



Fermente Ürünler ve İlk İki Yıl Beslenmesindeki Yeri

Dr. Funda ÇETİN

AKIŞ

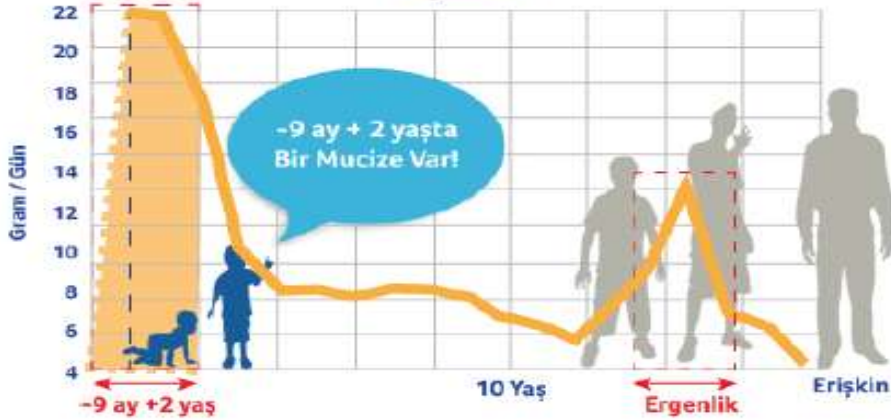
1. Bebeęi ve gelişimini tanımak
2. Bebeęin gelişim süreci içerisindeki dezavantajları ve sıkça karşılaşılan sorunların dokümantasyonu
3. Gelişim ve sorunların giderilmesinde beslenmenin rolü
4. Anne sütü ve fermantasyon
5. Fermente süt ve ürünleri
6. Klinik uygulama ve kanıt düzeyleri
7. Tamamlayıcı beslenme sürecinde fermantasyon
8. Eve götürülecek mesajlar



Erken Bebek Beslenmesi

Büyüme ve gelişimin en hızlı olduğu dönemdir, geleceği şekillendirir.

Büyüme Hızı



Beyin ve sinir sistemi ile bağışıklık ve sindirim sisteminin en hızlı geliştiği dönemdir.



Fiziksel Gelişim

3. yılın sonunda
500 trilyon hücre



Zeka Gelişimi

3. yıl sonunda
beyin gelişimi %85



Bağışıklık
Gelişimi

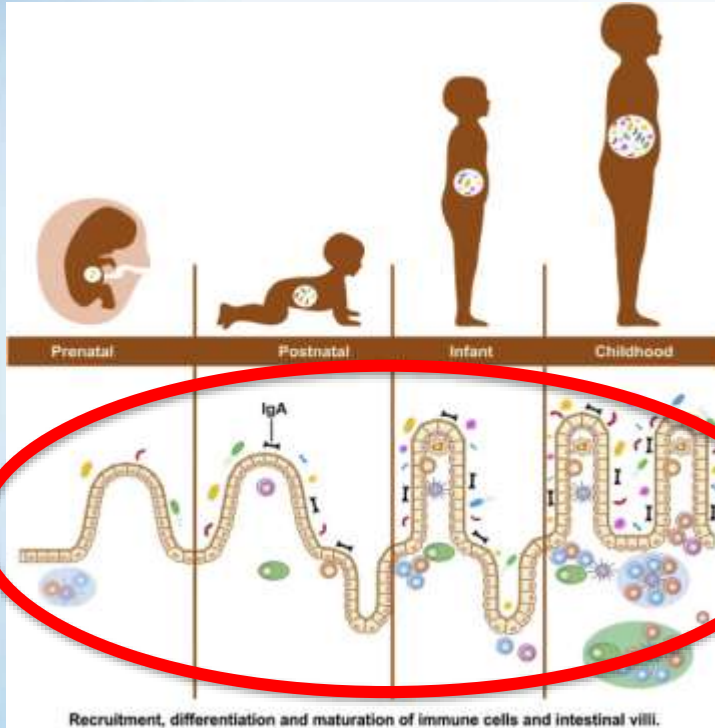
2. yıl sonunda
barsak bariyerinin
gelişimi tamamlanır.



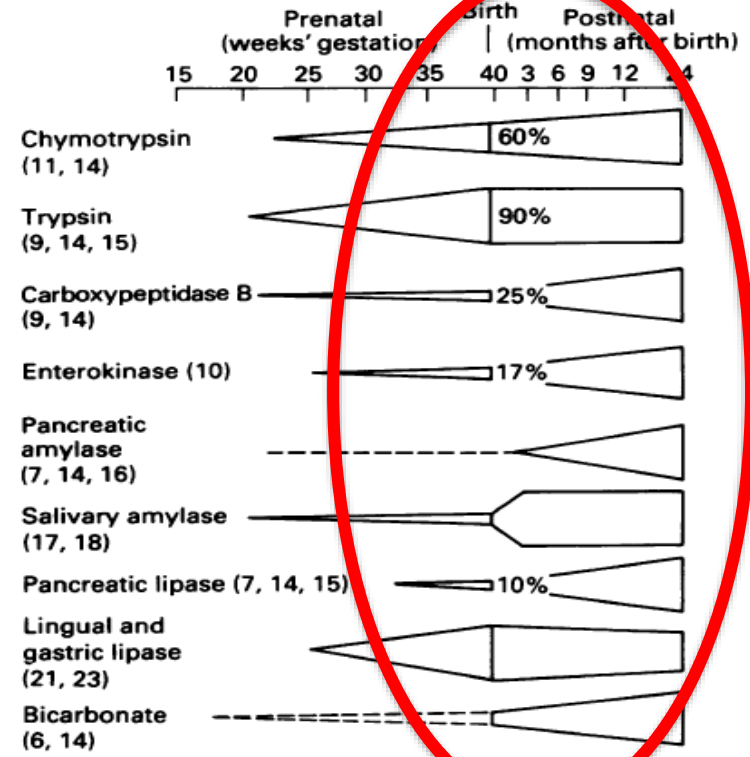
Sindirim Sistemi
Gelişimi

1. yılın sonunda
sindirim ve emilim
kapasitesi gelişir.

Sindirimin mukozal ve luminal fazı erken bebeklik döneminde gelişimini sürdürür!



Ximenez C, Arch Med Res, 2017



Mc Clean P, Arch Dis Child, 1993

Enterik sinir sistemi erken bebeklik döneminde gelişimini sürdürür!

The Brain in Your Gut

The gut's brain, known as the enteric nervous system, is located in sheaths of tissue lining the esophagus, stomach, small intestine and colon.

SMALL INTESTINE CROSS SECTION

Submucosal plexus

Layer contains sensory cells that communicate with the myenteric plexus and motor fibers that stimulate the secretion of fluids into the lumen.

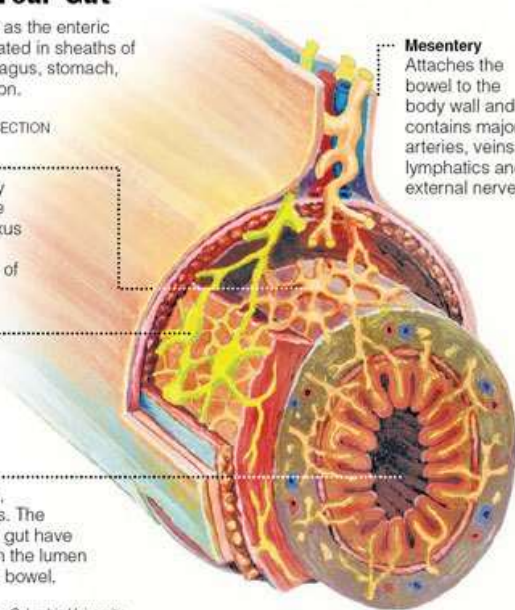
Myenteric plexus

Layer contains the neurons responsible for regulating the enzyme output of adjacent organs.

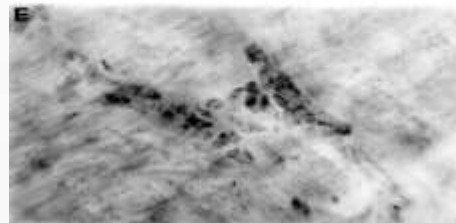
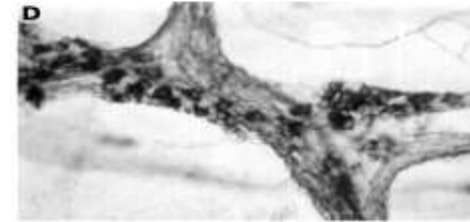
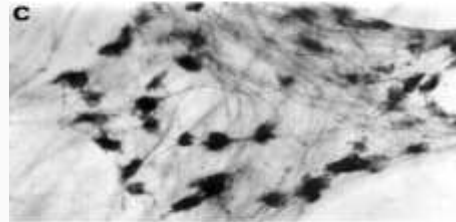
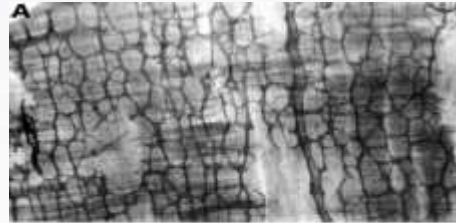
Lumen No nerves actually enter this area, where digestion occurs. The brains in the head and gut have to monitor conditions in the lumen across the lining of the bowel.

Mesentery

Attaches the bowel to the body wall and contains major arteries, veins, lymphatics and external nerves.



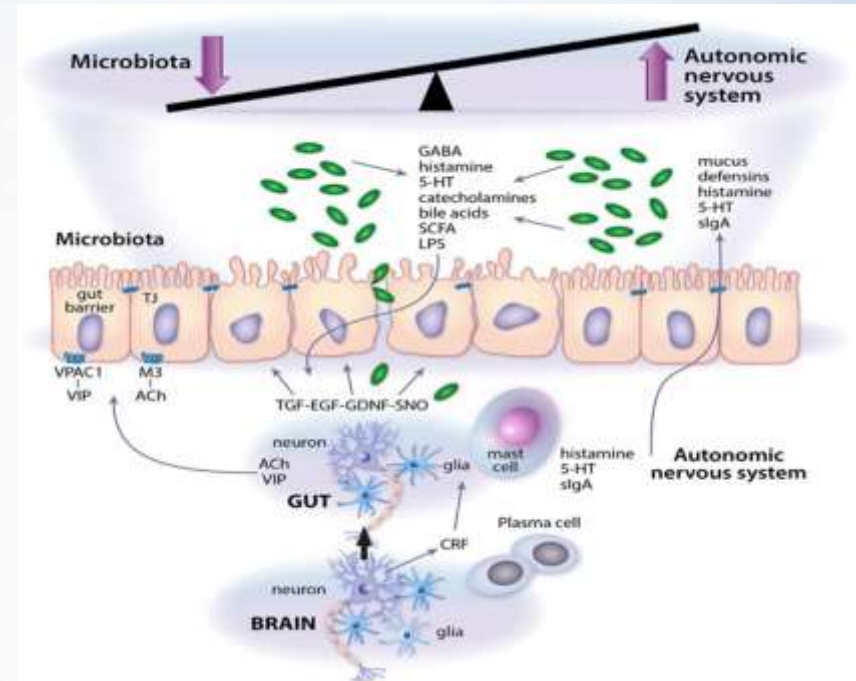
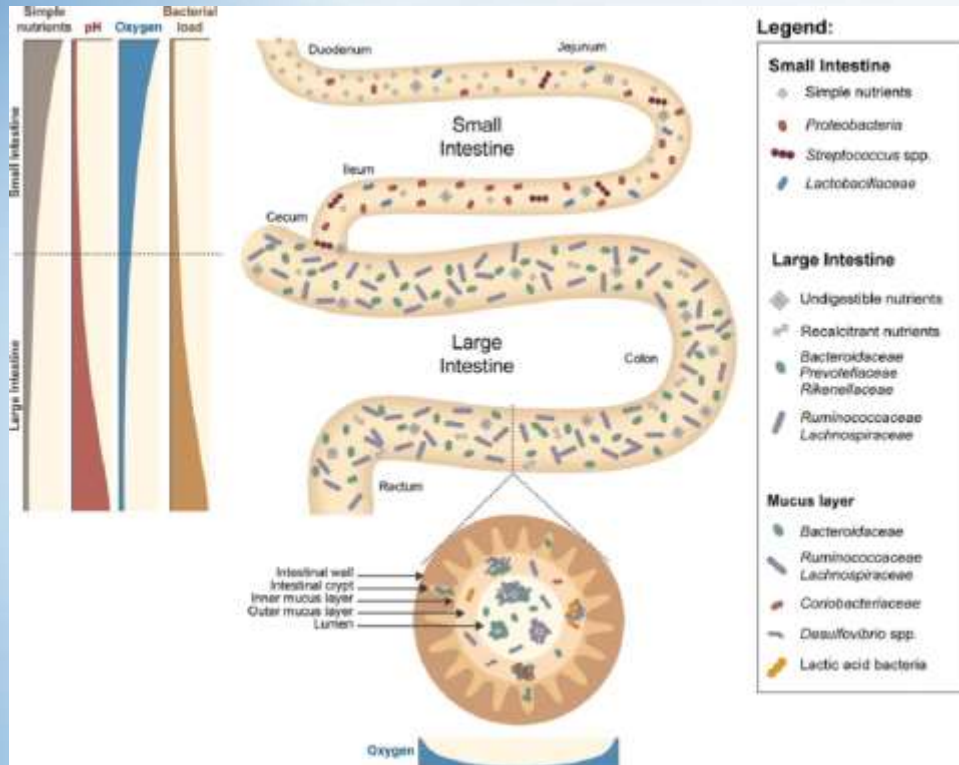
Source: Dr. Michael D. Gershon, Columbia University



