

# The Future of Food and Healthcare: VegMed Web 2021 – Scientific Congress for Plant-Based Nutrition and Medicine

February 28 to March 2, 2021

## ABSTRACTS

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## Presentations & Workshops

NR. 1

### Food as medicine

Michalsen, A.

Department of Internal and Complementary Medicine, Immanuel Hospital Berlin, Berlin, Germany

Is it possible to improve symptoms or to even heal diseases through an appropriate and individualized diet?

On the one hand, public health and prevention research indisputably show that nutrition-related diseases, such as overweight, obesity or type 2 diabetes, are continuously increasing in industrialized countries. Also, diseases which are considered to be at least partly induced by nutrition, such as autoimmune diseases, hypertension, dementia, functional and inflammatory gut diseases or depression, are clearly on the increase. On the other hand, epidemiological data from nutritional sciences often provide evidence that is too unprecise and unreliable, causing major controversies in international scientific discussions about nutrition issues during the last years.

Therefore, the synthesis of data from laboratory and animal research, from observational studies and from randomized controlled trials with clinical experience and clinical evidence should be considered. The key messages of this perspective are:

1. The more plants a diet includes, the healthier it is. This can be put down in the beneficial effects of fiber, the important roles of the microbiome and of secondary phytochemicals.
2. Industrial processing and ultra-processing reduce possible beneficial health effects of normo-caloric diets.
3. The question, how a world population of 10 billion people can be fed appropriately and in a healthy way, touches several aspects such as production circumstances, regionality and seasonality. A plant-based diet is a very relevant factor here.
4. Caloric restriction and intermittent or periodical fasting methods and their “metabolic switch” are effective techniques for prevention and therapy of numerous nutrition-related diseases.
5. In order to maximize its preventive and therapeutic effects intermittent fasting has to be combined with therapeutic aspects of chronobiology and individual genetics.
6. Periodic fasting can be applied as an add-on treatment to conventional therapy in various chronic diseases. Several techniques of modified fasting, fasting-mimicking-diet (FMD) and caloric restriction mimetics (CRM) can be implemented.

It can be summarized, that the meaning of nutritional therapy in increasing in modern medicine while the current evidence remains complex and controversial and the implementation in routine medical practice is still insufficient. It can be expected, that evidence from randomized trials focusing on nutrition and caloric restriction will significantly increase over the next years.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 2

### Finding nutritional therapy in the jungle of the German health system

Köpcke, U.

Verband der Diätassistenten – Deutscher Bundesverband e.V. (VDD), Essen, Germany

In Germany, the prevention of nutrition related diseases as well as nutrition-related health promotion has a comparatively long and changing history, which in the year 2000 culminated in the “prevention paragraph” in the Social Code Book. This paragraph provides preventive measures in the fields of malnutrition, obesity, stress management, physical activity, and drug use (alcohol and tobacco), all these being mandatory components of the service spectrum of statutory health insurance (SHI). Around 90% of the German population is covered by SHI, which allows them to enjoy prevention services in the above-mentioned fields.

In contrast to this, nutritional advice in case of a diagnosed disease is much more difficult to receive by patients. Even though the highest social court of Germany had named nutritional therapy as a remedy in the year 2000, the Federal Joint Committee (G-BA) responsible to transform law into guidelines decided to allow nutritional advice by prescription only in case of cystic fibrosis (CF) and rare congenital metabolic disorders like PKU. Patients with other nutrition related diagnoses might receive nutritional information through disease management programs, or if they need more individual advice refunded partly by their SHI in case of applying. The situation of nutritional intervention in the clinical setting requires much improvement as well. Only 23% of German clinics employ dietitians or nutritionists even though they are responsible to provide remedies. This might be caused by the little financial benefit of nutritional advice for the hospitals. Yet, since 2019 nutritional therapy can be coded if structural demands are fulfilled and starting 2020/2021 the performance of nutritional therapy will be reimbursed.

The workshop provides an overview of possibilities in the clinical and the ambulant sector of the German Health Care System to guide the patient to safe nutritional advice in case of nutritional prevention and therapy. The aim of the workshop is to discuss options and necessary tools and information for all partners of the health care process: the patient, the physician, other health care professionals and the dietitian.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 3

### Medical emergency climate crisis – Climate change as a health hazard

Herrmann, M.

