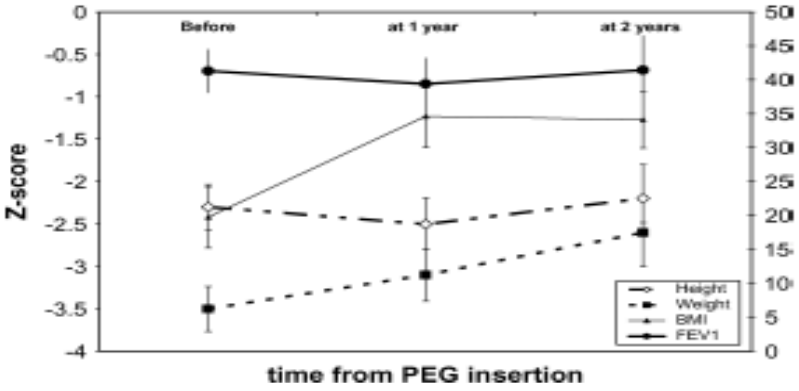
- *Efrati, JPGN 2006; *Oliver, Ped Pulm 2004*
- ***Best, JPGN 2011;*

Guías Clínicas de Nutrición Enteral

- La CFF no hace recomendaciones en relación a la mejoría o estabilización de la función pulmonar

Los trabajos son contradictorios en relación a los resultados de la NE sobre la FP.

Algunos trabajos han incluido pacientes muy enfermos



Efrati O., JPGN 2006.

Review

Enteral tube feeding for individuals with cystic fibrosis: Cystic Fibrosis Foundation evidence-informed guidelines

Sarah Jane Schwarzenberg [a,*], Sarah E. Hempstead [b], Catherine M. McDonald [c], Scott W. Powers [d], Jamie Wooldridge [e], Shaina Blair [f], Steven Freedman [g], Elaine Harrington [h], Peter J. Murphy [i], Lena Palmer [j], Amy E. Schrader [k], Kyle Shiel [l], Jillian Sullivan [m], Melissa Wallentine [l], Bruce C. Marshall [b], Amanda Radmer Leonard [n]

Journal of Cystic Fibrosis 15 (2016) 724–735

Consensus statements.

