AOAC INTERNATIONAL

LOWLANDS SECTION

Darmgezondheid: Gezondheid zit in de darmen

9:15 De darm binnenstebuiten

Prof. Ger Rijkers
University College Roosevelt

Darmgezondheid: Gezondheid zit in de darmen

WHO definition of Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2 , p. 100) and entered into force on 7 April 1948.

This Definition has not been amended since 1948.

BMJ

BMJ 2011;343:d4163 doi: 10.1136/bmj.d4163

ANALYSIS

How should we define health?

The WHO definition of health as complete wellbeing is no longer fit for purpose given the rise of chronic disease. **Machteld Huber and colleagues** propose changing the emphasis towards the ability to adapt and self manage in the face of social, physical, and emotional challenges

Machteld Huber *senior researcher*[1], J André Knottnerus *president, Scientific Council for Government Policy* [2], Lawrence Green *editor in chief, Oxford Bibliographies Online—public health*[3], Henriëtte van der Horst *head* [4], Alejandro R Jadad *professor*[5], Daan Kromhout *vice president, Health Council of the Netherlands*[6], Brian Leonard *professor*[7], Kate Lorig *professor*[8], Maria Isabel Loureiro *coordinator for health promotion and protection*[9], Jos W M van der Meer *professor*[10], Paul Schnabel *director* [11], Richard Smith *director*[12], Chris van Weel *head* [13], Henk Smid *director* [14]

BMJ

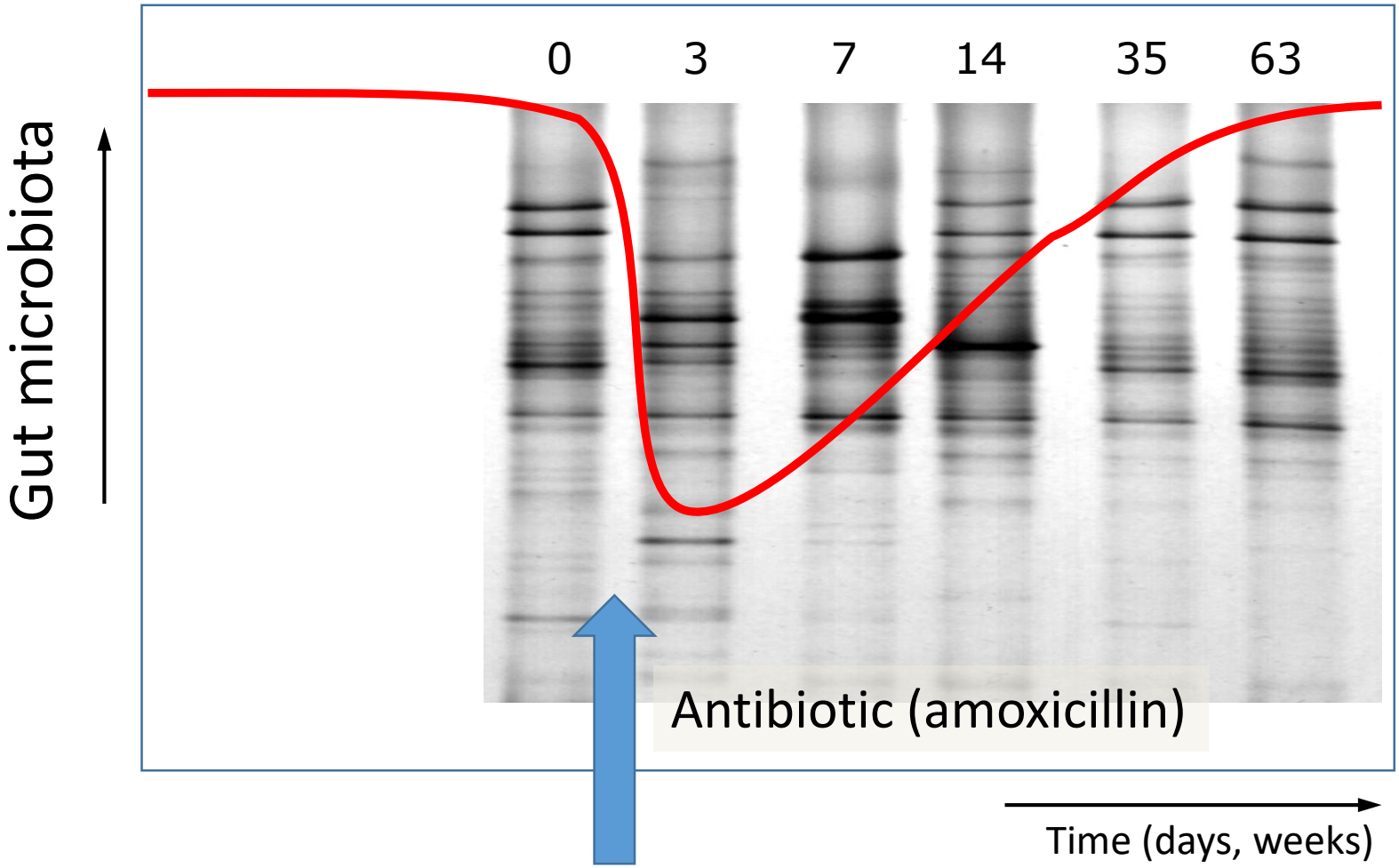
BMJ 2011;343:d4163 doi: 10.1136/bmj.d4163

the ability to adapt and to self manage

ADAPT
INTERNATIONAL

Koning CJ et al. Am J Gastroenterol. 2008 Jan;103(1):178-89.

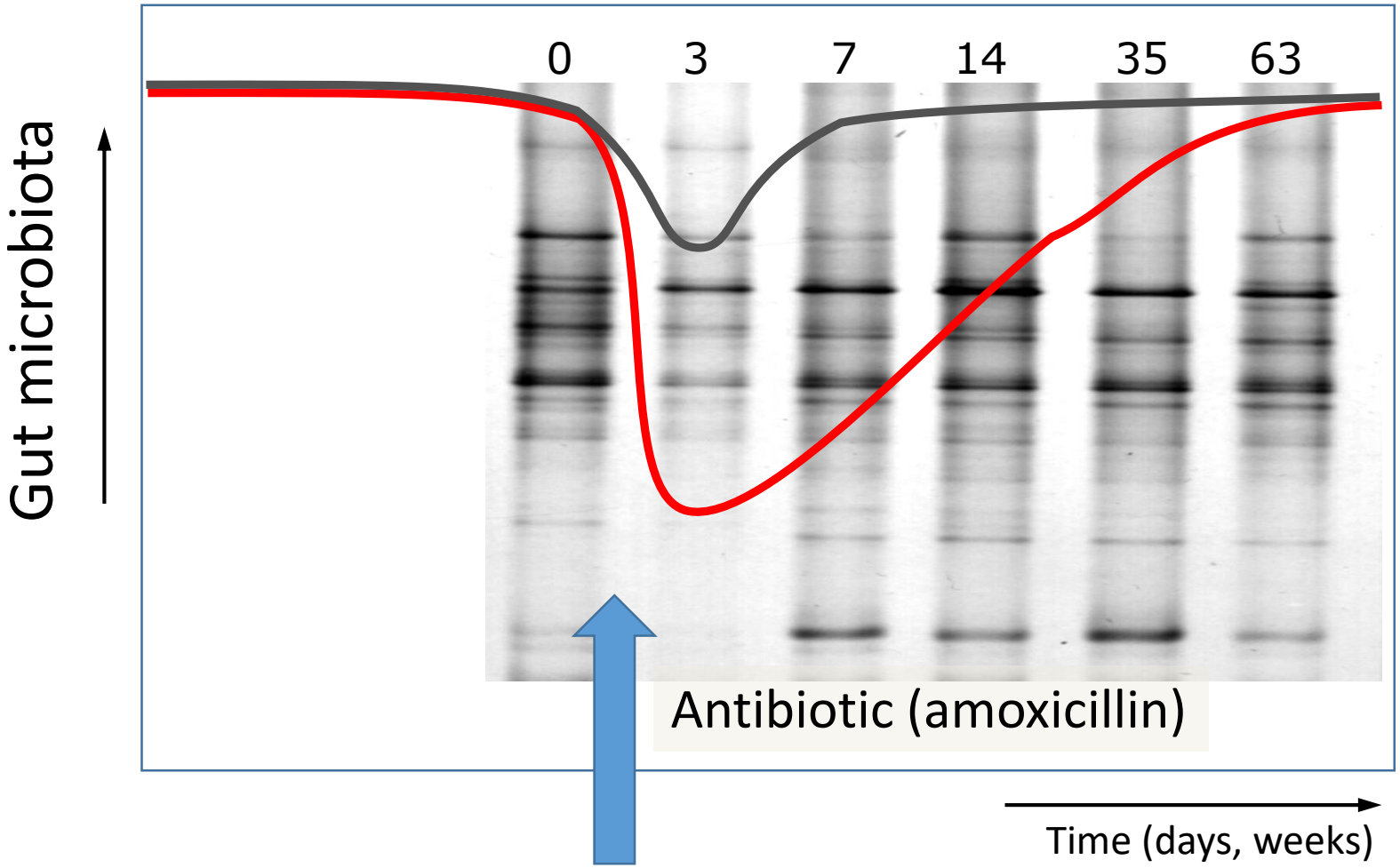
Maintaining Health
Readjust (homeostasis)



Koning CJ et al. Am J Gastroenterol. 2008 Jan;103(1):178-89.

Maintaining Health
Readjust (homeostasis)

*Probiotics: *B. bifidum, B. lactis, B. longum, E. faecium, L. rhamnosus, L. paracasei L. plantarum (2x), L. acidophilus* (2x)



