

The Gut Brain Axis

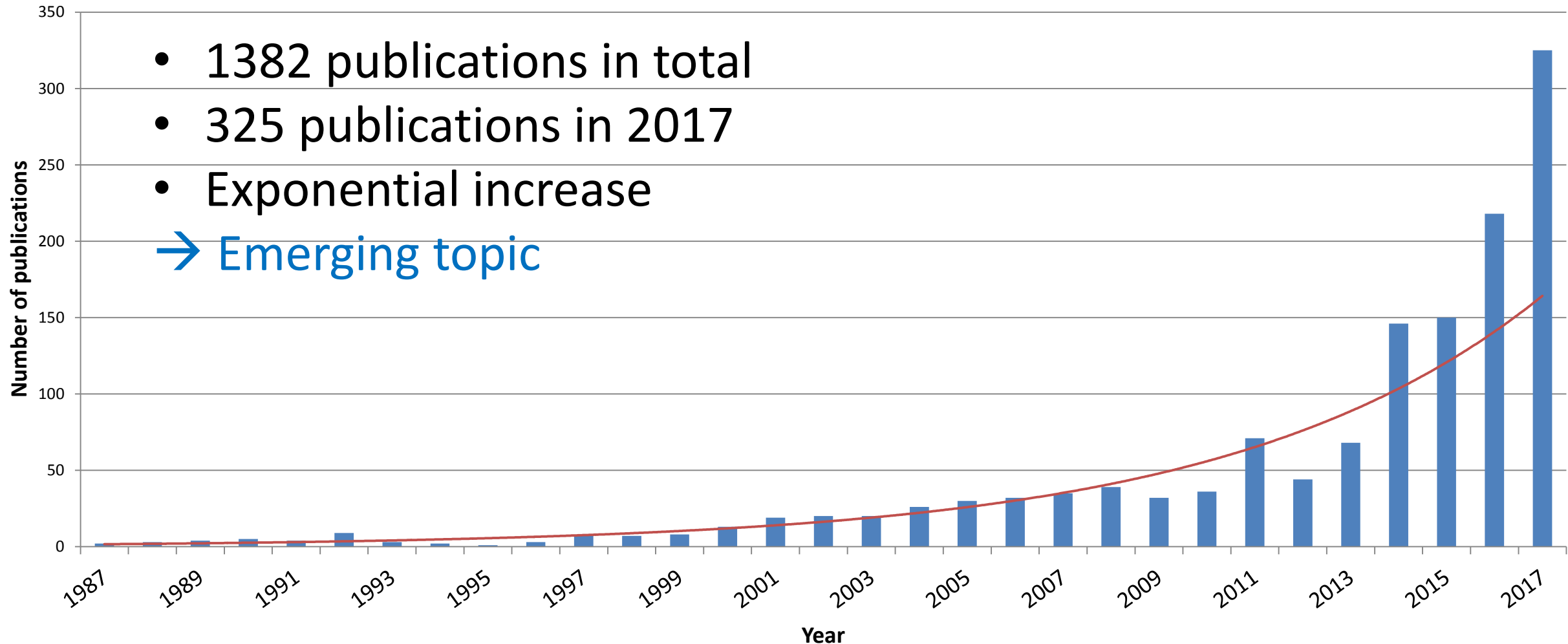
ILSI Europe's research from gut to brain

Tobias Recker

23 January,
Southampton, Bermuda



Number of publications in pubmed on *gut brain axis* over the past 30 years



Current ILSI Europe Scientific Portfolio

FOOD SAFETY

Microbiological Food Safety

- Control Options for Viruses in Food Processing
- Industrial Microbiological Risk Assessment – **Completed**
- Process Validation Protocols
- EU Project EFFORT

Contaminants

- Reactions & Potential Mitigation of Mycotoxins During Food Processing
- (Bio-)Markers of Exposure to Process-Related Contaminants
- Mineral Oil Risk Assessment

Low Dose Effect

- Cancer Potency Database
- Carcinogen Dose-Response Database for TTC
- Uncertainty in TTC

New Approaches for Food Safety

- ToxCast Data on Food Chemicals
- Micronutrient-Food Matrix Interactions
- Next-Generation Sequencing
- Application of Adverse Outcome Pathways
- Authenticity of Food
- Erasmus+ Programme SUIT4FOOD

Packaging

- 6th International Symposium on Food Packaging
- *In Vitro* Bioassays for Food Contact Materials Safety
- Adhesives for Food Packaging Applications
- PET and PS for Food Packaging Applications

Food Allergy

- Verifying VITAL[®] 2.0 Reference Doses: Suitability of Analytical Methods
- Severity versus Dose with Respect to Allergic Reactions
- Tolerable Risk in Food Allergy
- EU Project iFAAM

Joint Food Safety and Nutrition Task Force

Alternatives to Animal Testing

- Holistic Approaches to Develop Alternative Strategies

NUTRITION, DEVELOPMENT & HEALTHY AGEING

Glycaemia & Inflammation

- Reduction of Post-Prandial Glycaemia
- Nutrition and Inflammation
- Metabolic Syndrome Studies
- Post-Prandial Glycaemic Response in Children

Early Life Nutrition

- Early Growth Velocity – **Completed**
- Gestational Diabetes & Diet
- Early Bacterial Colonisation
- Determinants of Immune Competence

Healthy Ageing

- Nutrition for the Ageing Brain
- Plant-Based Ingredients & Cognitive Performance
- Effect of Food Component Interactions on Brain Functions

Nutrient Status of Population Groups

- Carbohydrate-Based Recommendations for Dietary Guidelines
- Health Effects of Saturated Fats
- Nutrition Guidelines for Diabetes

Energy Balance

- Dietary Fibres & Satiety
- Adaptation to Changes in Satiety
- Role of Sweet Taste on Nutrition & Food Preference
- NWO Project Satiation

EXPOSURE & INTAKE ASSESSMENT

Food Intake Assessment Methodology

- Uncertainties in Food Intake Assessments
- Evaluation of New Methods for Dietary Intake Assessment
- Preferred Approaches for Quantifying the Impact of Modifying Nutrient Intakes
- Additive Occurrence & Loyalty

Food Intake Data

- Adequacy of Dietary Fibre Intake
- Adequacies of Omega 3 & Omega 6 PUFA Intakes
- Dietary Supplements, Nutrient-Dense Food & Food Fortification & the Elderly
- Iodine Intake in Europe

GUT MICROBIOTA & HEALTH

Prebiotics

- Structure-Function Relationship for Prebiotic Compounds

Probiotics

- Probiotics: Interplay with the Intestinal Barrier Function
- Mechanisms of Probiotic Action

Oral & Gut Microbiota

- Oral & Systemic Health Resilience
- Exploring the Role of Major Gut Microbiota Clusters – **Completed**
- Microbiome Human Study Research Guidance
- Short Chain Fatty Acid Production for Health

NUTRITION SECURITY & SOCIETAL ASPECTS

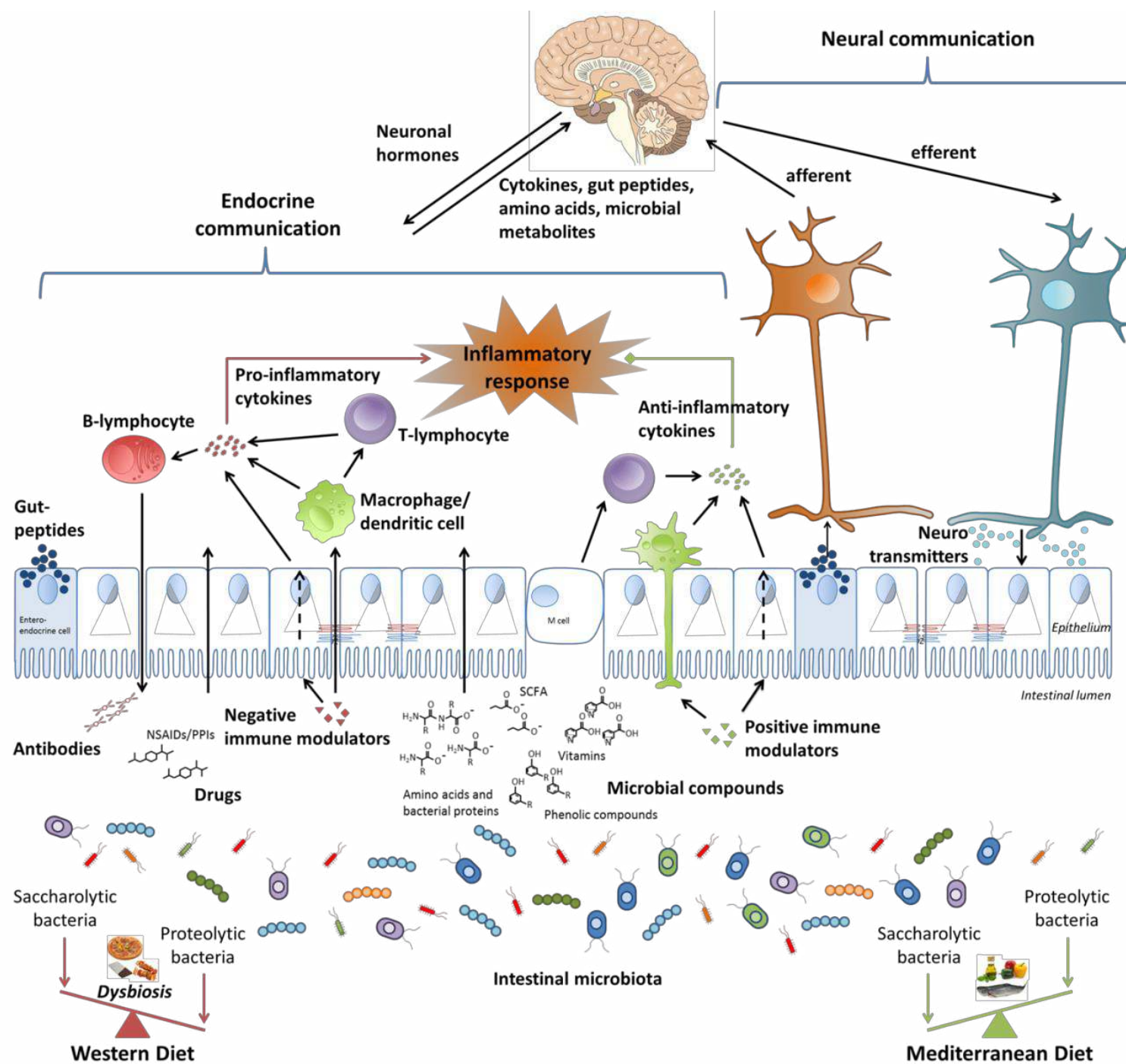
Nutrition Security & Societal Aspects

- Nudging Towards Healthier Food Choices
- EU Project SUSFANS
- EU Project FIT4FOOD2030

