ABSTRACTS
OF LECTURES AND POSTERS

FOOD FOR HEALTHY AGEING

MAINTAINING HEALTH THROUGHOUT THE LIFESPAN

23–25 OCTOBER 2017

AMSTERDAM
THE NETHERLANDS

CONTENTS

WELCOME

Welcome to **Food for Healthy Ageing**, 23-25 October 2017, Amsterdam, The Netherlands!

Population ageing is a global phenomenon. According to a report from the United Nations*, the population aged 60 or over is the fastest growing. More than 20% of the world population will be over the age of 60 by 2050. However, ageing is not just personal. It has enormous public health importance as the prevalence of certain diseases, including heart disease, diabetes, and dementia, is increasing. This has led scientists and medical professionals to seek an understanding of how to maintain health throughout the ageing process. Besides physical activity and lifestyle, nutrition is a tremendously promising factor playing a powerful role in promoting population health.

*United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, Key Findings and Advance Tables. Working Paper No. ESA/P/WP.241.

Food for Healthy Ageing focuses on evidence-based nutritional interventions for men and women that can either slow or reverse the effects of ageing, thereby maintaining health throughout the life span. The conference topics are intended to meet the needs of researchers, food and healthcare professionals who want to be updated on the progress and possibilities in this field. Interested attendees include basic research scientists, nutritionists, dietitians, physicians, students, policy makers, and key opinion leaders with an interest in food for healthy ageing.

The programme has been put together with the support of a committee consisting of:

- Dr. Johanna Dwyer, Tufts University and National Institutes of Health, USA
- Prof. Dr. Lisette de Groot, Division of Human Nutrition, Wageningen University & Research, The Netherlands
- Dr. Marjorie Koenen, Consultant, The Netherlands
- Prof. Dr. Luc van Loon, Department of Human Biology and Movement Sciences, Maastricht University, The Netherlands
- Dr. Jan Steijns, FrieslandCampina, The Netherlands

Join the intimate atmosphere of a small conference with numerous opportunities to network!

PROGRAMME AT A GLANCE

MONDAY 23 OCTOBER 2017

13:00	Opening of **Food for Healthy Ageing**
13:10 – 14:25	FOOD FOR HEALTHY AGEING: KEYNOTE TOPICS
14:25 – 16:15	THE ROLE OF FOOD IN MAINTAINING IMMUNE HEALTH IN AGEING
16:15 – 16:45	**Coffee/tea break**
16:45 – 18:30	FOOD AND COGNITIVE HEALTH IN AGEING
18:30	**End of day 1**

TUESDAY 24 OCTOBER 2017

08:30 – 10:15	FOOD, GUT MICROBIOTA AND HEALTHY AGEING
10:15 – 10:45	**Coffee/tea break**
10:45 – 12:00	FOOD, GUT MICROBIOTA AND HEALTHY AGEING *(continued)*
12:00 – 12:30	SPEED PRESENTATIONS
12:30 – 13:30	**Lunch break**
13:30 – 15:15	FOOD ASSOCIATED WITH MUSCOSKELETAL HEALTH IN AGEING
15:15 – 15:45	**Coffee/tea break**
15:45 – 17:30	HEALTHY AGEING AND FOOD: MISCELLANEOUS TOPICS
17:30	**End of day 2**

WEDNESDAY 25 OCTOBER 2017

08:30 – 10:45	CHALLENGES AND OPPORTUNITIES AHEAD
10:45 – 11:15	**Coffee/tea break**
11:15 – 13:00	CHALLENGES AND OPPORTUNITIES AHEAD *(continued)*
13:00	Closing of **Food for Healthy Ageing**

CONFERENCE PROGRAMME

MONDAY 23 OCTOBER 2017

13:00 Opening of **Food for Healthy Ageing**

FOOD FOR HEALTHY AGEING: KEYNOTE TOPICS

Chair: Prof. Dr. Lisette de Groot, *Wageningen University & Research, The Netherlands*

13:10 Plasticity of ageing: the lessons from model organisms
Dr. Nazif Alic, *Institute of Healthy Ageing, University College London, UK*

13:35 Nutrition and health later in life
Prof. Dr. Lisette C. de Groot, *Division of Human Nutrition, Wageningen University & Research, The Netherlands*

14:00 Reversal of ageing? Lessons from anti-senescence drugs
Dr. Peter de Keizer, *Department of Molecular Genetics, Erasmus MC, The Netherlands*

THE ROLE OF FOOD IN MAINTAINING IMMUNE HEALTH IN AGEING

Chair: Prof. Dr. Christine Loscher, *Dublin City University, Ireland*

14:25 Chair's introduction

14:30 Can we use food to alter our ageing immune system?
Prof. Dr. Christine Loscher, *Health Technologies and the Healthy Ageing Society, Dublin City University, Ireland*

14:55 Diet and its impact on the ageing immune system
Prof. Dr. Simon Carding, *Quadram Institute Bioscience and Norwich Medical School, University of East Anglia, UK*

15:20 The impact of a tailored Mediterranean diet on inflammation and body composition in elderly
Dr. Aurelia Santoro, *Department of Experimental, Diagnostic and Specialty Medicine, University of Bologna, Italy*

15:45 Effects of bovine lactoferrin, GOS and vitamin D on innate immune function in elderly women
Prof. Dr. Joost van Neerven, *Wageningen University & Research and FrieslandCampina, The Netherlands*

16:15 **Coffee/tea break**

MONDAY 23 OCTOBER 2017

FOOD AND COGNITIVE HEALTH IN AGEING

Chair: Dr. David Vauzour, *University of East Anglia, UK*

16:45 Chair's introduction

16:50 Lifestyle factors and cognitive ageing
Dr. Janie Corley, *Department of Psychology, Centre for Cognitive Ageing and Cognitive Epidemiology, The University of Edinburgh, UK*

17:15 Nutrient patterns and risk of neurodegenerative diseases
Dr. Catherine Féart, *Bordeaux Population Health Research Center, University of Bordeaux France*

17:40 Food for thought: the impact of polyphenols on brain ageing
Dr. David Vauzour, *Norwich Medical School, University of East Anglia, UK (on behalf of ILSI Europe)*

18:05 Multi-nutrient intervention results in reduced disease progression in early Alzheimer's disease – LipiDiDiet clinical trial results
Prof. Dr. Tobias Hartmann, *Deutsches Institut für Demenzprävention, Universität des Saarlandes, Germany*

18:30 **End of day 1**

TUESDAY 24 OCTOBER 2017

FOOD, GUT MICROBIOTA AND HEALTHY AGEING

Chair: Dr. Jiangchao Zhao, *University of Arkansas, USA*

08:30 Chair's introduction

08:35 Gut health - an important player in healthy ageing
Dr. Ida Schoultz, *School of Medical Sciences, Örebro University, Sweden*

09:00 Gut microbiome signatures of healthy ageing
Dr. Jiangchao Zhao, *Department of Animal Science, University of Arkansas, USA*

09:25 The human microbiome and conditions of ageing: insights from TwinsUK
Dr. Claire J. Steves, *Department of Twin Research and Genetic Epidemiology, King's College London and Department of Clinical Gerontology, King's College Hospitals NHS Foundation Trust, UK*

09:50 Can nutritional strategies improve the microbiome and health status at the advanced age?
Dr. Clara G. de los Reyes-Gavilán, *Dairy Research Institute of Asturias, Spanish National Research Council, and Health Research Institute of Asturias, Spain*

10:15 **Coffee/tea break**

10:45 Can prebiotics contribute to healthier ageing?
Dr. Jelena Vulevic, *Clasado Research Sciences Ltd., UK*

11:10 The potential of probiotics usage within elderly care: efficacy, quality of life, and costs considerations
Dr. Olaf Larsen, *Yakult Nederland and Athena Institute, VU Amsterdam, The Netherlands*

11:35 Tailoring the gut microbiota for potential prevention of Alzheimer's disease
Nittaya Marungruang, *Food for Health Science Centre, Lund University, Sweden*

SPEED PRESENTATIONS

Chair: Dr. Jiangchao Zhao, *University of Arkansas, USA*

12:00 Exploring gut health, well-being and diet in a Swedish population of general older adults
Frida Fart, *Nutrition and Physical Activity Research Centre, Department of Medical Sciences, Örebro University, Sweden*

12:10 Towards user-friendly diagnostics detecting multiple biomarkers for a personalised nutrition advice at home
Dr. Aart van Amerongen, *BioSensing & Diagnostics, Wageningen University & Research, The Netherlands*

12:20 Long-term effect of folic acid and vitamin B12 supplementation on cancer risk: B-PROOF, a randomised controlled trial
Sadaf Oliai Araghi, *Departments of Internal Medicine and Public Health, Erasmus MC, The Netherlands*

12:30 **Lunch break**

TUESDAY 24 OCTOBER 2017

FOOD ASSOCIATED WITH MUSCOSKELETAL HEALTH IN AGEING

Chair: Dr. Jan Steijns, *FrieslandCampina, The Netherlands*

13:30 Chair's introduction

13:35 Musculoskeletal ageing; can dietary components impact skeletal health?
Dr. James. R. Edwards, *Botnar Research Centre, Nuffield Department of Orthopaedics, Rheumatology and Muscoskeletal Sciences, University of Oxford, UK*

14:00 Dairy and bone health: how strong is the scientific evidence?
Dr. Ellen van den Heuvel, *FrieslandCampina, The Netherlands*

14:25 Bone and cartilage: the role of nutrition in osteoarthritis
Dr. Marie-Noëlle Horcajada, *Nutrition & Health Department, Nestlé Research Center, Switzerland*

14:50 Nutrition interventions and sarcopenia
Prof. Dr. Mary Hickson, *Dietetics, Human Nutrition and Health Research Group, Institute of Health and Community, Plymouth University, UK*

15:15 **Coffee/tea break**

HEALTHY AGEING AND FOOD: MISCELLANEOUS TOPICS

Chair: Dr. Olaf Larsen, *Yakult Nederland and VU University, The Netherlands*

15:45 Chair's introduction

15:50 The quest for healthy ageing: insights from the caloric restriction paradigm
Dr. Rozalyn M. Anderson, *Department of Medicine, University of Wisconsin-Madison, USA*

16:15 Nutritional interventions for age-related macular degeneration
Dr. José Paulo Andrade, *Faculty of Medicine, Department of Biomedicine, University of Porto and CINTESIS, Portugal*

16:40 Saliva: not just a digestive fluid
Prof. Dr. Enno Veerman, *ACTA, The Netherlands*