Mikrobiota gelişimi



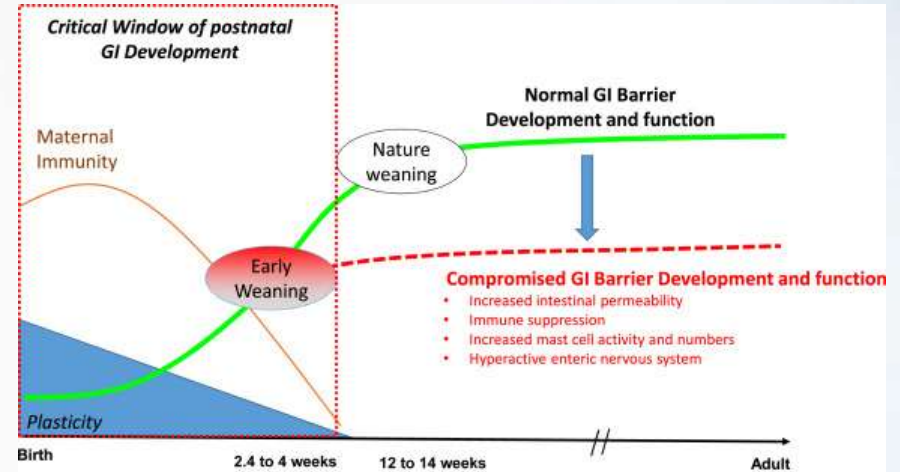
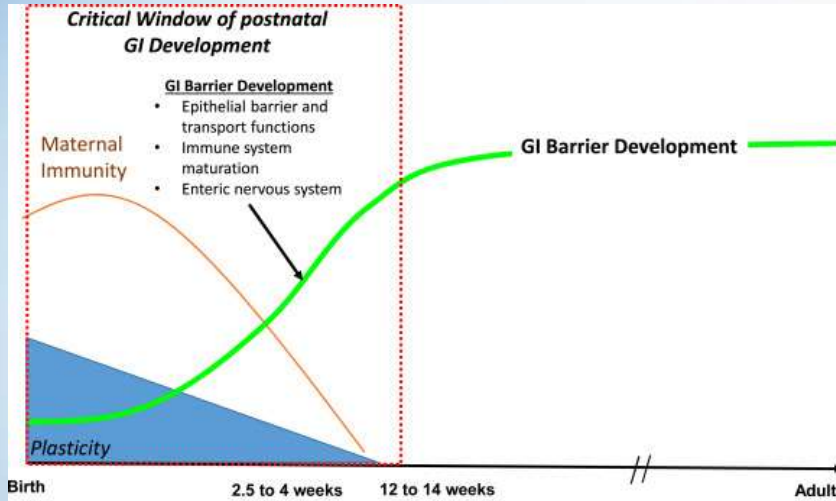
Homeostasis



Savidge TC, *Front Cell Neuroscience*, 2016

Pereira F, *Envir Microbiol*, 2016

Sindirim Sistemi Matürasyonu

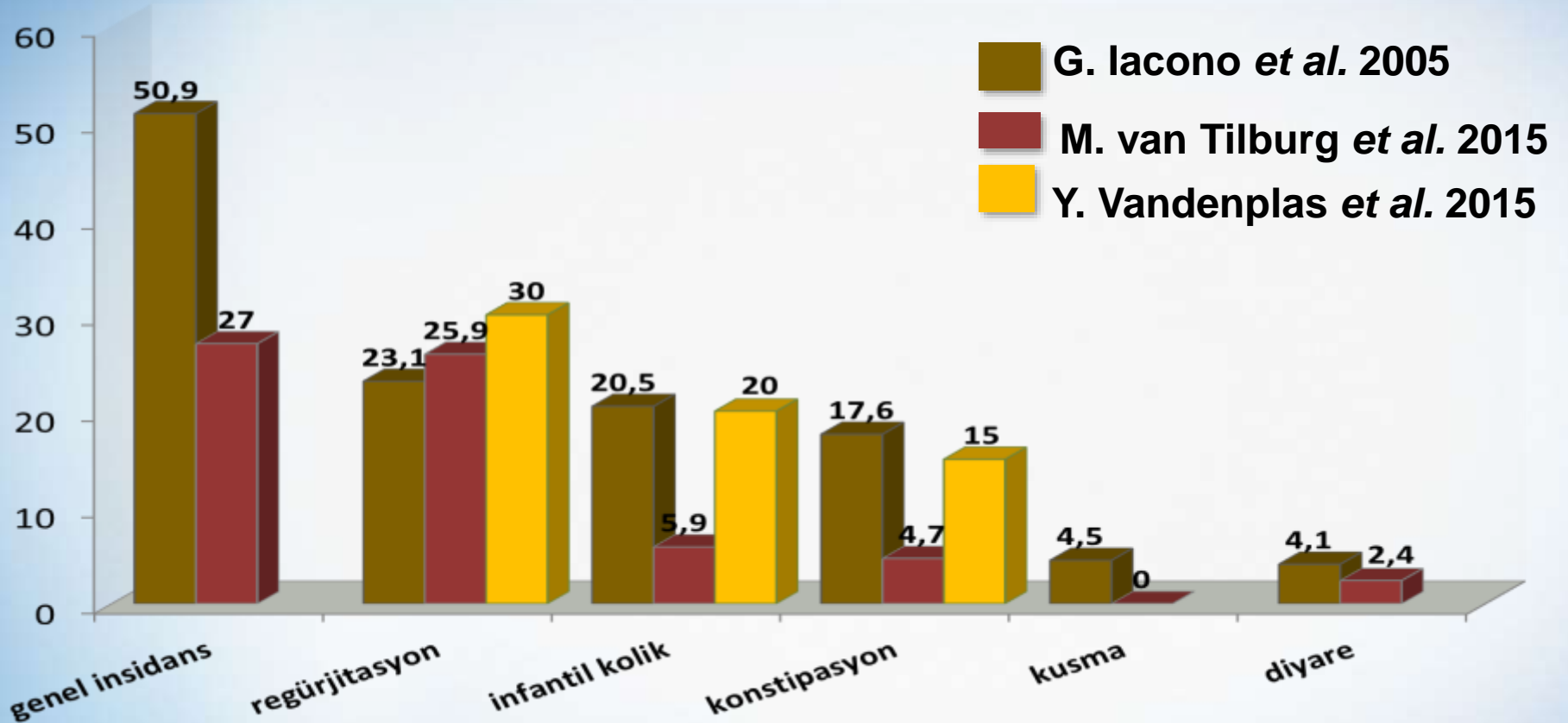


Bebeklerde Sindirim Sistemi Sorunları



Sağlıklı bebeklerde sıkça gözlenen, nedeni tam olarak açıklanamamış, sindirim sistemi şikayet ve bulguları !

Bebeklerde fonksiyonel sindirim sorunları



Medical Position Paper

Nondigestible Carbohydrates in the Diets of Infants and Young Children: A Commentary by the ESPGHAN Committee on Nutrition

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ABSTRACT

The consumption of nondigestible carbohydrates is perceived as beneficial by health professionals and the general public, but the translation of this information into dietary practice, public health recommendations, and regulatory policy has proved difficult.

Nondigestible carbohydrates are a heterogeneous entity, and their definition is problematic. Without a means to characterize the dietary components associated with particular health benefits, specific attributions of these cannot be made. Food labeling for "fiber" constituents can be given only in a general context, and the development of health policy, dietary advice, and education, and informed public understanding of nondigestible carbohydrates are limited.

There have, however, been several important developments in our thinking about nondigestible carbohydrates during the past

few years. The concept of fiber has expanded to include a range of nondigestible carbohydrates. Their fermentation, fate, and effects in the colon have become a defining characteristic; human milk, hitherto regarded as devoid of nondigestible carbohydrates, is now recognized as a source for infants, and the inclusion of nondigestible carbohydrates in the diet has been promoted for their "prebiotic" effects. Therefore, a review of the importance of nondigestible carbohydrates in the diets of infants and young children is timely. The aims of this commentary are to clarify the current definitions of nondigestible carbohydrates, to review published evidence for their biochemical, physiologic, nutritional, and clinical effects, and to discuss issues involved in defining dietary guidelines for infants and young children. *JPGN* 36:329-337, 2003. © 2003 Lippincott Williams & Wilkins, Inc.



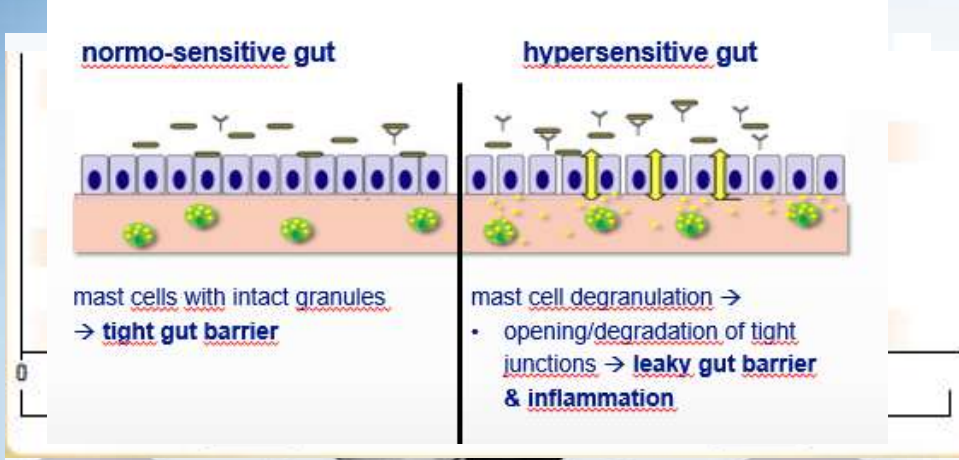
Alarm Belirtileri

- 1) Hematemez
- 2) Kanlı dışkılama
- 3) Gıda reddi
- 4) Beslenme-yutma güçlükleri
- 5) Başlangıcın hayatın ilk 3 haftasında olması
- 6) Bir yaştan sonra devam etmesi
- 7) Safralı kusma

Alarm Bulguları

- 1) Büyüme geriliği
- 2) Nörolojik gelişim geriliği
- 3) Dışkıda gizli kan varlığı
- 4) İleri derece karın gerginliği
- 5) Ateş
- 6) Dehidratasyon bulguları
- 7) Özofajit
- 8) Tıkayıcı apne
- 9) Reaktif hava yolu hastalığı
- 10) Akciğer aspirasyonu

Kolik



1. Göbek çevresinde spasmodik-kıvrandırıcı ağrı → Ağlama, çığlık
2. Sebep ??
 - Non- GIS
 - GIS immatürasyonu, gıda tolerans, mikrobiyota gelişimi
3. Günde >3 saat, haftada >3 gün

ALLE
REAC

Article | [OPEN](#)

Lactate-utilizing community is associated with gut microbiota dysbiosis in colicky infants

Van T. Pham, Christophe Lacroix, Christian P. Braegger & Christophe Chassard

Scientific Reports 7, Article number: 11176

(2017)

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Bebeklerde Sindirim Sistemi Sorunları



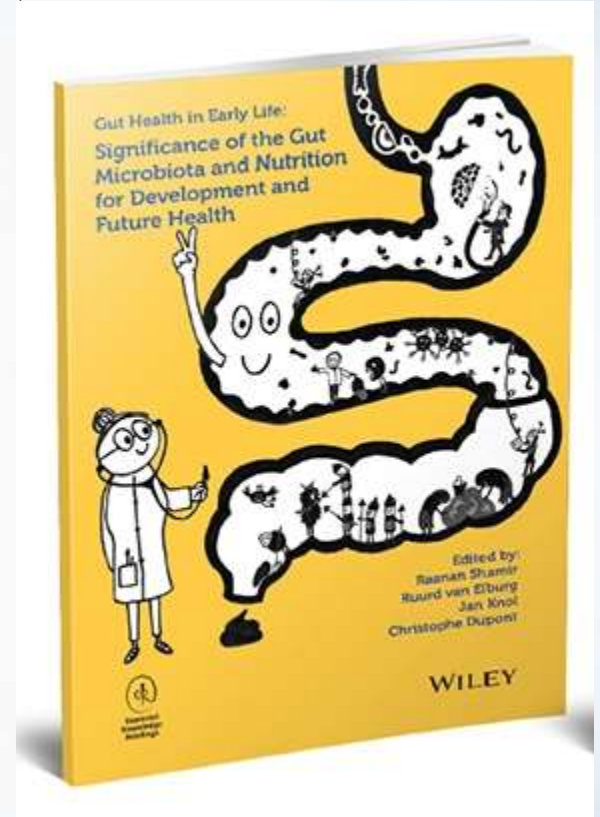
İyi Seyirli ve Geçici

- Beslenme güçlükleri, anne sütünü bırakma^{1,2}
- Ana babada stress, depresyon ve güvensizlik hissi^{3, 4}
- Aile yaşam kalitesinde bozulma^{5,6}
- Yaşamın ileri dönemlerinde IBS semptomları^{7,8}