KLUG – German Alliance Climate Change and Health, Berlin, Germany

Climate change is an existential threat for humanity. It is the biggest threat for health in our century and an imminent health emergency, for ecosystems, animals and humans. It is threatening the amazing improvements in public health having been achieved in the last century. At the same time, it is a major opportunity for global health, since climate protection measures come along with massive health co-benefits.

However, the topic has been absent in the health sector until very recently. Even within the climate movement the connection between climate

change and health is only rarely recognized. Fridays for Future and the broader for Future Movement have clarified, that we are globally as well as nationally stuck in the implementation of the necessary measures. We are sleepwalking into catastrophe.

It has been clear for some time that we need a „Great Transformation“ – a far-reaching, cross-sectoral, cross-national, global transformation. Fridays for Future and other climate activists have demonstrated in 2019 how citizen change agents can take the lead in tackling the existential crisis we are in. Health for Future activists have demonstrated that health professionals and the health narrative can play a strategic role in building up the momentum to achieve the critical mass to turn things around. This implies to develop a much broader understanding of human action and the power of working together. Advocating for a plant-based diet is a key facet of the broader transformation agenda. It needs to be placed in the larger transformation agenda to develop its full potential.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 4

### **Mechanisms of nutrition in the development, prevention and reversal of chronic disease**

*Trilk, J.*

University of South Carolina School of Medicine Greenville, Greenville, SC, USA

The World Health Organization (WHO) recognizes that nutrition-related chronic diseases, such as obesity, type 2 diabetes, cardiovascular disease, osteoporosis and some cancers, are leading causes of global morbidity, mortality and high health care costs. Medical professionals are in a position to stem the tide of chronic disease incidence and prevalence in their patients; however, most medical professionals are not adequately trained in the mechanistic roles that nutrition plays in chronic disease, despite the overwhelming scientific evidence that supports the efficacy and effectiveness of healthy nutrition. The WHO states that the right investment in nutrition could save 3.7 million lives by 2025, which could start with medical professional education. This talk will describe the evidence-based mechanisms of nutrition in the development, prevention, and reversal of type 2 diabetes, non-alcoholic fatty liver disease, hypertension, heart disease, osteoporosis, breast cancer, colon cancer, and other chronic diseases, with the goal of improving the audiences' medical knowledge for optimum patient care.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 5

### **Protein in plant-based diets: classical and emerging topics**

*Mariotti, F.*

Department for Human Biology and Nutrition, AgroParisTech, Institute of Technology for Life, Food and Environmental Sciences, Paris, France

In this presentation, I will discuss the different aspects of protein nutrition related to plant protein intake. I will start with the classical issues concerning the ability of plant protein sources to cover basic protein (nitrogen) and indispensable amino acid requirements. I will present data on protein and amino acid intakes from vegetarian diets in western countries and gather information in terms of adequacy for protein and amino acids requirements, using indirect and direct data to estimate nutritional status. I will point out that protein-rich foods, such as traditional legumes, nuts and seeds, are by far sufficient to achieve full protein adequacy in adults following a vegetarian/vegan diets, whereas the issue of deficiency in any amino acid has been substantially overstated. This will also provide a perspective on the issue for newly vegetarians or vegans following less classical dietary patterns. I will also examine the question in older adults, where the issues linked to the protein adequacy of vegetarian diets are more complex, and in children where, conversely, the issue is simpler when energy requirement are met. In a second part of the presentation, I will outline the most recent advances in plant protein nutrition, which has shifted the viewpoint to long-term health. I will recall the data regarding

plant protein intake and cardiometabolic health, which may be attributed in part to the nutrient cluster conveyed by plant protein sources and I will end up with the recent data suggesting that plant protein per se, that is, their amino acids, may have a beneficial effect on cardiometabolic health. From old myths to recent long-term public health data, there are now clear indications that the definition of plant protein quality should be modernized.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 6

### **Lifestyle medicine at the University of South Carolina School of Medicine Greenville: the classroom-clinic-community model**