17:05 Cardiovascular and renal effects of an egg lysozyme hydrolysate
Dr. Heleen van den Bosch, *Food and Biobased Research, Wageningen University & Research, The Netherlands*

17:30 **End of day 2**

WEDNESDAY 25 OCTOBER 2017

FOOD FOR HEALTHY AGEING: CHALLENGES AND OPPORTUNITIES AHEAD

Chair: Dr. Rozalyn M. Anderson, *University of Wisconsin-Madison, USA*

08:30 Chair's introduction

08:35 Biomarkers of ageing: from function to molecular biology
Prof. Dr. Karl-Heinz Wagner, *Research Platform Active Ageing and Department of Nutritional Sciences, University of Vienna, Austria*

09:00 Metabolomics as biomarker for healthy ageing
Dr. Marian Beekman, *Department of Molecular Epidemiology, Leiden University Medical Center, The Netherlands*

09:25 Diet and epigenetic ageing
Austin Quach, *Department of Human Genetics, UCLA, USA*

09:50 Diet, phosphate and biological ageing
Prof. Dr. Paul Shiels, *Institute of Cancer Sciences, University of Glasgow, UK*

10:15 Role of micronutrients in healthy ageing – what is the evidence?
Prof. Dr. Peter Weber, *Institute of Biological Chemistry and Nutritional Science, University of Hohenheim, Germany*

10:45 **Coffee/tea break**

11:15 Sustainable and healthy dietary patterns: a holistic approach to healthy ageing
Dr. Jessica Kiefte-de Jong, *Department of Epidemiology, Erasmus MC and Leiden University College The Hague, The Netherlands*

11:40 Personalised nutrition in ageing society: redox control of major age-related diseases
Prof. Dr. Mustapha Cherkaoui Malki, *Laboratoire Bio-PeroxIL, Université Bourgogne Franche-Comté, France*

12:05 Nutrigerontology: the key for achieving successful ageing and longevity
Prof. Dr. Calogero Caruso, *Department of Pathobiology and Medical Biotechnologies, University of Palermo, Italy*

12:30 Long-term consequences of maternal malnutrition
Dr. Torsten Plösch, *Department of Obstetrics and Gynaecology, University Medical Center Groningen, The Netherlands*

12:55 Chair's summary & closing remarks

13:00 Closing of **Food for Healthy Ageing**

Take your packed lunch to eat along the way!

MONDAY 23 OCTOBER 2017

SESSIONS:

- **FOOD FOR HEALTHY AGEING: KEYNOTE TOPICS**
- **THE ROLE OF FOOD IN MAINTAINING IMMUNE HEALTH IN AGEING**
- **FOOD AND COGNITIVE HALTH IN AGEING**

MONDAY 23 OCTOBER 2017

13:10 – 13:35

PLASTICITY OF AGEING: THE LESSONS FROM MODEL ORGANISMS

Nazif Alic

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Ageing and the associated functional decline are of growing medical, social and economic importance. For centuries we have thought of ageing as fixed and inevitable. However, in the last three decades, the modern science of biogerontology has revealed ageing as plastic. We now have a number of nutritional, genetic and pharmacological interventions that can extend lifespan in simple model organisms, often ameliorating or delaying the diseases of ageing.

In this talk, I will describe a number of these interventions, focusing on the nutrient signalling pathways and mentioning work that I was involved in. These interventions, and the knowledge gained by studying them in simple model organisms, could be the key to ensuring life-long health in humans.


NOTE

MONDAY 23 OCTOBER 2017

13:35 – 14:00

NUTRITION AND HEALTH LATER IN LIFE*

Prof. Dr. Lisette C. de Groot

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The ageing process is influenced by a variety of factors, including extrinsic, malleable lifestyle variables. The present paper deals with the epidemiological evidence for the role of dietary patterns and key nutritional concerns in relation to survival and ageing-related disorders that present themselves in later life. Healthful dietary patterns appear to be most relevant in old age. Specific nutritional concerns are related to vitamin D, vitamin B12 and protein malnutrition.

An important challenge to further expand the knowledge base is currently addressed by the NuAge project, acknowledging the complexity of the ageing process and integrating different dimensions of research into human healthy ageing. In the meantime, reversing poor adherence to existing guidelines for a healthy diet remains a first challenge in public health nutritional practices.

* Source: The Proceeding of the Nutrition Society 2016 May, 75(2):169-173.
doi: 10.1017/S0029665116000033. Epub 2016 Feb 26.


NOTE

MONDAY 23 OCTOBER 2017

14:00 – 14:25

REVERSAL OF AGEING? LESSONS FROM ANTI-SENESCENCE DRUGS

Peter L.J. de Keizer

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Population age continues to increase in the foreseeable future. Since many diseases manifest themselves at older age, it is important to develop better ways to counteract the negative consequences of ageing. For long, it was simply unclear what molecular mechanisms underlie ageing. We now know that unresolved damage to the DNA is one of the drives of ageing. When the amount of unresolved damage passes a threshold, cells can enter a state of senescence. Senescent cells cease to divide, but chronically secrete a wide range of factors that permanently alter their environment. As such, they are thought to impair tissue function and drive a range of age-related diseases. Genetic clearance of senescent cells delays features of ageing and identifying how senescent cells avoid apoptosis would allow for the prospective design of anti-senescence compounds to address whether homeostasis can also be restored.

Here, I will discuss how we identified the protein FOXO4 as a pivot in senescent cell viability and how we designed a specific drug, a D-Retro-Inversed FOXO4 peptide, which selectively eliminates senescent cells. Under conditions where it was well tolerated *in vivo*, FOXO4-DRI could neutralise doxorubicin-induced chemotoxicity. Moreover, it restored fitness, fur density and renal function in both fast ageing XpdTTD/TTD and naturally aged mice. Current research is focused on better understanding the potential long-term dangers of senescence-clearance, optimisation of FOXO4-DRI and the molecular mechanisms that dictate sensitivity or resistance. Thus, therapeutic targeting of senescent cells is feasible under conditions where loss of health has already occurred and in doing so tissue homeostasis can effectively be restored.


NOTE

MONDAY 23 OCTOBER 2017

14:30 – 14:55

CAN WE USE FOOD TO ALTER OUR AGEING IMMUNE SYSTEM?

Christine Loscher

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The global population is currently undergoing unprecedented demographic changes. Although the news that we are living longer is positive, this situation presents new challenges to individuals and to society as a whole. Ageing is often associated with chronic disease and an increased susceptibility to infection that can negatively impact an individual's quality of life. In addition to this, there are rising healthcare costs and economic consequences associated with this demographic shift. For this reason, interventions that can either slow or reverse the negative effects of ageing, thereby increasing health span would have major benefits for individuals and society.

Ageing leads to marked changes in the composition, function and competence of both the innate and adaptive immune systems. The overall change to the immune system with age is termed immunosenescence and has a multifactorial aetiology; a consequence of the complexity of the immune system as well as multiple genetic and environmental influences. In addition to increased risk of infection, immunosenescence is also associated with an increased risk of a number of chronic diseases. This talk will explore the use of food to alter the function of our immune system, and the potential positive impact on our risk of developing chronic disease.


NOTE

MONDAY 23 OCTOBER 2017

14:55 – 15:20

DIET AND ITS IMPACT ON THE AGEING IMMUNE SYSTEM

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Ageing is accompanied by increased susceptibility to infection and age-associated chronic diseases. It is also associated with reduced vaccine responses, which is often attributed to immunosenescence and the functional decline of the immune system. Immunosenescence is characterised by a chronic, low-grade, inflammatory state termed inflammaging.

Habitants of Mediterranean regions maintain good health into old age; often attributed to Mediterranean diets. We have therefore undertaken a study to determine if adoption of a Mediterranean (MED)-diet by elderly subjects, in Norfolk (UK), can improve immune responses of these individuals. Elderly subjects (65-79 years old) recruited to the EU FP7 NU-AGE study were randomised to the control or MED-diet groups, for one year and blood (serum and PBMC) samples taken pre- and post-intervention for immune (dendritic cell and antibody repertoire) analysis. For comparison, samples were also obtained from young (18-45 years old) subjects. Age-related differences in DC populations and PBMC cytokine profiles were detected with evidence of a positive impact of MED diet intervention on the production of specific adipokines. The implications of these findings and the potential of dietary interventions in ageing and immunosenescence will be discussed.


NOTE

MONDAY 23 OCTOBER 2017

15:20 – 15:45

THE IMPACT OF A TAILORED MEDITERRANEAN DIET ON INFLAMMATION AND BODY COMPOSITION IN ELDERLY

Aurelia Santoro*

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Demographic trends show progressive ageing of the population and increasing incidence of age-related diseases. Current evidence emphasises the role of low-grade chronic inflammation in the process of ageing. Therefore, strategies aimed to reduce and control inflammaging represent powerful tools to combat chronic age-related diseases altogether extending the health span of population. The EU Project NU-AGE (30 partners, from 16 EU countries) has been studying the effect of a whole Mediterranean diet tailored for people over 65 years of age (NU-AGE diet) on the health status of elderly people paying particular attention to their inflammatory status.

A total of 1295 volunteers free of major overt diseases, ageing 65-79 years, were enrolled in 5 European countries (Italy, France, UK, The Netherlands, and Poland) and randomised to control (no intervention, n=650) or diet group (NU-AGE diet, n=644). Health and nutritional status, body composition, inflammation and other parameters were deeply characterised before (T0) and after 1 year (T1). Food and nutrient intake has been assessed by means of 7-days food records. The adherence to NU-AGE diet has been evaluated by NU-AGE compliance index based on the dietary goals of the NU-AGE diet. Diet group significantly increased the compliance to NU-AGE diet. A significant decrease of android/gynoid fat mass and android fat/lean-mass ratio was achieved as the adherence to NU-AGE Diet increases (P=2.19E-14 and P=5.19E-10, respectively). A significant decrease of the pro-inflammatory parameters C-reactive protein (CRP) and pentraxin-3 was observed as the adherence increases, while the levels of adiponectin, an anti-inflammatory parameter significantly decreased. Interesting differences among the 5 EU countries and gender also emerged.

NU-AGE dietary intervention has succeeded in improving the consumption of typical Mediterranean diet foods in elderly people. The NU-AGE diet improves both the inflammatory status and the body composition profile of elderly people. Response to treatment at one year showed interesting differences among countries and by gender. These results suggest that the NU-AGE diet could be a powerful strategy to counteract the age-related health impairment.