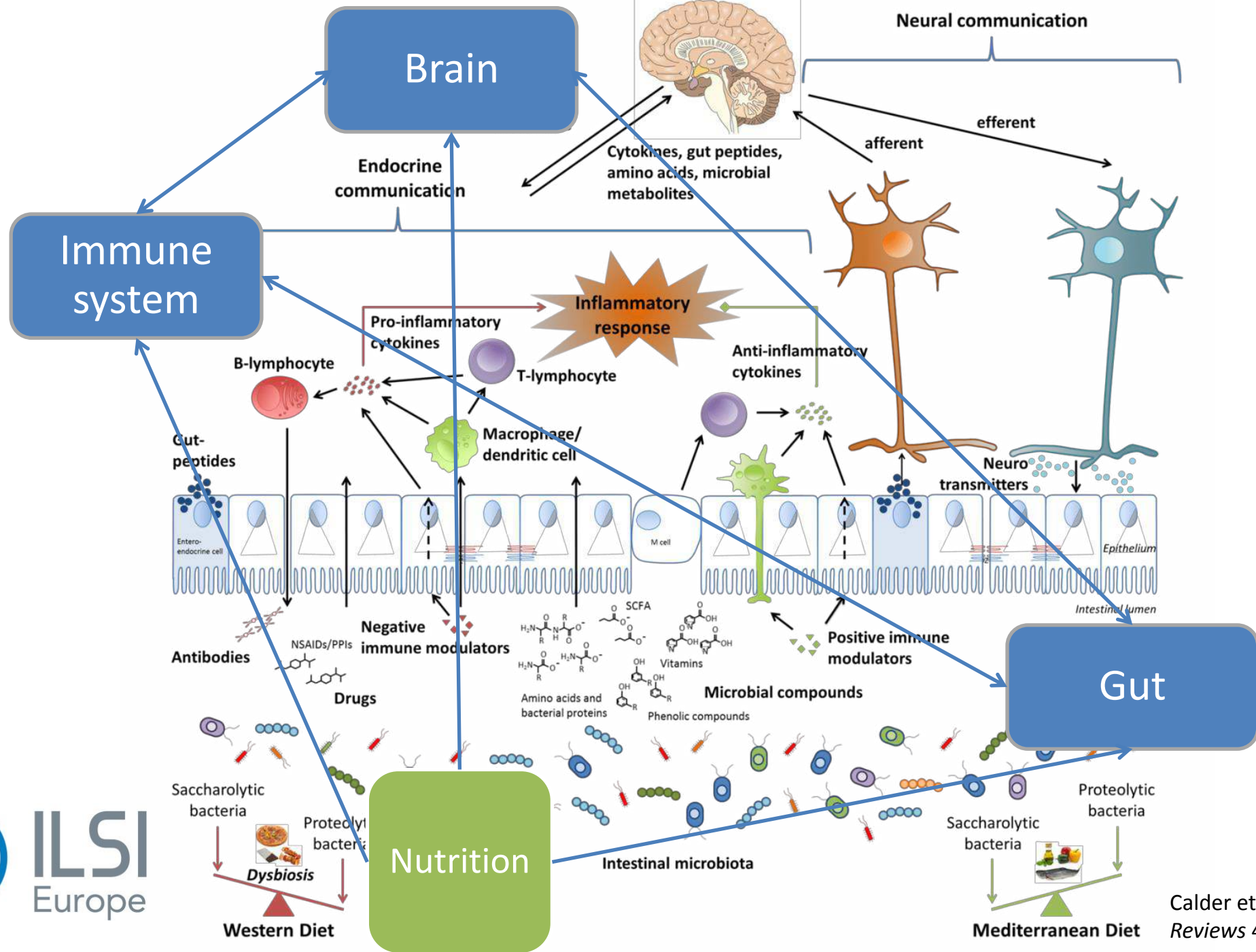
BIOMARKERS & FUNCTIONAL EFFECT MEASUREMENTS

Biochemical and Immunological Markers of Nutrition

- Marker Validation Initiative Part III – **Completed**
- Glycaemic Exposure Markers in the Non-Diabetic Population
- Efficacy Markers of Diabetes Risk
- Quality of Life Measures
- EU Project PATHWAY-27

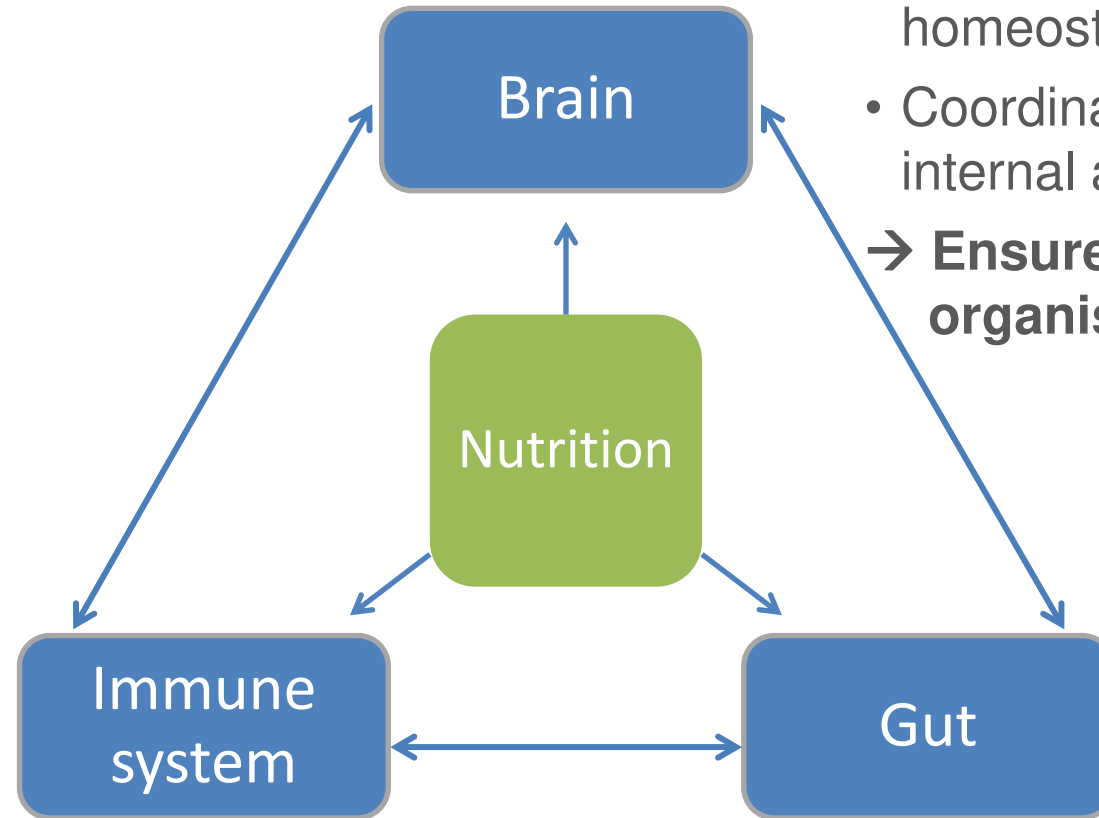


ILSI
Europe



ILSI
Europe

Schematic representation of the gut brain axis



- Controller of basic homeostatic processes
 - Coordinates the responses to internal and external threats
- **Ensures survival of the organism**

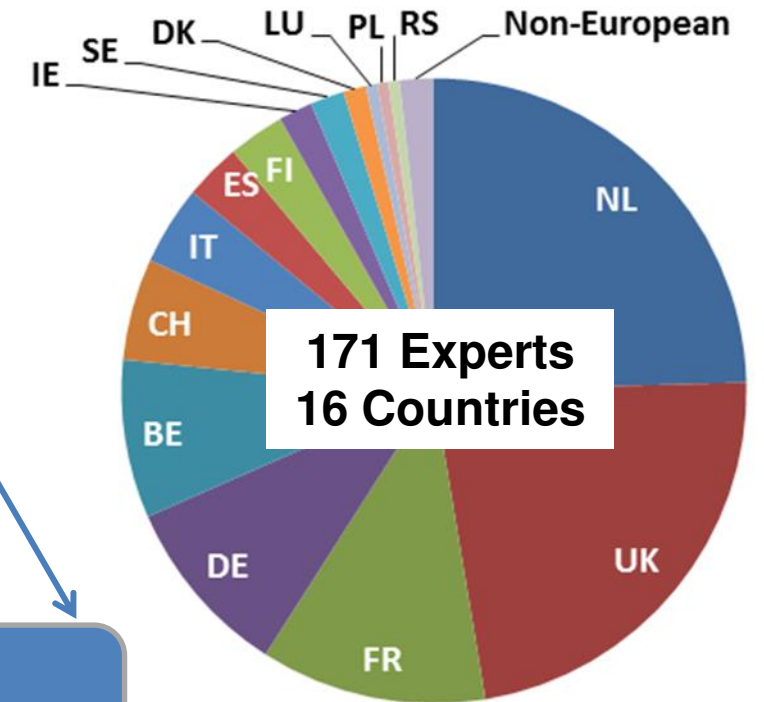
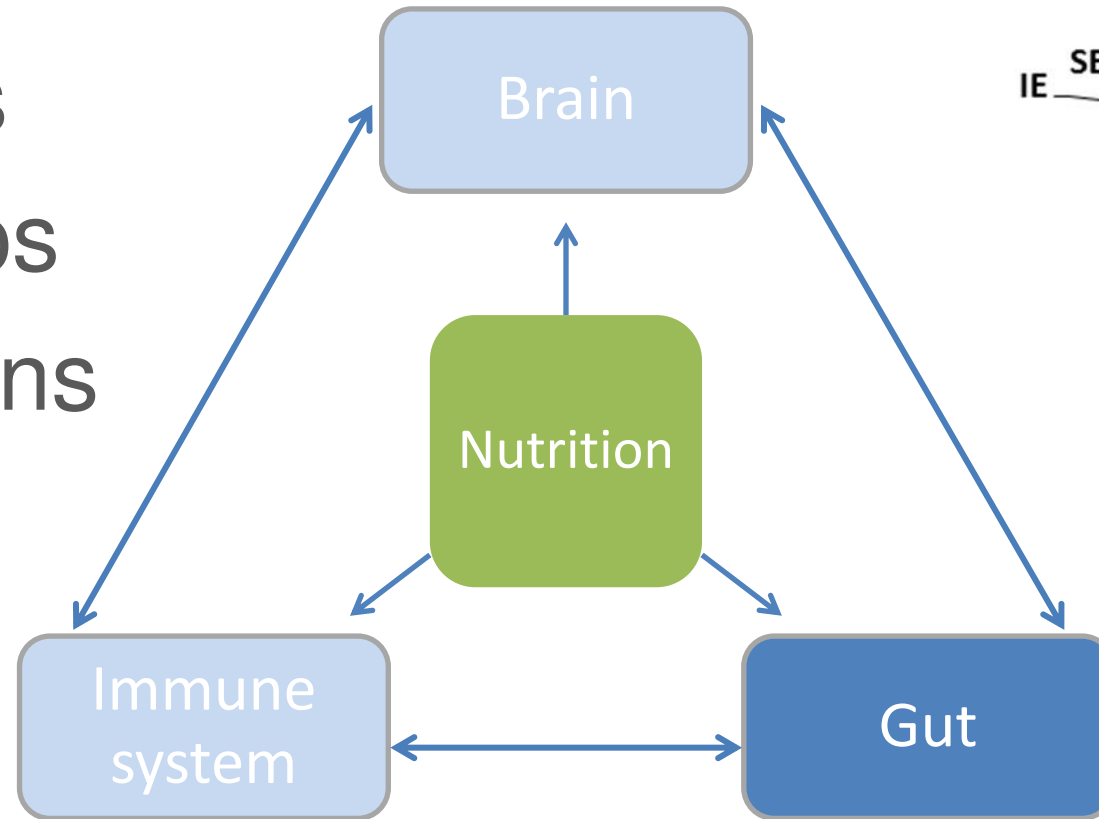