	Statement
1.	The CF Foundation recommends enteral tube feeding as a means to improve age-dependent anthropometrics in individuals with CF that are unable to consume adequate calories and protein to meet growth/weight maintenance goals, despite appropriate evaluation and intervention by a multidisciplinary team.
2.	The CF Foundation does not recommend for or against enteral tube feeding to improve or stabilize pulmonary function in individuals with CF.
3.	The CF Foundation recommends evaluation by a multidisciplinary CF team prior to enteral feeding tube placement in individuals with CF, to identify and treat conditions that might be contributing to nutritional decline.
4.	The CF Foundation recommends that patient and family education about nutritional care including the role of enteral tube feeding be done throughout the lifetime of the individual with CF.
5.	The CF Foundation recommends that the risks of certain conditions be considered and discussed with individuals with CF prior to the placement of an enteral feeding tube including but not limited to: coagulopathy, severe obstructive lung disease, ascites, portal hypertension, history of abdominal surgery, peritoneal dialysis, or alcohol and/or substance abuse.
6.	The CF Foundation recommends against using FEV_1 as an absolute contraindication to percutaneous or surgical enteral tube placement in individuals with CF.
7.	The CF Foundation recommends nasoenteral tube feeding in individuals with CF who require short-term (less than 3 months) nutritional repletion.
8.	The CF Foundation recommends discussion of third party/individual coverage of supplies and formula with individuals with CF prior to placement of an enteral feeding tube.
9.	The CF Foundation recommends that a comprehensive history and physical exam, with specific attention to factors that represent potential complications be performed in advance of scheduling the placement of the percutaneous or surgical enteral feeding tube by the medical team performing the procedure in individuals with CF.
10.	The CF Foundation recommends that clinical assessment of gastroesophageal reflux be performed prior to enteral feeding tube placement in individuals with CF.
11.	The CF Foundation recommends against routine pH/impedance or radiographic procedures to assess gastroesophageal reflux in individuals with CF prior to percutaneous or surgical enteral feeding tube placement.
12	The CF Foundation recommends that, to mitigate perioperative risk, the CF provider managing the pulmonary care of individuals with CF determine timing, based on pulmonary status, for percutaneous or surgical enteral feeding tube placement.
13.	The CF Foundation recommends that platelet count and international normalized ratio (INR) be measured in individuals with CF prior to percutaneous enteral feeding tube placement.
14.	The CF Foundation recommends against the placement of a percutaneous or surgical enteral feeding tube during acute illness.
15.	The CF Foundation recommends consultation with an anesthesiologist and the consideration of more intensive pulmonary therapy prior to placement of a percutaneous or surgical enteral feeding tube in individuals with CF and moderate to severe lung disease.
16.	The CF Foundation recommends that enteral feeding tubes be placed by percutaneous endoscopic, laparoscopic, or radiologic technique when possible as opposed to open surgical techniques in individuals with CF.
17.	The CF Foundation recommends that individuals with CF who are intolerant of gastric feeding receive jejunal feeding.
18.	The CF Foundation recommends that airway clearance be re-initiated within 24 h of percutaneous or surgical enteral feeding tube placement in children and adults with CF.
19.	The CF Foundation recommends optimal post-operative pain management to facilitate re-initiation of airway clearance in adults and children with CF who receive an enteral feeding tube.
20.	The CF Foundation recommends initiation of a bowel regimen to prevent post-operative constipation or distal intestinal obstruction syndrome, in individuals with CF, especially those receiving narcotic pain management.
21.	The CF Foundation recommends adherence to the 2010 Clinical Care Guidelines for Cystic Fibrosis-Related Diabetes in individuals with CF who are using enteral feeding tubes.
22.	The CF Foundation recommends the use of supplemental enteral nutrition for pregnant or lactating women with CF who are unable to consume adequate calories and protein to meet nutritional goals despite appropriate evaluation and intervention by a multidisciplinary team.
23.	The CF Foundation recommends the use of Cystic Fibrosis Foundation Evidence-based Guidelines for Management of Infants with Cystic Fibrosis to choose the best feeding type, breastmilk or formula, for enteral tube feeding in children with CF under 2 years of age.
24.	The CF Foundation recommends continuous nocturnal infusion for individuals with CF who are receiving supplemental enteral tube feeding.
25.	The CF Foundation does not recommend for or against the use of a specific type of formula (polymeric, semi-elemental, elemental) for enteral tube feeding in individuals with CF.
26.	The CF Foundation does not recommend for or against a specific method of providing pancreatic enzyme therapy during enteral tube feeding in individuals with CF.
27.	The CF Foundation does not recommend for or against the routine use of acid blockade during enteral tube feeding in individuals with CF.
28.	The CF Foundation recommends a comprehensive planning approach with a multidisciplinary CF care team including the managing gastroenterologist, case manager and home care agency prior to discharge.
29.	The CF Foundation recommends evaluation by a CF-trained Registered Dietitian Nutritionist (RDN) to calculate energy needs and assess optimal enteral tube feeding supplementation from enteral tube feeding in individuals with CF.
30.	The CF Foundation recommends monitoring growth or BMI and tolerance of enteral tube feeding to allow changes if the individual with CF is not meeting goals or tolerating the current regimen.
31.	The CF Foundation recommends monitoring for the development of an oral aversion, disordered eating, or other related behavioral concerns in individuals with CF receiving enteral tube feeding.
32.	CF Foundation recommends that enteral feeding tube removal follow careful consideration of medical and psychosocial goals for individuals with CF.
33.	The CF Foundation recommends that individuals with CF who have had enteral feeding tube placement be monitored at least annually by a gastroenterologist, preferably with enteral device experience, in addition to their quarterly CF care center visit.