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* Co-authors: R. Ostan, G. Guidarelli and G. Battista (University of Bologna, Italy); A. Bazzocchi (The 'Rizzoli' Orthopaedic Institute, Italy); C.P.G.M. de Groot and A. Berendsen (Wageningen University & Research, The Netherlands); B. Pietruszka and A. Bialecka (Warsaw University of Life Sciences, Poland); A. Jennings and S. Fairweather-Tait (University of East Anglia, UK); N. Meunier and E. Caumon (CHU de Clermont-Ferrand, France); S. Carding (Quadram Institute Bioscience and University of East Anglia, UK); C. Nicoletti (Quadram Institute Bioscience, UK and University of Florence, Italy); F. Claudio (Institute of Neurological Sciences, Italy); and the NU-AGE Consortium


NOTE

MONDAY 23 OCTOBER 2017

15:45 – 16:15

EFFECTS OF BOVINE LACTOFERRIN, GOS AND VITAMIN D ON INNATE IMMUNE FUNCTION IN ELDERLY WOMEN

Joost (R.J.J). van Neerven*

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The immune system passes through profound changes during ageing. Elderly people have a decreased ability to mount adaptive immune responses (e.g., to vaccination), and also have impaired innate immune responses. On the one hand the innate immune system becomes less responsive to pathogenic stimuli, but on the other hand it is overly active and produces inflammatory markers in steady state. As a result, elderly people have an increased susceptibility to respiratory and intestinal infections, whilst serum levels of inflammatory markers are increased. The latter is thought to contribute to the high prevalence of non-communicable diseases such as (osteo)arthritis, type 2 diabetes, Alzheimer and other inflammatory diseases in elderly people.

Milk and several milk (related) components have previously been linked to lower levels of inflammatory markers. However, not much is known on the ability of food to modulate the innate immune defect in response to pathogenic stimuli. The NOBLE study was designed to study if lactoferrin, GOS and vitamin D can improve immune function in > 65-year-old healthy female volunteers. In a randomised double-blind placebo controlled pilot study, two groups of each 15 healthy women of >65 year received, bovine lactoferrin (1 g/day Vivinal Lactoferrin) for a period of 9 weeks, in combination with GOS (4 g/day Vivinal GOS) during the last 6 weeks, and vitamin D (20 µg /day) during the last 3 weeks. Maltodextrin was used as a placebo. At the start of the study and at week 3, 6, and week 9, blood was drawn to study serum levels of inflammatory markers and *ex vivo* cellular responses to pathogen related TLR stimuli. In response to TLR stimulation, both the cumulative production of IL-6, TNF-α and IFN-α in supernatant by PBMCs, as well as intracellular production of these cytokines in plasmacytoid DC (pDC) and myeloid DC (mDC) was measured. At baseline, these analyses were also performed in healthy young women that did not further participate in the nutritional intervention study. The serum levels of inflammatory markers were lower in the young women compared to the elderly women. In addition, the young donors had higher numbers of mDC and pDC in their blood, and showed higher cytokine responses to TLR stimulation compared to the elderly women.

The results of the food intervention with bovine lactoferrin, GOS and vitamin D are currently being analysed and preliminary results of this study will be discussed.

* Co-authors: M. van Splunter, H. Fick-Brinkhof, H.F.J. Savelkoul and B. Meijer (Wageningen University & Research, The Netherlands; E. van Hoffen and E. Floris (NIZO food research, The Netherlands)


NOTE

MONDAY 23 OCTOBER 2017

16:50 – 17:15

LIFESTYLE FACTORS AND COGNITIVE AGEING

insights from the Lothian Birth Cohort 1936 study

Janie Corley*

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Cognitive ageing variation is evident from studies documenting numerous individual characteristics associated with relatively high cognitive functioning in advanced age. Investigations of risk and protective factors for cognitive decline and dementia have yielded robust evidence for several potentially modifiable lifestyle factors associated with risk of relative cognitive decline; alcohol consumption, diet, physical activity, and smoking, are among the most cited. Determining the extent to which such factors are associated with cognitive health in later life is important as there is the potential to contribute to ameliorating declining trajectories of cognitive function.

In the Lothian Birth Cohort 1936 (n=1,091) study, we have investigated the contribution of the following factors to individual differences in non-pathological cognitive ageing: caffeine and alcohol intake; dietary pattern; body mass index (BMI); smoking behaviour; and physical activity. Childhood cognitive function (IQ) scores were available for this sample, because most of them are surviving members of the Scottish Mental Survey of 1947, providing a rare opportunity to examine the role of prior cognitive abilities. Using general linear models, we assessed the relationships between lifestyle factors and both general and specific domains of cognitive function at age 70 years, adjusting for childhood IQ and other potentially confounding variables, including, age, sex, and adult socioeconomic status (SES). In models without childhood IQ, better cognitive function in later life was associated with a higher caffeine and alcohol intake, a healthy dietary pattern, lower BMI, increased physical activity, and not smoking. Their effect size was around 1% of the variance in cognitive test scores. In models which adjusted for childhood IQ scores, associations were markedly attenuated by a higher cognitive ability, and many were reduced to non-significance. We did observe independent associations of lower physical activity, and smoking, into old age, with poorer general cognition (*g*) and speed of information processing. Based on these findings, we suggest that associations between certain lifestyle factors and cognitive function in older age might – in part or whole – be explained by lifetime-stable intelligence differences. The relationship is likely to be bidirectional, such that cognitive abilities in early-life influence the adoption of health behaviours in adulthood and vice versa.

In conclusion, our results are consistent with the view that maintenance of cognitive health may be supported by an active lifestyle and smoking avoidance in later life. Though studies evaluating the impact of modifiable lifestyle factors on cognition offer potential insights into sources of cognitive ageing variability, this series of analyses on the LBC1936 indicate that future studies should be cognisant of the important confounding role played by lifetime cognition, before drawing causal conclusions.

* Co-authors: A.J. Gow (The University of Edinburgh and Heriot-Watt University, UK); J.M. Starr (The University of Edinburgh and Western General Hospital, UK); I.J. Deary, (The University of Edinburgh, UK)


NOTE

MONDAY 23 OCTOBER 2017

17:15 – 17:40

NUTRIENT PATTERNS AND RISK OF NEURODEGENERATIVE DISEASES

Catherine Féart

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Nutrition may contribute to prevent Alzheimer's disease (AD). First, hypovitaminosis D is highly prevalent worldwide, and particularly among the aged population. In addition to its effects on bone metabolism, it has been associated with several chronic conditions, such as cardiovascular diseases which are risk factors for dementia; yet, association of hypovitaminosis D to risk of dementia has been inconsistent. Second, previous research on individual nutrients and dementia may have inadequately reflected the complexity of diet-brain relationships. We sought to (i) analyse the relation between plasma 25(OH)D concentration and the risk of dementia and Alzheimer's Disease (AD), and (ii) to characterise nutrient biomarker patterns (which provide a more holistic approach of dietary exposure and bioavailability) associated with long-term risk of dementia in a large cohort of older persons, the Three-City (3C) study.

For the first analysis (25(OH)D concentrations considered as a single exposure), the study population consisted of 916 participants from the 3C-Bordeaux cohort aged 65 years and over, non-demented at baseline. The baseline concentration of plasma 25(OH)D was categorised as <25 nmol/L (deficiency), 25 to 50 nmol/L (insufficiency), or > 50 nmol/L (sufficiency). For the second analysis, we included 666 participants from the 3C study not demented and with blood measurements of 22 fat-soluble nutrients (12 fatty acids, 6 carotenoids, vitamin D, 2 forms of vitamin E, and vitamin A) at baseline. Nutrient patterns associated with dementia risk were characterised using Partial Least Square regression for Cox models (PLS-Cox). Participants were followed for up to 12 years and incident cases of dementia and AD were diagnosed by an independent committee of neurologists every 2 years during follow-up. First, the prevalence of plasma 25(OH)D deficiency and insufficiency at baseline were 23.8% and 59.7%, respectively. Compared to individuals with 25(OH)D sufficiency, participants with both 25(OH)D deficiency and insufficiency had a significantly increased risk of dementia (hazard ratio (HR)=2.12, 95% confidence interval (95% CI) 1.21-3.71 and HR=1.98, 95% CI 1.17-3.36, respectively). Stronger associations were observed with AD risk. Secondly, a 'deleterious' nutrient biomarker pattern combining lower blood vitamin D, carotenoids and polyunsaturated fats and higher blood saturated fats, was strongly associated with a higher risk of dementia. Compared to individuals in the first quintile of PLS-Cox score, participants in the highest quintile of score had a four-fold increased risk of dementia (HR=4.20, 95% CI 1.86-9.42, *P* for trend <0.001); this association appeared stronger than associations found with any individual nutrient biomarker.

In conclusion, a blood nutrient pattern reflecting deficiencies in vitamin D, carotenoids and polyunsaturated fats in non-demented older persons appeared strongly associated with a greater risk of dementia over the decade following biomarker assessment in this large cohort of older persons. These results suggest that maintaining adequate vitamin D status and providing sufficient carotenoids and polyunsaturated fats in older age could contribute to delay or prevent the onset of dementia, especially of AD aetiology.


NOTE

MONDAY 23 OCTOBER 2017

17:40 – 18:05

FOOD FOR THOUGHT: THE IMPACT OF POLYPHENOLS ON BRAIN AGEING

David Vauzour*

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Accumulating evidence suggests that diet and lifestyle can play an important role in delaying the onset or halting the progression of age-related health disorders and to improve cognitive function. A growing number of dietary intervention studies in humans and animals and in particular those using polyphenols, have been proposed to exert a multiplicity of neuroprotective actions within the brain, including a potential to protect neurons against injury induced by neurotoxins, an ability to suppress neuroinflammation and a potential to promote memory, learning, and cognitive functions. These effects appear to be underpinned by two common processes. First, they are capable of interactions with critical protein and lipid kinase signalling cascades in the brain, leading to an inhibition of apoptosis triggered by neurotoxic species and to a promotion of neuronal survival and synaptic plasticity. Second, they induce beneficial effects on the vascular system, leading to changes in cerebrovascular blood flow capable of causing enhance vascularisation and neurogenesis, two events important in the maintenance of cognitive performances. Together, these processes act to maintain brain homeostasis and play important roles in neuronal stress adaptation and thus polyphenols might have the potential to prevent the progression of neurodegenerative pathologies.