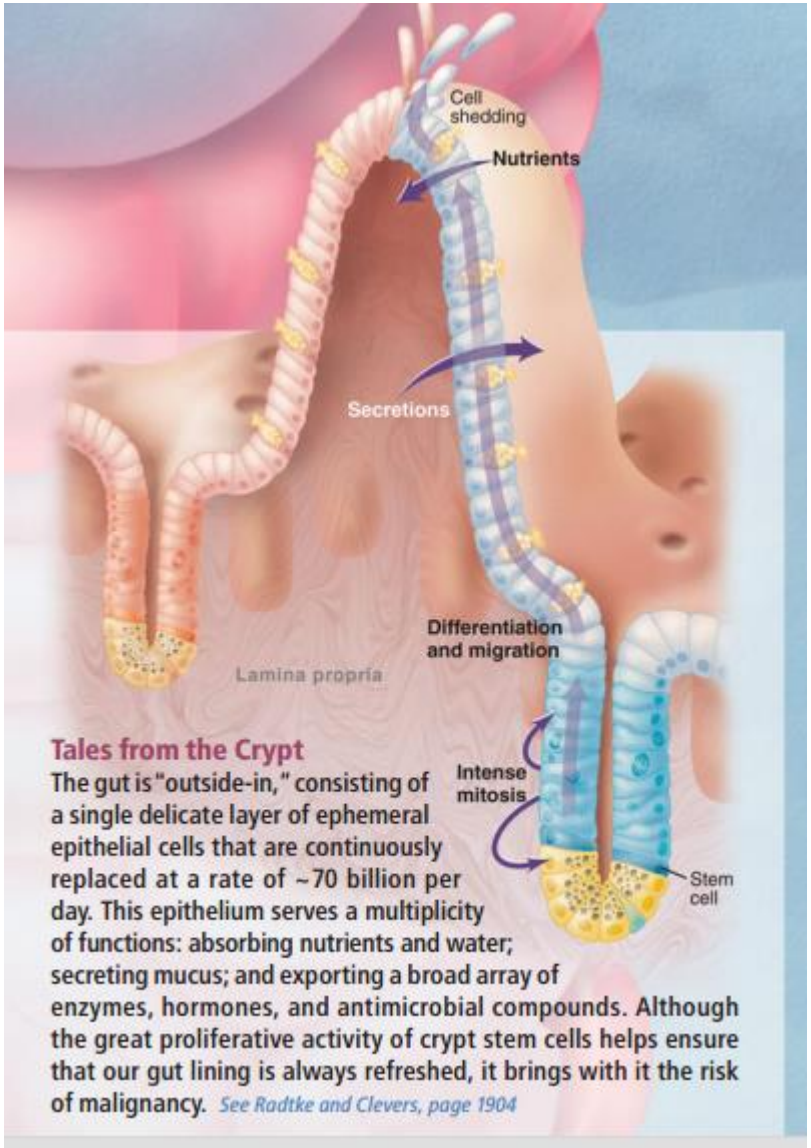
25 March 2005

Science

Vol. 307 No. 5717
Pages 1421–2016 $10

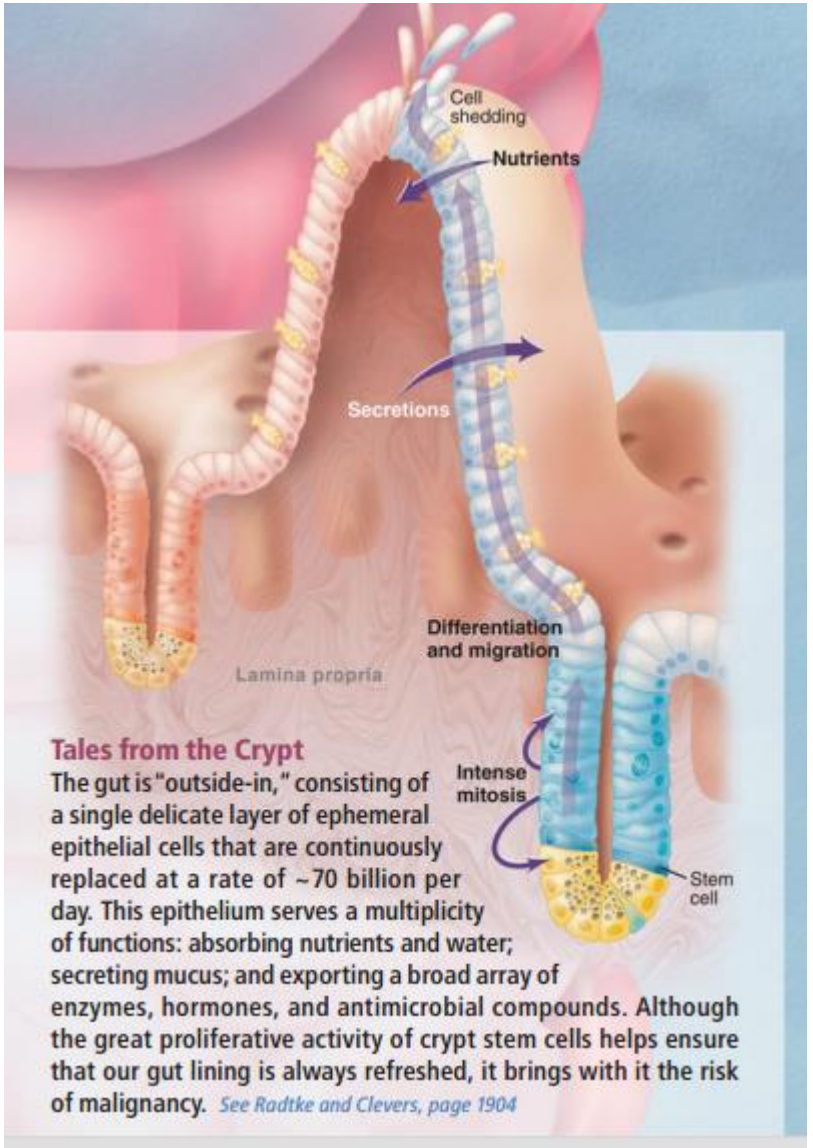
The Gut
INNER TUBE OF LIFE

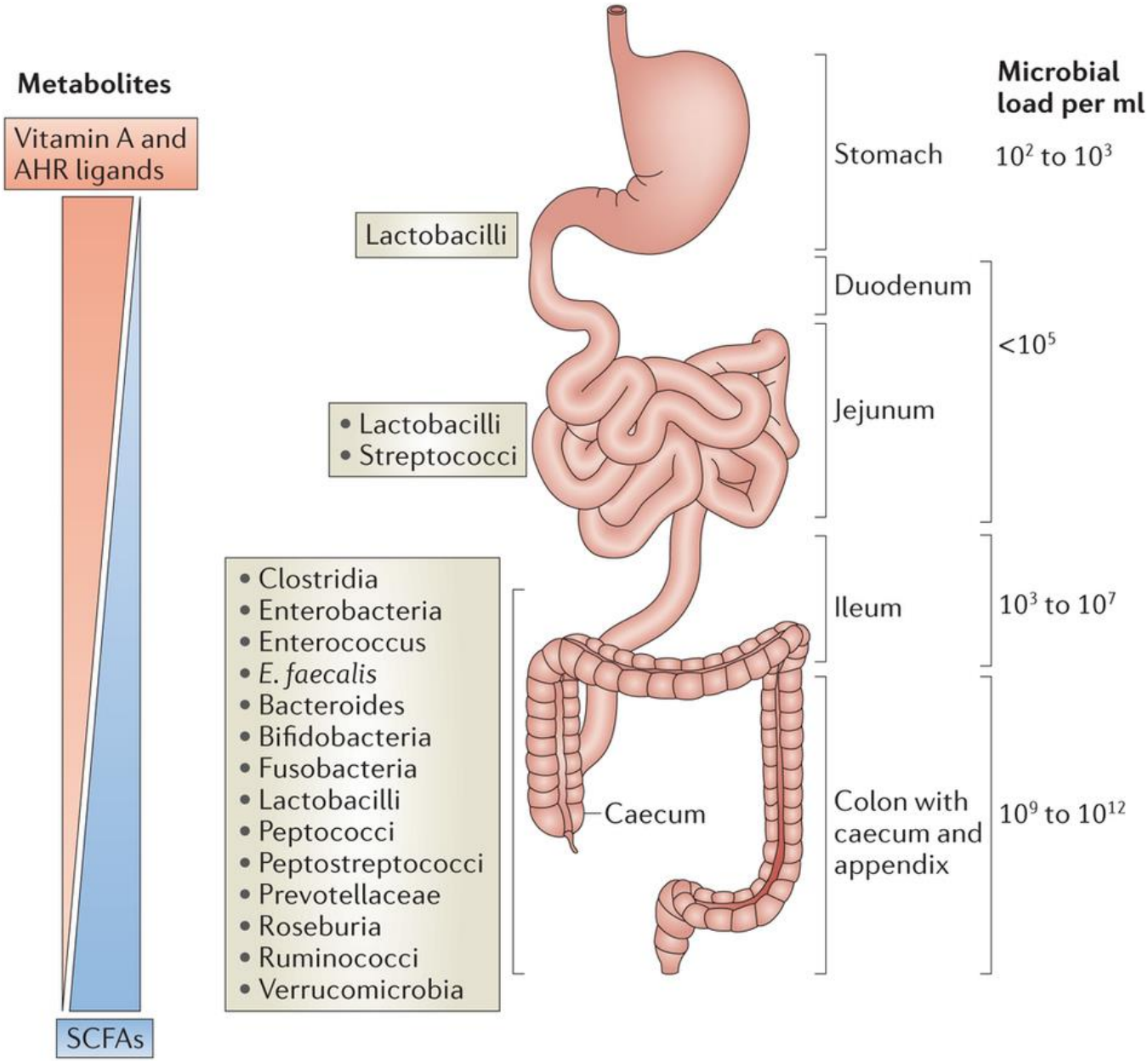
Inner Tube of Life



Inside Out

The beauty of art is to show something that is not really possible. Sjaak Sinnige




Metabolites
Vitamin A and AHR ligands
SCFAs
Lactobacilli
• Lactobacilli
• Streptococci
• Clostridia
• Enterobacteria
• Enterococcus
• E. faecalis
• Bacteroides
• Bifidobacteria
• Fusobacteria
• Lactobacilli
• Peptococci
• Peptostreptococci
• Prevotellaceae
• Roseburia
• Ruminococci
• Verrucomicrobia
Caecum
Microbial load per ml
Stomach
10² to 10³
Duodenum
Jejunum
<10⁵
Ileum
10³ to 10⁷
Colon with caecum and appendix
10⁹ to 10¹²

SCIENTIFIC AMERICAN

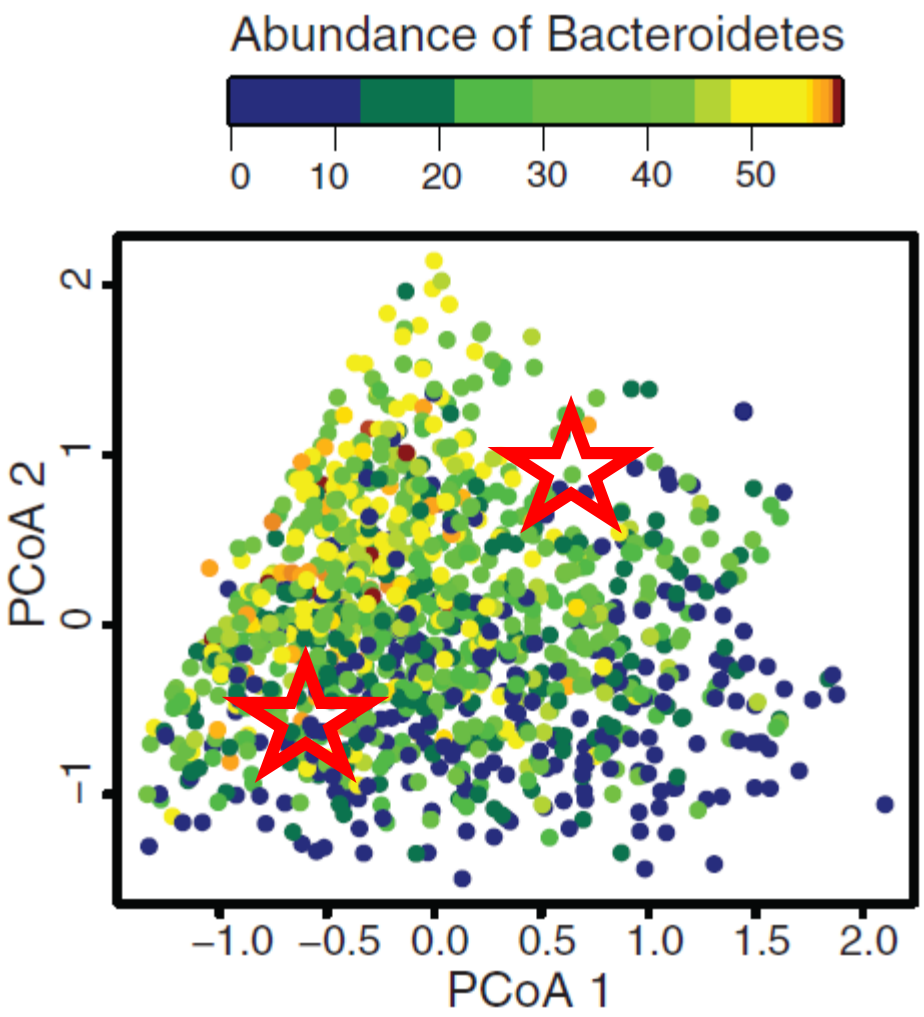
June 2012

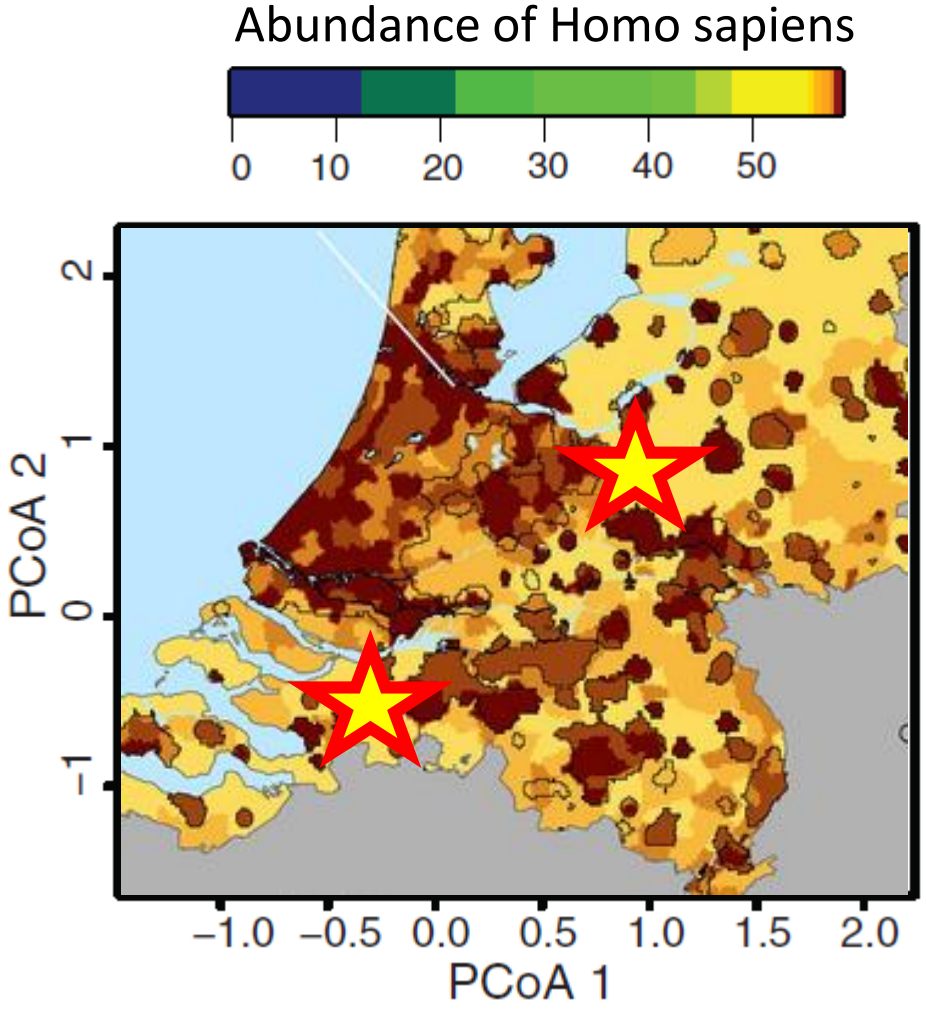
ScientificAmerican.com

Your Inner Ecosystem

Jeroen Raes

we're all different





SCIENCE sciencemag.org

29 APRIL 2016 • VOL 352 ISSUE 6285

HOW DO WE GET OUR MICROBIOME?