- Defence machinery to fight pathogens
 - **Key role in regulating homeostasis**
- part of fundamental physiological processes and a close crosstalk with other body systems

- An unhealthy gut contributes to a wide range of diseases
- The gut microbiota plays a major role in gastrointestinal health

Gut related activities

- 12 Activities
- 3 Workshops
- 9 Publications



- An unhealthy gut contributes to a wide range of diseases
- The gut microbiota plays a major role in gastrointestinal health

Gut related activities

Mechanistic Insights into Functions of Prebiotics and Probiotics

Gut Microbial Composition and Metabolism

Intestinal Barrier

Health Benefits of Prebiotics and Probiotics

Beneficial health effects have been reported on consumption of specific prebiotic or probiotic food products/ingredients/supplements.

Evaluation of the evidence for prebiotics and probiotics' functionality in several areas of application like inflammatory conditions or metabolism and energy homeostasis

ILSI EUROPE CONCISE MONOGRAPH SERIES
PROBIOTICS, PREBIOTICS AND THE GUT MICROBIOTA



Prebiotic effects: metabolic and health benefits

Marcel Roberfroid¹, Glenn R. Gibson², Lesley Hoyles², Anne L. McCartney², Robert Rastall², Ian Rowland², Danielle Wolvers³, Bernhard Watzl⁴, Hania Szajewska⁵, Bernd Stahl⁶, Francisco Guamer⁷, Frederique Respondek⁸, Kevin Whelan⁹, Veronique Coxam¹⁰, Marie-Jeanne Davicco¹⁰, Laurent Léotoing¹⁰, Yo Auriedouard¹⁰

Supplemental Material can be found at: <http://jn.nutrition.org/cgi/content/full/139/11/3799DC1>

The Journal of Nutrition

Supplement: Guidance for Assessing Probiotics Beneficial Effects—How to Fill the GAP



ILS Europe

Guidance for Substantiating the Evidence for Beneficial Effects of Probiotics: Current Status and Recommendations for Future Research¹⁻³

Ger T. Rijkers,⁴ Stig Bengtmark,⁵ Paul Enck,⁶ Dirk Haller,⁷ Udo Herz,⁸ Marko Kalliomaki,⁹ Satoshi Kudo,¹⁰ Irene Lenoir-Wijnkoop,¹¹ Annick Mercenier,¹² Evelina Myllyluoma,¹³ Sylvie Rabot,¹⁴ Joseph Rafter,¹⁵ Hania Szajewska,¹⁶ Bernhard Watzl,¹⁷ Jerry Wells,¹⁸ Danielle Wolvers,¹⁹ and Jean-Michel Antoine²⁰

Gut related activities

Mechanistic Insights into Functions of Prebiotics and Probiotics

Gut Microbial Composition and Metabolism

Intestinal Barrier

Health Benefits of Prebiotics and Probiotics

Am J Physiol Gastrointest Liver Physiol 312: G171–G193, 2017.
First published December 1, 2016; doi:10.1152/ajpgi.00048.2015.

REVIEW | *Microbiome and Host Interactions*

Homeostasis of the gut barrier and potential biomarkers

Jerry M. Wells,¹ I
Patrice D. Cani,⁶ 1
Annick Mercenier

Citation: *Clinical and Translational Gastroenterology* (2016) 7, e196; doi:10.1038/ctg.2016.54
© 2016 the American College of Gastroenterology 2155-384X/16
www.nature.com/ctg

Human Intestinal Barrier Function in Health and Disease

British Journal of Nutrition, page 1 of 15

© The Authors 2017. This is an Open Access article, distributed under the terms of the Creative

Commons Attribution-NonCommercial-NoDerivatives licence (<http://creativecommons.org/licenses/by-nc-nd/4.0/>),

which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work

is unaltered and is properly cited. The written permission of Cambridge University Press must be obtained for

commercial re-use or in order to create a derivative work.

doi:10.1017/S0007114516004037

Can probiotics modulate human disease by impacting intestinal barrier function?

Peter A. Bron^{1*†}, Michiel Kleerebezem^{2†}, Robert-Jan Brummer³, Patrice D. Cani⁴, Annick Mercenier⁵,
Thomas T. MacDonald⁶, Clara L. Garcia-Ródenas⁵ and Jerry M. Wells²

Prebiotic effects: metabolic and health benefits

Marcel Roberfroid¹, Glenn R. Gibson², Lesley Hoyles², Anne L. McCartney², Robert Rastall², Ian Rowland²,
Danielle Wolvers³, Bernhard Watzl⁴, Hania Szajewska⁵, Bernd Stahl⁶, Francisco Guamer⁷,
Frederique Respondek⁸, Kevin Whelan⁹, Veronique Coxam¹⁰, Marie-Jeanne Davicco¹⁰,
Laurent Léotoing¹⁰, Yo
Audr

Supplemental Material can be found at:
<http://jn.nutrition.org/cgi/content/full/109/11379/DC1>

The Journal of Nutrition

Supplement: Guidance for Assessing Probiotics Beneficial Effects—How to Fill the GAP



Guidance for Substantiating the Evidence for Beneficial Effects of Probiotics: Current Status and Recommendations for Future Research^{1–3}

Ger T. Rijkers,⁴ Stig Bengtmark,⁵ Paul Enck,⁶ Dirk Haller,⁷ Udo Herz,⁸ Marko Kalliomaki,⁹ Satoshi Kudo,¹⁰
Irene Lenoir-Wijnkoop,¹¹ Annick Mercenier,¹² Evelina Myllyluoma,¹³ Sylvie Rabot,¹⁴ Joseph Rafter,¹⁵
Hania Szajewska,¹⁶ Bernhard Watzl,¹⁷ Jerry Wells,¹⁸ Danielle Wolvers,¹⁹ and Jean-Michel Antoine²⁰



ILS
Europe

ILSI EUROPE CONCISE MONOGRAPH SERIES
PROBIOTICS, PREBIOTICS
AND THE GUT MICROBIOTA



Gut related activities

Mechanistic Insights into Functions of Prebiotics and Probiotics

Gut Microbial Composition and Metabolism

Intestinal Barrier

Health Benefits of Prebiotics and Probiotics

Nutrition Research Reviews (2015), 28, 42-66
doi:10.1017/S0954422415000037
© The ILSI Europe a.i.s.b.l. 2015. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/3.0/>), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Towards microbial fermentation metabolites as markers for health benefits of prebiotics

Kristin A. Verbeke¹,
Michiel Kleerebezer¹

Eur J Nutr
DOI 10.1007/s00394-017-1445-8



REVIEW | *Microbiome and Host Interactions*

Homeostasis of the gut barrier and potential

Jerry M. Wells,¹ I
Patrice D. Cani,⁶ 1
Annick Mercenier

Gut microbiota functions: metabolism of nutrients and other food components

Ian Rowland¹ · Glenn Gibson¹ · Almut Heinken² · Karen Scott³ · Jonathan Swann⁴ ·

Eur J Nutr
DOI 10.1007/s00394-017-1546-4



Human Intestinal Barrier Function and Disease

Julia König, PhD¹,
Jacqueline Whyte¹

British Journal of Nutrition, page 1 of 15
© The Authors 2017. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. The written permission for commercial re-use or in order to create a derivative work must be obtained from the publisher.

Can probiotics modulate human intestinal barrier function?

Peter A. Bron¹*, Michiel Kleerebezer¹,
Thomas T. MacDonald⁶, Clara L. G.

Systematic review of the effects of the intestinal microbiota on selected nutrients and non-nutrients

Colette Shortt¹ · Oliver Hasselwander² · Alexandra Meynier³ · Arjen Nauta⁴ ·
Estefanía Noriega Fernández⁵ · Peter Putz⁶ · Ian Rowland⁷ · Jonathan Swann⁸ ·
Jessica Türk⁹ · Joan Vermeiren¹⁰ · Jean-Michel Antoine¹¹

ILSI EUROPE CONCISE MONOGRAPH SERIES
PROBIOTICS, PREBIOTICS
AND THE GUT MICROBIOTA



Prebiotic effects: metabolic and health benefits

Marcel Roberfroid¹, Glenn R. Gibson², Lesley Hoyles², Anne L. McCartney², Robert Rastall², Ian Rowland²,
Danielle Wolvers³, Bernhard Watzl⁴, Hania Szajewska⁵, Bernd Stahl⁶, Francisco Guamer⁷,
Frederique Respondek⁸, Kevin Whelan⁹, Veronique Coxam¹⁰, Marie-Jeanne Davicco¹⁰,
Laurent Léotoing¹⁰, Yo

Supplemental Material can be found at:
<http://jn.nutrition.org/cgi/content/full/109-113779/DC1>

The Journal of Nutrition
Supplement: Guidance for Assessing Probiotics Beneficial Effects—How to Fill the GAP