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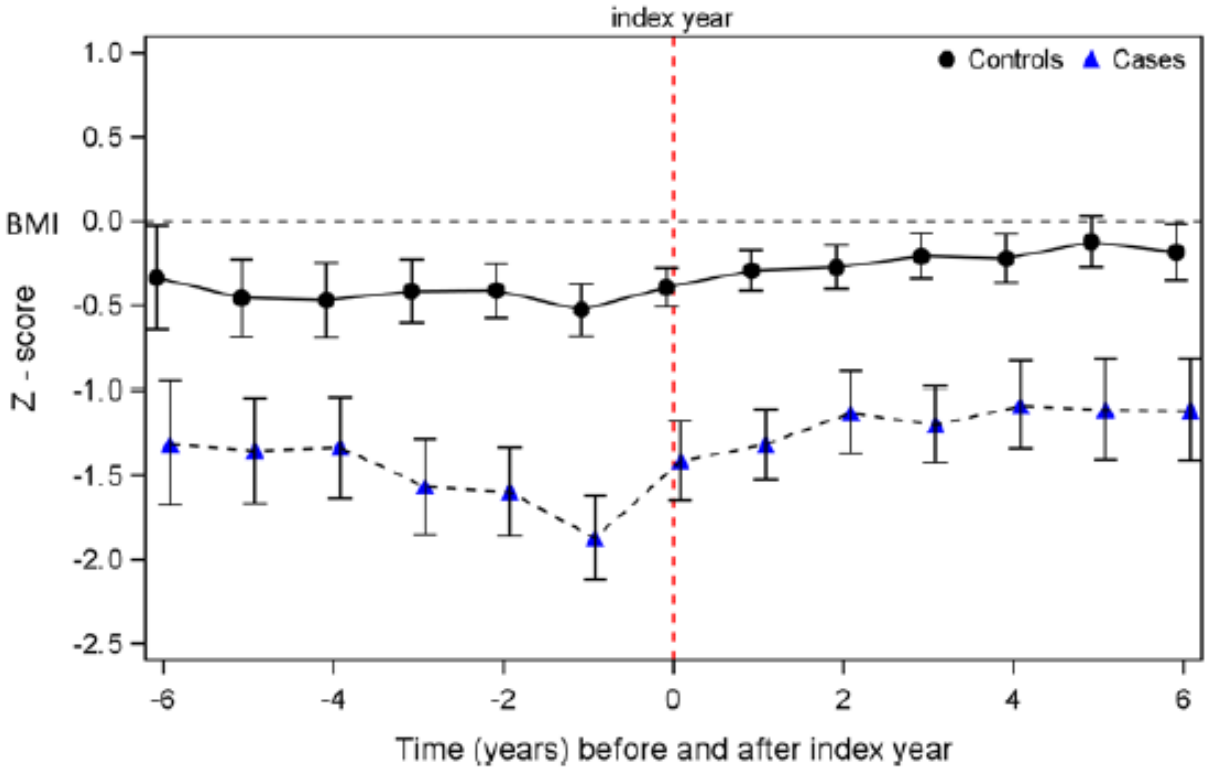
The effect of enteral tube feeding in cystic fibrosis: A registry based study

Denis Libeert [a,1], Dimitri Declercq [c,f,1], Simeon Wanyama [b], Muriel Thomas [b], Sabine Van daele [d], Frans De Baets [d], Stephanie Van Biervliet [e,*]