1 . Miller-Loncar C. 2004, 2. Howard C.R. 2006, 3. Vik T. 2009, 4. Akman I. 2006, 5. Rautava P. 1995, 6. Brown M. 2009, 7. Partry A. 2013, 8. Indio F. 2011

Hayatın erken evrelerinde → BESLENME

1. İmmun Sistem
2. Gastrointestinal sistem gelişim ve fonksiyonları



DSÖ Önerisi



- **İLK 6 AY SADECE ANNE SÜTÜ**
- **EK GIDA ÖNE ÇEKİLMEMELİDİR**
- Tamamlayıcı →6-9 AY ARASI KALORİNİN %30
- 9-12 AY ARASI %50'Sİ EK GIDADAN GELMELİ KALANI ANNE SÜTÜNDEN
- ANA İÇECEK ANNE SÜTÜ VEYA ONA EN YAKIN SÜT OLMALIDIR.
- DÜŞÜK PROTEİN, GEREKTİĞİ KADAR KALORI

HUMAN MILK: AN ORCHESTRA OF BENEFITS

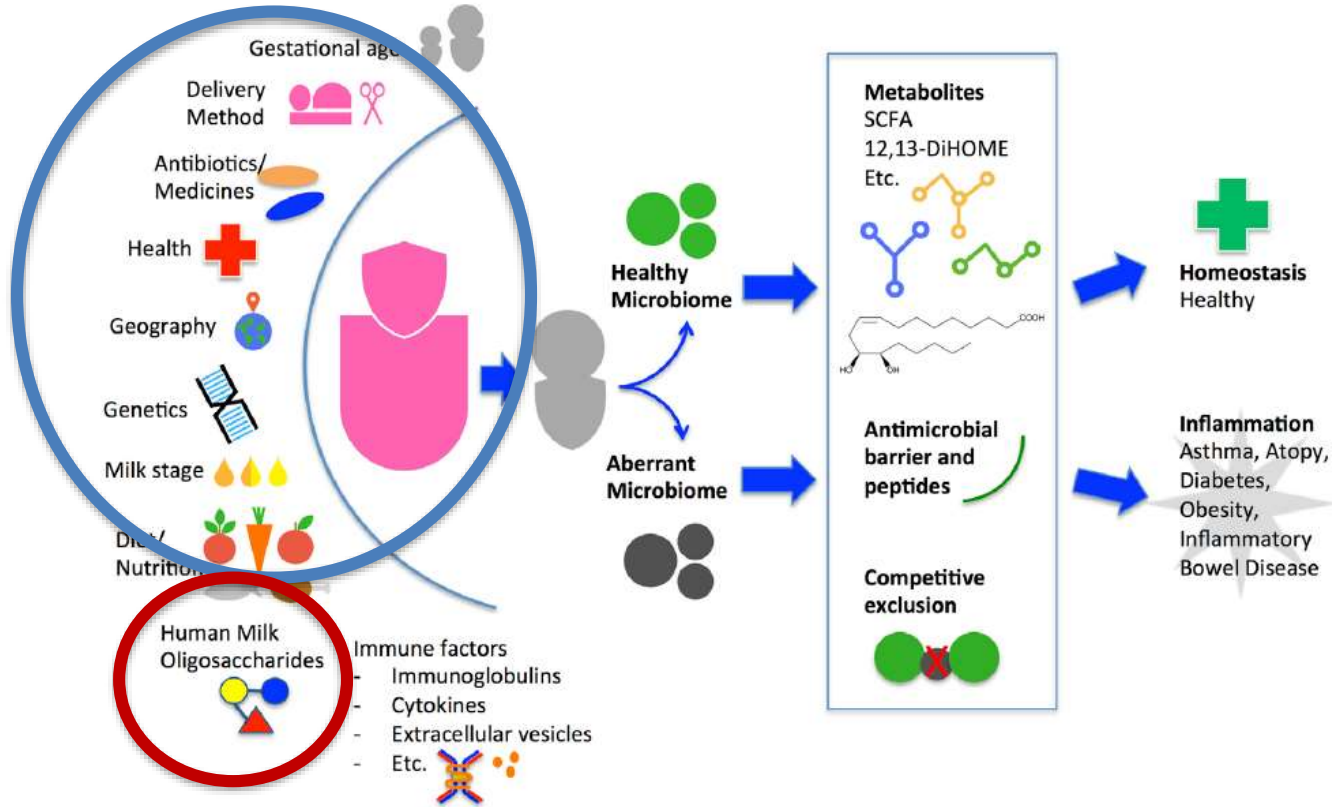


88% Water

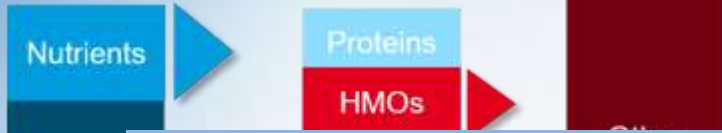


	Oligosaccharides	Bacteria & Metabolites	Fat / LCPUFA	Lactose	Proteins	Hormones	Vitamins	Living Cells	Nucleotides	Minerals
Immunity	●	●	●	●	●		●	●	●	
Growth	●	●	●		●	●	●		●	●
Gut Health	●	●	●	●	●	●	●	●	●	●
Other	Microbiota	Microbiota Digestion	Brain Energy	Energy	Signaling	Mood			Brain	Bone & Teeth Blood

Doğumdan sonra ilk beslenme ile AS mikrobiyomu ve HMO bebekte mikrobiyotanın gelişimi ve çeşitliliği uyarılır !



Beş temel monosakkarit yapı taşına eklenen değişik konfigürasyon ve sayıda disakkarit eklenmiştir.



- Fukosilasyon Lewis kan grup antigenleri ile ilintilidir.
- Sializasyon ise bireyler arası fukosilasyon kadar değişken değildir.
- Genetik ve çevresel faktörler HMO biyosentezini etkiler mi ???

Water

Human milk composition

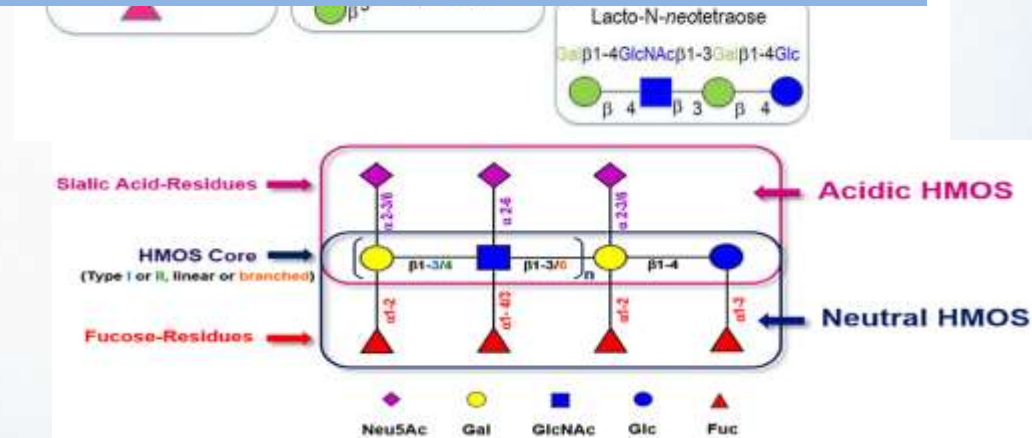
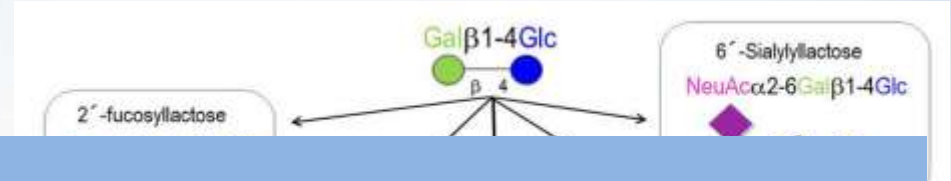
Lactose