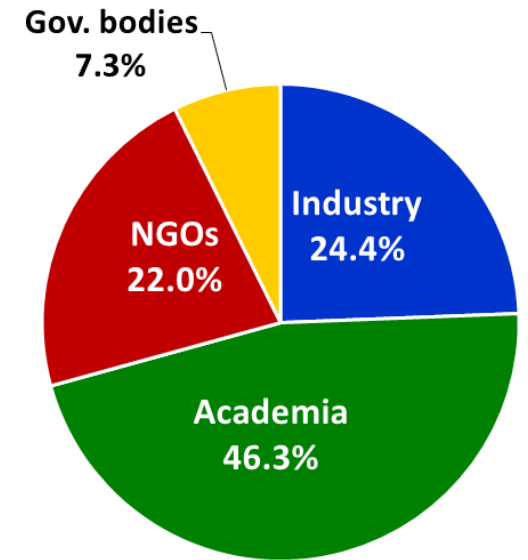
Guidance for Substantiating the Evidence for Beneficial Effects of Probiotics: Current Status and Recommendations for Future Research¹⁻³

Ger T. Rijkers,⁴ Stig Bengtmark,⁵ Paul Enck,⁶ Dirk Haller,⁷ Udo Herz,⁸ Marko Kalliomaki,⁹ Satoshi Kudo,¹⁰
Irene Lenoir-Wijnkoop,¹¹ Annick Mercenier,¹² Evelina Myllyluoma,¹³ Sylvie Rabot,¹⁴ Joseph Rafter,¹⁵
Hania Szajewska,¹⁶ Bernhard Watzl,¹⁷ Jerry Wells,¹⁸ Danielle Wolvers,¹⁹ and Jean-Michel Antoine²⁰



ILSI
Europe

Gut Microbial Composition and Metabolism



Stakeholder Workshop, on 3-4 December 2015

- Gut microbiota metabolism extends metabolic flexibility of host to process a wide range of substrates
- Microbial metabolites of nutrients and non-nutrients can be important cell signaling molecules (SCFA, bile acids) and have impacts on health (SCFA, TMA, phenolics)
- Large inter-individual variation in microbiota → potential consequences for metabolism of dietary compounds and health

Mechanistic Insights into Functions of Prebiotics and Probiotics

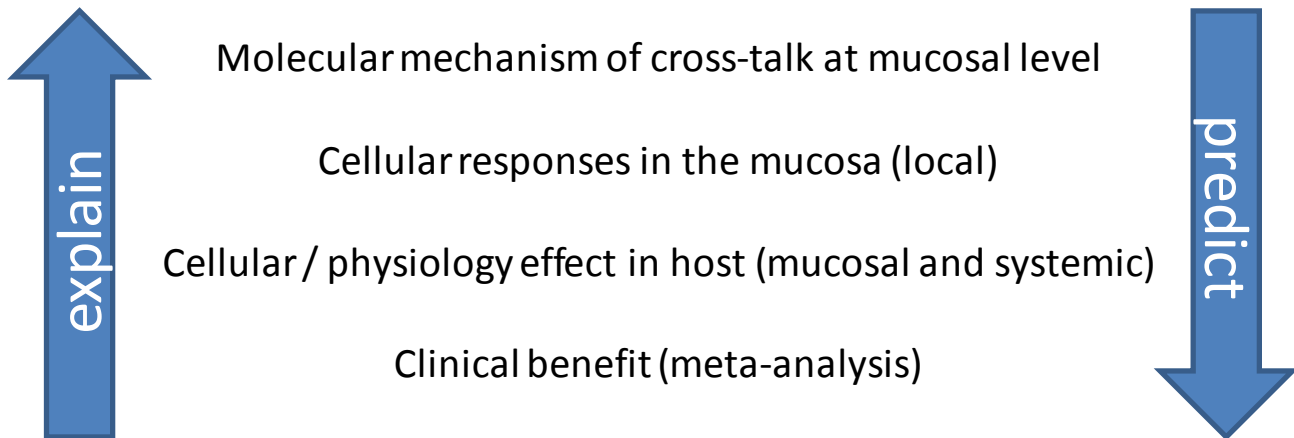
Mechanisms of Probiotic Action

- Investigate and evaluate current knowledge about the mechanisms of probiotic action
- Link health benefit, physiological function and probiotic mechanism;

Structure-Function Relation of Prebiotics

- Prediction how a specific core structure of a carbohydrate compound impacts the gut microbiota, and subsequently the host

→ This activity is a first step in defining structure-function relations



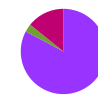
Oligofructose

$(\text{Fru}\beta 2 \rightarrow 1)_n \text{Fru}\beta 2 \leftrightarrow 1\alpha \text{Glc}$



Soy oligosaccharides

$(\text{Gal}\alpha 1 \rightarrow 6)_{1-3} \text{Glc}\alpha 1 \leftrightarrow 2\beta \text{Fru}$



Galacto-oligosaccharides

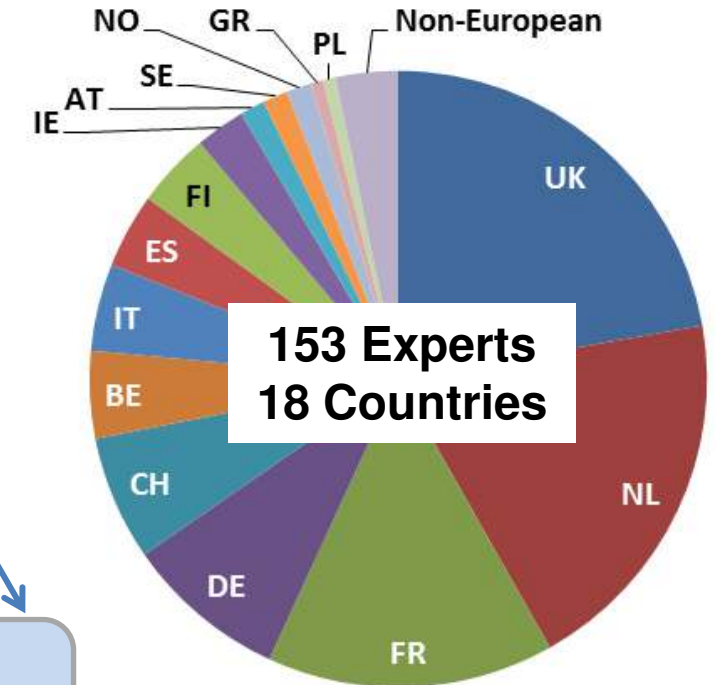
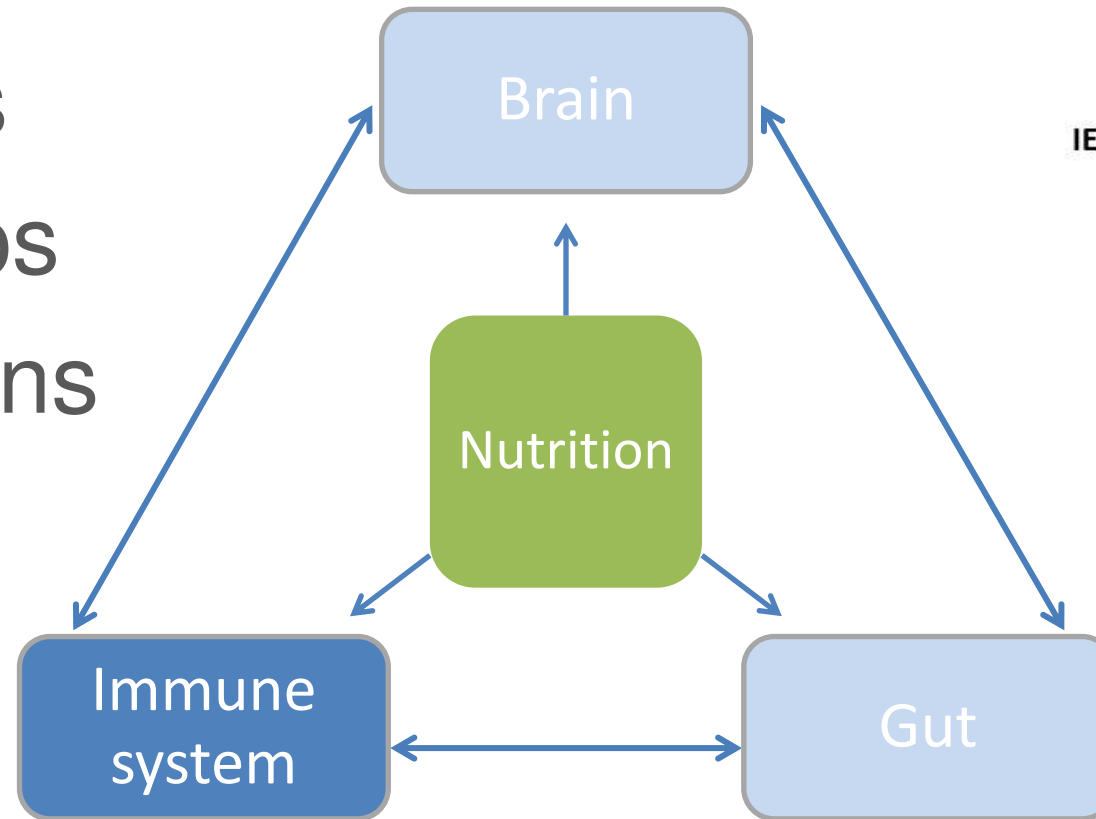
$(\text{Gal}\beta 1 \rightarrow 4/6)_n \text{Glc}$



Acetate
Propionate
Butyrate

Immune system related activities

- 10 Activities
- 2 Workshops
- 9 Publications



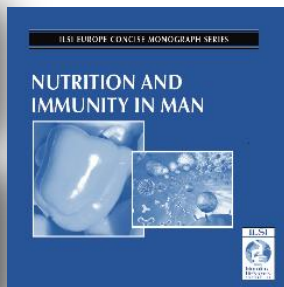
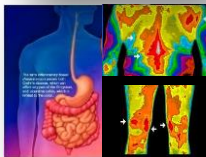
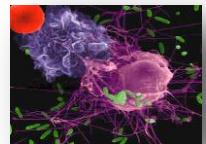
- Defence machinery to fight pathogens
- **Key role in regulating homeostasis**
- part of fundamental physiological processes and a close crosstalk with other body systems

Immune system related activities

Understanding the health relevance of immune modulation and the role of nutrition

Understanding the impact of nutrition on immune functions

Understanding the complexity of the immune system and its role in maintaining health



Monitoring immune modulation by nutrition in the general population: identifying and substantiating effects on human health

Ruud Albers¹, Raphaëlle Bourdet-Sicard², Deborah Braun³, Philip C. Calder⁴, Udo Herz⁵,

Inflammatory Disease Processes and Interactions with Nutrition

P. C. Calder¹, R. Albers², J.-M. Antoine³, S. Blum⁴, R. Bourdet-Sicard³, G. A. Fems⁵, G. Folkerts⁶,

A Consideration of Biomarkers to be used for Evaluation of Inflammation in Human Nutritional Studies