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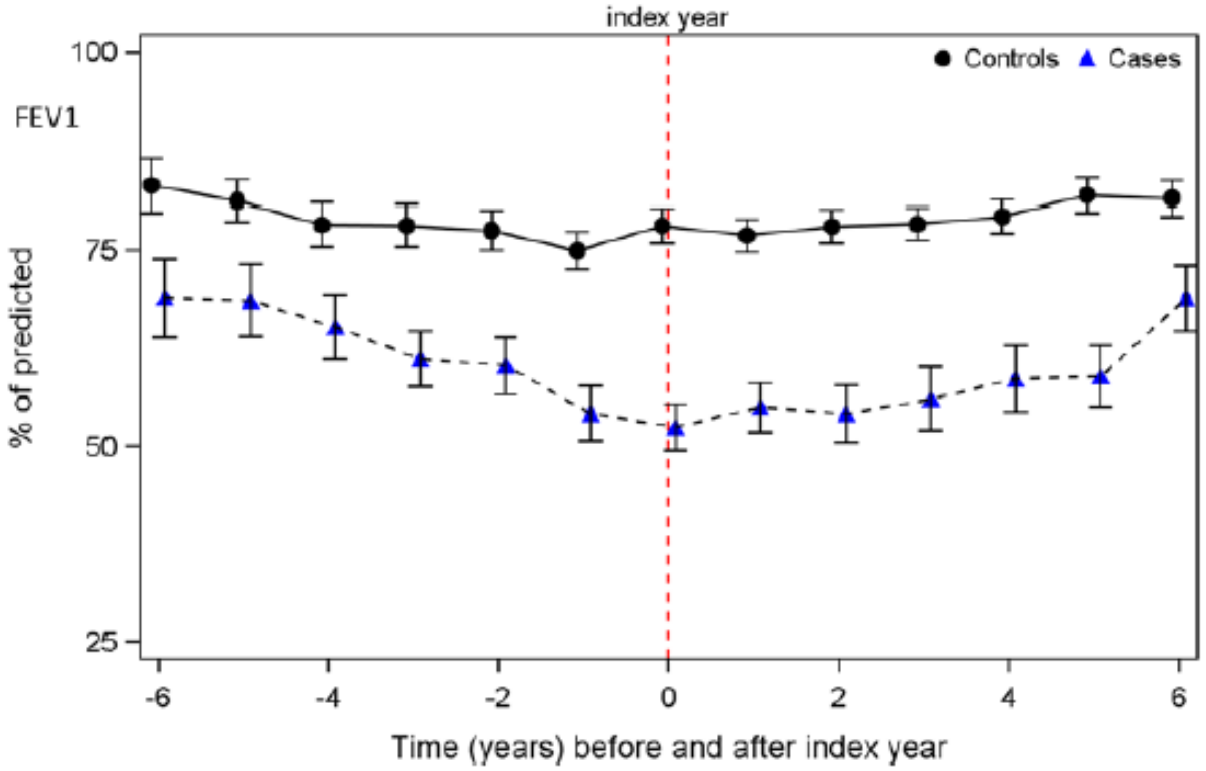


Nutrición: Adherencia

La adherencia es un mediador en la evolución de la enfermedad

Variables: Edad

Sexo

Deseo de normalidad

Conocimiento de la enf.

Severidad

Aspectos psicológicos

Disfunción familiar

KNT 30-35%

Recomendaciones dietéticas 16-20%

Enzimas 27-43%

Psychological factors affecting disease activity in children and adolescents with cystic fibrosis: medical adherence as a mediator
Beth A. Smith and Beatrice L. Wood

Curr Opin Pediatr 19:553–558. © 2007 Lippincott Williams & Wilkins.