BIRTH:
A newborn gets its microbes from:

- its mother's birth canal
- skin of its mother and other care-givers

BREAST MILK:
Breast milk has been fine-tuned over millions of years to provide:

- nutrients, vitamins, and antibodies
- diverse microbes to populate the baby's gut

ENVIRONMENT:
For the rest of the baby's life, it will continuously encounter new microbes from:

- soil and water
- people, pets, plants
- new and diverse foods

▲ skin of its mother and other care-givers

SCIENTIFIC REPORTS

OPEN

Intestinal colonisation patterns in breastfed and formula-fed infants during the first 12 weeks of life reveal sequential microbiota signatures

Received: 8 March 2017
Accepted: 6 July 2017
Published online: 16 August 2017

Harro M. Timmerman[1], Nicole B. M. M. Rutten[2], Jos Boekhorst[1], Delphine M. Saulnier[1,7], Guus A. M. Kortman[1], Nikhat Contractor[3,8], Martin Kullen[3,9], Esther Floris[1], Hermie J. M. Harmsen[5], Arine M. Vlieger[2], Michiel Kleerebezem[1,6] & Ger T. Rijkers[2,4]

breastfed formula-fed

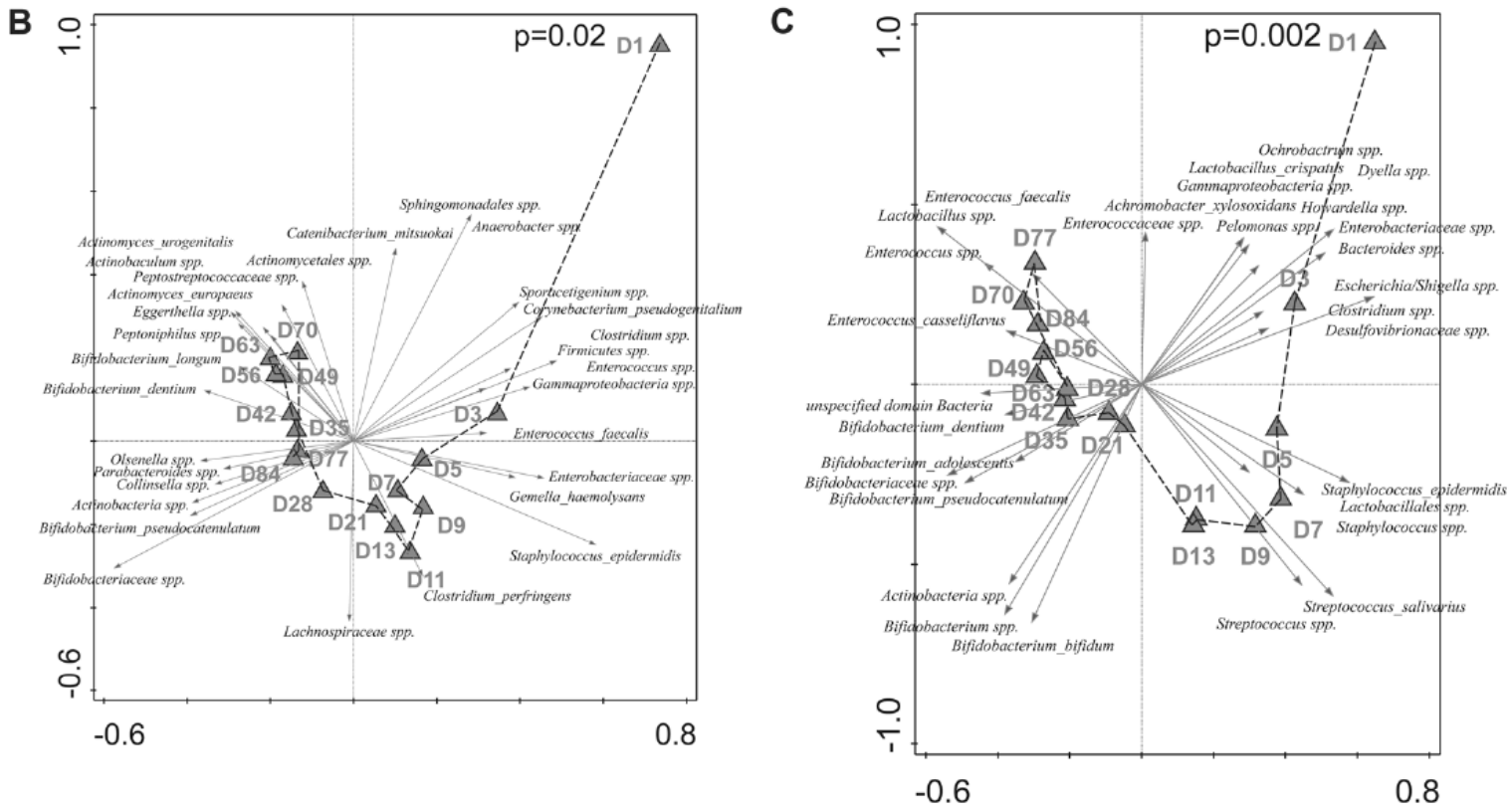


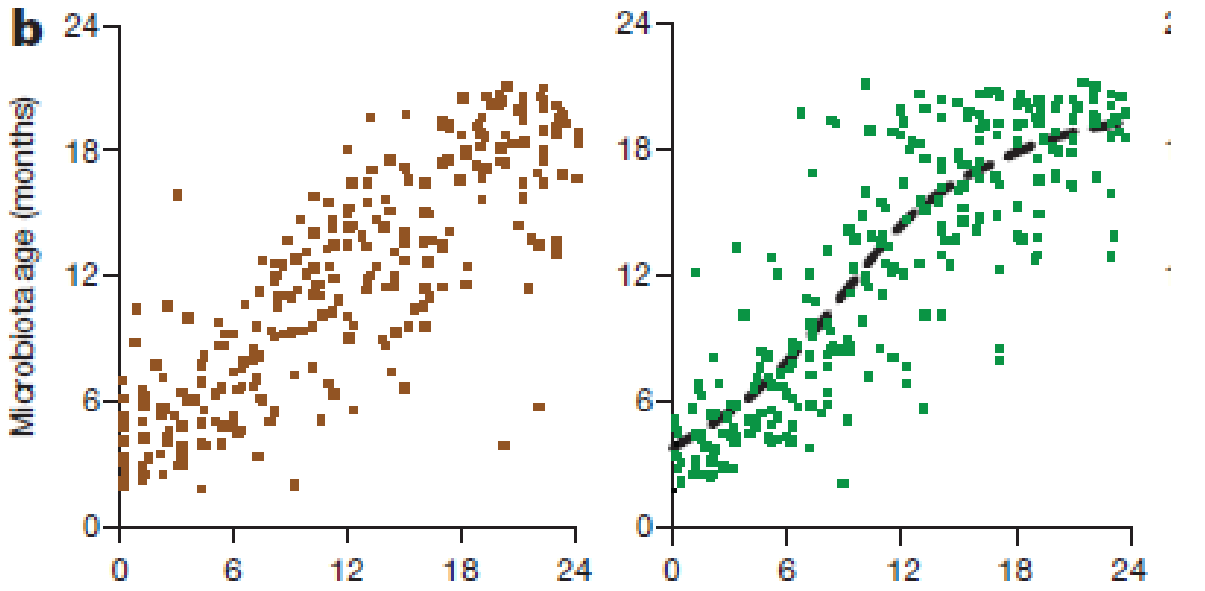
Figure 4. (**A**,**B**,**C**) Triplot of partial RDA based on the relative abundance of detected species in individuals over time (day 1 until 12 weeks of age). Constrained explanatory variables are indicated by triangles: day 1 (D1) until day 84 (D84). Impact of time on microbiota composition was assessed in (**A**) all breastfed and formula-fed infants, after removing the effects of individual and type of feeding, (**B**) Breastfed infants only, after removing the effects of individual, and (**C**) Formula-fed infants only, after removing the effects of individual. The arrows indicate the 30 species which had the highest amount of variability in their values explained by the canonical

Normal development gutmicrobiota

a

Rank	OTU ID	Taxonomic annotation
1	326792	*Faecalibacterium prausnitzii*
2	189827	*Ruminococcus* sp. 5 1 39BFAA
3	470663	*Lactobacillus ruminis*
4	191687	*Dorea longicatena*
5	72820	*Bifidobacterium longum*
6	194745	*Ruminococcus* sp. 5 1 39BFAA
7	15141	*Lactobacillus mucosae*
8	561483	*Bifidobacterium* sp.
9	217996	*Staphylococcus* sp.
10	364234	*Ruminococcus* sp. 5 1 39BFAA
11	287510	*Catenibacterium mitsuokai*
12	261912	*Dorea formicigenerans*
13	361809	*Ruminococcus torques*
14	108747	*Streptococcus thermophilus*
15	533785	*Bifidobacterium* sp.
16	9514	*Haemophilus parainfluenzae*
17	561636	*Streptococcus* sp.
18	312461	*Clostridium* sp.
19	470139	*Clostridium ramosum*
20	181834	*Clostridium* sp.
21	148099	*Weissella cibaria*
22	469873	*Bifidobacterium* sp.
23	185951	*Clostridiales* sp.
24	212619	*Ruminococcaceae* sp.

Increasing importance in accuracy of model



doi:10.1038/nature13421

The whole world is reading pirated papers *pp. 497 & 508*

Neurochemistry of sleeping and waking *pp. 517 & 550*

Halogenated olefins via the *E* train *p. 569*

Science

$15
29 APRIL 2016
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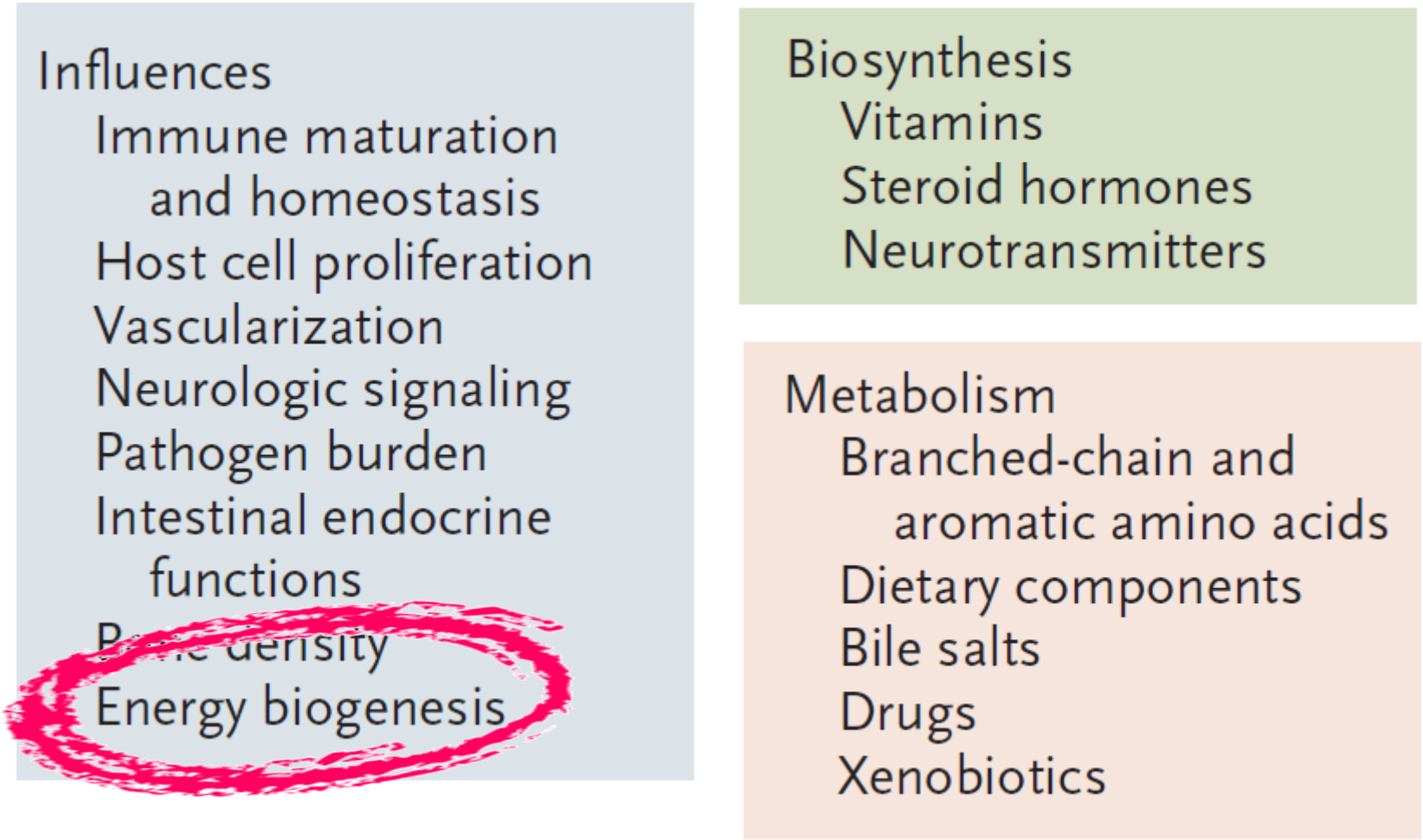
AAAS