* On behalf of ILSI Europe


NOTE

MONDAY 23 OCTOBER 2017

18:05 – 18:30

MULTI-NUTRIENT INTERVENTION RESULTS IN REDUCED DISEASE PROGRESSION IN EARLY ALZHEIMER'S DISEASE – LIPIDIDIET CLINICAL TRIAL RESULTS

Tobias Hartmann*

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Epidemiological data suggest diet is an important modifiable risk factor for dementia. Preclinical research from the LipiDiDiet programme has shown that the neuroprotective potential of individual nutrients can be remarkably increased by combining with other nutrients with neuroprotective properties. The specific multi-nutrient combination Fortasyn Connect (Souvenaid) targets neuronal membranes and multiple pathologies prominently affected in AD. Together, this contributes to an overall neuroprotective and anti-neurodegenerative effect. Previous randomised controlled trials (RCTs) with this intervention have shown improved memory performance in drug-naïve mild Alzheimer's disease (AD) dementia patients, and a good safety profile. The LipiDiDiet clinical trial investigates the long-term effects of Fortasyn Connect in prodromal AD.

The LipiDiDiet study (NTR1705) is a 6-year (2 year with a blinded extension up to 4 years), double-blind, parallel-group, multi-country RCT in subjects with prodromal AD, receiving the multi-nutrient combination Fortasyn Connect (Souvenaid) or an iso-caloric control product once daily. Primary outcome is a cognitive composite z-score based on a neuropsychological test battery. Secondary and exploratory outcomes include clinical dementia rating – sum of boxes (CDR-SB), episodic memory and other cognitive parameters, MRI brain volumes, blood levels of fatty acids, uridine, homocysteine, HDL and LDL cholesterol, and triglycerides, and CSF levels of several AD pathology biomarkers, in addition to tolerance and safety. A total of 311 subjects with prodromal AD were randomised. The LipiDiDiet study population of subjects with prodromal AD according to the IWG-1 criteria, showed a CSF biomarker profile as expected for a prodromal AD (MCI due to AD) population according to the IWG-2, NIA-AA 2011, and upcoming NIA-AA 2018 research criteria and revealed a frequency of ApoE ε4 genotype in the expected range for a sporadic AD population. Group differences on secondary endpoints of disease progression measuring cognition and function and hippocampal atrophy were observed. Study product compliance was high and there were no reasons for safety concerns. An overview of the preclinical results, clinical and biomarker results of the LipiDiDiet clinical trial will be presented, including favourable effects of the nutrient combination on the secondary outcomes CDR-SB and hippocampal volume.

In conclusion, preclinical investigation indicated that a nutrient combination has effects on multiple biological pathways that contribute to an overall neuroprotective effect superior to single nutrients. Especially remarkable are the beneficial results on reduced hippocampal atrophy, a well-established AD disease progression marker which is tightly linked to the disease typical failing memory performance, and the stabilisation on the CDR-SB which is a reliable clinically relevant composite assessment tool, measuring cognition and every day functions. The LipiDiDiet trial is the first completed RCT on nutrition in prodromal AD showing beneficial effects on measures of disease progression and therefore supports the role of this nutritional intervention in prodromal AD.

Acknowledgements. Funding, EU FP7 project LipiDiDiet, Grant Agreement No. 211696.

* Co-authors (for the LipiDiDiet study group): A. Solomon; P.J. Visser; S. Hendrix; K. Blennow; M. Kivipelto; H.Soininen


NOTE

TUESDAY 24 OCTOBER 2017

SESSIONS:

- **FOOD GUT MICROBIOTA AND HEALTHY AGEING**
- **SPEED PRESENTATIONS**
- **FOOD ASSOCIATED WITH MUSCOSKELETAL HEALTH IN AGEING**
- **HEALTHY AGEING AND FOOD: MISCELLANEOUS TOPICS**

TUESDAY 24 OCTOBER 2017

08:35 – 09:00

GUT HEALTH – AN IMPORTANT PLAYER FOR HEALTHY AGEING

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In the last decades, the expected lifespan has increased dramatically due to improved health and longevity. This global ageing phenomenon will have a major impact on health-care systems worldwide due to an increased incidence of age-related diseases and greater needs for hospitalisation. As the life expectancy of the population increases worldwide, there is an increasing awareness of the importance of 'healthy ageing' and 'quality of life'. A well-functioning gut is an essential area through which health and wellbeing might be promoted. Gastrointestinal (GI) problems, such as constipation and diarrhoea, are widespread phenomena among older adults and represent conditions often accompanied with extensive care and among the oldest old hospitalisation. Severe inflammatory diseases, such as inflammatory bowel disease, have also been reported to increase among the elderly. It is therefore vital to perform new research to identify mechanisms upon which novel therapies can be developed with the capacity to strengthen gut function and relieve the older adults from gastrointestinal discomfort.

The human gastrointestinal tract is a very complex ecosystem in which the gut microbiota interplays with host cells and dietary derived components. This gut microbiota plays a central role in health and disease: a balanced microbiota has been related to the modulation of the immune system, barrier function and antioxidant defence, whereas the reduced abundance of some microbial populations appears to be correlated with a health status prone to various diseases. Increased intestinal permeability is a hallmark of many GI diseases and a disrupted barrier function is associated with intestinal inflammation as well as neurological diseases.

A part of my research aims to investigate whether a dysfunctional barrier function is associated with common GI symptoms often occurring in the elderly and whether prebiotic substances can strengthen the intestinal barrier function among older adults and decrease the experience of GI symptoms.


NOTE

TUESDAY 24 OCTOBER 2017

09:00 – 09:25

GUT MICROBIOME SIGNATURES OF HEALTHY AGEING

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The success of modern medicine, better nutrition and care has dramatically increased the human life span, leading to an increasing elder population. The global population ageing poses substantial challenges to economy, society and health care. Therefore, healthy ageing is the goal of many studies to reduce and postpone age related morbidities. The gastrointestinal tract houses trillions of microbial cells known as the gut microbiota, which has coevolved with human body throughout the whole lifespan and are critical to human health. The changes in physiology, diet, medication, and living styles associated with ageing lead to changes in gut microbiomes in the elderly.

Centenarians have been used as a model for healthy ageing studies because of their abilities to delay, or even avoid chronic diseases. The genetics of centenarians have been extensively examined, but much remains unknown about their gut microbiomes until recently. To characterise the gut microbiota in centenarians, we enrolled 67 long-living people (≥90 years old) including healthy centenarians and non-agenarians in Dujiangyan and Ya'an, Sichuan, China. We sequenced their gut microbiota and compared them with those from younger age group. By using random forest, we identified gut microbiota signatures that differentiate these long-living people from the younger group. These signatures include greater microbial diversity and higher abundance of several OTUs associated with potentially beneficial bacteria (e.g., *Clostridium* XIVa, *Ruminococcaceae*, *Akkermansia*). These signatures were validated by an independent Italian cohort. Our study suggests that modulating gut microbiota might provide a new way to promote healthy ageing.


NOTE

TUESDAY 24 OCTOBER 2017

09:25 – 09:50

THE HUMAN MICROBIOME AND CONDITIONS OF AGEING: INSIGHTS FROM TWINSUK

Claire J. Steves

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It is now increasingly recognised that the billions of microorganisms living in symbiosis with us have an influence on disease. Evidence is mounting that the gut microbiome, in particular, influences both host metabolic potential and its innate and adaptive immune system. Inflammatory states characterise many diseases of ageing and have been associated with frailty and vulnerability to death. This prompts the hypothesis that the gut microbiome could alter the inflammatory state of the individual and directly influence the development of these common and burdensome clinical problems. Because the microbiome is easily modifiable, this could have major therapeutic impact.

Here, I present evidence to date on the role of the microbiome in frailty and other common age-related disorders, with a focus on data from the TwinsUK cohort of over 2,500 individuals with gut microbiome data. In addition, I discuss the role of diet, which may both influence the gut microbiome, and change as a response to disease. These observational findings are provocative, and highlight the need for interventional in ageing research to substantiate and translate findings.


NOTE

TUESDAY 24 OCTOBER 2017

09:50 – 10:15

CAN NUTRITIONAL STRATEGIES IMPROVE THE MICROBIOME AND HEALTH STATUS AT THE ADVANCED AGE?

Clara G. de los Reyes-Gavilán*

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The microbial community inhabiting our body is known as 'microbiota', and the ensemble of their genomes is named as 'microbiome'. The gut, and more particularly the colon, is the most densely populated area of our body. The gut microbiota and its metabolites interact with the host at different levels, its correct composition and functionality being essential for maintaining a 'healthy status'. The recent development of next generation sequencing (NGS) methods has greatly facilitated the study of the microbiota and has evidenced that its composition is strongly influenced by age and diet, although some aspects of its functionality still remain insufficiently known. On the other hand, the precise way in which the diet and its components modify the functionality of the intestinal microbiome is far from being completely understood.

Changes in the intestinal microbiota occur during ageing and are frequently accompanied by physiological changes, modifications of the functionality of the gastrointestinal tract, impairment of the immune system ('inflammaging'), and variation in dietary habits that frequently lead to nutritional deficiencies or malnutrition. All these alterations considered together may contribute to the higher susceptibility of elderly people to disease. There are a limited number of studies describing the composition of the microbiota in elderly individuals, and even less about its functionality. It is known that the core microbiota of the elderly significantly differs from that of healthy adults. Not all changes in the microbiota as age advances may necessarily mean a detrimental health effect, as functional redundancy exists in this ecosystem. However, the reduction in species diversity of most bacterial groups, shift in dominant species, increase of facultative anaerobic bacteria, and decrease in the production of short chain fatty acids in the gut are general features that impair the microbiota resilience, and contribute to the establishment of a state prone to disease and to the increase of infections risk in the elderly. To design nutritional interventions for this specific human group, it is necessary to establish the precise action targets by comparing the microbiota of defined elderly populations with healthy subjects from their near surroundings; these should be at preference adults from a socio-economic group with historic past, social habits and geographical location as close as possible to the elder population under study.

Understanding the mechanisms underlying the interaction of specific nutrients with the microbiota, as well as the beneficial action of probiotics, prebiotics and bioactive dietary compounds will provide the scientific support for the rational design of specific diets and food products for the elderly population.

* Co-authors: S. González (University of Oviedo and Health Research Institute of Asturias, Spain; N. Salazar and M. Gueimonde (Dairy Research Institute of Asturias, Spanish National Research Council, and Health Research Institute of Asturias, Spain)


NOTE

TUESDAY 24 OCTOBER 2017

10:45 – 11:10

CAN PREBIOTICS CONTRIBUTE TO HEALTHIER AGEING?