Annals of Internal Medicine

ORIGINAL RESEARCH

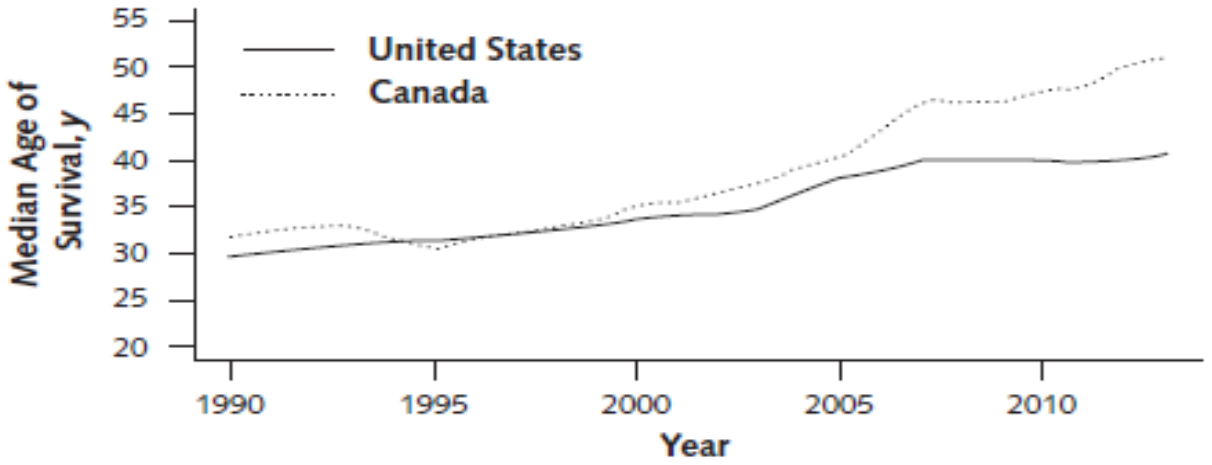
Survival Comparison of Patients With Cystic Fibrosis in Canada and the United States

A Population-Based Cohort Study

Ann Intern Med. doi:10.7326/M16-0858

Anne L. Stephenson, MD, PhD; Jenna Sykes, MMath; Sanja Stanojevic, PhD; Bradley S. Quon, MD, MSc; Bruce C. Marshall, MD; Kristofer Petren, BA, BSc; Josh Ostrenga, MSc; Aliza K. Fink, DSc; Alexander Elbert, PhD; and Christopher H. Goss, MD, MSc

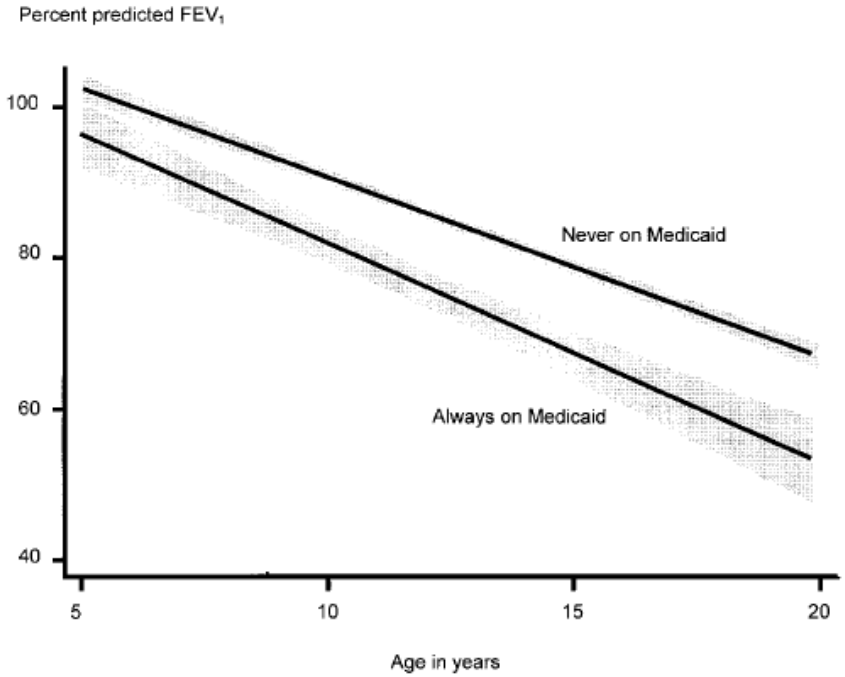
Median age of survival over time.