*Trilk, J.*

University of South Carolina School of Medicine Greenville, Greenville, SC, USA

While scientific evidence demonstrates conclusive associations between unhealthy lifestyle behaviors and increased morbidity and mortality related to non-communicable chronic diseases (NCDs), most physicians are not formally taught the root causes of NCDs nor how to counsel patients regarding their lifestyle behaviors for disease prevention and treatment. Since its inception in 2012, the University of South Carolina School of Medicine Greenville (UofSCSOMG) has designed, developed, and implemented an innovative, formalized Lifestyle Medicine classroom-clinic-community model to provide required undergraduate medical student training with a graduating program-level goal to improve population health. Students matriculating to UofSCSOMG are introduced to the Lifestyle Medicine curriculum as a required component of undergraduate medical education which all students receive across the four years of the program. While in their biomedical science modules, medical students in their M1 and M2 years are educated in detail and at the intracellular level in the biochemical and physiological mechanisms how lifestyle behaviors either plays a role in the prevention of, or pathophysiology of chronic disease. Medical students in the M3 and M4 years continue education in Lifestyle Medicine in an applied clinical knowledge and skills format with patients, and are also educated about the innovative clinic-to-community referral program called "Exercise is Medicine Greenville" (EIMG<sup>®</sup>). In partnership with the YMCA of Greenville and Prisma Health, EIMG<sup>®</sup> delivers a 12-week, community-based, clinical exercise and lifestyle behavioral intervention for prevention and treatment of NCDs including obesity, dyslipidemia, hypertension, and Type 2 diabetes. Patients in the departments of Family Medicine and Internal Medicine are counseled by medical students and referred through the EPIC electronic health record to the program. The process of developing the classroom-clinic-community model was guided by the Association of American Medical Colleges' Core Entrustable Professional Activities (required for graduates entering residency) and aimed to satisfy the Quadruple Aim components of better outcomes, lower cost, improved patient experience, and improved physician experience. This talk will describe the approach used to design and implement the model and offers guidance to other undergraduate medical schools that may wish to implement Lifestyle Medicine training to improve physicians' medical knowledge and clinical skills for optimum health care.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 7

### **Plant-based nutrition and heart failure**

*Kerley, C.*

Plant Based Doctors Ireland, Dublin, Ireland

Growing evidence has emerged about the role of dietary patterns and components in heart failure (HF) incidence and severity. Several plant-based diets have consistently been associated with decreased HF incidence and severity, notably the Dietary Approaches to Stop Hypertension (DASH) and Mediterranean diets. Several other plant-based dietary patterns, including low-fat diets and the rice diet, also show promise.

Higher dietary quality, as assessed using different scores, seems to provide protective qualities. Fruit, vegetables, legumes and wholegrains appear to be beneficial, whereas red/processed meats, eggs and refined carbohydrates appear harmful. Some evidence suggests detrimental effects of dairy products and poultry, but more research is needed. There is observational and interventional evidence that a plant-based diet high in antioxidants, micronutrients, nitrate and fiber but low in saturated/trans fats may decrease the incidence and severity of HF. Potential mechanisms for this include decreased oxidative stress, homocysteine and inflammation levels, as well as higher antioxidant defense and nitric oxide bioavailability with gut microbiome modulation.

Plant based diets appear to decrease the incidence and severity of heart failure.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 8

### **Mediterranean and other plant-based diets and cognitive decline**

*Yannakoulia, M.*

Department of Nutrition and Dietetics, School of Health Science and Education, Harokopio University, Athens, Greece

The concept of the Mediterranean diet was originally conceived by Ancel Keys, in the Seven Countries Study. Nowadays, this term is widely used to describe the traditional dietary habits of people in Mediterranean countries and it is characterized by abundance of plant foods: fruits, vegetables, a lot of bread, other forms of cereals, legumes, nuts, and seeds. Olive oil is the principal source of fat. Mediterranean diet includes moderate amounts of dairy products (principally cheese and yogurt), low to moderate amounts of fish and poultry, red meat in low amounts and wine, consumed modestly, normally with meals. Greater adherence to this pattern has been associated with longevity and lower prevalence of several chronic diseases. In relation to cognition, the Mediterranean diet is the most extensively studied dietary pattern in the context of brain ageing. Most (not all) cross-sectional and prospective studies suggest that higher adherence to this pattern is associated with slower rates of decline in performance in cognitive tests and with lower risk for dementia or mild cognitive impairment or progression from mild cognitive impairment to dementia. This finding is supported by the results of two clinical trials, in the context of the PREDIMED study that included a Mediterranean dietary pattern and nuts or olive oil in the two intervention arms. Other plant-based, dietary patterns have been also studied in relation to cognitive outcomes, with promising results. Although the underlying mechanisms have not been elucidated, partly due to the challenges associated with the multidimensionality of diet and of cognitive function, the existing evidence supports the adoption of a plant-based dietary pattern for the promotion of cognitive health and the prevention of brain aging.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 9