Jelena Vulevic

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The health status of older people is becoming a global concern because of the rate at which the population is ageing. Age-related physiological changes in the gastrointestinal tract, together with lifestyle and dietary changes, affect the human gut microbiota and its interaction with the immune system. The result is a greater susceptibility to various infectious and non-infectious diseases in older individuals. Prebiotics, such as galacto-oligosaccharides (GOS), are dietary ingredients that selectively fortify beneficial gut microbial groups. Therefore, they have the potential to reverse the age-related decline in beneficial bacteria and modulate associated health parameters.

This presentation will aim to present some of current evidence relevant to the contribution of prebiotics in ageing, giving an example of one specific GOS mixture called Bimuno or B-GOS that exhibits functional properties beyond the prebiotic effect.


NOTE

TUESDAY 24 OCTOBER 2017

11:10 – 11:35

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The ageing population is a worldwide challenge as it is associated to a declined health-status and increasing healthcare costs. A reduction in quality of the gut microbiota is intimately linked with the ageing process, and can lead to reduced bowel habits and quality of life. This presentation focusses on the potential of microbiota management using probiotic intervention to improve bowel habits within nursing home residents. All aspects of the valorisation cycle within this domain will be discussed, like the unmet need, the efficacy of probiotics, the acceptance of probiotics by medical doctors, possible cost-reduction, as well as the products itself focusing on the interaction between the probiotic microorganisms and their carrier matrix. These topics will be illustrated by recent research results.


NOTE

TUESDAY 24 OCTOBER 2017

11:35 – 12:00

TAILORING THE GUT MICROBIOTA FOR POTENTIAL PREVENTION OF ALZHEIMER'S DISEASE

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Using a germ-free (GF) APPPS1 transgenic mouse model of cerebral beta-amyloidosis, we found that Alzheimer's disease (AD)-like pathology was substantially reduced in the absence of the gut microbiota. Conventionally-raised APPPS1 mice also showed an altered gut microbiota as compared to wild-type mice. Further, colonising GF APPPS1 transgenic mice with gut microbiota from conventionally-raised APPPS1 transgenic mice showed increased cerebral amyloid-beta (Ab) pathology, while colonisation with gut microbiota from wild-type mice was less effective in increasing cerebral Ab levels. This suggested a possible role of the gut microbiota in AD pathology. The reduction of Ab pathology was also accompanied by reduction in neuroinflammation. Several rat and mouse experiments have demonstrated the potential to alter the gut microbiota composition using tailored prebiotics and that these alterations could be linked to lower systemic inflammation. Selected dietary fibre sources given to mice showed potential effect to favor specific groups of bacteria that were depleted in APPPS1 mice and these may be used as an effective dietary approach to tailor the gut microbiota for potential prevention or delaying the progression of Alzheimer's disease.


NOTE

TUESDAY 24 OCTOBER 2017

12:00 – 12:10

SPEED PRESENTATION

EXPLORING GUT HEALTH, WELL-BEING AND DIET IN A SWEDISH POPULATION OF GENERAL OLDER ADULTS

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Gastrointestinal symptoms are common among elderly and are known to decrease the quality of life. In addition, elderly individuals particularly point out gut health as a factor influencing optimal functionality. Dietary patterns are known to influence gut health and have been associated to dyspepsia, irritable bowel syndrome and inflammatory bowel disease. Despite this, neither the prevalence of gastrointestinal symptoms nor the relationship between gut health, well-being and dietary factors have been thoroughly elucidated among free-living older adults. This is an important group to consider when investigating healthy ageing, since they are not yet dependent on elevated health care resources and with the right support might be able to maintain higher functionality for a longer time. Our aim is to investigate the relationship between gut health, well-being and dietary intake in a population of free-living older adults.

A cross-sectional observational study was performed with validated questionnaires regarding gastrointestinal symptoms, diet, stress, anxiety and depression. 302 participants (age $\geq$ 65 years), representing the general population, were enrolled in the study whereby 262 completed the study (median age 72, interquartile range 69-76, females 66%). Dietary intake was collected with a food frequency questionnaire and compared to national guidelines. The data is shown as percentage of study participants meeting the dietary recommendations. Statistical analysis included descriptive analysis for prevalence and median scores as well as a Spearman correlation. The study protocol was approved by the Ethics board (Uppsala, dnr 2012/309). 75% of the study population had at least one gastrointestinal symptom whereof 24% of moderate grade. Well-being was generally high with low levels of stress, anxiety and depression. An inadequately low dietary intake was found for the following macronutrients: protein (56% of participants), fibre (85%) and unsaturated fats (>99%). Inadequately high intake was found for saturated fats (96%) and alcohol (28%). Significant correlations were found between increasing gastrointestinal symptoms and: depression, anxiety, stress and low protein and fibre intake. Another significant correlation was also seen between low stress levels and high protein intake. Although the study population in general experienced high level of well-being, a majority of the participants experienced gastrointestinal symptoms. In addition, we identified that many elderly individuals had a low intake of fibre and protein, which correlated to increased gastrointestinal symptoms. Our results suggest that dietary interventions designed to increase gut health might be a cost-effective strategy to improve health and well-being among free-living older adults.

* Co-authors: L. Östlund-Lagerström, S. Engelheart, M. Lindqvist, D. Repsilber, R.J. Brummer, A. Kihlgren and I. Schoultz (Örebro University, Sweden)


NOTE

TUESDAY 24 OCTOBER 2017

12:10 – 12:20

SPEED PRESENTATION

TOWARDS USER-FRIENDLY DIAGNOSTICS THAT DETECT MULTIPLE BIOMARKERS FOR A PERSONALISED NUTRITION ADVICE AT HOME

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Personalised food and nutrition is a new trend that is very attractive to the food industry. However, also from a health care point of view this development is of great interest. Increasingly, it is recognised that nutrition, more in particular the set of ingredients in the food products consumed, should be personalised to optimally contribute to an individual's health status. Consumption of food not only serves to 'survive', but can also be used to prevent diseases to develop or to play a role in diminishing disease symptoms and/or progression. To enable a personalised approach special food products can be developed for particular target groups, such as babies, the elderly and hospitalised persons. From the scientific literature specific requirements can be easily found and such dedicated foods are already on the market.

Another approach to dedicated food products starts from a personalised focus. Even within target groups, each individual is unique as far as the requirement for particular food ingredients is concerned, and, therefore, this approach should be based on thorough knowledge of the individual needs. An important way of getting the right information is through detection of relevant biomarkers that can be found in the blood (finger prick) or in other body fluids such as saliva and tear fluid. Preferably, a test to be used is user-friendly (can be done by a layman), very rapid, multi-biomarker and can be read automatically. In addition, the outcome should be an advice regarding food products that will support or improve the present health status of the person using the test. At BioSensing & Diagnostics, user-friendly and multi-analyte tests are being developed. The well-known 'pregnancy hormone test', a so-called lateral flow diagnostic test, has been transformed into a multi-analyte platform by applying tiny low-nanoliter spots (e.g., 25 in a 5x5 array) in which each spot is a separate test. Running the body fluid through the test will show the presence of particular biomarkers through upcoming black spots. In just some minutes the results can be automatically read by a real-time video reader with wireless connection to a preferred receiver such as a smartphone or a computer at a GP's office. One of the goals is the development of an app that yields a personalised nutrition advice based on the data obtained in the test.

* Co-authors: J. Veen and H. Arends (HAN University of Applied Sciences, The Netherlands; M. Koets (Wageningen University & Research, The Netherlands)


NOTE

TUESDAY 24 OCTOBER 2017

12:10 – 12:20

SPEED PRESENTATION

LONG-TERM EFFECT OF FOLIC ACID AND VITAMIN B12 SUPPLEMENTATION ON CANCER RISK: B-PROOF, A RANDOMISED CONTROLLED TRIAL

Sadaf Oliai Araghi*

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Folic acid as well as vitamin B12 play a key role in one-carbon metabolism. Several studies have shown that disrupted one-carbon metabolism has a function in the aetiology of cancer. However, there is continuing disagreement and controversy regarding the potential adverse effects of folic acid and vitamin B12 supplementation on cancer risk.

The aim of the current study was to assess the long-term effect (follow-up of 6-8 years) of folic acid and vitamin B12 supplementation (intervention of 2-3 years) on the incidence of all types of cancer, notably colorectal cancer (CRC). The study comprised secondary analyses of the B-PROOF study (B-vitamins for the prevention of osteoporotic fractures): a large multi-centre double blind randomised controlled trial designed to investigate the effect of a 2-year daily oral vitamin B12 (500 µg) and folic acid (400 µg) supplementation versus control on fracture incidence in people of 65 years and older with a high homocysteine serum level. Participants in both treatment groups additionally received 15 µg (600 IU) of vitamin D daily. For the present analysis, information on cancer incidence was obtained from the Netherlands Comprehensive Cancer Organisation (IKNL), from baseline until 1 December 2015 (n=2.524). We used the ICD-10 codes C00-C97 for all cancer (except C44 for skin cancer), C18-C20 for CRC and C18 for colon cancer. During follow-up, 138 persons (11%) developed cancer in the intervention group and 117 persons (9.2%) in the control group. Intention-to-treat analyses revealed that cancer risk was not significantly different between both groups in the intention-to-treat analyses (HR= 1.21; 95% CI: 0.94-1.54 for the intervention vs. control group). However, participants receiving folic acid and vitamin B12 had an almost twofold increased risk of CRC (HR= 1.76; 95% CI: 1.03-3.01 for the intervention vs. control group).

In conclusion, combined folic acid and vitamin B12 supplementation may increase the risk of CRC in ambulant elderly. Further studies are needed regarding to these B-vitamins and cancer risks for this particular age group.

* Co-authors: J.C. Kiefte-de Jong (Erasmus MC and Leiden University College The Hague, The Netherlands); S.C. van Dijk, B.H. Stricker and A.G. Uiterlinden (Erasmus MC, The Netherlands); K.M.A. Swart, P. Lips and N.M. van Schoor (VUmc, The Netherlands); H.W. van Laarhoven (Academic Medical Centre, The Netherlands); L. de Groot (Wageningen University & Research, The Netherlands); V. Lemmens (Erasmus MC and Netherlands Comprehensive Cancer Organisation, The Netherlands); N. van der Velde (Erasmus MC and Academic Medical Center, The Netherlands)


NOTE

TUESDAY 24 OCTOBER 2017

13:35 – 14:00

MUSCULOSKELETAL AGEING; CAN DIETARY COMPONENTS IMPACT SKELETAL HEALTH?