P.C. Calder¹, N. Ahluwalia², R. Albers^{3,4}, N. Bosco⁵, R. Bourdet-Sicard⁶,

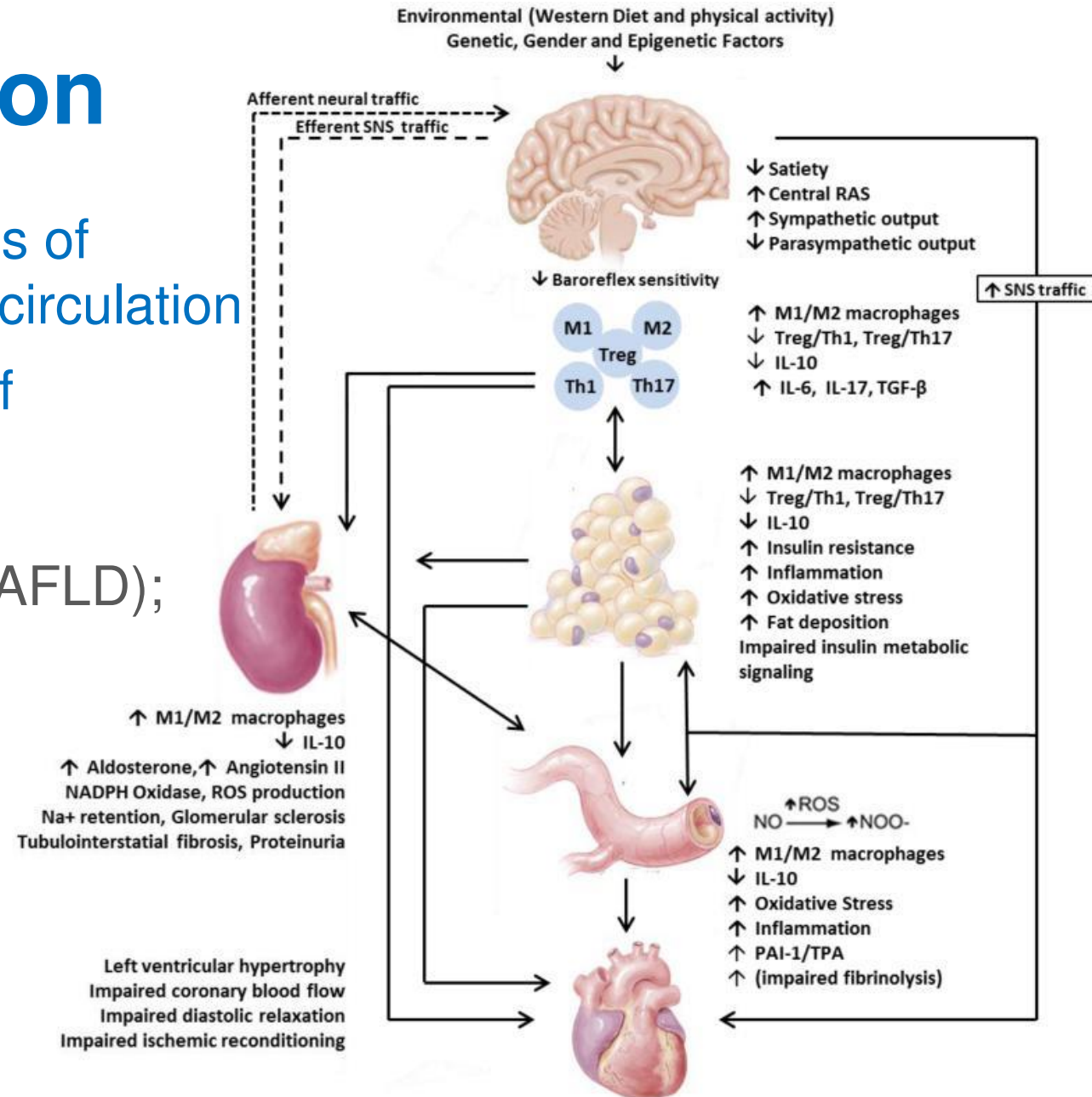
British Journal of Nutrition (2005), 94, 452-481
© ILSI 2005

Markers to measure immunomodulation in human nutrition intervention studies†

Ruud Albers¹, Jean-Michel Antoine², Raphaëlle Bourdet-Sicard², Philip C. Calder³, Michael Gleeson⁴,

Low-grade inflammation

- Characterised by raised concentrations of inflammatory markers in the systemic circulation
- Pathological feature of a wide range of chronic disease conditions:
 - Metabolic syndrome (MetS);
 - Non-alcoholic fatty liver disease (NAFLD);
 - Type 2 diabetes mellitus (T2DM);
 - Chronic kidney disease (CKD);
 - Cardiovascular disease (CVD);
 - Cognitive decline.



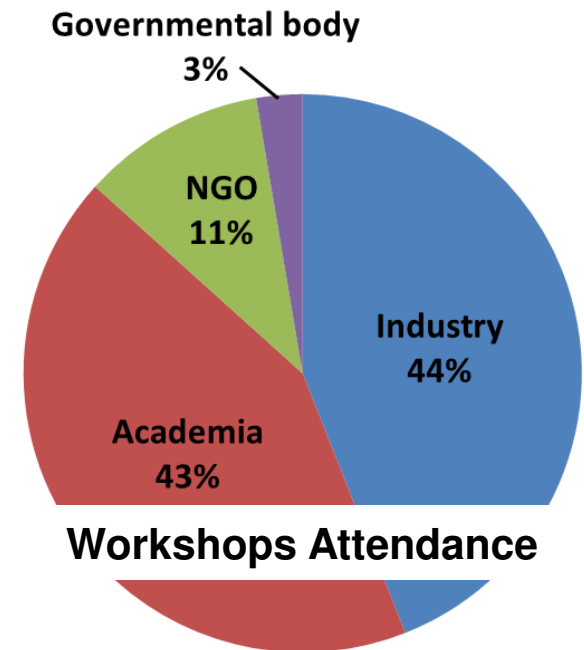


ILSI Europe Workshop on
Low-grade Inflammation: A High-grade Challenge
Biomarkers and Modulation by Dietary Strategies

15 SEPTEMBER 2013, GRANADA, SPAIN

In collaboration with ILSI
Brazil, ILSI North America,
ILSI Southeast Asia Region

- Highlighted the **importance of low-grade inflammation** in health and disease;
- Reviewed and interpreted the extensive literature on the **dietary modulation of low-grade inflammation** by macronutrients, micronutrients and non-nutrients (such as fibre and other plant bio-actives);
- Provided a comprehensive overview of the hierarchy of **inflammatory markers as biomarkers of risk** of the metabolic syndrome, diabetes, cardiovascular disease, cognitive and gut health;
- Focused on issues relevant to the **translation of research findings into health claims.**
 - Controlling inflammation a key future preventative and therapeutic target



Low-grade inflammation and diet

Dietary factors and low-grade inflammation in relation to overweight and obesity

Philip C. Calder¹, Namanjeet Ahluwalia², Fred Brouns^{3,21}, Timo Buetler^{4,22}, Karine Clement⁵, Karen Cunningham⁶, Katherine Esposito⁷, Lena S. Jönsson⁸, Hubert Kolb⁹, Mirian Lansink¹⁰, Ascension Marcos¹¹, Andrew Margioris¹², Nathan Matusheski¹³, Herve Nordmann¹⁴, John O'Brien⁴, Giuseppe Pugliese¹⁵, Salwa Rizkalla⁵, Casper Schalkwijk¹⁶, Jaakko Tuomilehto¹⁷, Julia Wärnberg^{11,18}, Bernhard Watzl¹⁹ and Brigitte M. Winklhofer-Roob²⁰

Low-grade inflammation, diet composition and health: current research evidence and its translation

Anne M. Minihane¹, Sophie Vinoy², Wendy R. Russell³, Athanasia Baka⁴, Helen M. Roche⁵, Kieran M. Tuohy⁶, Jessica L. Teeling⁷, Ellen E. Blaak⁸, Michael Fenech⁹, David Vauzour¹, Harry J. McArdle³, Bas H. A. Kremer¹⁰, Luc Sterkman¹¹, Katerina Vafeiadou¹², Massimo Massi Benedetti¹³, Christine M. Williams¹⁴ and Philip C. Calder^{15,16}

- Explains the nature of chronic low-grade inflammation in the context of overweight and obesity;
- Describes the factors that might influence it, in particular those related to diet.
- Focus on the latest research findings in the areas of inflammation and cardio-metabolic, cognitive and gut health,
- Reviews how early-life nutrition as well as the macronutrient and plant bioactive composition of the adult diet influence inflammatory processes.

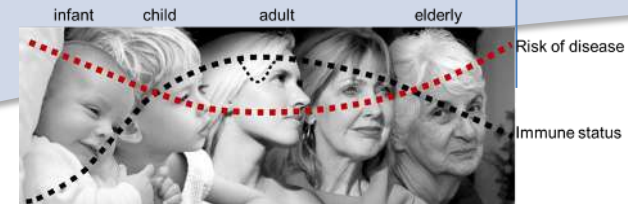
Immune system related activities

Understanding immune modulation across lifespan

Understanding the health relevance of immune modulation and the role of nutrition

Understanding the impact of nutrition on immune functions

Understanding the complexity of the immune system and its role in maintaining health



Monitoring immune modulation by nutrition in the general population: identifying and substantiating effects on human health
 Ruud Albers¹, Raphaëlle Bourdet-Sicard², Deborah Braun³, Philip C. Calder⁴, Udo Herz⁵,

Ageing Research Reviews 40 (2017) 96–119

Contents lists available at ScienceDirect

Ageing Research Reviews

journal homepage: www.elsevier.com/locate/arr

ELSEVIER

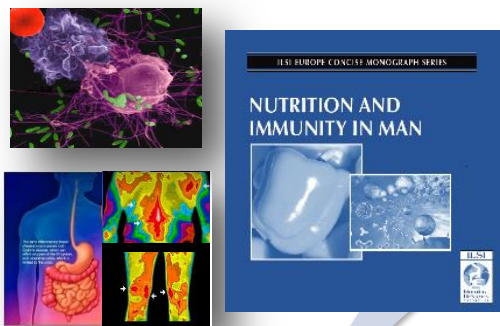
Review

Health relevance of the modification of low grade inflammation in ageing (inflammageing) and the role of nutrition

Philip C. Calder^{a,b}, Nabil Bosco^c, Raphaëlle Bourdet-Sicard^d, Lucile Capuron^{e,f}, Michael Gleeson^g, Udo Herz^h, Deborah Braunⁱ, Ruud Albers^j, Michael Altmann^k, Michaela Müller^l, Michaela Müller^m