SPECIAL ISSUE

MICROBIOTA AT WORK

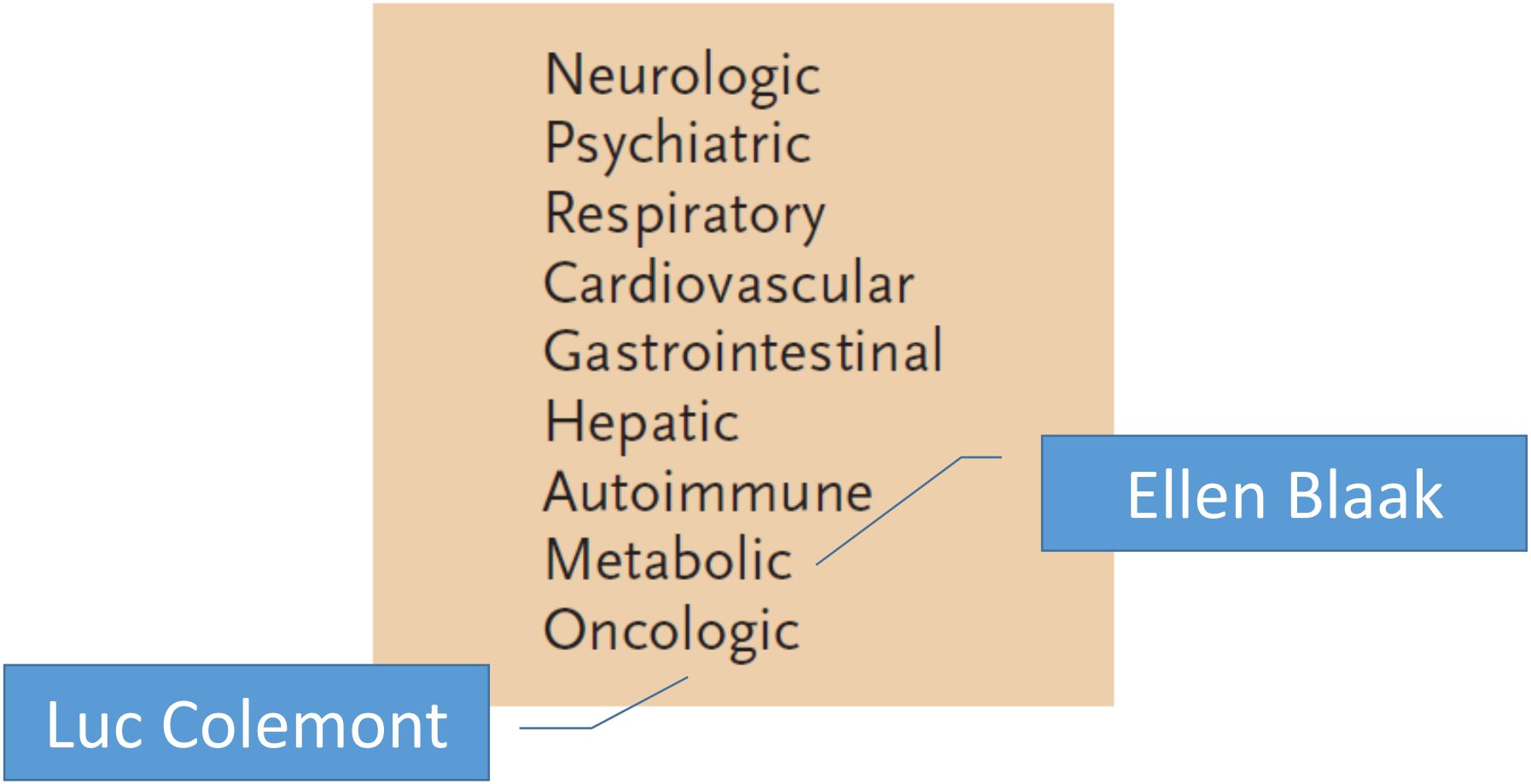
Figure 1. Some Functions of the Gut Microbiota and Disease Associations.




obesity


American style diet

Figure 1. Some Functions of the Gut Microbiota and Disease Associations.



Gut/brain axis and the microbiota

Brain–Gut–Bone Marrow Axis

Implications for Hypertension and Related Therapeutics

Microbiota-gut-brain axis and the central nervous system

Acne vulgaris, probiotics and the gut-brain-skin axis - back to the future?

Emerging pathogenic links between microbiota and the gut–lung axis

Gut-liver axis: gut microbiota in shaping hepatic innate immunity

Comparative effects of intraduodenal fat and glucose on the gut-incretin axis

The gut–kidney axis in IgA nephropathy: role of microbiota and diet on genetic predisposition

KEYWORDS: Athletic performance; Gut-muscle-axis; Probiotics; Protein utilization; Sports nutrition

NCBI Resources How To

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed "gut immune axis" Search

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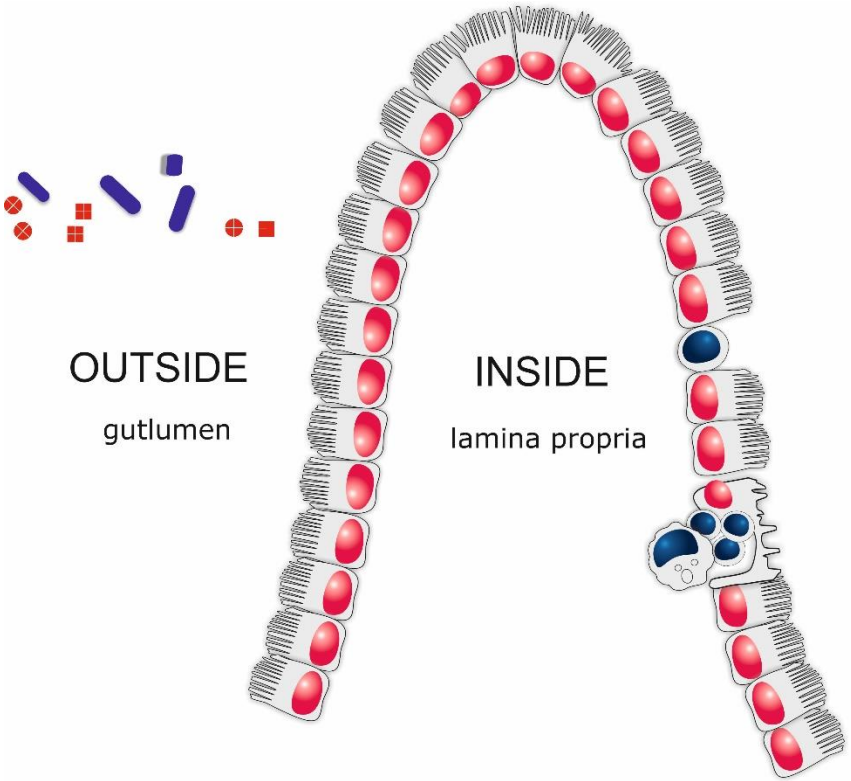
Mucosal dilemmas

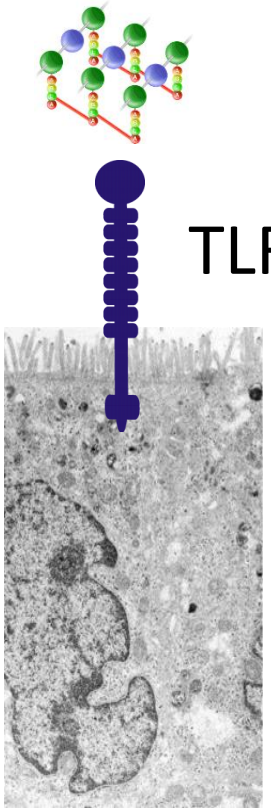


recognize and attack: response

recognize and do not attack: tolerance

Neonatal tollerance

Peptidoglycan



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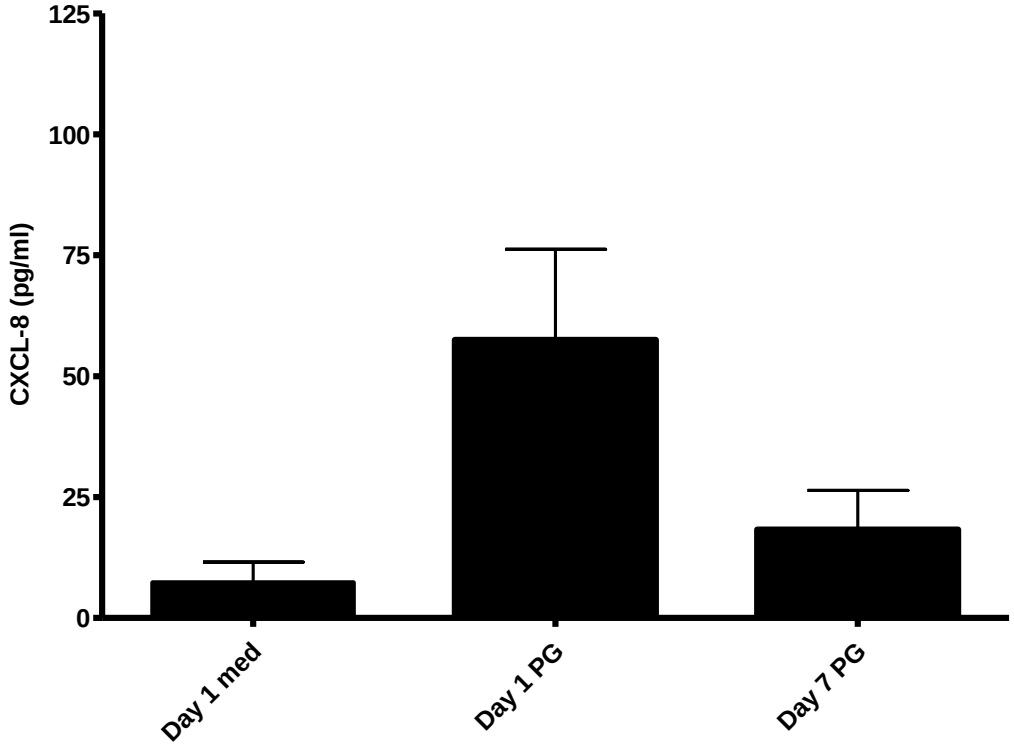
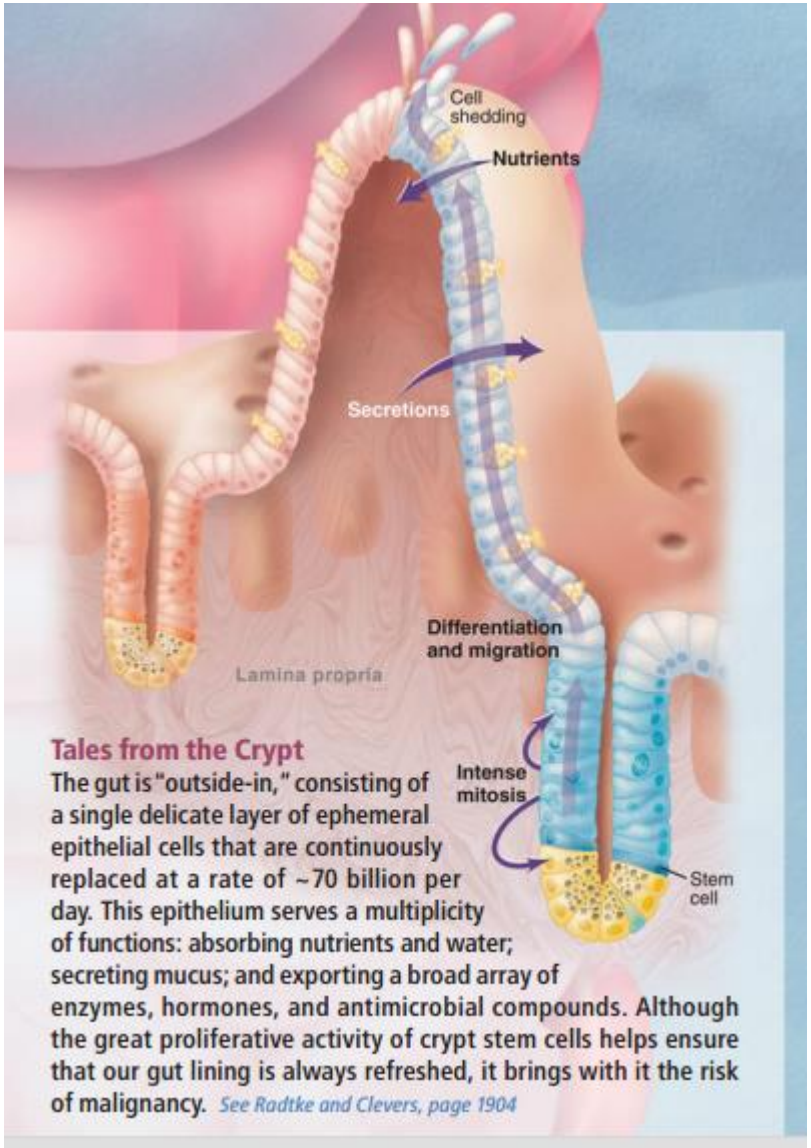


Data Edward Nieuwenhuis

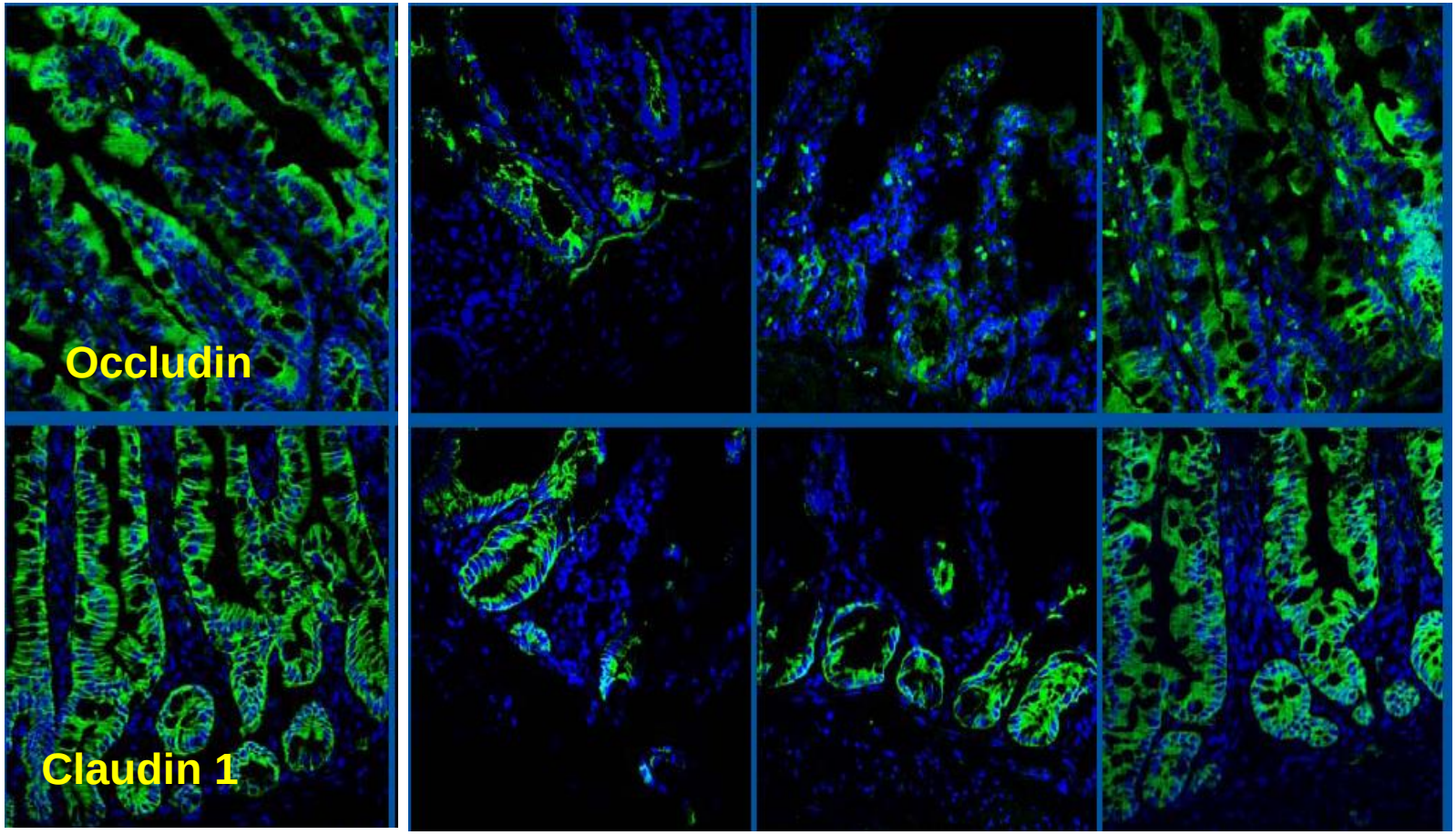
Inner Tube of Life



Tales from the Crypt

The gut is "outside-in," consisting of a single delicate layer of ephemeral epithelial cells that are continuously replaced at a rate of ~70 billion per day. This epithelium serves a multiplicity of functions: absorbing nutrients and water; secreting mucus; and exporting a broad array of enzymes, hormones, and antimicrobial compounds. Although the great proliferative activity of crypt stem cells helps ensure that our gut lining is always refreshed, it brings with it the risk of malignancy. *See Radtke and Clevers, page 1904*