James Edwards

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Ageing is universally linked to a decline in skeletal health. The focus of our Musculoskeletal Ageing Group is to identify and characterise common factors linking ageing with skeletal biology and disease. In recent years, this has included the study of sirtuin biology in bone and joint tissues, where SirT1 has been revealed as a crucial mediator in the fine cellular control of bone formation and bone resorption. Moreover, cartilage degradation and normal chondrocyte formation and activity are impacted by alterations in SirT1 expression, which decline with age in all musculoskeletal tissues. Interestingly, changes in SirT1 also impact the autophagy process of cellular waste removal and recycling, which is strongly associated with declining tissue function with increasing age. Loss of SirT1 with age alters the epigenetic status of key autophagy proteins and consequent activity, to reduce chondrocyte activity and predispose to cartilage degradation seen in age-related disorders such as osteoarthritis.

Recently, we have used pre-clinical models to show that targeting SirT1 or autophagy with naturally occurring, dietary-related products can increase activity and improve cellular function and protect against musculoskeletal disease. Specifically, the plant polyphenol resveratrol found in high quantities in nuts, grapes and red wine, stimulates osteoblast formation and bone growth in vivo, whilst the polyamine spermidine, from wheat germ, soybeans, cheese, activates autophagy and protects against arthritis. Our ongoing work is aimed at identifying specific food groups conferring protective musculoskeletal effects and characterise the mechanisms through which this occurs.


NOTE

TUESDAY 24 OCTOBER 2017

14:00 – 14:25

DAIRY AND BONE HEALTH: HOW STRONG IS THE SCIENTIFIC EVIDENCE?

Ellen G.H.M. van den Heuvel*

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The relevance of dairy produce for the diminishment of osteoporotic risk is still a matter of scientific debate due to the outcome of a few single observational studies. This presentation will address the most robust point estimate on the role of dairy, as reported in systematic reviews (SRs) and meta-analyses (MAs) on randomised controlled trials in case of bone mineralisation or prospective studies in case of fracture risk.

Based on 9 MAs/SRs, we found that plain dairy or fortified with calcium and/or vitamin D improves total body bone mineral content (BMC) when the daily baseline calcium intake is lower than 750 mg in Caucasians and Chinese girls. In primarily adult Caucasian women, small beneficial effects of (fortified) dairy were found on bone mineral density (BMD of lumbar spine, total body, total hip and femoral neck). With regard to childhood fracture risk, no conclusion can be drawn. Milk, fortified or plain, does not seem to play a role or to a low extent of about 5% in the reduction of hip fracture risk, mostly studied in adult Caucasian women. Based on pooled individual patient data, however, there are indications that at very high age, osteoporotic fracture risk decreases 5-10% at a higher milk intake. Overall, the role of dairy for BMC in girls or BMD in older adults, mostly Caucasian women, has been sufficiently established. Less clear is the association between dairy and fracture risk in both age-groups. More research is needed on specific target groups, especially ethnicities and men, and the role of different (fortified) dairy products within the context of bone health promoting diets.

* Co-author: J.M.J.M. Steijns (FrieslandCampina, The Netherlands)


NOTE

TUESDAY 24 OCTOBER 2017

14:25 – 14:50

BONE AND CARTILAGE: THE ROLE OF NUTRITION IN OSTEOARTHRITIS

Marie-Noëlle Horcajada

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Osteoarthritis (OA) is a chronic, painful, degenerative and inflammatory condition that affects the joints. Symptomatic knee pain and discomfort appear at early stages of the disease, even before radiographic evidence of OA, leading ultimately to impaired mobility and reduced quality of life. The most common risk factors are age and obesity, but includes others such as previous joint injury, gender, genetics, bone density, muscle weakness and nutritional factors, such as vitamin D deficiency. Although the underlying mechanisms of the pathogenesis of OA in relation to ageing are not entirely elucidated, there is growing evidence that a combination of local and systemic factors are involved with complex interactions of mechanical, biochemical and pro-inflammatory mediators.
The search for effective therapies that attenuate joint degradation, improve joint flexibility and relieve joint pain has been challenging and currently the most popular intervention for OA management are non-steroidal anti-inflammatory drugs (NSAIDs). However, these are associated with adverse side effects. Overall, intervention strategies are focused on managing symptoms in diagnosed individuals but are largely inadequate resulting in incomplete pain reduction usually without improved function or modification of disease progression. Specifically, disease-modifying therapies for OA are not currently available, and approximately 75% of OA patients regularly receive more than one symptomatic treatment. The prevention of this chronic disease would also be beneficial.

Several international guidelines recommend non-pharmacological interventions, such as exercise and weight management, at early stages of OA. However, preventive and alternative treatments could also come from nutrition, through dietary supplement/nutraceuticals. Some positive beneficial effects have been highlighted with nutraceuticals in the course of OA, the most widely studied ones being glucosamine and chondroitin. Collagen supplementation has also been considered as an option to limit damage to the articular cartilage over time following the onset of OA. In the first OA prevention trial, the PROOF study showed that oral glucosamine sulphate with or without a personalised diet and exercise program, led to a decrease in the incidence of knee OA in a group of overweight and obese women with no diagnosis of knee OA and without treatment for knee symptoms at baseline.

Finally, in a recent study, we have tested the feasibility of a combined nutrition and exercise approach in healthy, older adults experiencing joint pain and discomfort but not yet diagnosed as OA, in order to test if such an intervention could alleviate symptoms and improve quality of life. This trial was conducted as a single-arm, baseline trial in a Chinese population using a mix of Tai-Chi and resistance type exercise inclusive of a nutritional, dairy supplement containing Ca, vitamin D, vitamin C, zinc and glucosamine sulphate. This kind of intervention is in line with the ever-increasing interest in implementing more holistic lifestyle approaches for OA management and prevention.


NOTE

TUESDAY 24 OCTOBER 2017

14:50 – 15:15

NUTRITION INTERVENTION AND SARCOPENIA

Mary Hickson

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This presentation critically reviews the published nutrition intervention trials targeting sarcopenia, with and without exercise. The studies which examine nutrition interventions to treat sarcopenia include whole protein, essential amino acids and β-hydroxyl β-methylbutyrate (HMB) supplementation. Sarcopenia is the loss of muscle mass, strength and/or performance with age. Since amino acids and energy are required for muscle synthesis it is possible that nutritional intake influences sarcopenia. Nutritional studies are challenging to carry out because of the complexity of modulating dietary intake. It is very difficult to change one nutrient without influencing many others, which means that many of the published studies are problematic to interpret. The issues of timing and distribution of protein intake, and increased splanchnic amino-acid sequestration are discussed, and recommendations for future trials are made.


NOTE

TUESDAY 24 OCTOBER 2017

15:50 – 16:15

THE QUEST FOR HEALTHY AGEING: INSIGHTS FROM THE CALORIC RESTRICTION PARADIGM

Rozalyn M. Anderson

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Several diseases of ageing, including diabetes, cancer, and neurodegeneration, have an established metabolic component. An emerging paradigm in ageing research identifies metabolic dysfunction as a root cause in the age-related increase in disease vulnerability. Our studies in non-human primates have focused on links between nutrition, metabolic status, and disease vulnerability. Caloric restriction (CR) delays ageing and the onset of age related disease in diverse species, including non-human primates. Our work demonstrates that CR animals are healthier than their control counterparts with lower indices in multiple disease-risk factors. Molecular profiling identifies CR responsive elements in the transcriptome, proteome, and metabolome, and show that improvements in health and survival are associated with changes in metabolism in nonhuman primates, a highly translational model for human ageing. Biomarkers identified in these studies may be clinically relevant for the early identification of elevated disease risk in humans as a function of age.


NOTE

TUESDAY 24 OCTOBER 2017

16:15 – 16:40

NUTRITIONAL INTERVENTIONS FOR AGE-RELATED MACULAR DEGENERATION

Jose Paulo Andrade*

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Age-related macular degeneration (AMD) is the main cause of blindness in industrialised countries affecting the elderly, and its prevalence is growing sharply due to the increase of longevity. As there is a central vision loss in advanced AMD, the quality of life is significantly reduced. There are treatments available for some forms of the disease, but they are expensive and consuming the healthcare budgets of numerous countries.

Therefore, it would be useful to prevent the onset of AMD and delay its evolution, trying to modify some of the environmental and modifiable risk factors. Although the precise pathogenesis of AMD is not known, oxidative stress and inflammation appear to be involved. Thus, it was thought that dietary antioxidants and/or vitamins and nutritional supplements could prevent AMD or delay its progression due to the reduction of inflammatory events and oxidative stress. There are multiple nutritional interventions evaluated in observational studies and some randomised clinical trials. The AREDS and AREDS2 clinical trials found that nutritional supplements including vitamins C and E, beta-carotene, and zinc might reduce the progression to advanced AMD in some patients. It was also reported that supplementation with lutein/zeaxanthin might have some benefits. More importantly, the implementation of dietary patterns naturally rich in antioxidants and healthy fats was associated with a lower prevalence of AMD. In particular, the most studied dietary pattern, the Mediterranean diet, rich in fruits and vegetables, whole grains, some fish and a modest amount of red and processed meats was specifically linked to a lower risk of AMD. This is very important as even a modest protective effect on the prevention of AMD and progression of the disease can have a relevant impact on the quality of life of the patients and may decrease the economic and social burden to society.

* Co-author: A. Carneiro (University of Porto and Hospital S. João, Portugal)


NOTE

TUESDAY 24 OCTOBER 2017

16:40 – 17:05

SALIVA: NOT JUST A DIGESTIVE FLUID

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Saliva is a complex mixture, mainly composed of secretions from the major salivary gland (parotid, submandibular and sublingual glands) and from numerous minor glands situated in the tongue, cheek, palate and lips. The digestive functions of saliva include moistening of food, the formation of a smooth food bolus, assisting in taste perception and the initial digestion of starch. The majority of the functions of saliva, however, deal with protection of the hard and soft oral tissues against microbial, chemical and mechanical injury. This becomes clear when the salivary glands fall dry, e.g., as a side effect of medication or radiotherapy in the head and neck region. Teeth will rapidly decay, and the oral mucosa become vulnerable to bacterial and fungal infections. Thus, patients with chronic shortage of saliva are prone to develop rampant caries, because of the diminished protection by saliva and are more vulnerable for dental wear, due to the combined processes of attrition, abrasion and erosion.