Inflammatory Disease Processes and Interactions with Nutrition
 P. C. Calder¹, R. Albers², J.-M. Antoine³, S. Blum⁴, R. Bourdet-Sicard³, G. A. Fems⁵, G. Folkerts⁶,

A Consideration of Biomarkers to be used for Evaluation of Inflammation in Human Nutritional Studies
 P.C. Calder¹, N. Ahluwalia², R. Albers^{3,4}, N. Bosco⁵, R. Bourdet-Sicard⁶,



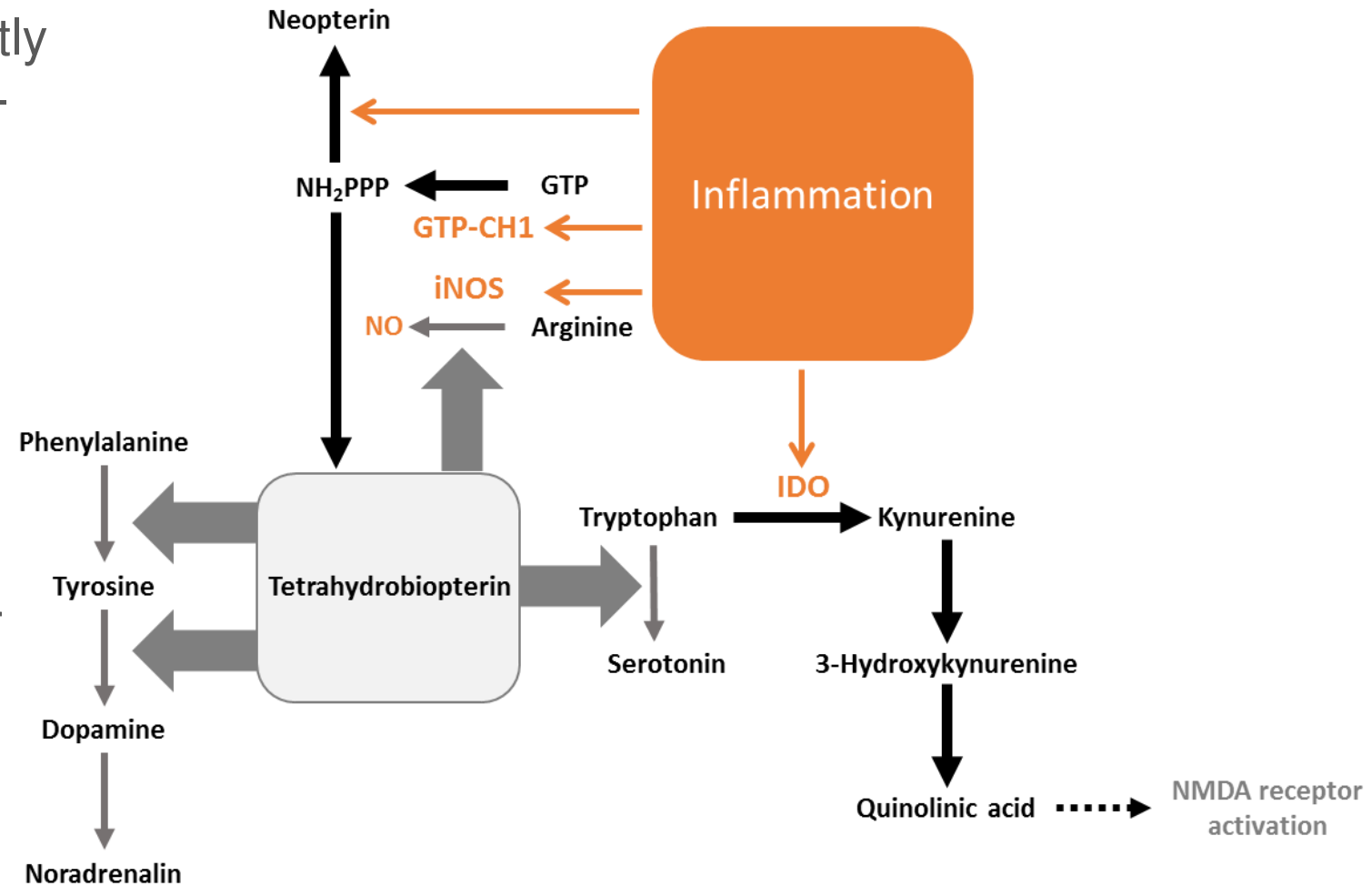
British Journal of Nutrition (2005), 94, 452–481
 © ILSI 2005

Markers to measure immunomodulation in human nutrition intervention studies†

Ruud Albers¹, Jean-Michel Antoine², Raphaëlle Bourdet-Sicard², Philip C. Calder³, Michael Gleeson⁴,

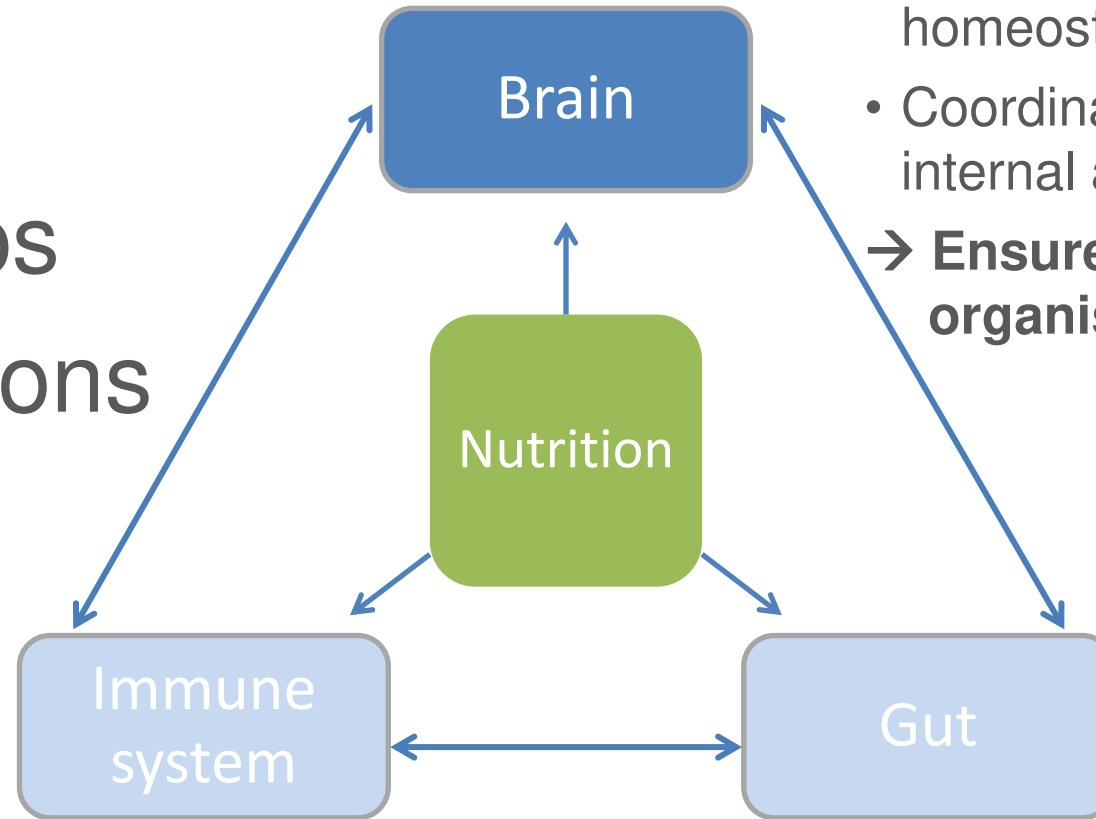
Low Grade Inflammation mediated alteration of brain functions

- Pro-inflammatory cytokines potently modulate the activity of the neuro-endocrine system → chronic inflammation could result into dysregulation of the HPA axis
- Pro-inflammatory cytokines significantly modulate neural plasticity and neurogenesis
- Pro-inflammatory cytokines have potent effects on neurotransmitter metabolism and function

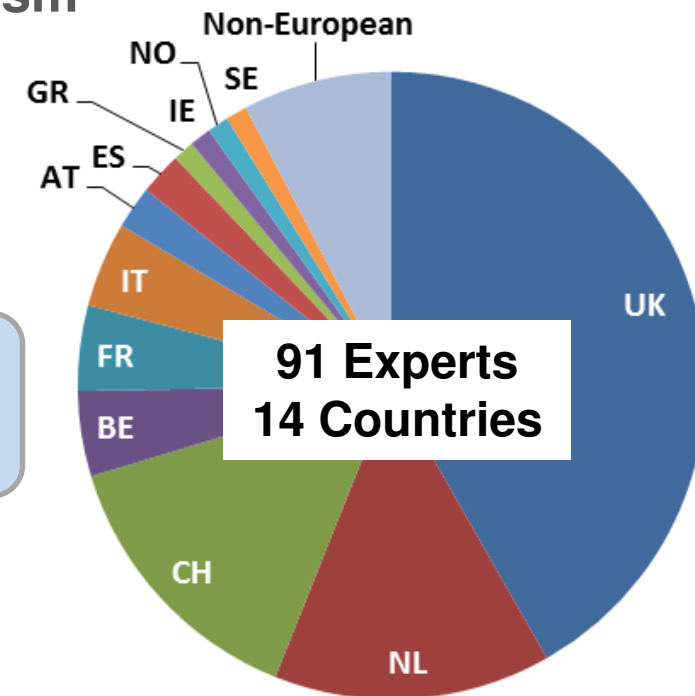


Brain related activities

- 7 Activities
- 4 Workshops
- 10 Publications



- Controller of basic homeostatic processes
 - Coordinates the responses to internal and external threats
- Ensures survival of the organism



Brain related activities

Food Component Interactions and Brain Functions

Plant-Based ingredients and cognitive performance

Workshop Series 'Nutrition for the Ageing Brain'

Impact of nutrition on cognition and behaviour in childhood

Examination of measures, techniques and tests for assessing effects of food and nutrients.



Eur J Nutr (2008) 47(Suppl 3):4-24
DOI 10.1007/s00394-008-3002-y

SUPPLEMENT

E. Isaacs
J. Oates

Nutrition and cognition: assessing cognitive abilities in children and young people

Ageing Research Reviews 35 (2017) 222-240

Contents lists available at ScienceDirect

Ageing Research Reviews

journal homepage: www.elsevier.com/locate/arr

Nutrition for the ageing brain: Towards evidence for an optimal diet

CrossMark



Brain imaging and human nutrition: which measures to use in intervention studies?