Macro- and micronutrients

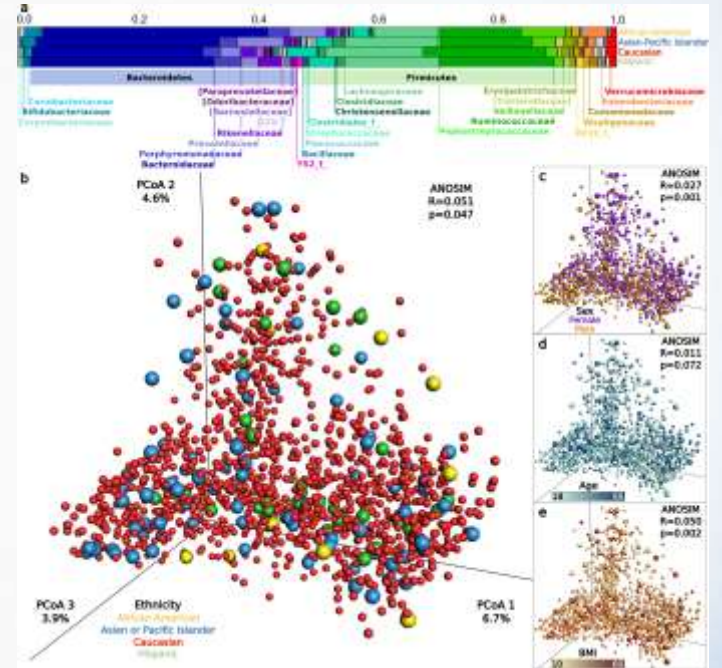
3FL

2'FL

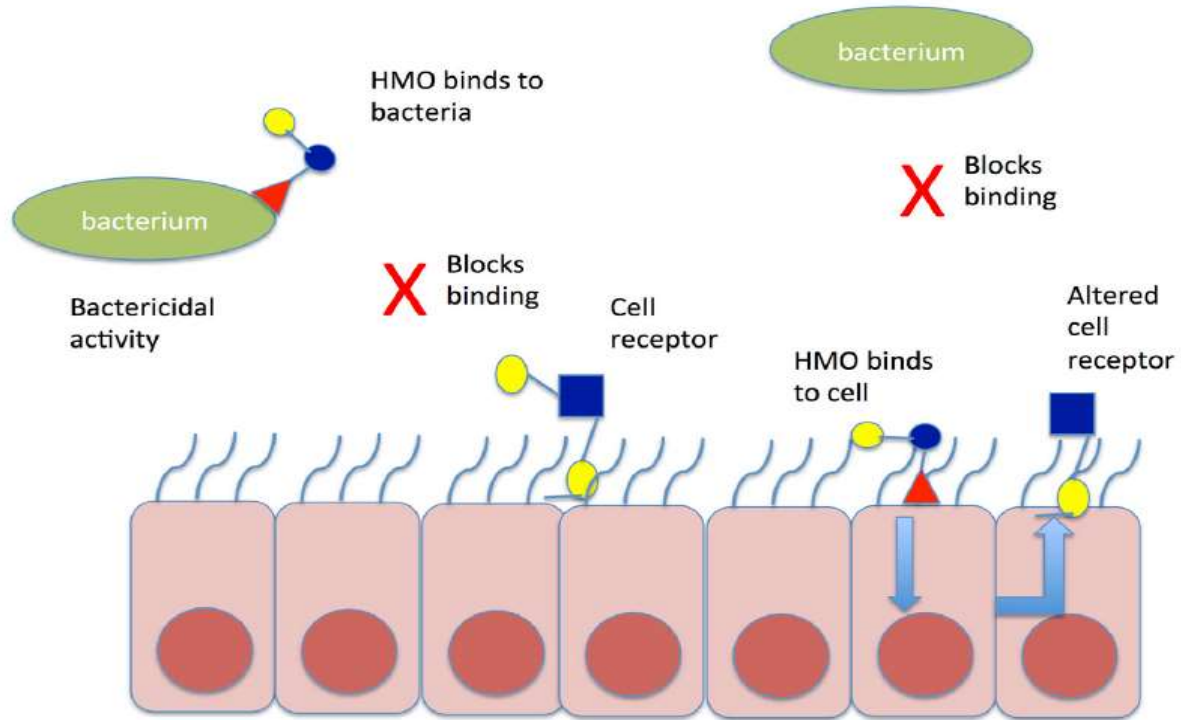
HMOs in human milk



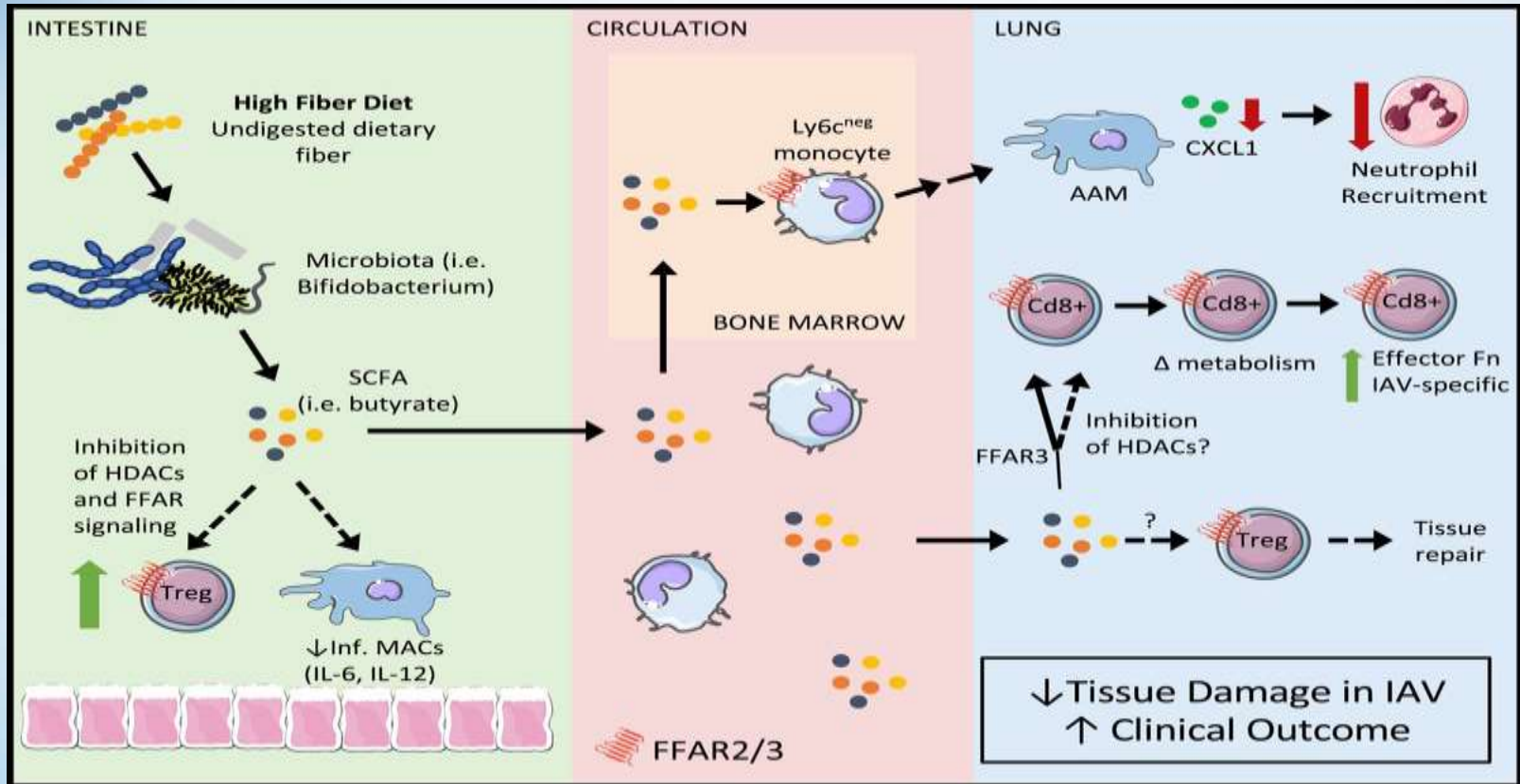
- Her bakteri HMO çeşitlerini kullanamaz !
- HMO'yu aktif kullanabilen bakteriler dominans kazanır → *Bifidobakter longum*
- HMO kullanamayanlar eliminasyona uğrar !
- İndirgenen HMO'yu kullanabilen bakteriler ikincil artar ! → **ÇEŞİTLİLİK**



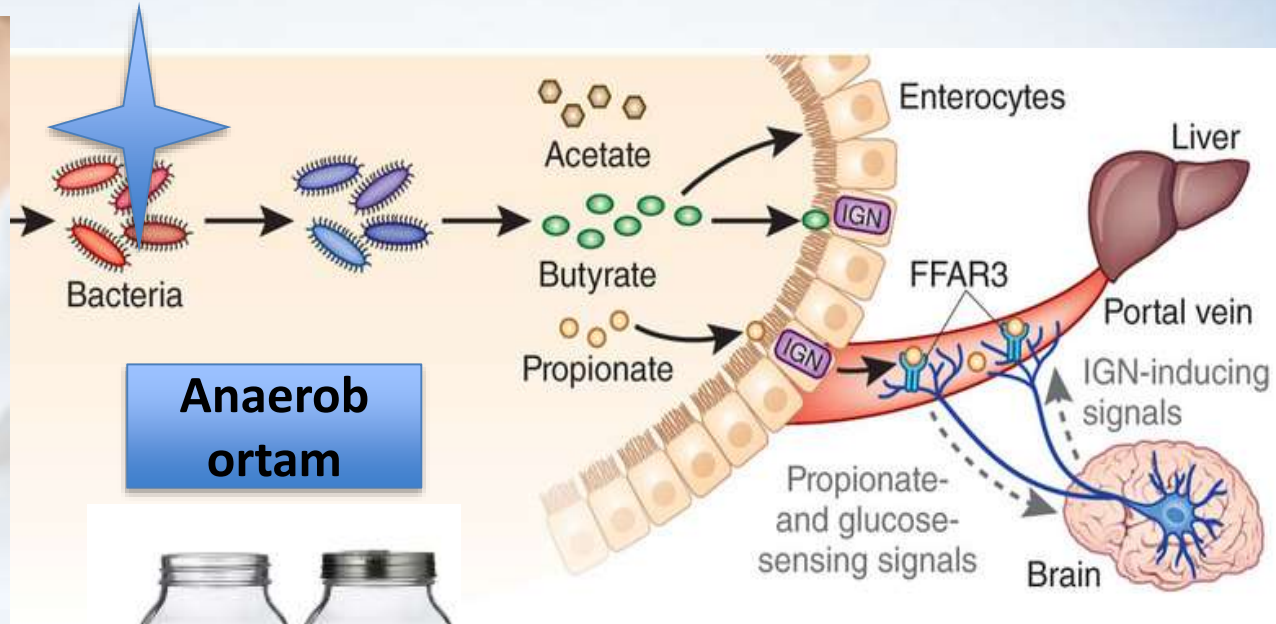
HMO antiadhezif ve antimikrobiyal olarak fonksiyon görür.



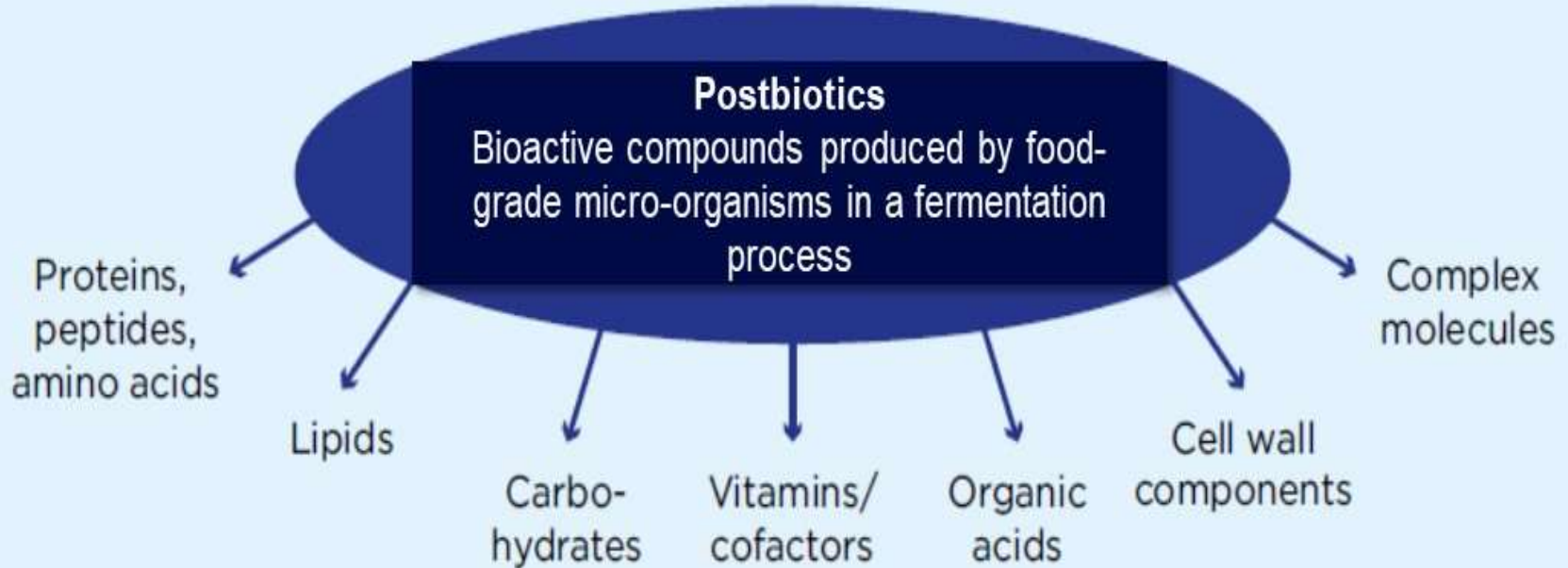
HMO epitel ve immun sistem fonksiyonlarını düzenler !



FERMENTASYON

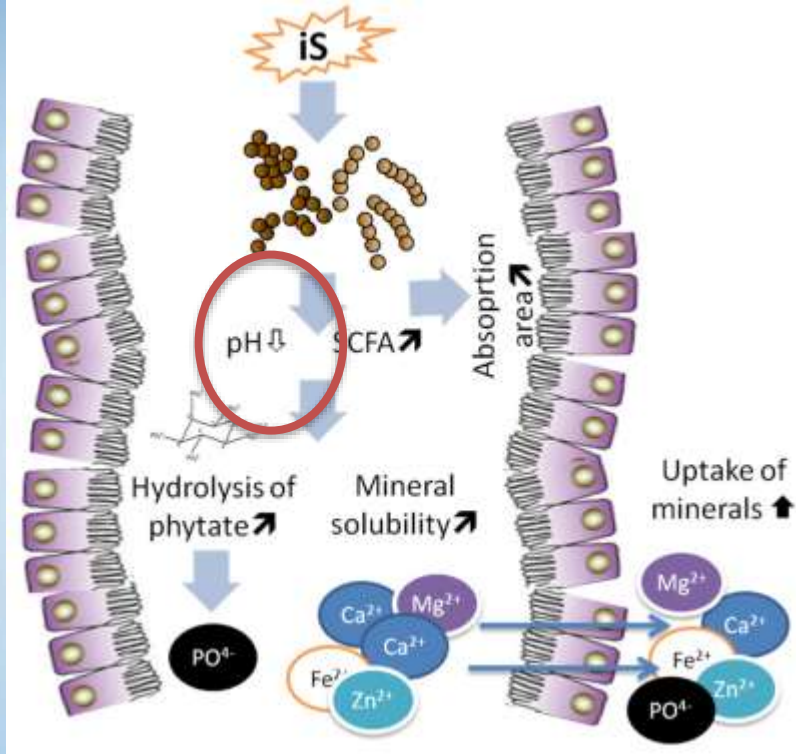


POSTBİYOTİK

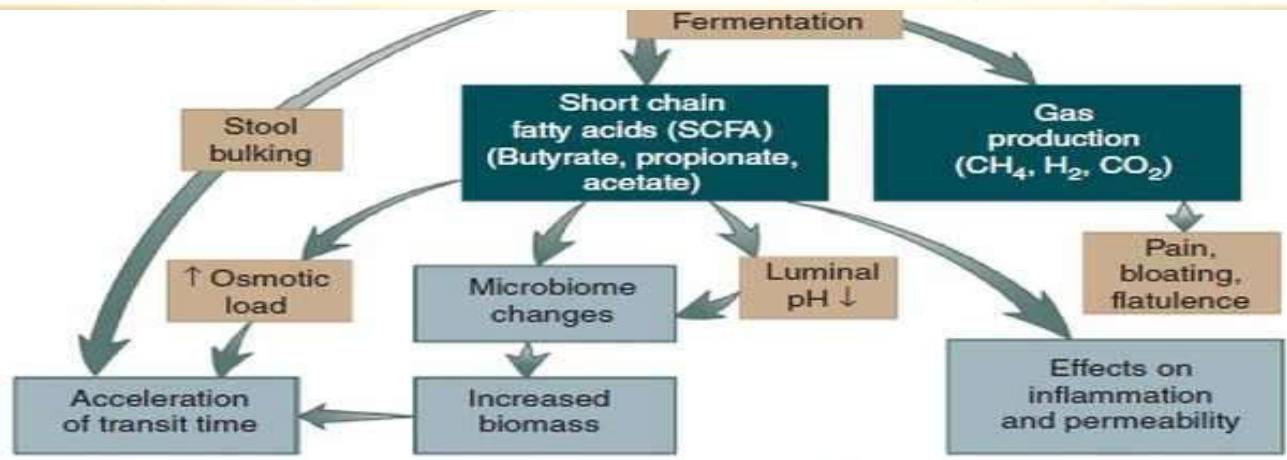


Sağlığı desteklemek için besinlerle alınan fermantasyon ürünleridir !