Saliva protects the oral tissues in various ways: the cleansing action of the saliva flow clears the mouth from bacteria and food particles. Buffering ions in saliva, particularly bicarbonate, aid in acid neutralisation, in this way protecting the dental enamel against demineralisation. Calcium and phosphate ions in saliva not only prevent spontaneous dissolution of the tooth mineral, but are also the building blocks for repair of initial lesions in the dental enamel. Finally, saliva plays a key role in the maintenance of a stable and healthy oral microflora. On one hand, it contains multiple antimicrobial systems which in various ways prevent uncontrolled outgrowth of microorganisms. On the other hand, glycoproteins in saliva support growth of bacteria under conditions of low external nutrient supply. In this presentation a concise overview will be given of the various protective functions of saliva. In particular, attention will be paid to the role of saliva in the protection against dental caries (tooth decay), the most common chronic disease.


NOTE

TUESDAY 24 OCTOBER 2017

17:05 – 17:30

CARDIOVASCULAR AND RENAL EFFECTS OF AN EGG LYSOZYME HYDROLYSATE

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NWT-03 is a novel egg protein hydrolysate with ACE-inhibitory and mild blood lowering properties in hypertensive rats. Dipeptidyl peptidase 4 (DPP4) and angiotensin-converting enzyme (ACE) are regarded important target-enzymes in glycaemic control and renovascular protection. Angiotensin-converting enzyme (ACE-)inhibitors exert vasoprotective effects that may help to control progression of micro- and macrovascular complications herein. DPP4 inhibits incretins like GLP-1 resulting in less insulin secretion. In vitro results of NWT-03 show ACE- and DPP4- inhibitory activity. Therefore, we studied the effect of this hydrolysate on renovascular damage in Zucker diabetic fatty rats (ZDF).
ZDF rats received 1 g/kg per day NWT-03 or 3 mg/kg per day vildagliptin (VIL) as a positive control for DPP4-inhibition, from age 10 to 25 weeks. Metabolic and renal functions were assessed, the kidney removed for histological analysis of glomerulosclerosis and expression of pro-inflammatory/fibrotic markers (RT-PCR and western blot), and the aorta removed for studies of endothelium-dependent relaxation (EDR).

Hyperinsulinemic ZDF typically developed signs of diabetes type-2 and renovascular damage associated herewith (albuminuria, glomerulosclerosis, and impaired EDR). NWT03 did not improve metabolic parameters, but neither did vildagliptin despite a 5-fold increase in GLP-1 levels. NWT-03 and vildagliptin both reduced renal Il-1β / Il-13 mRNA expression and glomerulosclerosis, but only NWT-03 additionally reduced renal TNFα mRNA / P22phox protein expression and albuminuria, and restored aorta EDR. Indomethacin added to the organ bath instantly improved EDR, indicating a role of COX-derived contractile prostanoids opposing relaxation. This indomethacin effect was reduced in NWT-03, but not vildagliptin aorta, and coincided with decreased renal COX-1/2 protein expression.
The findings demonstrate that long-term supplementation with egg protein hydrolysate NWT-03 attenuated renovascular damage in this preclinical rat model of diabetes type 2. A comparison to the DPP4-inhibitor vildagliptin suggests that the effects of NWT-03 were related to both ACE- and DPP4-inhibitory properties. Development of protein hydrolysates following a multiple targets strategy may be of profit to functional food formulations.

In a recent human dose-finding study with a crossover design, NWT-03 or placebo was given for 7 days, separated by a 5-day washout period (Plat, J. *et al.*, 2017. British Journal of Nutrition, in press). NWT-03 in a dose of 2 g lowered daytime and 36-hour blood pressure in subjects with mild hypertension. In this same group, 5 g NWT-03 lowered night time blood pressure.

* Co-authors: H. Buikema and W.H. van Gilst (University of Groningen, The Netherlands); A. van Amerongen (Wageningen University & Research, The Netherlands)


NOTE

WEDNESDAY 25 OCTOBER 2017

FINAL SESSION:

- **FOOD FOR HEALTHY AGEING: CHALLENGES AND OPPORTUNITIES AHEAD**

WEDNESDAY 25 OCTOBER 2017

08:35 – 09:00

BIOMARKERS OF AGEING – FROM FUNCTION TO MOLECULAR BIOLOGY

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Ageing is a natural and multi-factorial phenomenon characterised by the accumulation of degenerative processes that are in turn underpinned by multiple alterations and damage within molecular pathways. The alterations and damage ultimately compromise cell and tissue functions. The proposed mechanisms that contribute to the ageing process and the development of these chronic, age-associated diseases include DNA damage, alterations in gene and non-coding RNA expression, genotoxicity, oxidative stress, and the incidence of shorter telomeres. It remains an important goal to provide increasingly accurate measures or predictors of the onset of ill health. Conversely, and of equal importance, is the ability to characterise the maintenance of age-appropriate optimal health. The ability to distinguish between what is normal biological ageing and when health is adversely compromised is an important area for which little experimental data exists. As such, there is no gold standard tool for assessing healthy ageing and no single measure has yet qualified as a sensitive and specific biomarker of ageing. This results in some panels of markers that are associated with survival, health at old age, frailty, age-related (multi-)morbidity or disability, which will be discussed in the presentation.

Advancing adult age is associated with profound changes in body composition. One of the most prominent of these changes is sarcopenia, defined as the age-related loss in skeletal muscle mass, which results in decreased strength and aerobic capacity and thus functional capacity. Sarcopenia is also closely linked to age-related losses in bone mineral, basal metabolic rate and increased body fat content. Skeletal muscle is a highly malleable tissue, whereby muscle mass is determined by a fine-tuned network of muscle growth and degradation pathways. While the activation of the phosphoinositide 3-kinase (PI3K)/Akt pathway by insulin-like growth factor-1 (IGF-1) leads to muscle hypertrophy, its inhibition by myostatin, a member of the transforming growth factor-β (TGF-β) family, generally lead to muscle atrophy and inhibits muscle differentiation. Also, other TGF-β family members, such as activin A and growth differentiation factor-15 (GDF-15), seem to have a negative impact on skeletal muscle growth. With these aspects in mind, it is not surprising that many of these molecules are suggested as blood-based biomarkers of ageing. Further mechanisms that contribute to the ageing process and the development of chronic, age-associated diseases include increased levels of DNA damage, genotoxicity, oxidative stress, and shorter telomeres. Latter parameters also have a close link to nutrient status and are changed at weak storage levels.

The talk will summarise established blood based and muscular biomarkers for ageing, link them to changes based on lifestyle intervention programmes in elderly, and will also specifically focus on the cellular and molecular level.

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NOTE

WEDNESDAY 25 OCTOBER 2017

09:00 – 09:25

METABOLOMICS AS BIOMARKER FOR HEALTHY AGEING

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Worldwide, the proportion of older and highly aged people in the population is rising fast. Metabolic and physical health generally decline among older adults, be it in a highly heterogeneous fashion. The rate of ageing is different between persons and some individuals become very old and seem to delay or even escape age-related disability. Hence, by investigating longevity as a trait, we may be able to identify mechanisms that promote healthy ageing and protect against age-related disease.

From the Leiden Longevity study, we have learnt that the members of long-lived families resemble the phenotypes of caloric restricted mice: a.o. low glucose, low triglycerides, lower prevalence of type 2 diabetes and cardiovascular disease. Moreover, plasma levels of glucose, insulin and triglycerides have been identified as biomarkers for healthy ageing meeting the four criteria for good biomarkers for healthy ageing. They show an association with (i) chronological age, (ii) familial propensity for longevity, (iii) known health parameters, and (iv) morbidity and/or mortality. Thus, nutrient sensing pathways and metabolic health seem the key players in healthy ageing and there is an urgent need to stimulate healthy ageing among the increasing group of older adults.

Lifestyle interventions can successfully improve metabolic health, for example by dietary restriction and/or increased physical activity. Though, it has been unclear whether a 25% reduction in energy balance likewise improves metabolic health in older adults and is feasible in this age group. In the Growing Old TOgether (GOTO) study we investigated the effect of a lifestyle intervention in older adults by both clinical and metabolomic profiles. Participants reduced energy balance by 25% for 13 weeks, targeted by 12.5% reduction in caloric intake and 12.5% increase in physical activity. The GOTO study consisted of 164 individuals (mean age 63.2 years) with a BMI of 23-35 kg/m2, which are mostly couples of whom one was member of a longevity family and the other their spouse. We measured the response to the intervention by other established markers of metabolic health, state-of-the-art metabolic profiles measured with hydrogen-1 NMR (1H-NMR). Furthermore, we investigated the relation between the changing body composition and the changing metabolome due to the lifestyle intervention, to get insight in the underlying signals of the metabolome as a biomarker for healthy ageing.

* Co-authors: B.A. Schutte, P. Dibbets-Schneider, D. van Heemst and P.E. Slagboom (Leiden University Medical Center, The Netherlands); E.B. van den Akker (Leiden University Medical Center and Delft University of Technology, The Netherlands); J. Deelen (Leiden University Medical Center and Max Planck Institute for Biology of Ageing, Germany); O. van der Rest (Wageningen University & Research, The Netherlands)


NOTE

WEDNESDAY 25 OCTOBER 2017

09:25 – 09:50

DIET AND EPIGENETIC AGEING

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Dietary and nutritional factors have been shown to relate to a number of health-related outcomes, yet there is a need for studies that examine their relationship to molecular ageing rates. Toward this end, we study the epigenetic clock and other predictors of chronologic age based on site-specific CpG DNA methylation. These biomarkers have previously been shown to be independent predictors of all-cause mortality, chronic conditions, and age-related functional decline. We analyse cross-sectional data from 4,173 postmenopausal female participants from the Women's Health Initiative, as well as 402 male and female participants from the Italian cohort study, Invecchiare nel Chianti, examining associations between accelerated epigenetic ageing and dietary, cardiometabolic, and lifestyle factors. We find that decreased epigenetic age acceleration is associated with factors such as intake of lean meats, fruits, vegetables and alcohol, physical activity, socioeconomic status, and reduced cardiometabolic risk markers. These results suggest that the healthful effects of these factors might be mediated in part by through anti-ageing effects.

* Co-authors: M.E. Levin and S. Horvath (University of California - Los Angeles, USA)


NOTE

WEDNESDAY 25 OCTOBER 2017

09:50 – 10:15

DIET, PHOSPHATE AND BIOLOGICAL AGEING

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In the Scottish city of Glasgow, the difference in life expectancy between affluent and deprived communities is 28.7 years. This remarkable difference is the largest reported in the developed world, despite common risk factors for age-associated morbidities. In fact, male life expectancy among the most deprived is as low as 54 years, while it stands at over 80 years among the least deprived, with both living within a 15-km geographical radius. This exceptional gradient of socio-economic difference is reflected in the associated variation in mortality and morbidity in this city. The reasons for this remain unclear, but these have been investigated as a part of the psychological, social, and biological determinants of ill health (pSoBiD) study cohort. In the pSoBiD cohort, we have demonstrated that accelerated ageing amongst the most deprived is associated with poor diet, telomere shortening and genomic DNA hypomethylation.