maintenance of gut barrier integrity



Coldwater stress	-	+	+	+
Multispecies probiotics	-	-	**placebo**	+

Inflammatoire darmziekten

Aanvallen

buiten **voeding** **bacterien**

Inflammatie

binnen

Verdedigen

Mucosaal immuunsysteem

inflammatoire darmziekten

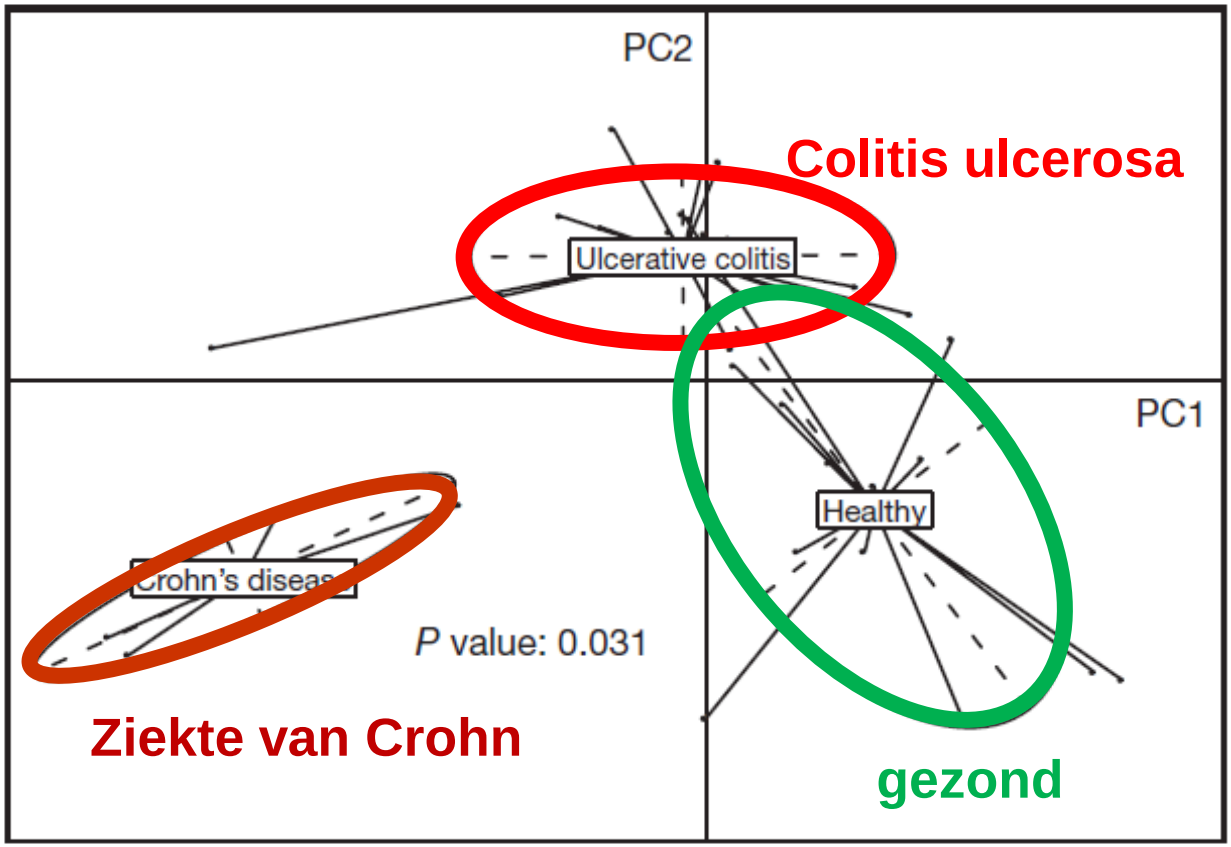
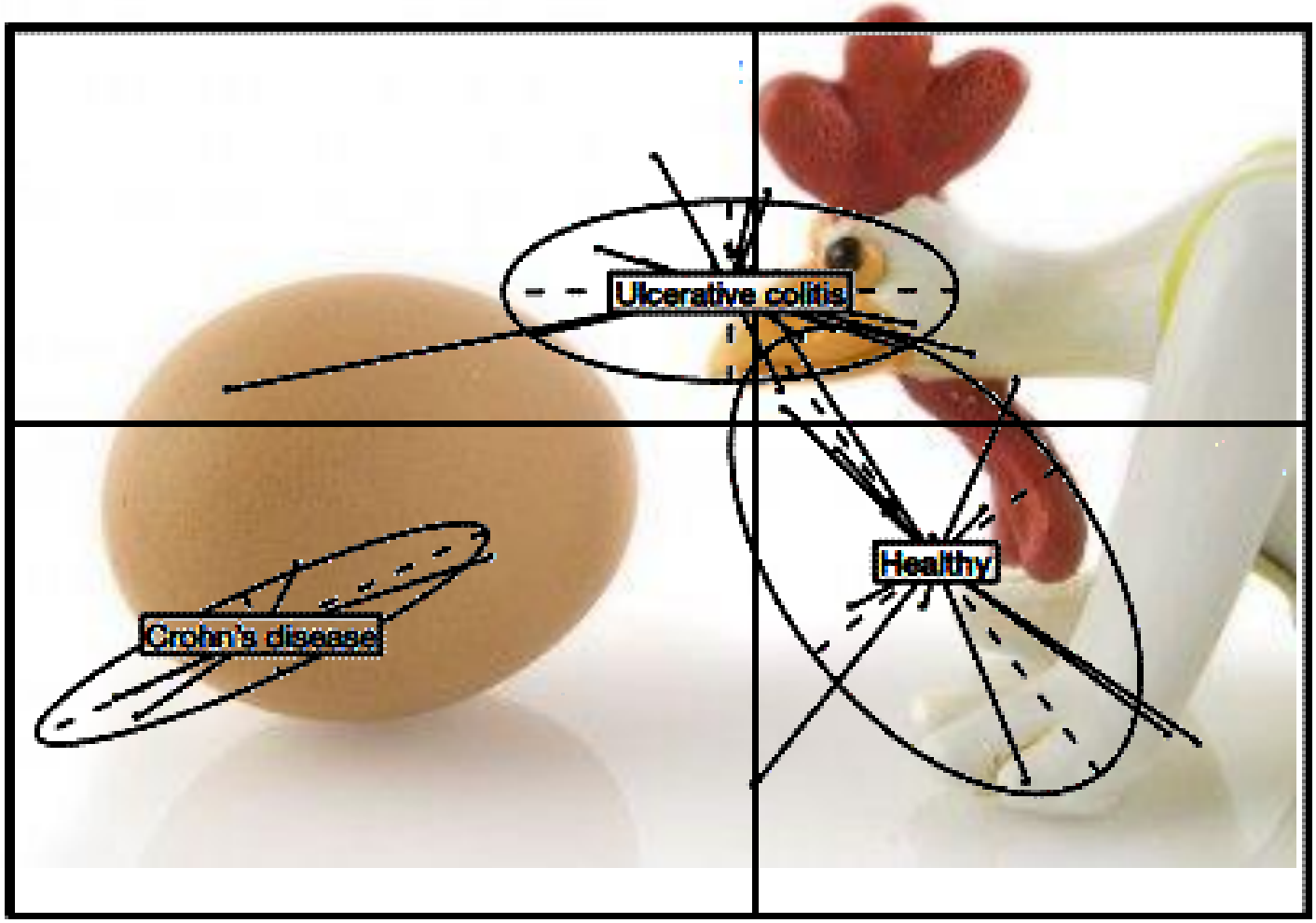
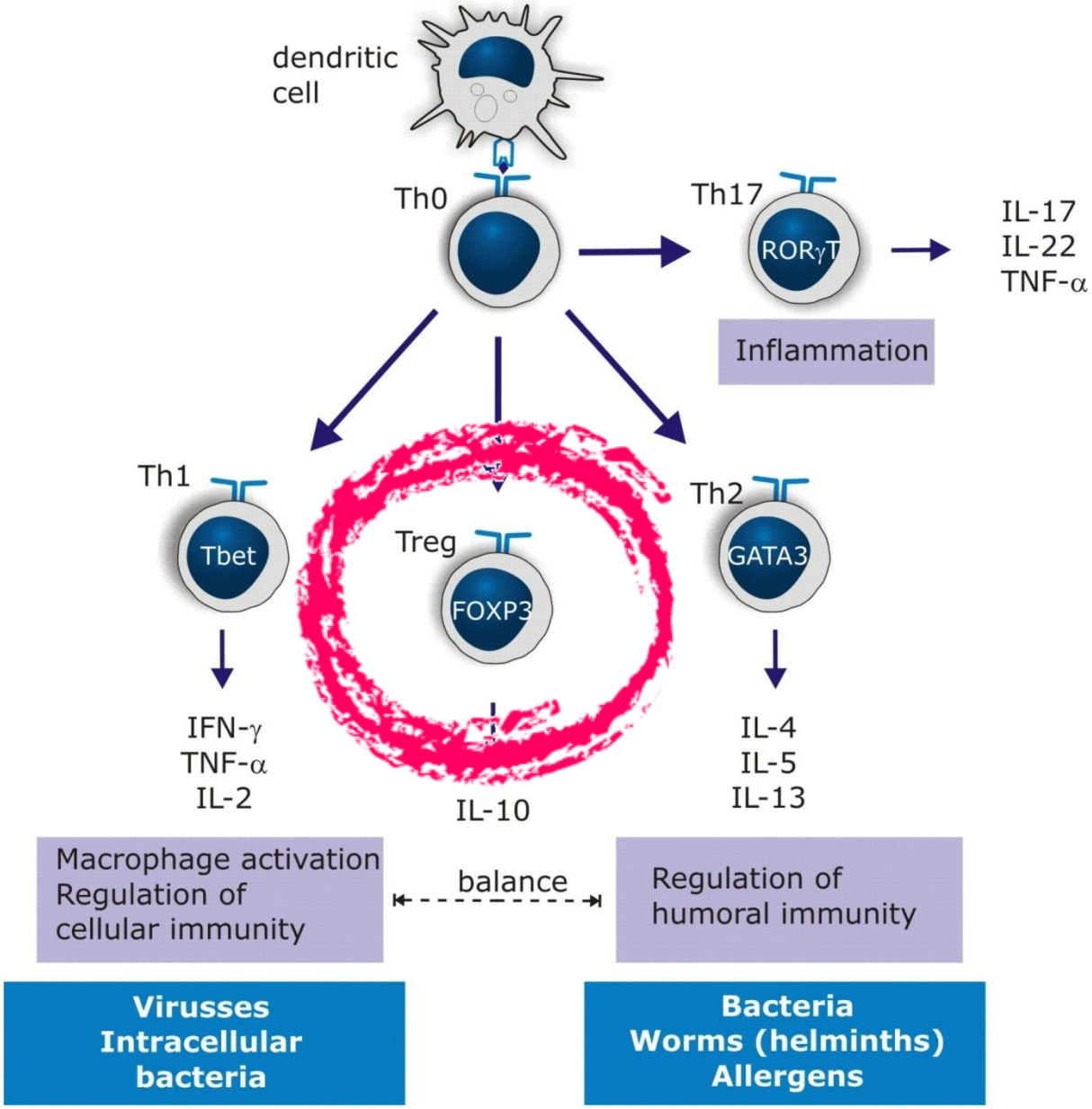