FERMENTASYON → Postbiyotikler



- pH ↓ → metabolik düzenlenme
- pH ↓ → patojenlerin inhibisyonu
- Mineral çözünürlüğü artar
- Bakteriyel enzim → Laktaz



Likely mechanism of action of fiber on intestinal transit time and visceral hypersensitivity

- biotikler...

**Mikrobiyota kompozisyonunu
mikroorganizmaların metabolik ve
fonksiyonel fenotip belirler!**

**Probiyotik mikroorganizmaların
metabolize edeceği prebiyotiklerin
son ürünleri bireysel farklılıklar
gösterir!**

- **Postbiyotik →**
 - **Bireysel farklılıklara imkan tanımayan son ürün**
 - **Canlı mikroorganizma içermediği için stabilizasyon/ raf ömrü sorunu yok**
 - **Kolonizasyona ihtiyaç göstermez**
 - **Kritik hasta, prematüre ve küçük çocukta güvenli bir alternatif**

Postbiyotik

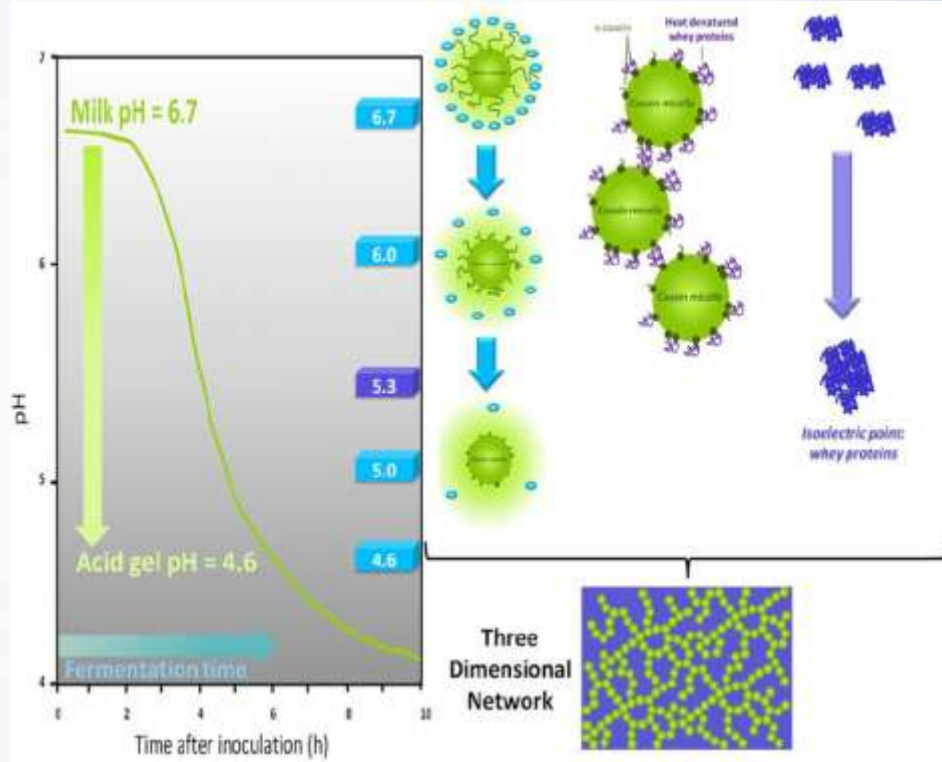
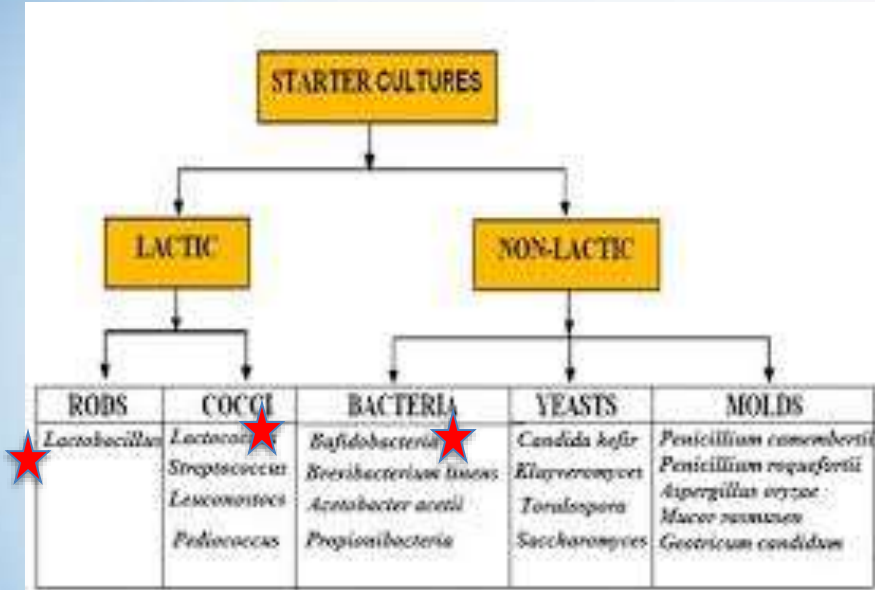


Paraprobiyotikler

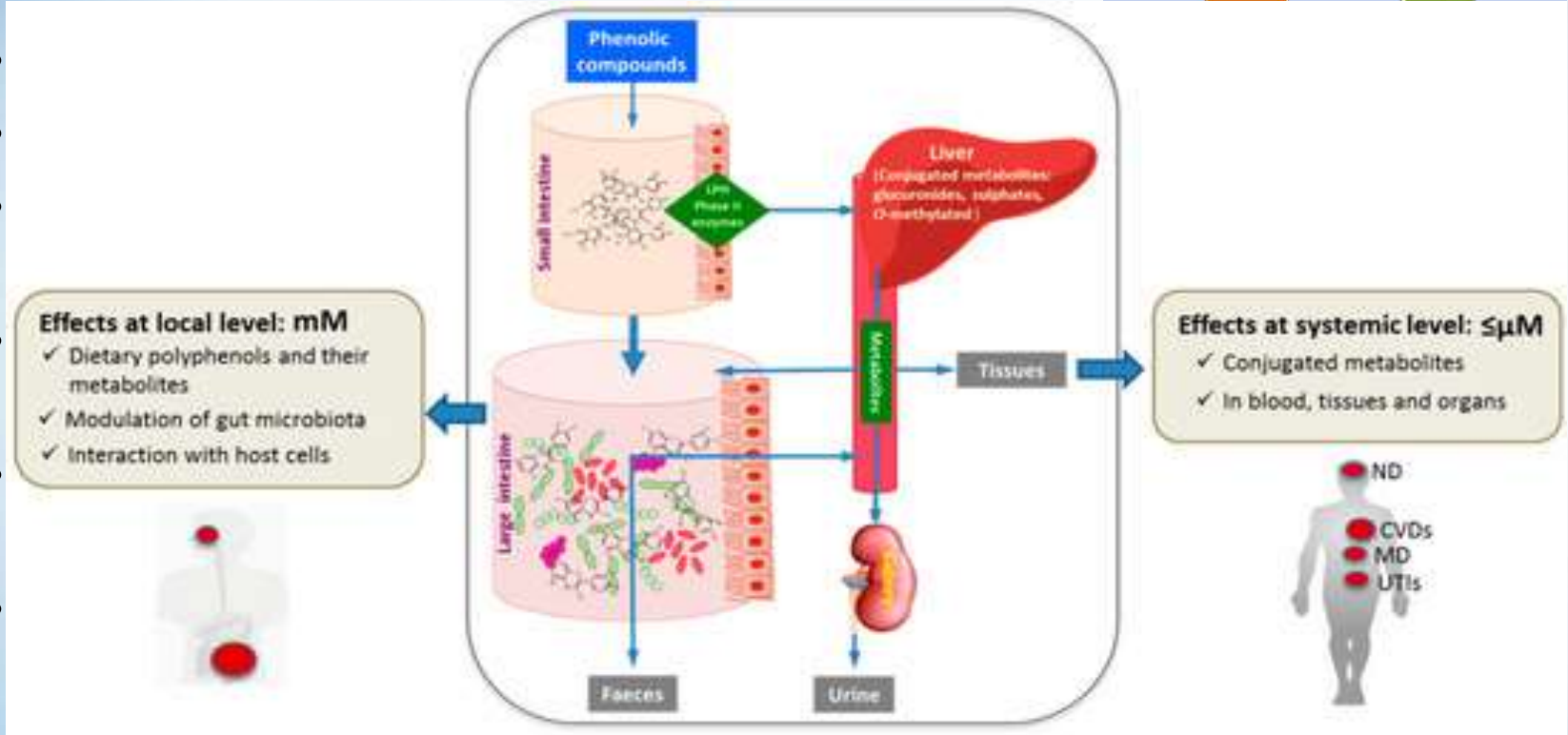


**Fermente infant
Formülleri**

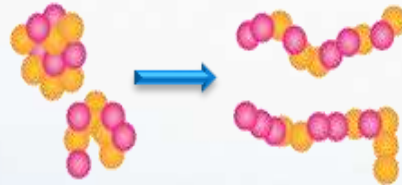
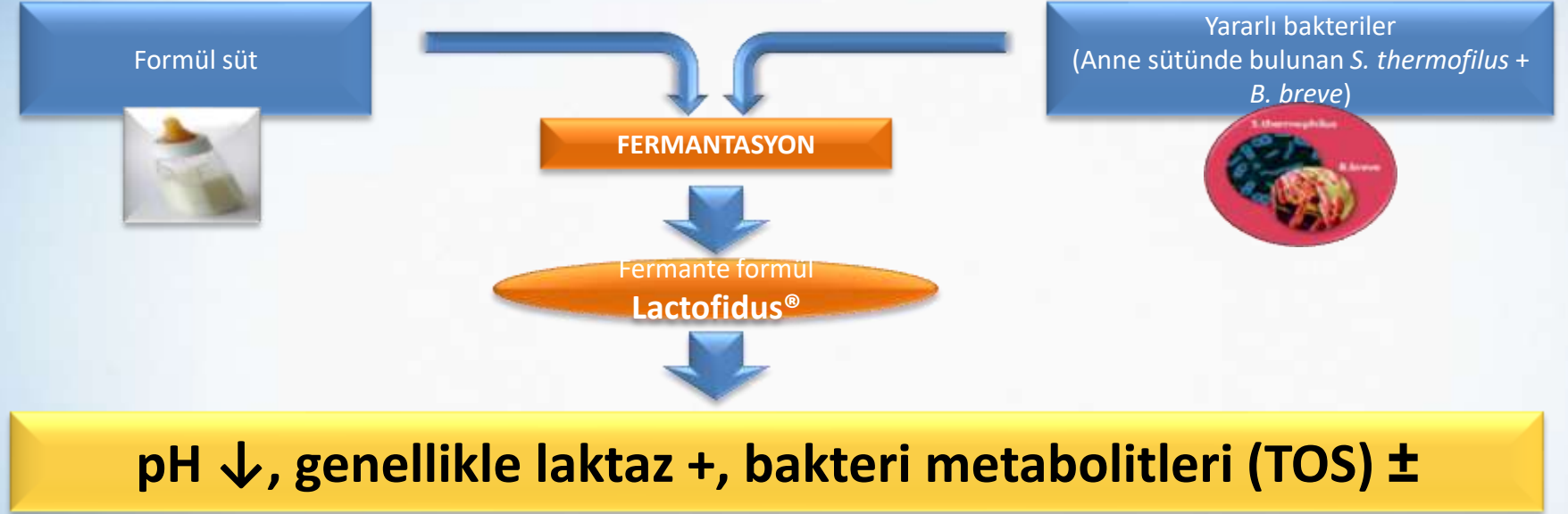
Süt / Süt Ürünü Fermantasyonu



Süt Fermantasyon Ürünleri/ Postbiyotikler

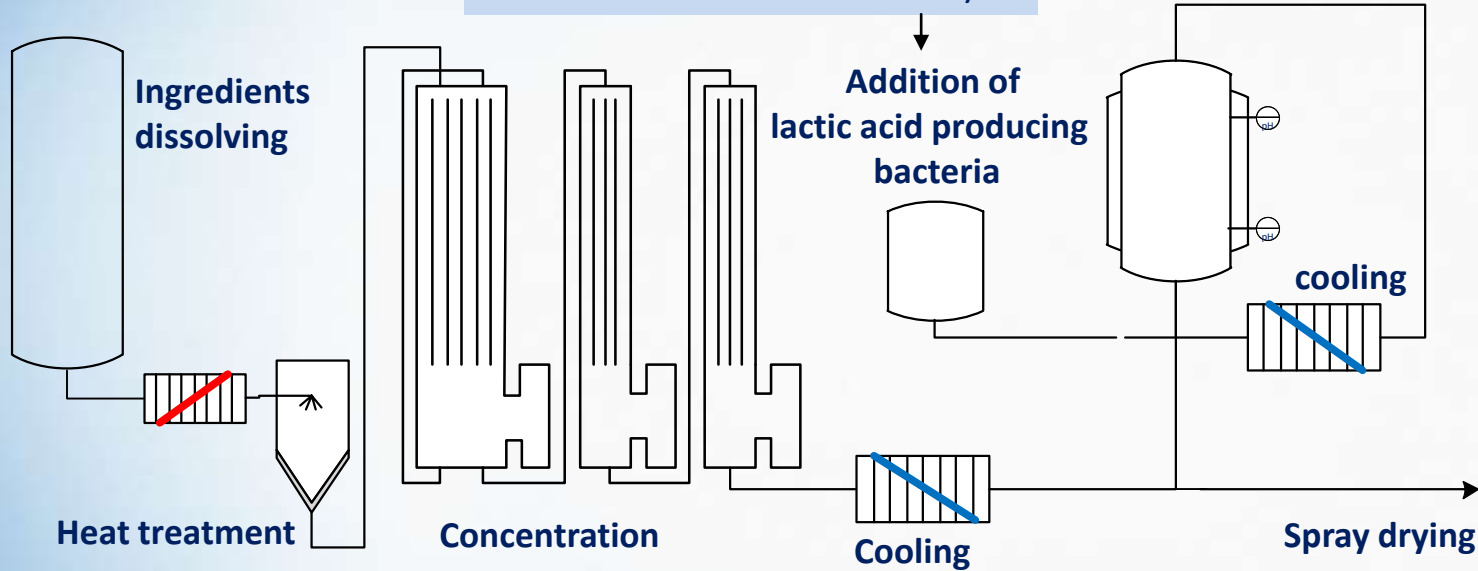


Süt Fermantasyon Ürünleri/ Postbiyotikler



Süt Fermantasyon Ürünleri/ Postbiyotikler

S. thermophilus & *B. breve*
(GRAS micro-organisms, approved by Codex Alimentarius & EC Directive on IFFO)



Fermented formula
containing microbial enzymes such as **lactase** and bacterial metabolites such as **lactic acid**, as well as bacterial cells and components; slightly **decreased pH**

Klinik Uygulama

Table 1. Overview of clinical studies with fermented infant formula in the period 1989–2013.