A common direct link between ageing and nutrition has also been demonstrated recently within mammalian genera, based around the uptake of dietary phosphate with a strong correlation between serum phosphate levels and longevity. Here we report significant relationships between serum phosphate levels and markers of biological age DNA methylation content, gender and chronological age in the pSoBiD cohort. When analyses were adjusted for socio-economic status and nutritional factors, associations were observed between accelerated biological ageing (telomere length, genomic methylation content) and nutritionally acquired phosphate levels among the most deprived males, directly related to the frequency of red meat consumption. Significantly, these individuals also displayed reduced renal function, at levels equivalent to mild to moderate kidney disease.

Additionally, we have identified red meat consumption as a significant contributory factor to inflammaging, associated with changes in the microbiome and the age-related epigenetic landscape. These novel data will be presented and discussed.


NOTE

WEDNESDAY 25 OCTOBER 2017

10:15 – 10:45

ROLE OF MICRONUTRIENTS IN HEALTHY AGEING – WHAT IS THE EVIDENCE?

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An estimated 2 billion people aged 60 years and older will inhabit the planet in 2050. Ageing is not a single process, but an accumulation of modifications, affecting different parts of the body to varying degrees resulting, with progressing ageing, in an increase of the incidence of non-communicable diseases (NCD). Many studies report a strong association of nutritional status and several NCD as well as a number of randomised clinical trials (RCT) find a reduced risk of NCD following supplementation of several (micro)nutrients. Thus, there is solid evidence established that nutrition is instrumental for maintaining good health among elderly populations. Vitamins B, D, E, polyunsaturated fatty acids and protein appear to be particularly important for maintaining health in older adults. However, it appears that the value of high quality dietary intake is often under-recognised. In addition, data from dietary surveys suggest that many of the elderly in Europe have intakes for various vitamins that are well below the recommendations and the situation appears to be even more critical for elderly in institutions such as care homes or in hospitalised elderly. Further, the ageing progress itself strongly affects nutrient intakes and utilisation due to social, physical and psychological changes. A particular concern of many people is the impact of ageing on mental capabilities, even more though as pharmaceutical options to address this appear to be limited. So, it is encouraging to see the emerging evidence from mechanistic studies, epidemiological studies, and RCT providing insight to the positive effects of docosahexaenoic acid (DHA) and micronutrients, such as the vitamin B family, in helping neurons to cope with ageing.

In summary, the current evidence clearly suggests an essential role of (micro)nutrients in addressing many challenges of an ageing population and more attention should be paid to it in particular as there is in many elderly borderline or even poor (micro)nutrient intakes. Given the relevance of nutrition for public health in ageing societies further data are required to even better understand the role of nutrition in healthy ageing.


NOTE

WEDNESDAY 25 OCTOBER 2017

11:15 – 11:40

SUSTAINABLE AND HEALTHY DIETARY PATTERNS: A HOLISTIC APPROACH TO HEALTHY AGEING

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Nutritional and other lifestyle factors play a key role in modulating the likelihood of healthy ageing. Nevertheless, studies of the effects of nutrients or single foods on ageing often show inconsistent results and ignore the overall framework of dietary patterns. Therefore, the use of dietary patterns (e.g., a Mediterranean dietary pattern) and the specific dietary recommendations (e.g., dietary approaches to stop hypertension and the American Healthy Eating Index) have become widespread in promoting lifelong health.

In general, some key ingredients of healthy dietary patterns can be identified. These include a high intake of fruit, vegetables, fish, (whole) grains and legumes/pulses and other starchy foods, whereas dietary patterns rich in red meat and sugar-rich foods have been associated with an increased risk of mortality and cardiometabolic outcomes. However, other dietary indices representing an overall picture of diet have also gained interested, such as glycaemic index/load and diet-dependent acid load. To what extent these reflect actual physiological mechanisms in the aetiology of age-related disease or whether it can be seen as merely a tool for healthy food choice remains to be established. At the same time, there is a growing need to facilitate sustainable diets in all its dimensions: environmental, economic and social, which also has implications on health ageing. Dietary guidelines are more often food-based instead of nutrient-based, this provides opportunities to address the environmental impacts of diets more explicitly because food consumption is responsible for 20-30% of the environmental burdens. In addition, the economic and social aspects of dietary patterns are becoming increasingly important since food insecurity is not linked to solely undernutrition anymore but is also becoming an important determinant of obesity and related non-communicable diseases. During this lecture, these recent developments and related challenges for nutritionists, scientists and policy makers will be discussed.


NOTE

WEDNESDAY 25 OCTOBER 2017

11:40 – 12:05

PERSONALISED NUTRITION IN AGEING SOCIETY: REDOX CONTROL OF MAJOR AGE-RELATED DISEASES

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The importance of a healthy ageing process becomes apparent when considering that (i) the generation 50+ (G50+) already has a share in population of around one third across Europe, with obvious regional variations, (ii) this share is likely to increase further in the future, and (iii) vitality at older age is not only an important measure of quality of life but also key to participation and productivity. The theme 'nutrition and ageing' has many different aspects and poses numerous challenges, which provide a fertile ground for many research themes and networks. Among them, the 'NutRedOx' network will focus on the impact of redox active compounds in food on healthy ageing, chemoprevention and redox control in the context of major age-related diseases.

The main aim of the NutRedOx network is the gathering of experts from across Europe, including other Mediterranean countries, and from different disciplines that are involved in the study of biological redox active food components and are relevant to the ageing organism, its health, function and vulnerability to disease. Together, these experts will form a major and sustainable EU-wide cluster in form of the 'NutRedOx Centre of Excellence' able to address the topic from different perspectives, with the long-term aim to provide a scientific basis for (improved) nutritional and lifestyle habits, to train the next generation of multidisciplinary researches in this field, to raise awareness of such habits among the wider population, and also to engage with industry to develop age-adequate foods and medicines.

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[*] Chair of the NutRedOx COST Action (CA16112); http://blog.u-bourgogne.fr/cost-nutredox


NOTE

WEDNESDAY 25 OCTOBER 2017

12:05 – 12:30

NUTRIGERONTOLOGY: THE KEY FOR ACHIEVING SUCCESSFUL AGEING AND LONGEVITY

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People want to live longer. Ageing is an unavoidable process, resulting from accumulation of somatic damage, owing to limited investments in maintenance and repair. In humans, healthy ageing and longevity occur by a fortunate interaction between chance, genetics and environment. Regarding the latter, physical activity and dietary habits are the most important modifiable elements. In particular, the use of foods poor in animal proteins with a low glycaemic index and rich in phytochemicals and other anti-oxidant and anti-inflammatory molecules, should be a correct choice to modulate anti-ageing molecular pathways. The new science that investigates how foods and their components and the diet influence lifespan and the risk of age-related diseases is nutrigerontology, which encompasses biogerontology, medicine, and dietetics. In particular, it was seen that the Mediterranean dietary regimen, characterised by a reduced intake of calories, with low glycaemic index, low animal protein intake and nutraceutical foods, reduces many risk factors for pathologies associated with ageing. Consequently, it is involved in the increase of healthy lifespan, the so called 'health-span', hence in longevity.

Concerning the mechanisms, metabolism plays a key role in the ageing process, through the involvement of the nutrient sensing pathways, such as insulin/IGF-1, sirtuins and mTOR, regulated by the presence or absence of specific nutrients or nutraceuticals. Therefore, a possible anti-ageing strategy is based on the modulation of these signals, with particular attention to the use of functional foods as therapeutic tool in combination with physical activity. Numerous data on experimental models and studies carried out on humans showed that the dietary restriction, aimed at reducing the intake of calories and animal proteins, might actually alter some risk factors for elderly diseases. These variations are linked to the activation of the AMP-activated protein kinase via, sensitive to ATP deficiency, which inhibits the pathway of mTOR and activates that of sirtuins, delaying ageing by the modulation of proteins, such as FOXO3A. It is a transcription factor for homeostatic genes, probably involved in the response to oxidative stress. Moreover, it is activated by the downregulation of the insulin/IGF-1 pathway. Nutraceuticals, such as resveratrol, other STACs (SIRT-1 activating compounds) or quercetin, are also able to modulate sirtuin and mTOR pathways with a final effect of avoiding (or delaying) age related diseases, hence promoting longevity.

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NOTE

WEDNESDAY 25 OCTOBER 2017

12:30 – 12:55

LONG-TERM CONSEQUENCES OF MATERNAL MALNUTRITION

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An overwhelming body of evidence links foetal (mal)nutrition to the development of chronic diseases at adult age (DOHaD hypothesis, Developmental Origins of Health and Disease). Several explanations for the various observed facets of the long-term consequences of foetal (under)nutrition are currently under investigation.

In recent papers, epigenetic mechanisms like DNA methylation or histone modifications have been proposed to be involved in metabolic programming: CpG islands, CG-dinucleotide-rich regions in the promoter of a gene, have been shown to be of crucial importance for the transcriptional activity of particular promoters. In general, transcription of a gene is blocked when the CpG island is methylated. A second layer of complexity is added by the fact that methylated areas of DNA attract methyl-DNA binding proteins and acquire histone modifications which also affect the accessibility of the DNA for transcription. Together, the interaction of DNA methylation and histone modification can regulate the activity of a DNA region. New technologies now enable us to measure DNA methylation and the active/silent areas of chromatin in a genome-wide way and correlate it with physiological observations.

Embryonic development proceeds as a complex set of interdependent and precisely integrated biological programmes, initiated by selective transcription of specific genes at specific points of time and regulated by a controlled maternal supply of nutrients. With the current state of knowledge of molecular regulation metabolism, it is possible to generate a network of metabolic events in the embryo and the foetus that may underlie programming. Nuclear receptors (e.g., PPARs, LXRs, FXR) provide the vehicles through which nutrients interact with the (epi)genome. Expression of these nuclear receptors is at least partially under control of CpG islands.

Disturbances in this complex network of interactions represent key events in metabolic programming of adult disease and are the focus of my work. I will discuss some of the early epigenetic modifications we observed in animal models and human samples and link them to metabolic disease in later life.


NOTE

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