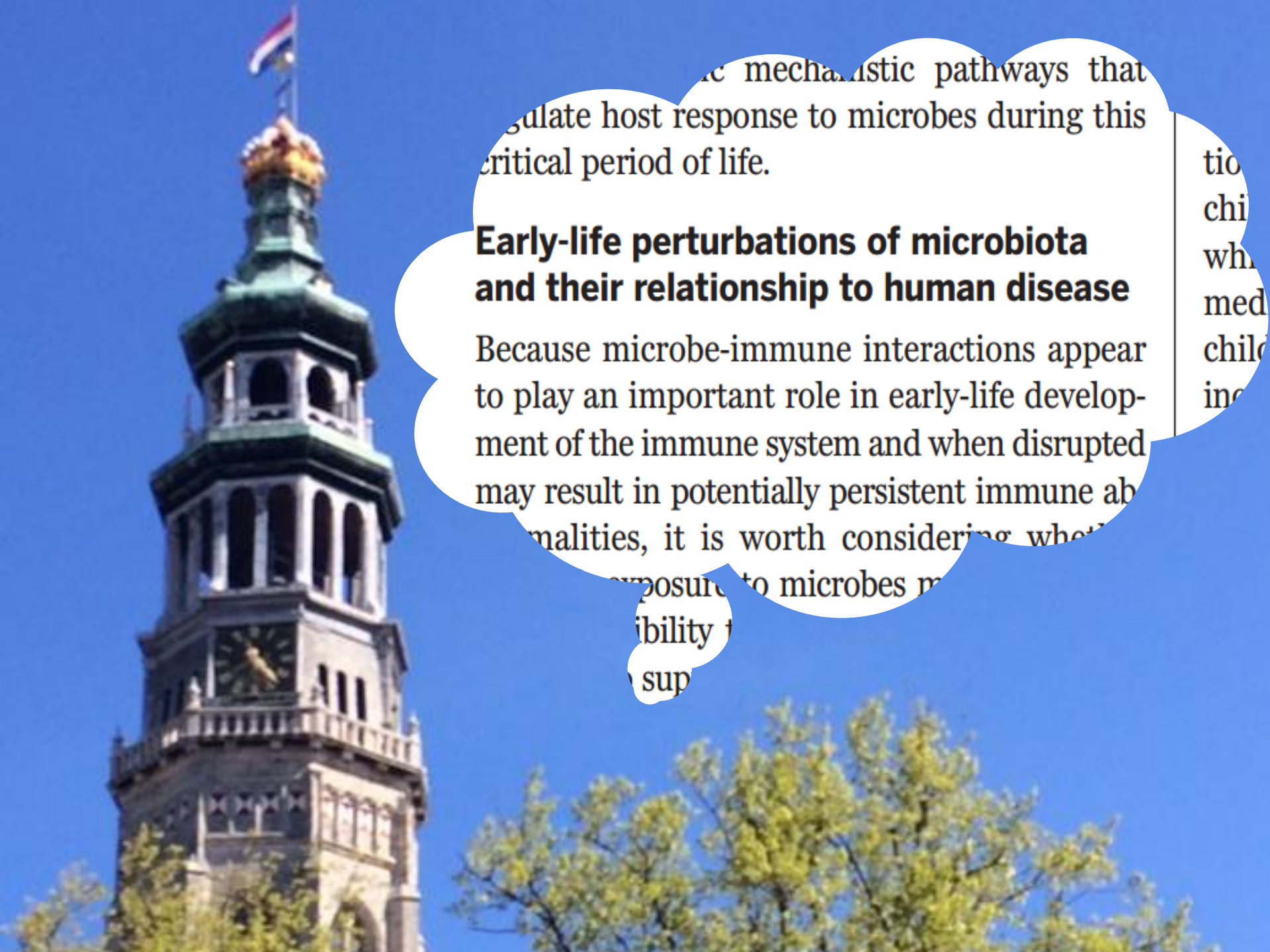
Figure 4 | Bacterial species abundance differentiates IBD patients and healthy individuals. Principal component analysis with health status as

inflammatoire darmziekten



Mucosale immuunsysteem in de darm





mechanistic pathways that
gulate host response to microbes during this
critical period of life.

Early-life perturbations of microbiota and their relationship to human disease

Because microbe-immune interactions appear to play an important role in early-life development of the immune system and when disrupted may result in potentially persistent immune ab
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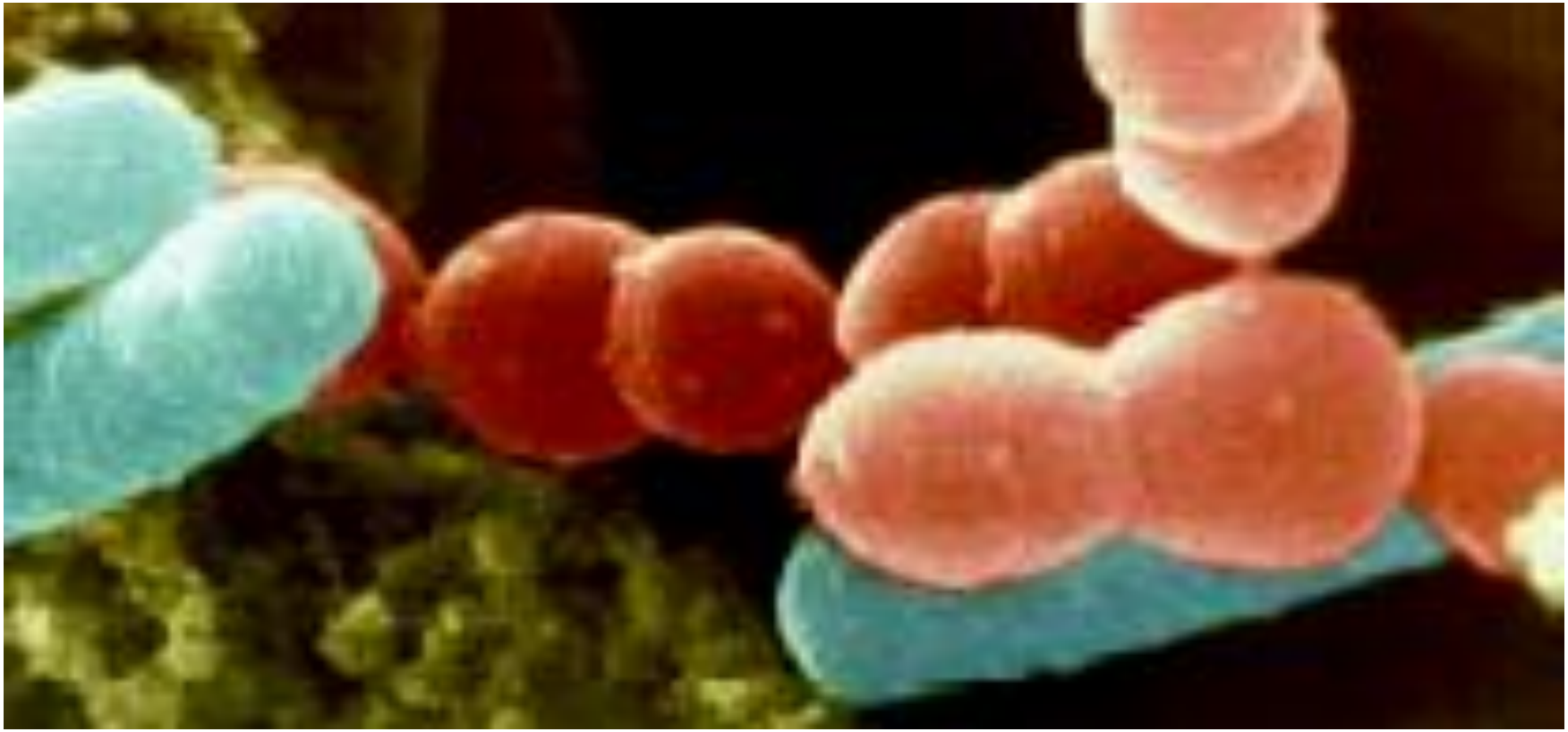
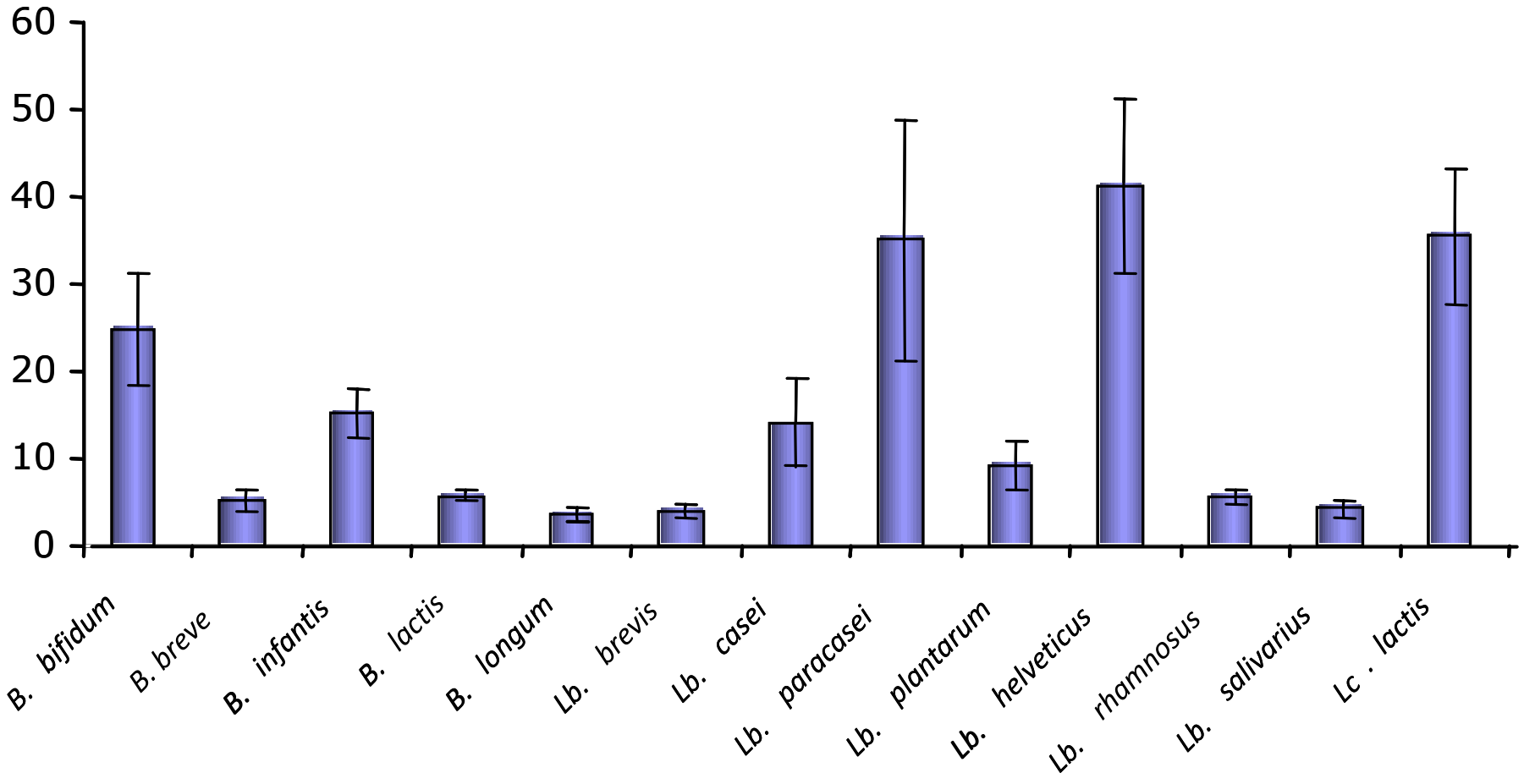
Probiotics



"live microorganisms that, when administered in adequate amounts, confer a health benefit on the host"

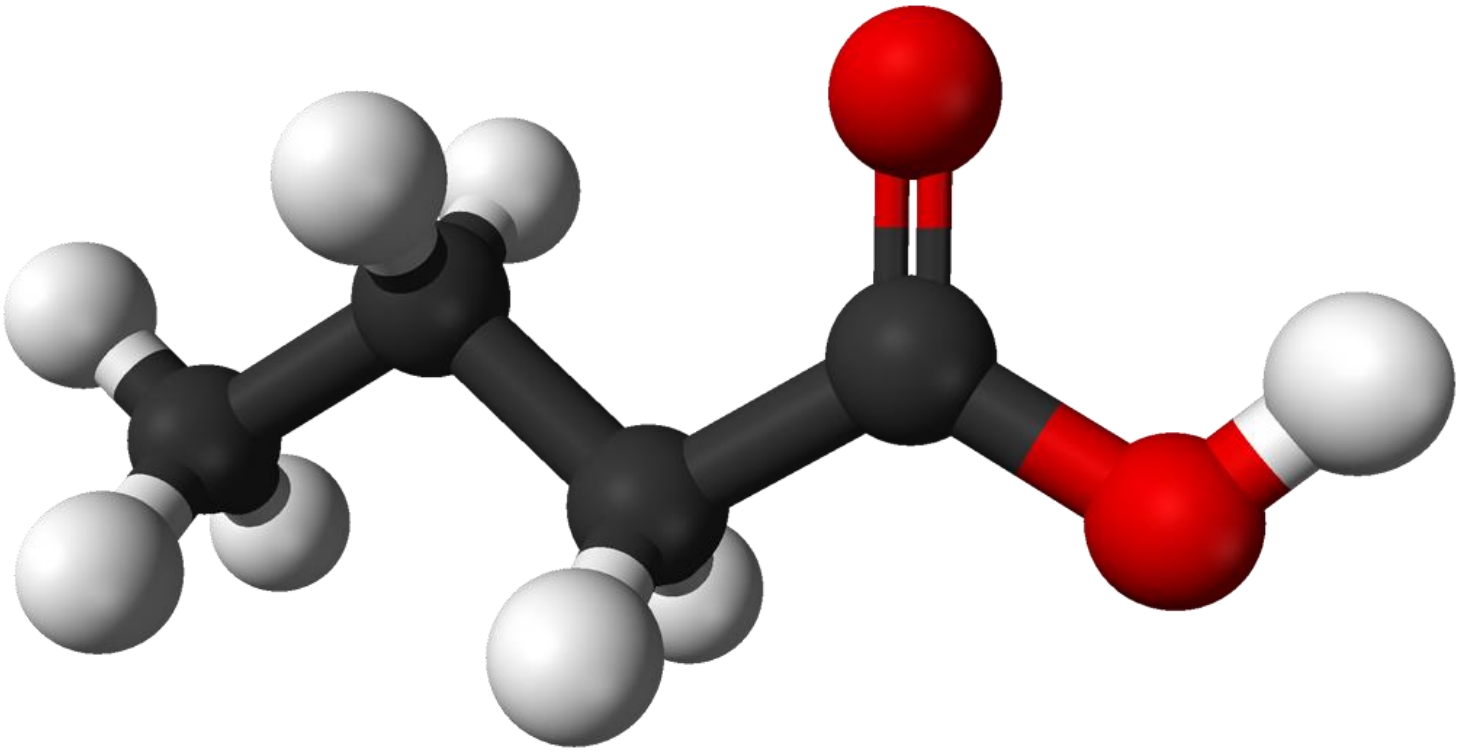
Hill, C. *et al. Nat. Rev. Gastroenterol. Hepatol.* advance online publication 10 June 2014;