Stéphane V. Sizonenko¹, Claudio Babiloni^{2,3}, Eveline A. de Bruin⁴, Elizabeth B. Isaacs⁵, Lena S. Jönsson⁶, David O. Kennedy⁷, Marie E. Latulippe⁸, M. Hasan Mohajeri⁹, Judith Moreines⁹, Pietro Pietrini¹⁰, Kristine B. Walhovd¹¹, Robert J. Winwood¹² and John W. Sijben¹³

Special Article

Eur J Nutr (2008) 47(Suppl 3):25-37
DOI 10.1007/s00394-008-3003-x

SUPPLEMENT

David Benton

The influence of children's diet on their cognition and behavior

Ageing Research Reviews 42 (2018) 40-55

Contents lists available at ScienceDirect

Ageing Research Reviews

journal homepage: www.elsevier.com/locate/arr

Review

Poor cognitive ageing: Vulnerabilities, mechanisms and the impact of nutritional interventions

Check for updates

Eur J Nutr (2016) 55:1991-2000
DOI 10.1007/s00394-015-1143-3

REVIEW

Criteria for validation and selection of cognitive tests for investigating the effects of foods and nutrients

Celeste A de Jager, Louise Dye, Eveline A de Bruin, Laurie Butler, John Fletcher, Daniel J Lamport, Marie E Latulippe, Jeremy PE Spencer, and Keith Wesnes

Eur J Nutr (2008) 47(Suppl 3):38-50
DOI 10.1007/s00394-008-3004-9

SUPPLEMENT

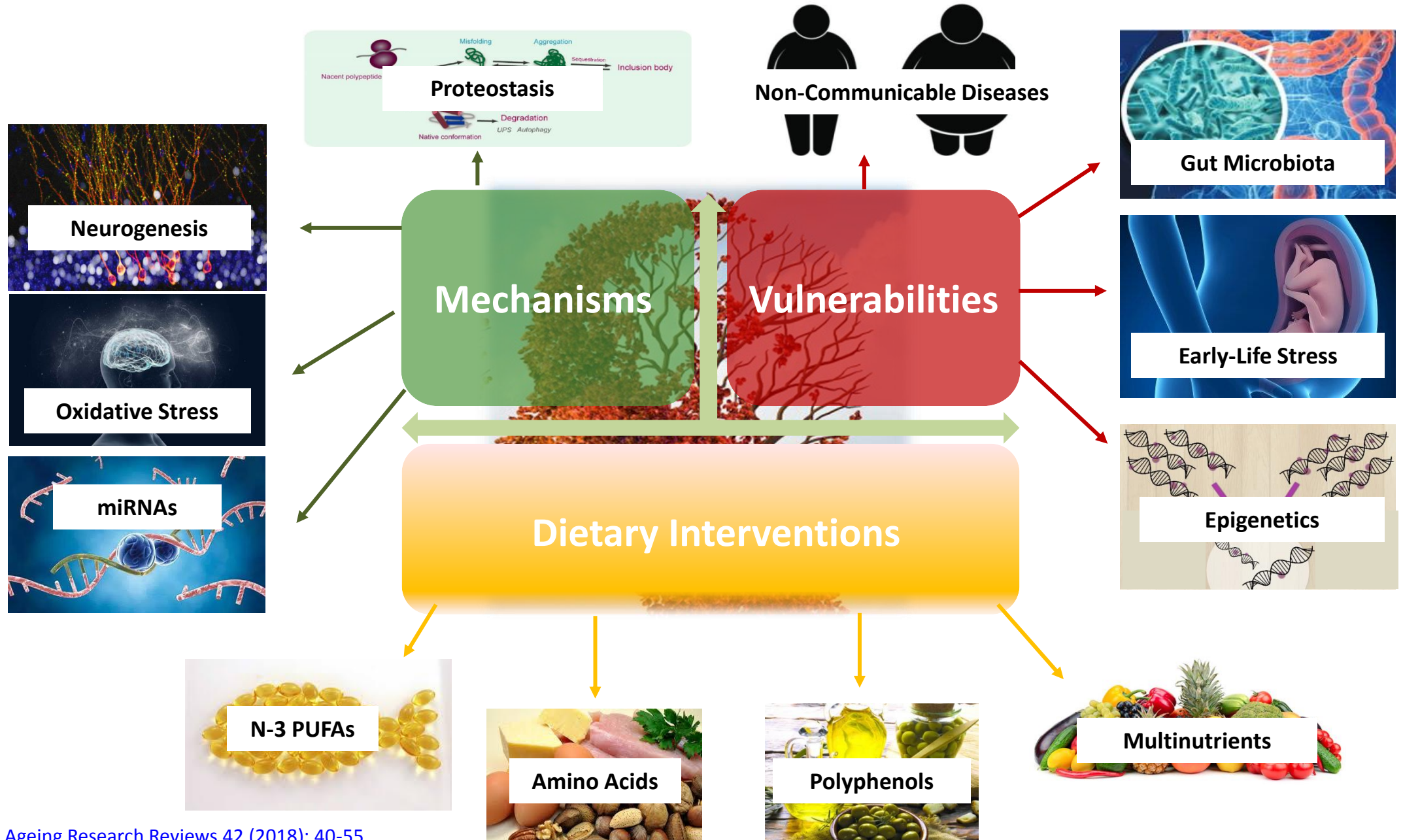
David Benton

Micronutrient status, cognition and behavioral problems in childhood

Examining techniques for measuring the effects of nutrients on mental performance and mood state

Mark Hamer¹ · Louise Dye² · E. Siobhan Mitchell³ · Sophie Laye^{4,5} · Caroline Saunders^{6,7} · Neil Boyle² · Jeroen Schuermans⁸ · John Sijben⁹

Nutrition for the Ageing Brain Workshops



Nutrition for the Ageing Brain Workshops

New

Upcoming 3rd Workshop

‘Nutrition for the Ageing Brain: Moving Towards Clinical Applications’

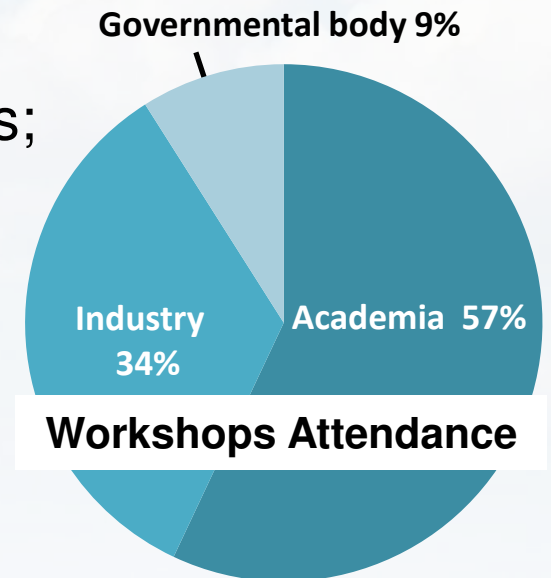
30 – 31 August 2018, Madrid, ES

Objectives

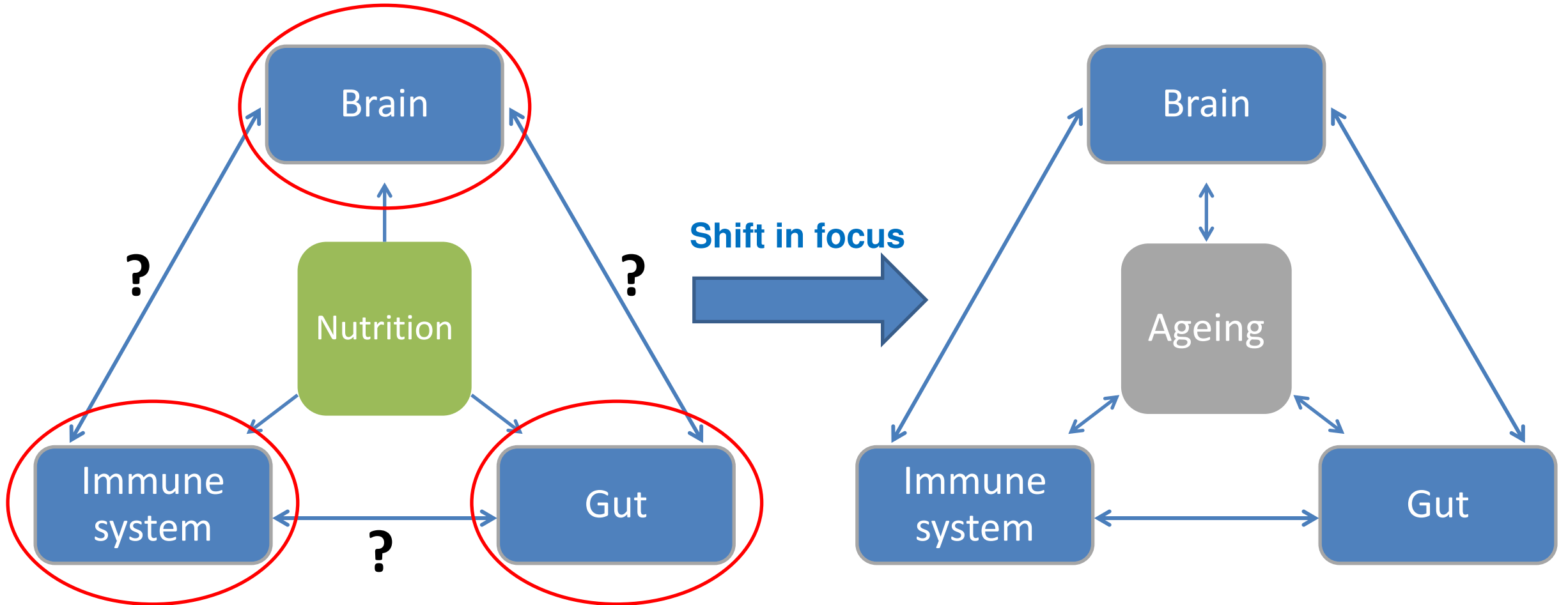
1. Debate the potential for maintaining cognitive function through dietary intake.
2. **Focus on clinical aspects and novel strategies** developed to determine whether diet and nutrients have efficacy in individuals affected by cognitive decline.

Main themes

- Impact of nutrition on brain functions using neuroimaging technologies;
- **Microbiome and immune status: impact on brain function;**
- Biomarkers of food intake and cognitive health;
- Sleep deprivation: effects on diet and cognitive performance;
- New methodologies applied to dementia and how nutrition could play a role.