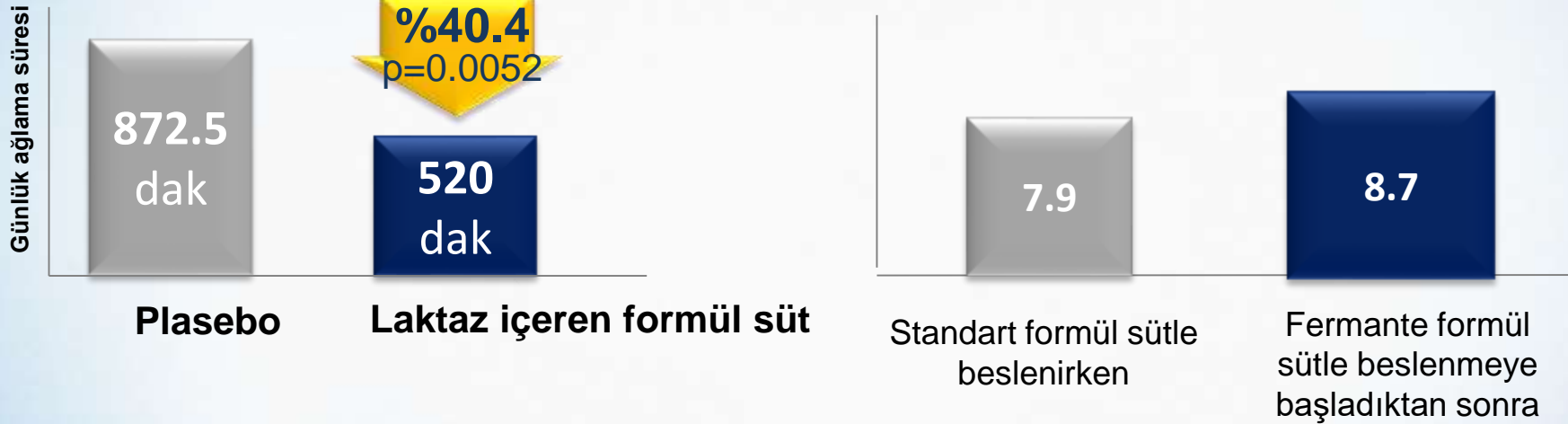
Reference	Study Characteristics	Location	N (age)	Duration of Intervention	Population	Control Group Feeding	Intervention Group Feeding	Main GI-Related Results in the Fermented IF Group
Morisset <i>et al.</i> 2011 [56]	Multicenter, randomized, double-blind, controlled study	France	N = 129 (0–24 mo.)	Birth–12 mo.	Infants at high risk of atopy	Standard IF	Non-hydrolysed IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	✓ Decreased GI symptom score at 4, 12 and 24 mo. (“digestive allergic manifestations”)
Campeotto <i>et al.</i> 2011 [55]	Multicenter, randomized, double-blind, controlled study	France	N = 58 (0–2 mo.)	During hospital stay: 2–5 wk	Pre-term infants (GA 30–35 wk)	Pre-term formula	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	<ul style="list-style-type: none"> ✓ No effect on bacterial colonization ✓ Decreased fecal calprotectin in fermented formula group, significantly from Week 3 ✓ Lower incidence of abdominal distension
Garcette <i>et al.</i> 2007 [61]	Multicenter, longitudinal, observational study	France	N = 680 (1–3 mo.)	~30 d	Infants with digestive discomforts (bloating, gas, belching, unexplained crying)	NA	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	✓ Decreased symptom score during study period (e.g., bloating and gas 49 vs. 13%; unexplained crying 39 vs. 11%)
Indrio <i>et al.</i> 2007 [58]	Single center, randomized, double-blind, controlled study	Italy	N = 90 (0–4 mo.)	4 mo.	Healthy infants	Standard IF or Breast milk	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	✓ Fecal pH in intervention group was equal to breast-fed group, and lower than standard IF group

Klinik Uygulama

Table 1. Cont.

Reference	Study Characteristics	Location	N (age)	Duration of Intervention	Population	Control Group Feeding	Intervention Group Feeding	Main GI-Related Results in the Fermented IF Group
Roy <i>et al.</i> 2004 [54]	Multicenter, randomized, double-blind, controlled study	France	N = 109 (0–3 mo.)	15 d	Infants with digestive discomforts (unexplained crying, bloating, regurgitation, eructation, hiccups)	Standard IF	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	<ul style="list-style-type: none"> ✓ Decreased intensity of digestive discomfort in intervention group ✓ Decreased gas in intervention group ✓ Tendency for decreased intestinal bloating
Mullié <i>et al.</i> 2004 [57]	Single center, randomized, double-blind, controlled study	France	N = 60 (0–5 mo.)	Birth–4 mo.	Healthy infants	Standard IF	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	<ul style="list-style-type: none"> ✓ Increased fecal bifidobacterial level, significant at 4 mo.
Thibault <i>et al.</i> 2004 [41]	Multicenter, randomized, double-blind, controlled study	France	N = 971 (4–6 mo.)	5 mo.	Healthy infants	Standard IF	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	<ul style="list-style-type: none"> ✓ Incidence and duration of diarrhea episodes are similar ✓ Less cases of dehydration (2.5% vs. 6%), less medical consultations (46% vs. 57%), less oral rehydration solution (ORS) prescriptions (42% vs. 52%) ✓ Fewer formula switches (60% vs. 75%)
Campeotto <i>et al.</i> 2004 [62]	Single center, open, prospective study	France	N = 69 (0–3 mo.)	3 mo.	Healthy newborns	Standard IF or Breast milk	IF fermented by <i>Bifidobacterium breve</i> and <i>Streptococcus thermophilus</i>	<ul style="list-style-type: none"> ✓ No GI symptoms scored ✓ No effect of the mode of feeding on fecal calprotectin concentrations in first week of life (d 3–7)

Klinik Uygulama



Klinik Uygulama

Acta Pa

REGULAR ARTICLE

Randomised controlled trial demonstrates that fermented infant formula with short-chain galacto-oligosaccharides and long-chain fructo-oligosaccharides reduces the incidence of infantile colic

Yvan Vandenplas (Yvan.Vandenplas@uzbrussel.be)¹, Thomas Ludwig², Hetty Bourinuis², Philippe Alliet³, Derek Forde⁴, Stefaan Pee Jonathan Hourihane⁵

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 2 Nutricia Research, Utrecht, The Netherlands
 3 Kinderziekenpraktijk, Hasselt, Belgium
 4 Stoney Medical Centre, Enniscorthy, Ireland
 5 Algemeen Stedelijk Ziekenhuis Asst, Aalst, Belgium
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 7 Paediatrics and Child Health, University College Cork, Cork, Ireland

Keywords

Fermented formula, Gastrointestinal tolerance, Infant formula, Infantile colic, Probiotic

Correspondence

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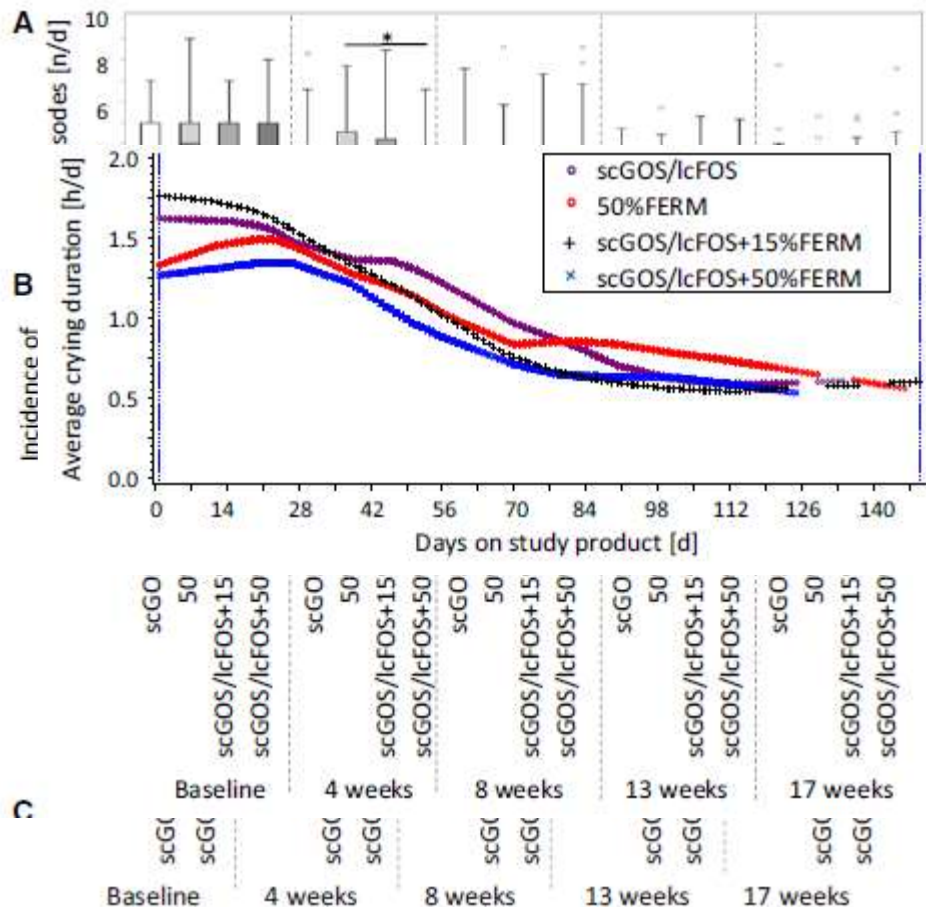
ABSTRACT

Aim: We examined the effects on gastrointestinal (GI) tolerance of a n that combined specific fermented formula (FERM) with short-chain gal oligosaccharides and long-chain fructo-oligosaccharides (scGOS/lcFOS) and concentration of 0.8 g/100 mL.

Methods: This prospective, double-blind, randomised, controlled trial c healthy, term infants aged 0–28 days whose parents decided to not st breastfeeding. Infant formula with scGOS/lcFOS+50%FERM, scGOS/lc 50%FERM and scGOS/lcFOS were tested. Parents completed standar diaries on GI symptoms, crying, sleeping and stool characteristics each infants were 17 weeks.

Results: All the formulas were well tolerated. At four weeks, the overall infantile colic was significantly lower (8%) with scGOS/lcFOS+50%FERM (20%, $p = 0.034$) or 50%FERM (20%, $p = 0.036$). Longitudinal that scGOS/lcFOS+50%FERM-fed infants also displayed a persistently l duration and showed a consistent stool-softening effect than infants wh without scGOS/lcFOS.

Conclusion: The combination of fermented formula with scGOS/lcFOS and showed a lower overall crying time, a lower incidence of infantile colic, softening effect in healthy term infants. These findings suggest for the specific infant formula has a preventive effect on infantile colic in form



Klinik Uygulama

NUTRITION

OPEN

Partly Fermented Infant Formulae Oligosaccharides Support Adequate Growth and Are Well-Tolerated

*Frédéric Huet, †Marieke Abrahamse-Berkeveld, †Sebastian T
‡Gérard Beley, †Christoph Savagner, *Yvan Vandenplas, and ‡.

ABSTRACT

Objective: Fermented formulae (FERM) and a specific mixture of 90% short-chain galacto-oligosaccharides and 10% long-chain fructo-oligosaccharides (scGOS/lcFOS; 9:1) have a potential beneficial effect on gastrointestinal function and microbiota development in infants. The present study assessed the safety and tolerance of the combination of partly fermented infant milk formulae and scGOS/lcFOS compared with either 1 feature, in healthy term infants.