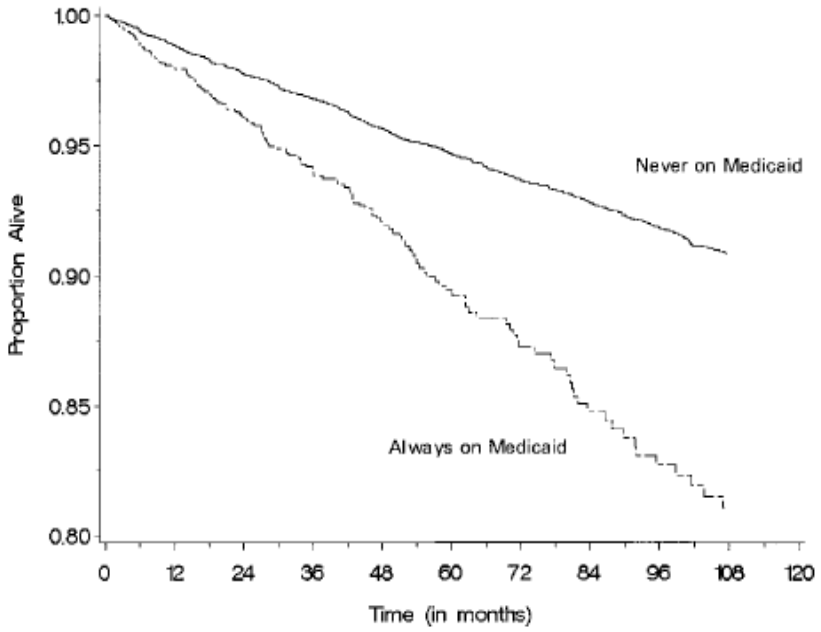


"The reasons for the survival gap is definitely multifactorial and not based on one factor alone…We hypothesize that three factors may be playing a role in the survival gap: lung transplantation; differences in the two health care systems; the differential approach to nutrition in the 1970s that started first in Canada," Anne Stephenson

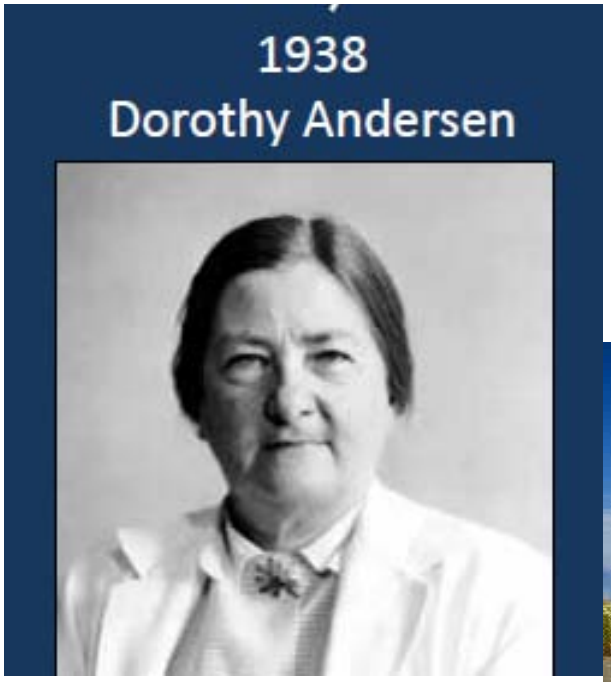
The Association of Socioeconomic Status with Outcomes in Cystic Fibrosis Patients in the United States

MICHAEL S. SCHECHTER, BRENT J. SHELTON, PETER A. MARGOLIS, and STACEY C. FITZSIMMONS





Am J Respir Crit Care Med Vol 163. pp 1331–1337, 2001



Gracias por su atención