In brief: Research from gut to brain



In brief: Research from gut to brain

415

EXPERTS

21

COUNTRIES

29

ACTIVITIES

28

PUBLICATIONS

9
WORKSHOPS

4.37
MEDIAN
IMPACT FACTOR

4,058
CITATIONS

48
MEDIAN
CITATIONS



ILSI
Europe

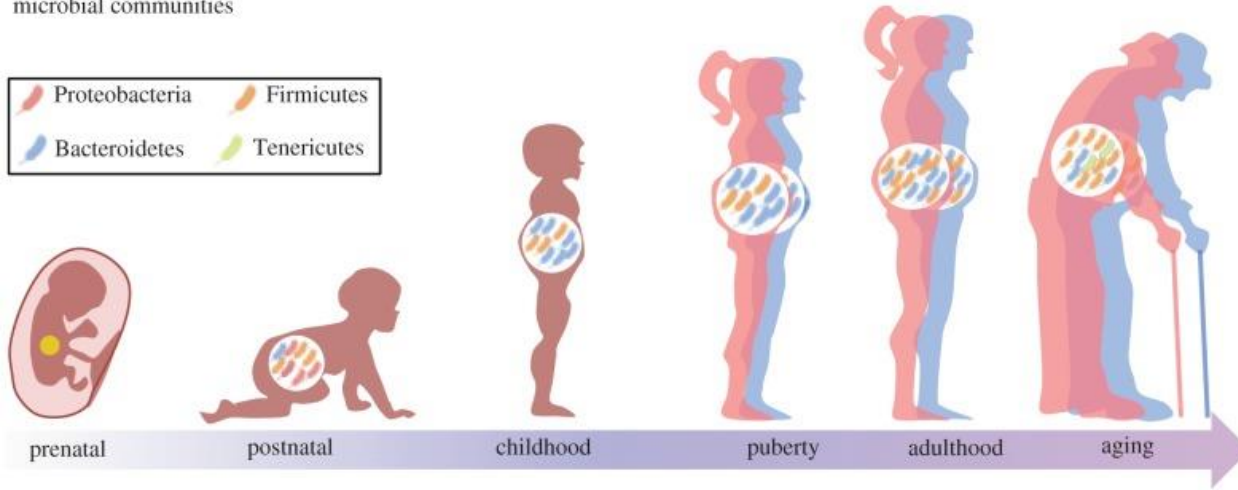
In brief: Research from gut to brain



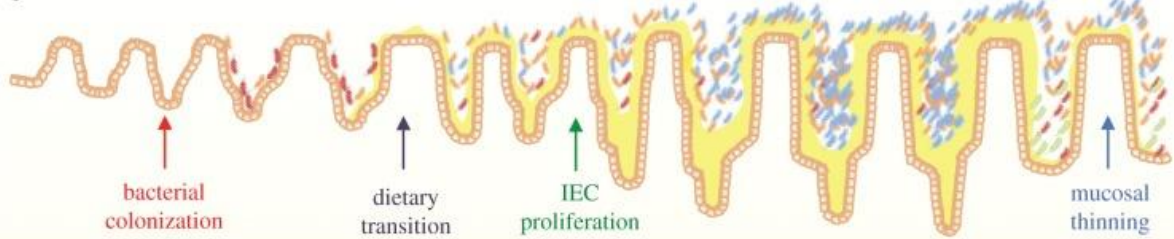
Outlook: The Ageing Gut

Derived from ILSI Europe's Emerging Issue Process

microbial communities



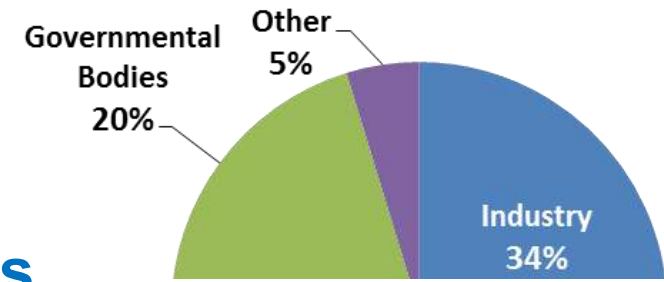
gastrointestinal tract



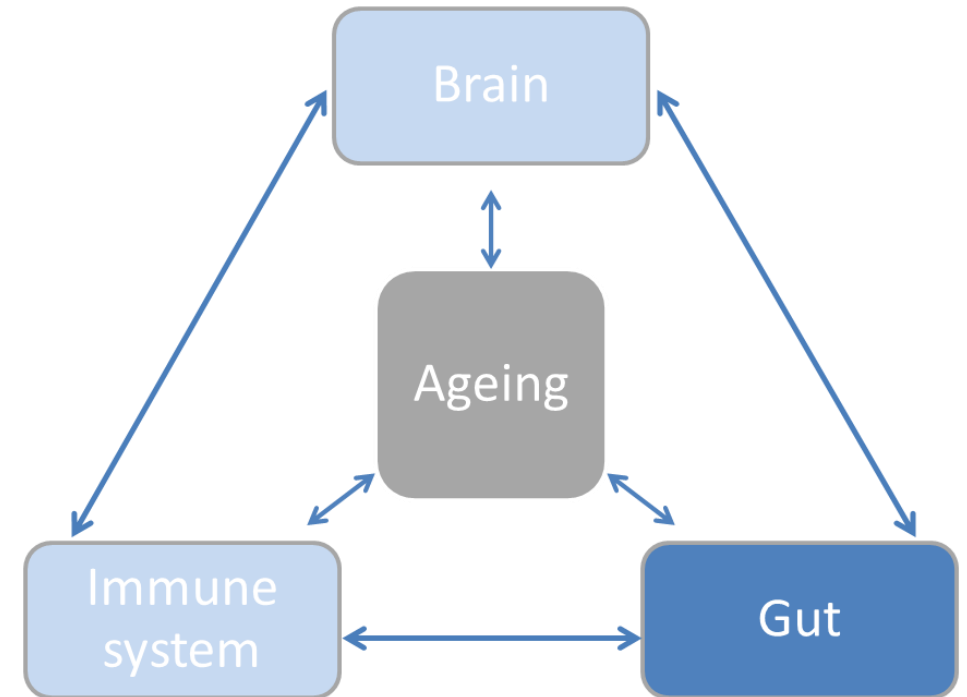
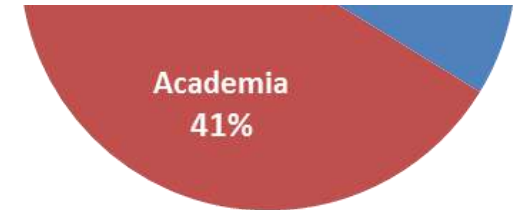
Jašarević et al., 2016 *Philos Trans R Soc Lond B Biol Sci.* 371(1688)



Start in Q3/4 2018

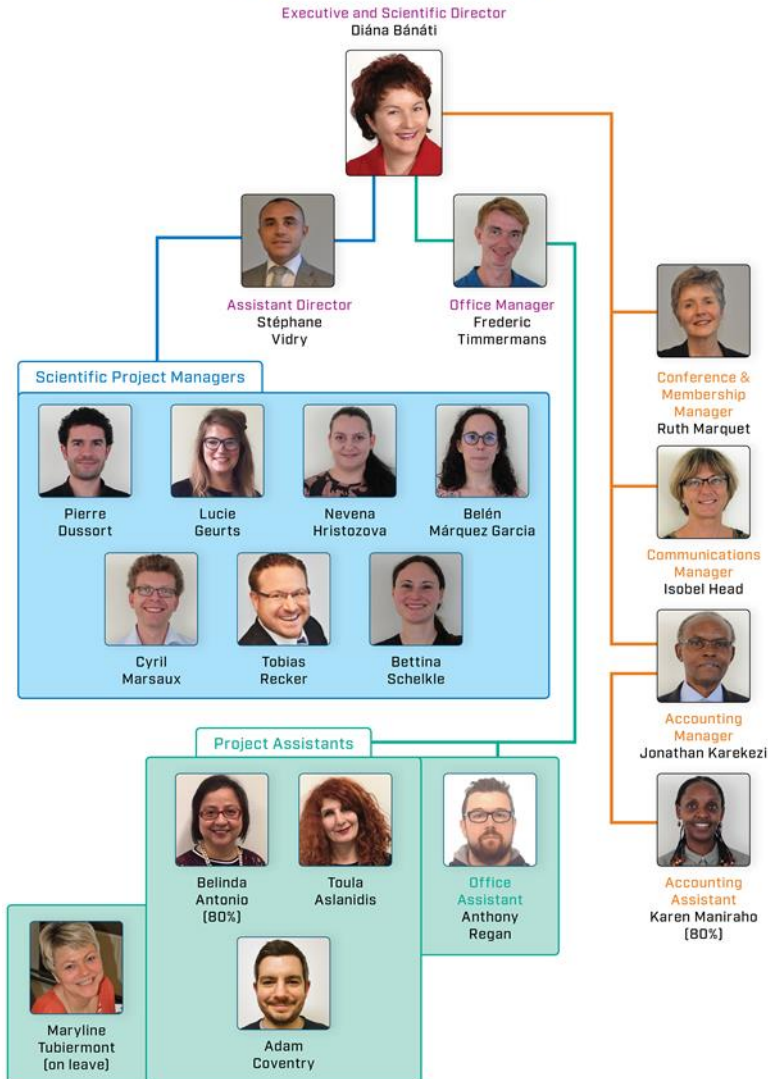


1100 Stakeholders



Thank you.

Organigramme of ILSI Europe



415
EXPERTS



61 Member Companies in 2017

- | | | |
|---------------------------|-------------------------------|---------------------------------------|
| Abbott Nutrition | Lonza | Roquette |
| ADM | Lucozade Ribena Suntory | Sanofi-Aventis Group |
| Ajinomoto | Luigi Lavazza | Schwabegroup |
| Arla Foods | Mars | Sensus |
| Barilla G&R Fratelli | Mayr-Melnhof Karton | SDM EUROPE |
| BASF SE | Mead Johnson Nutrition | Südzucker Group |
| Caelus Health | Merck | Swiss Quality Testing Services - SOTS |
| Cargill | Mondelēz International | Syngenta |
| Chr. Hansen | Monsanto Europe | Tate & Lyle |
| Cosucra Groupe Warcoing | Nestlé | Tereos |
| Danone | Nexira | Tetra Pak |
| Dow Europe | Omya International | The Coca-Cola Company |
| DSM | PepsiCo International | The Valspar Corporation |
| DuPont Nutrition & Health | Pfizer Consumer Healthcare | Tine SA R&D |
| Firmenich | Pierre Fabre Dermo-Cosmétique | Ülker Bisküvi |
| FrieslandCampina | PPG Industries | Unilever |
| General Mills | Premier Foods | WALA Heilmittel |
| Givaudan International | Procter & Gamble | Yakult Europe |
| Indoor Biotechnologies | Red Bull | Yili Innovation Center Europe |
| Institut Mérieux | | |
| Johnson & Johnson EAME | | |
| Kabi Fresenius | | |
| Kao Corporation | | |



www.ilsa.eu



International Life
Sciences Institute