Methods: Four hundred thirty-two infants were enrolled before 28 days of age and followed up to 17 weeks of age and assigned to 1 of the 4 groups: (i) formula with scGOS/lcFOS, (ii) scGOS/lcFOS + 15% FERM, (iii) scGOS/lcFOS + 50% FERM, or (iv) 50% fermented formula (50% FERM). Primary outcome was daily weight gain during intervention (equivalence criterion: difference in daily weight gain ≤ 3 g/day). Infants' anthropometrics, formula intake, number, and type of (serious) AEs were monitored monthly. Stool samples were collected at baseline and after 17 weeks for analysis of physiological and microbiological parameters.

Results: Equivalence of weight gain per day was demonstrated in both the intention-to-treat and per-protocol population, with a mean weight gain (SD) of 29.7 (6.1), 28.2 (4.8), 28.5 (5.0), and 28.7 (5.9) g/day for the groups i to iv respectively. No differences were observed in other growth parameters, formula intake, and the number or severity of AEs. In all scGOS/lcFOS-containing formulae, a beneficial effect of scGOS/lcFOS was observed, indicated by the lower pH, lower *Clostridium difficile* levels, and higher secretory immunoglobulin A levels.

Conclusion: The partly fermented infant milk formulae containing the specific mixture scGOS/lcFOS were well-tolerated and resulted in normal growth in healthy infants.

Key Words: fermented formula, microbiota, safety, scGOS/lcFOS

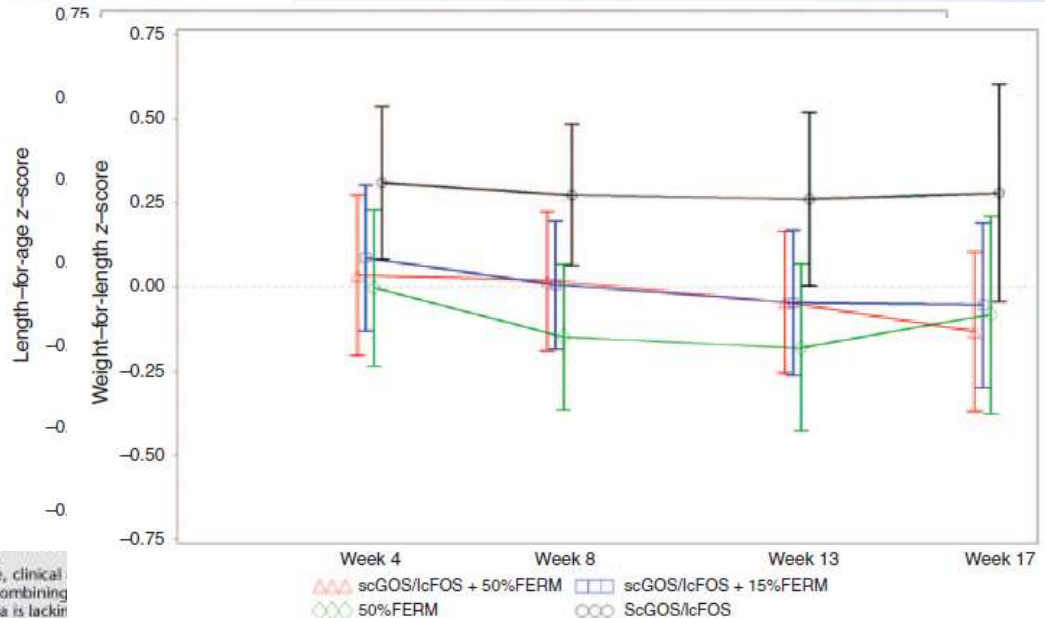
JPGN 2016;63: e43–e53

What Is Known

- Historically, de knowledge on formulae are u erance and are (with respect are warranted.
- Infant formulae ture of 90% sho 10% long-cha lcFOS; 9:1) sbl microbiota, sto effect on immu for use in infants.
- To our knowledge, clinical infant formulae combining fermented formula is lacki

What Is New

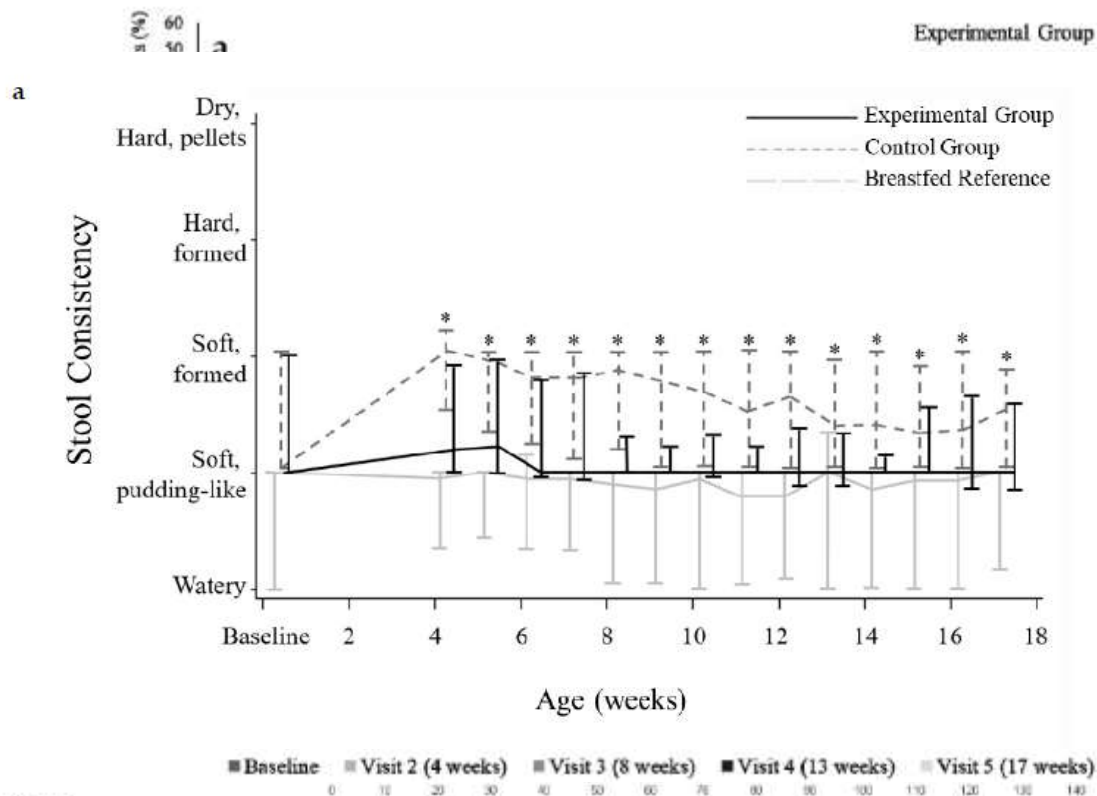
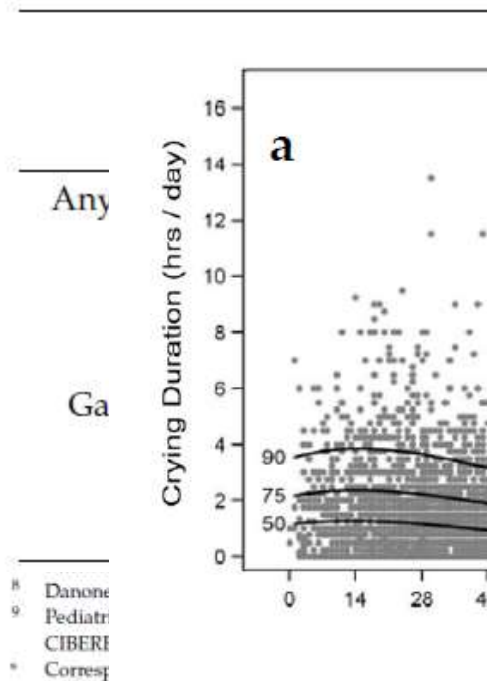
- Partly fermented infant formulae containing scGOS/lcFOS (9:1) can be considered as nutritionally adequate and safe for use in healthy, term infants.
- A beneficial effect of scGOS/lcFOS (9:1) on gut microbiota and stool characteristics was confirmed, irrespective of presence or dosage of fermented formula.

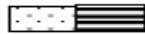






Week 4 Week 8 Week 13 Week 17

△△△ scGOS/lcFOS + 50% FERM □□□ scGOS/lcFOS + 15% FERM
◇◇◇ 50% FERM ○○○ ScGOS/lcFOS

Klinik Uygulama



GI Disorder	Presumed Aetiology	Potential Beneficial Action of Fermented Infant Formulae	References
Reflux and regurgitation	A F 	Less vomiting Faster gastric emptying Thickening gastric content	[53] [13] [54]
Bloating and ballooning	F G L P 	Less bloating Lactase addition Protease inhibition Microbiotal modifications	[54,55] [54,55,74,75] [25,76–78] [55–58]
Flatulence	G L P 	Less gas produced Lactase addition Protease inhibition	[54,55] [54,55,74,75] [25,76–78]
Colics	F G L P N 	Reduced crying time Lactase addition Protease inhibition Microbiotal modifications	[21,22] [21,22,66,68] [25,76–78] [55,57,58]
Diarrhoea	F G L 	Less severe diarrhea Lactase addition Microbiotal modifications Anti-inflammatory metabolites	[41,49,53,64,65] [54,55,74,75] [34,56–58,63,79] [25,80,81]

Aetiologies



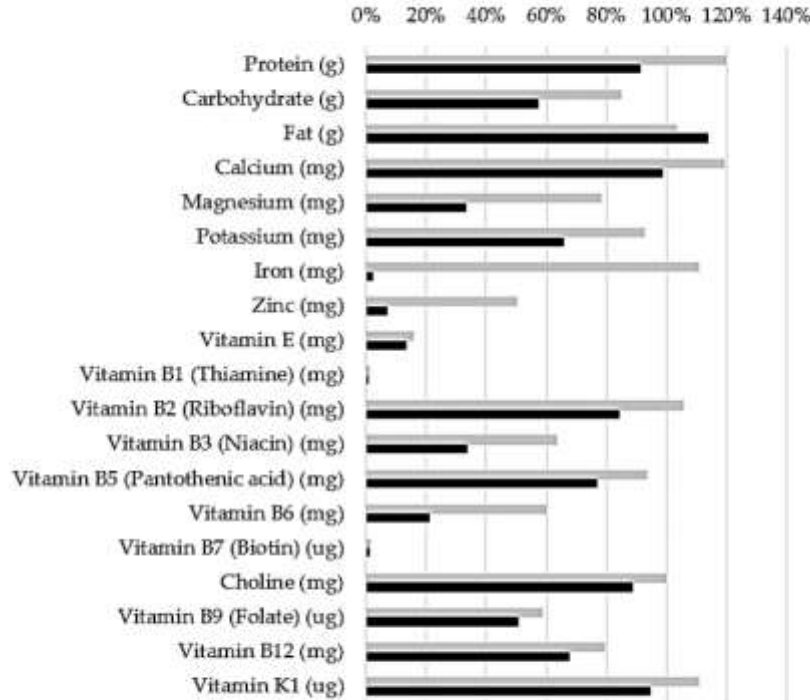
A: anatomical immaturity;
G: gut microbiota alterations;
P: protein maldigestion;



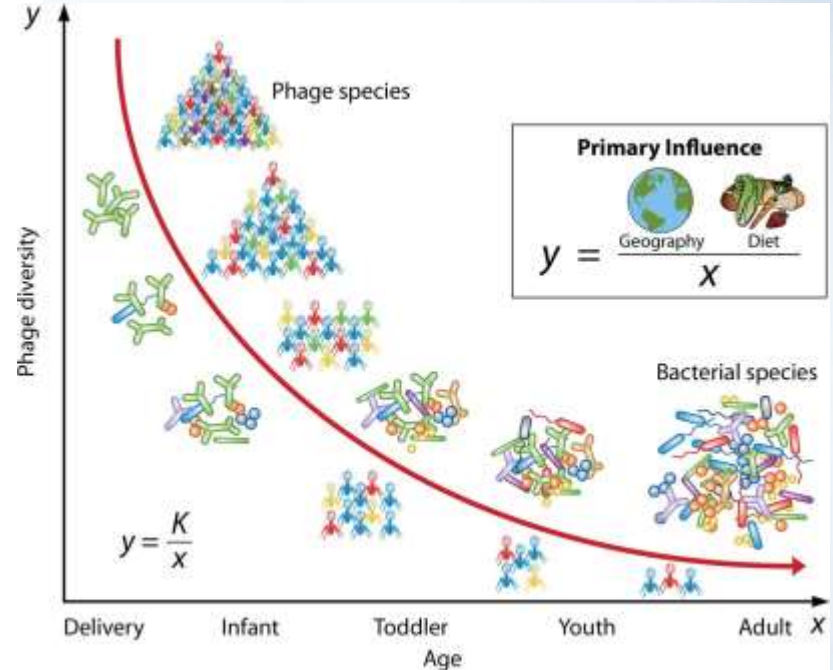
F: food hypersensitivity & allergy;
L: lactose maldigestion;
N: non-GI factors

Tamamlayıcı beslenme dönemi bebeğin ihtiyaçlarının sağlanması yanı sıra sağlıklı erişkin mikrobiyotasına geçişte önemlidir !