Induction of regulatory T cells by probiotics



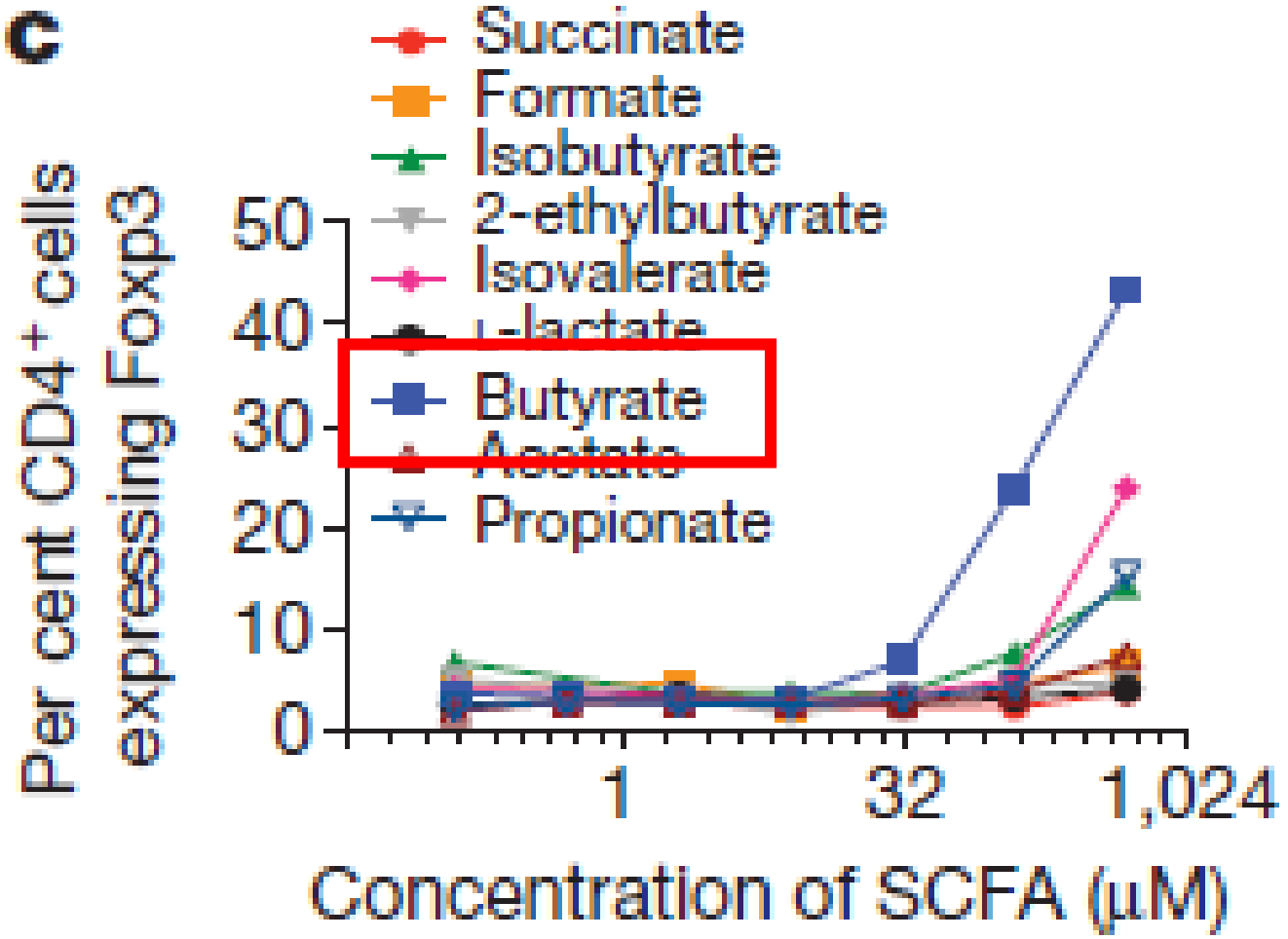
Clin Exp Allergy. 2010 Jan;40(1):103-10.
Lactic acid bacteria differ in their ability to induce functional regulatory T cells in humans.
de Roock S, van Elk M, van Dijk ME, Timmerman HM, Rijkers GT, Prakken BJ, Hoekstra MO, de Kleer IM.

Microbiota



Mucosal immune system

SCFA induce Treg

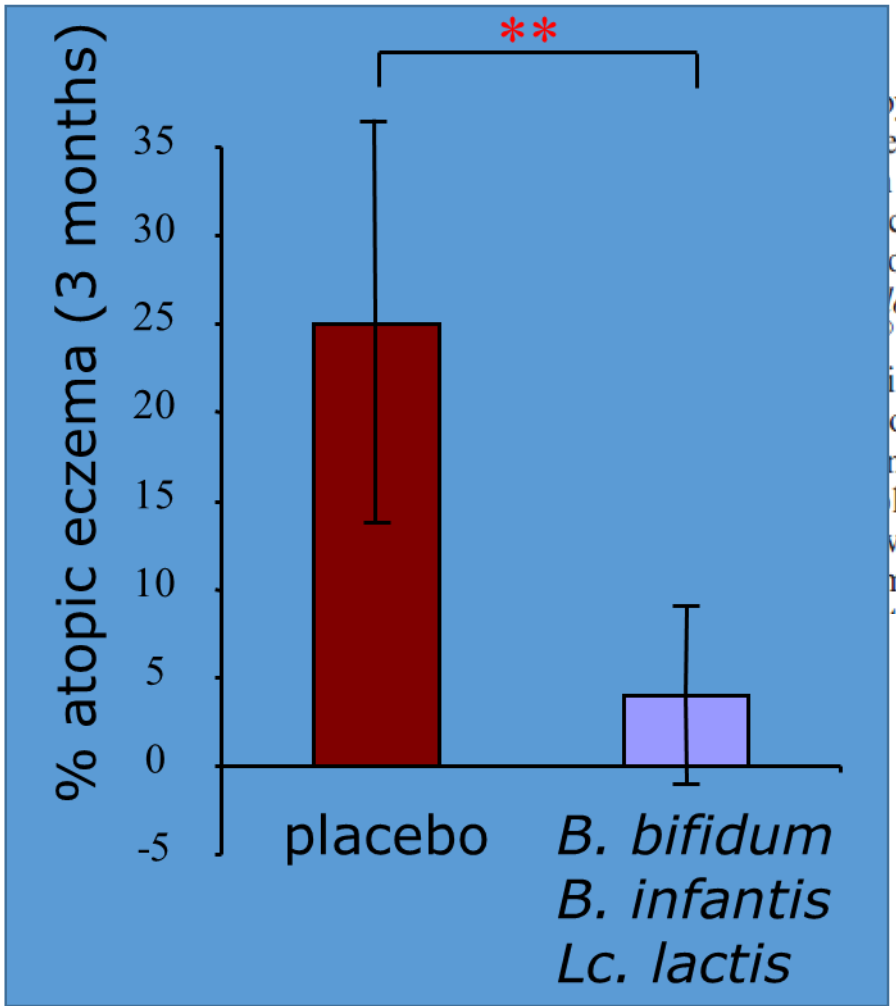


Allergy 2009 DOI: 10.1111/j.1398-9995.2009.02021.x

DOI: 10.1111/j.1398-9995.2009.02021.x

Original article

The effects of selected probiotic strains on the development of eczema (the PandA study)



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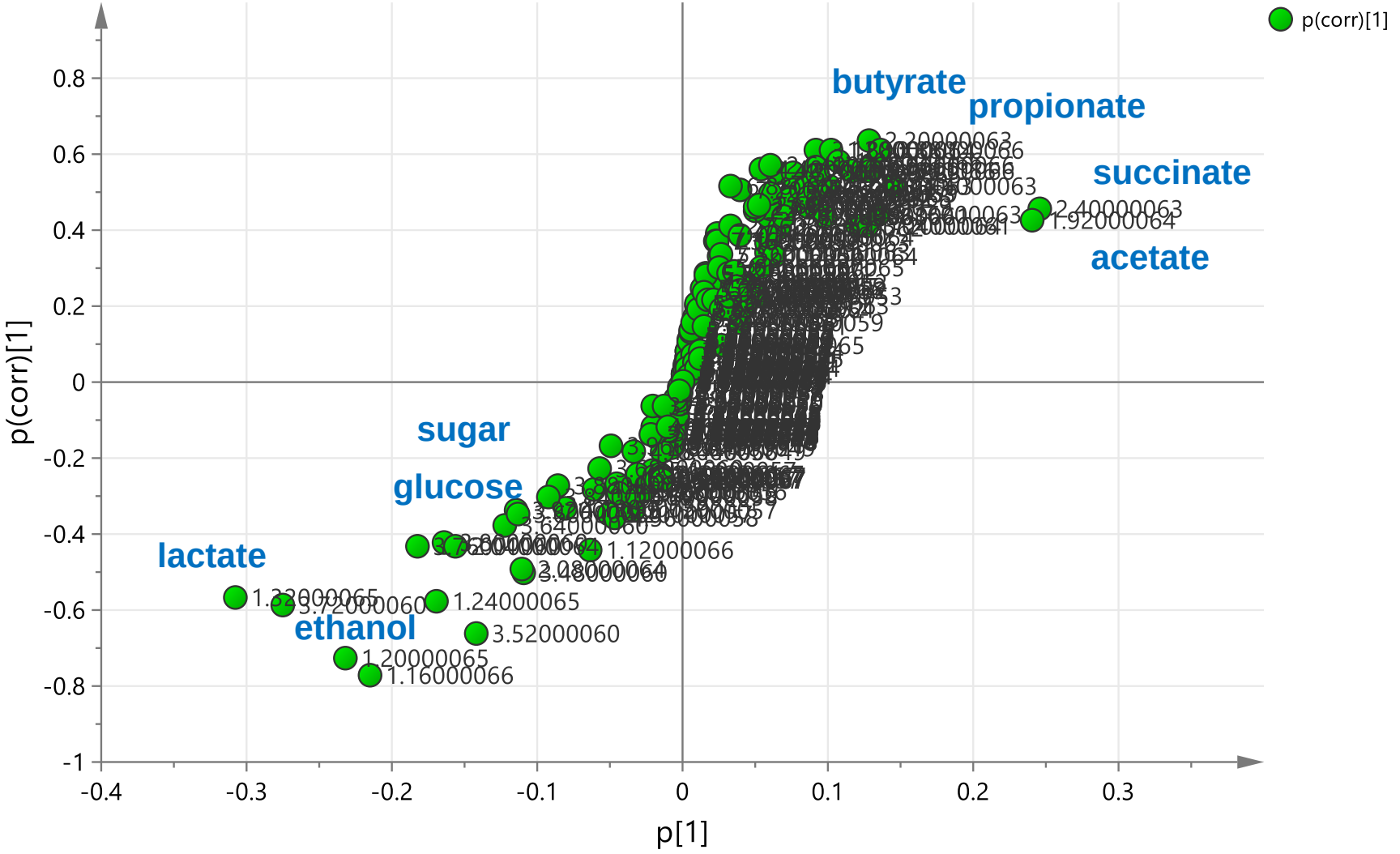
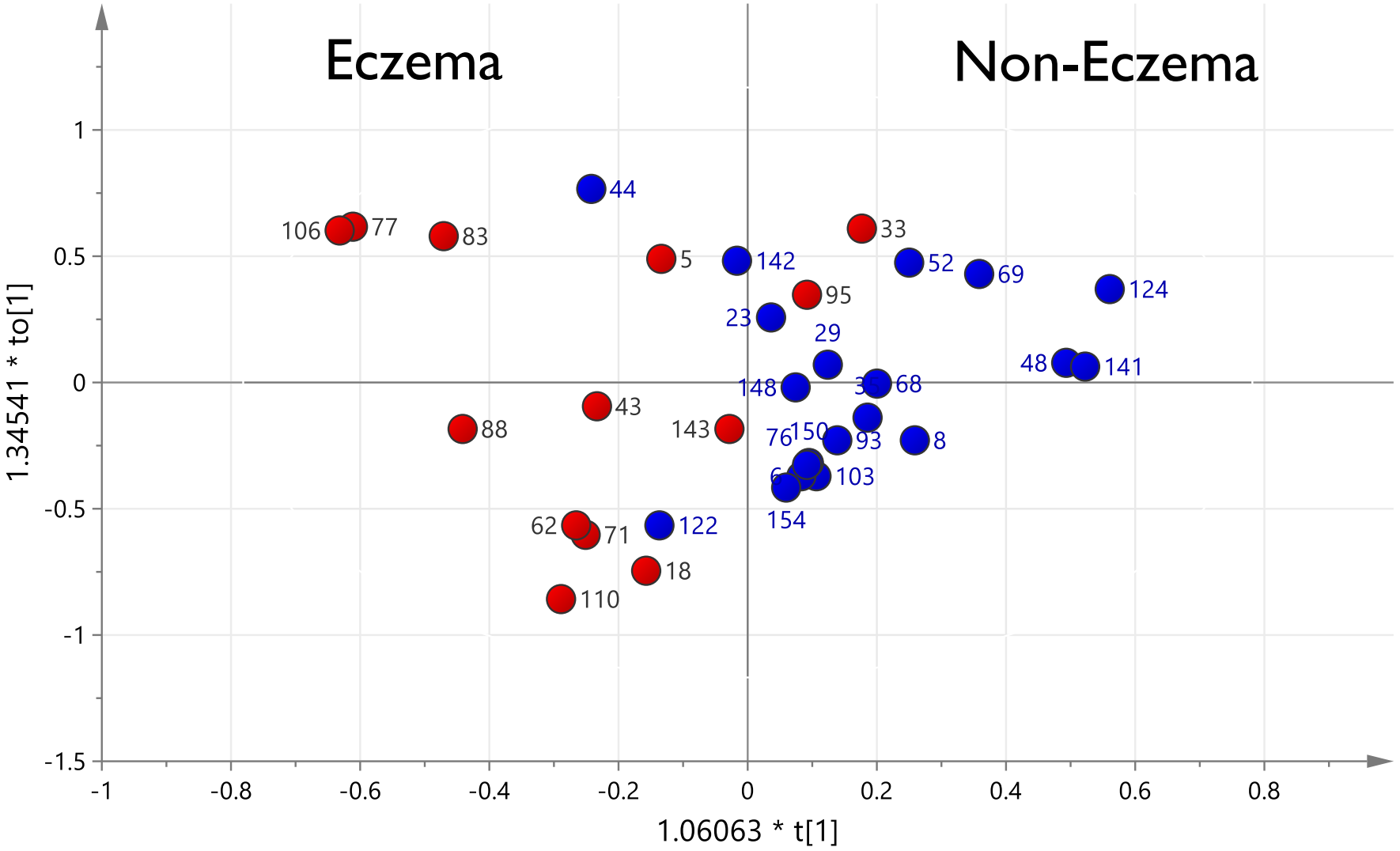
Untargeted metabolomics: NMR