Percent of nutrient requirements met by breastmilk in the first year of life



■ Percent of requirements met by breastmilk between 0-6 months
 ■ Percent of requirements met by breastmilk between 7-12 months



FERMENTASYON → Tam



- 4. aydan önce başlanmamalıdır !
- 7. aydan geç kalınmamalıdır !
- Anne sütü sürdürülmelidir !

Early introduction of complementary foods and childhood overweight in breastfed and formula-fed infants in the Netherlands: the PIAMA birth cohort study

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Abstract

Purpose To investigate whether early introduction of complementary foods (CF) is associated with an increased risk of overweight during childhood, and whether this association differs between formula-fed and breastfed infants.

Methods We included 2611 participants that were born at term from a Dutch population-based birth cohort ($n = 3986$) designed to investigate the development of asthma and allergies. Parents kept records of their infant's age when CF were first introduced. Weight and height were parent-reported yearly from age 1 to 8 years, and at ages 11, 14 and 17 years. We used multivariate generalized estimating equations analysis to investigate the association between timing of CF introduction (before 4 months vs at or after 4 months of age) and overweight at ages 1–17 years.

Results Children with CF introduction before 4 months had higher odds of being overweight during childhood than children with CF introduction at or after 4 months (OR 1.32, 95% CI 1.19, 1.47). This association was observed in formula-fed infants (OR 1.51, 95% CI 1.17, 1.94) and breastfed infants (OR 1.32, 95% CI 1.19, 1.47). The duration of breastfeeding modified the association between CF introduction and overweight: children breastfed for shorter than 4 months, but not children breastfed for 4 months or longer with CF introduction before 4 months had higher odds of being overweight (OR 1.37, 95% CI 1.19, 1.57 and 1.07, 95% CI 0.87, 1.32, respectively), compared to those with CF introduction at or after 4 months.

Conclusions In children born at term, formula-fed infants and infants who were breastfed for shorter than 4 months, but not infants who were breastfed for 4 months or longer, had a higher risk of being overweight during childhood when being introduced to CF before 4 months of age.

Keywords Infant feeding · Solids · Overweight · Childhood

Introduction

European (including Dutch) guidelines recommend postponing the introduction of complementary foods (CF) until 4–6 months of age, while continuing breastfeeding [1, 2]. Still, circa 8–15% of infants in Europe are introduced to CF before 4 months of age [3–5].

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s00394-018-1639-9>) contains supplementary material, which is available to authorized users.

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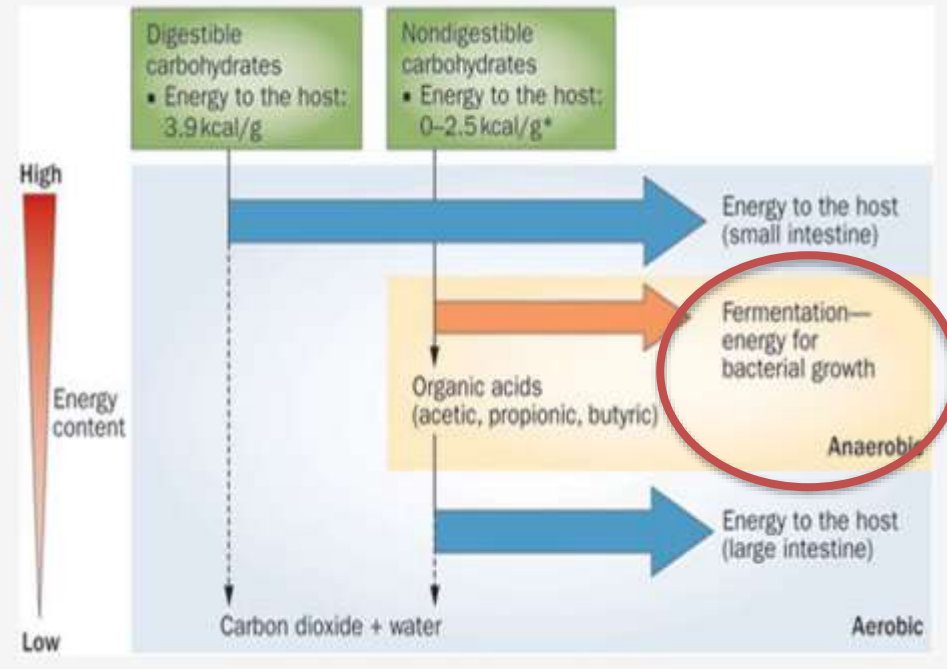
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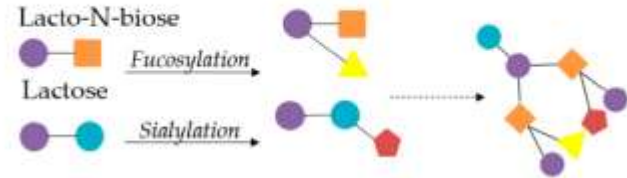
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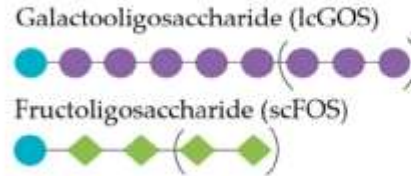
FERMENTASYON → Tamamlayıcı Beslenme



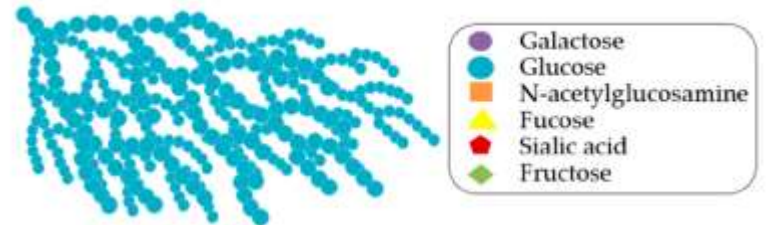
(a) Human Milk Oligosaccharides: β 1-3 & β 1-6 linkages



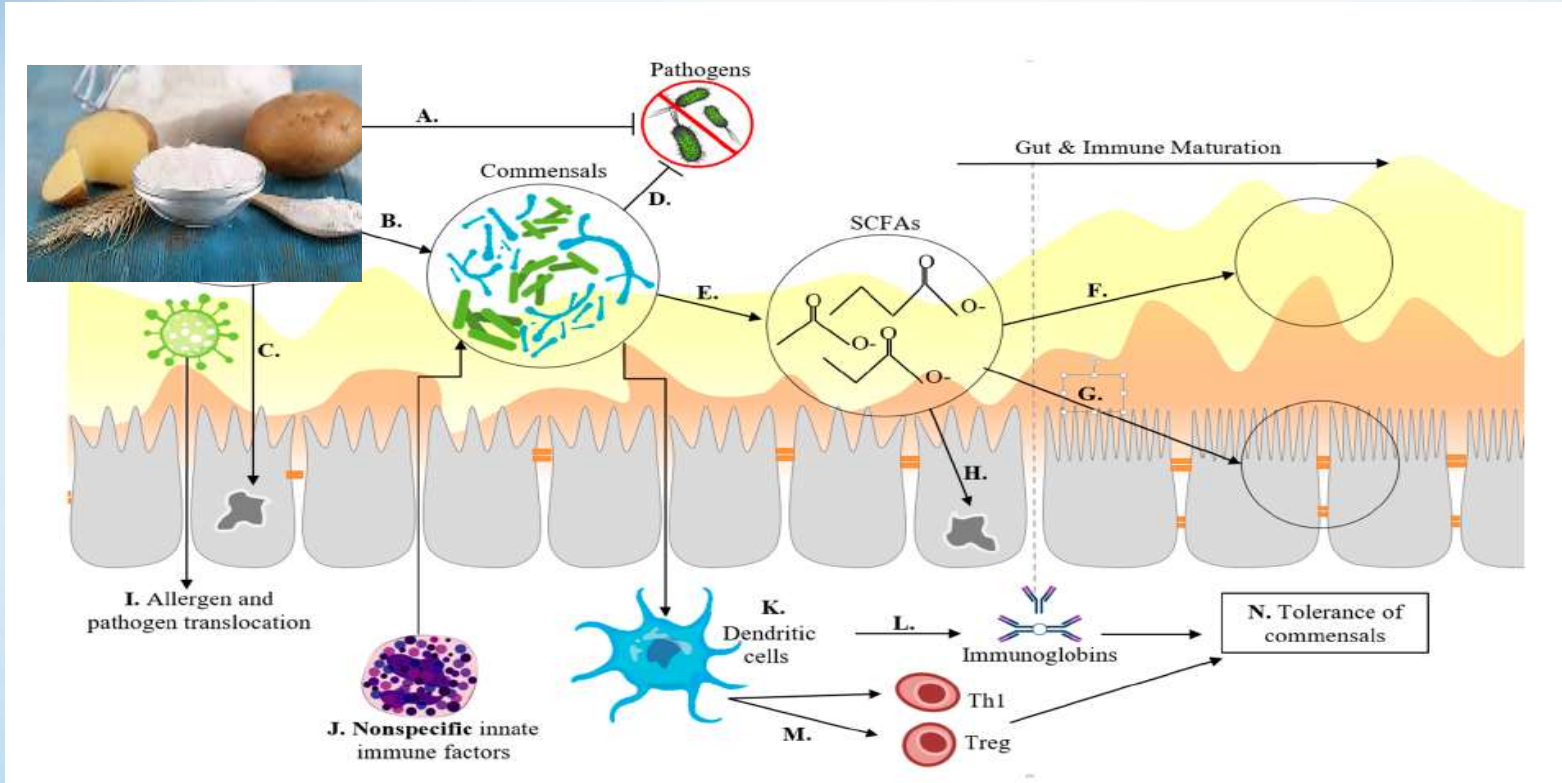
(b) Oligosaccharides in infant formula: β 1-2, β 1-4, β 1-6 linkages



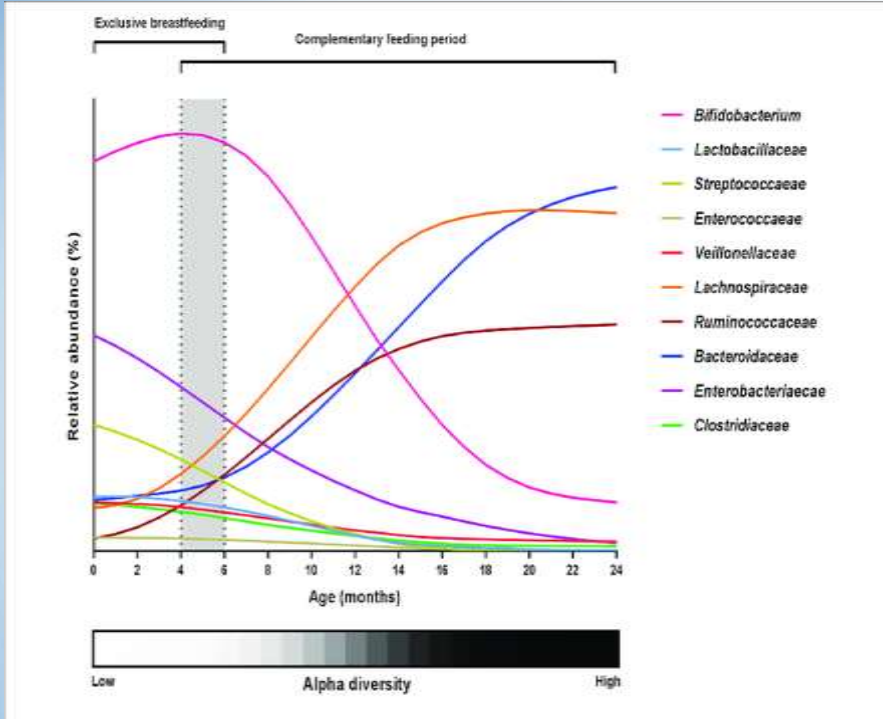
(c) Dietary fibres: α 1-6 linkages



FERMENTASYON → Tamamlayıcı Beslenme



FERMENTASYON → Tamamlayıcı Beslenme



- B. longum →
 - >30 polisakkaridaz (+)
 - HMO ve bitkisel polisakkarit sindirimi
 - Fakültatif gen ekspresyonu !
- Bifidobakter → Fermentasyon gücü 6.ay azalıyor → Firmicutes ↑

Mesajlar

- *Büyüme- gelişme ve GİS matürasyonu postnatal iki yılda aktif olarak sürmektedir.*
- *Mikrobiyota gelişimi sağlıklı gelecek ve GİS matürasyonu ile ilişkilidir.*
- *Fermentasyon ve ürünleri büyüme- gelişme ve GİS fonksiyonlarını destekler.*
- *GİS sağlığı ve gelişimi « PROBİYOTİK MİKROORGANİZMALAR + PREBİYOTİK → +POSTBİYOTİKLER « ile desteklenir!*
- *SAĞLIKLI GELECEK İÇİN EN İDEAL BESİN ANNE SÜTÜDÜR.*



TEŞEKKÜRLER