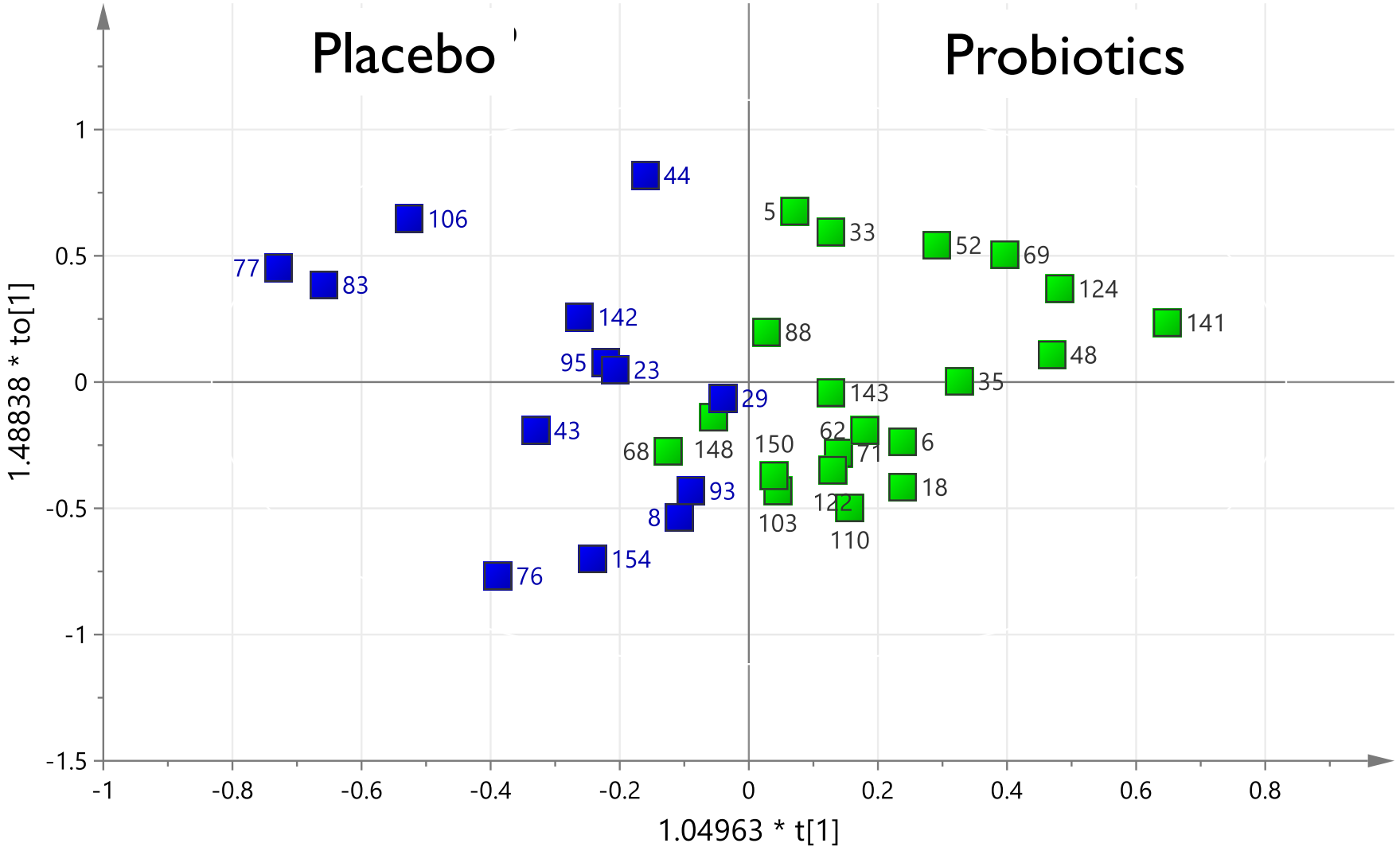


Kim et al., Beneficial Microbes, 2016

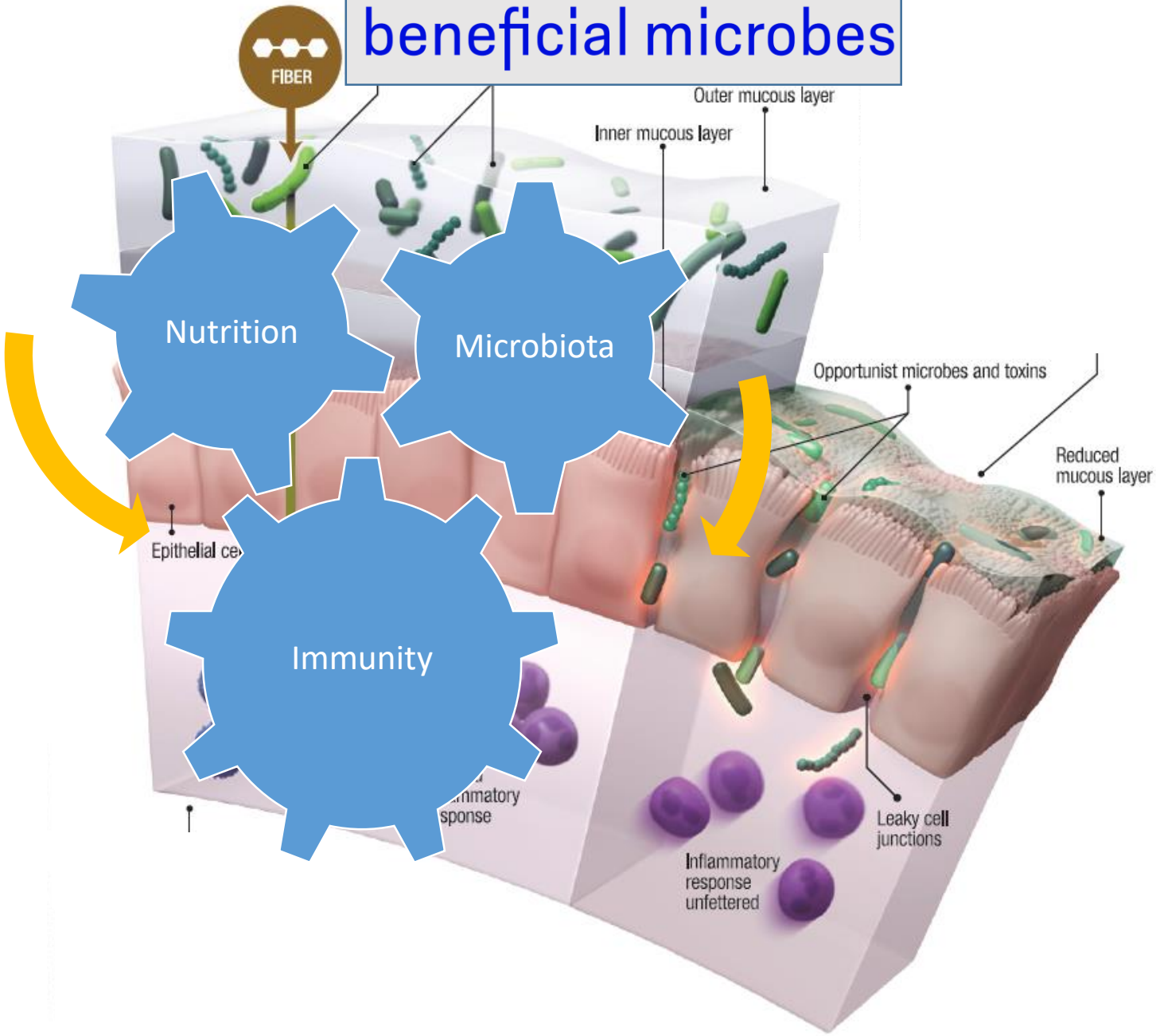
Existing or future eczema: less butyrate



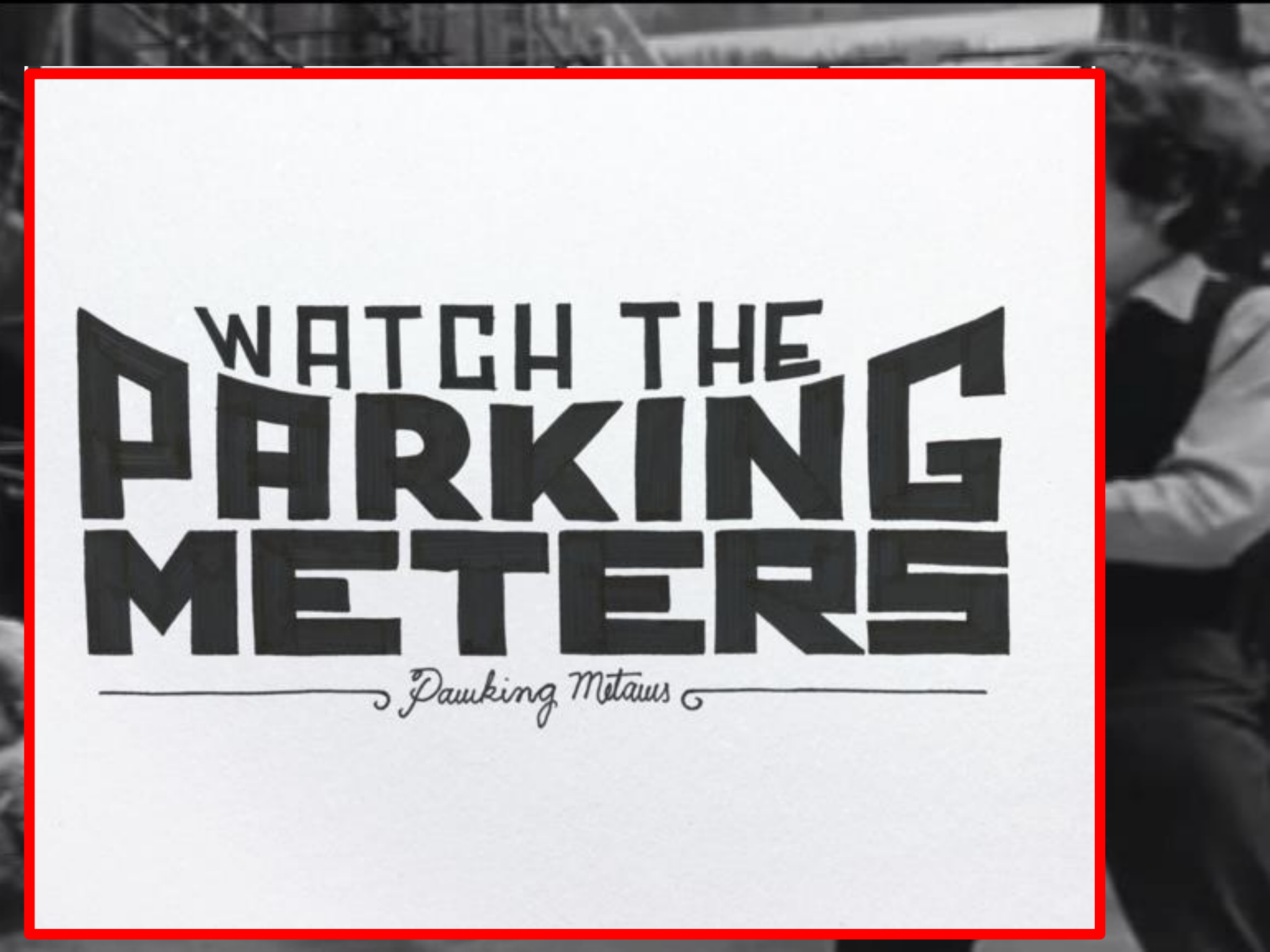
Administration of probiotics: more butyrate



beneficial microbes



MICROBIOTA is the new BLACK


WATCH THE
PARKING
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g.rijkers@ucr.nl

University College Roosevelt