### **Orthorexia – restrictive eating behavior or new nutritional trend?**

*Schwennen, B.*

Department for Acute Psychosomatics, Seepark-Klinik Bad Bodenteich, Germany

Identity formation via food- “fashion disease” or disease-worthy disorder? Not only the increasingly rigid “ideal of slimness”, but also increasing “health care constraints” “provoke” that eating behavior in society is increasingly “problematized”. At the same time, identity is found through “eating” or eating behavior. In this way, symptoms of eating disorders are also becoming more widespread – often with long-term consequences of social isolation, symptoms of malnutrition and often also malnutrition. Does “vegan nutrition” pave the way for eating disorders?

How does a healthy diet differ from symptoms of an eating disorder?

Ethical-moral and health reasons for a vegan diet in a therapeutic setting - is it possible to ensure the supply of critical nutrients through a selection of wholesome herbal foods as part of an eating disorder treatment?

These questions will be answered theoretically and practically during the lecture.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 10

### **Evaluating the role of vitamin B12 in lung cancer using multiple sources of evidence**

*Virani, S.*

Genetic Epidemiology Group, International Agency for Research on Cancer, France

Vitamin B supplementation can have side effects for human health, including cancer risk. The potential role of B vitamins in relation to cancer has been reported on previously. Two large randomized controlled trials of B vitamin supplementation in Norway found an increased risk for cancer among subjects who received both vitamin B12 and B9. Most cancers were lung cancer. Recently, the Vitamins and Lifestyle (VITAL) cohort study reported higher lung cancer in men who used vitamin B12 and B6 supplementation.

To clarify the role between vitamin B12 and lung cancer risk, we conducted two large and complementary analyses based on (i) directly measured circulating vitamin B12 concentrations in pre-diagnostic samples and (ii) a Mendelian randomization (MR) analysis based on genetic data. Our aim was to determine the role of vitamin B12 in lung cancer by direct measurements in pre-diagnostic blood samples and a Mendelian randomization approach. We used pre-diagnostic biomarker data from 5,183 case-control pairs nested within 20 prospective cohorts, and genetic data from 29,266 cases and 56,450 controls.

Eight single nucleotide polymorphisms were associated with vitamin B12 concentrations in the MR study. When assessing risk of lung cancer overall and by histological subtype, we found circulating vitamin B12 to be positively associated with overall lung cancer risk with an odds ratio of 1.15 (95% CI: 1.06-1.25). Genetically determined vitamin B12 concentrations were positively associated with overall lung cancer risk with an odds ratio of 1.08 (95% CI: 1.00-1.16). The consistency of these two independent and complementary approaches supports the hypothesis that high vitamin B12 status increases the risk of lung cancer.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 11

### **Orthorexia – forbidden food or healthy enjoyment based on a moral evaluation?**

*Schwennen, B.*

Department for Acute Psychosomatics, Seepark-Klinik Bad Bodenteich, Germany

In today's society, people affected by orthorexia no longer see illness as a fate that cannot be influenced, but as a “flaw” that they themselves have caused. Thus, it is almost a “duty” to keep oneself and the body healthy through a healthy diet and appropriate exercise. Affected persons often report about the concern or fears of being “seriously” ill, furthermore, about a great fear of growing old. Through a “compulsive fixation” on health-conscious, high-quality food, rigid nutritional rules in the sense of a “moral evaluation” are established through constant employment.

“this plant destroys 98% of cancer cells in only 16 hours”

“you have so much poison in your body-with only 2 ingredients flush 30 pounds of toxins out of your intestines”

“in the future take a teaspoon of this before you go to bed - you will never get up tired again, your hair will grow, you will have the sight of an eagle”

What are the background conditions of this “compulsive” focus on the quality of food, unrealistic-moral beliefs, and “intrusive” thoughts of “perfecting” health? Security due to fear of loss of control, a self-confident or compulsive personality style, a perfectionist demand on oneself - in search of recognition, identity formation and self-realization, feeling of belonging in the sense of a peer group? Should the diagnosis of orthorexia be given and how should this clinical picture be classified: As an obsessive-compulsive disorder, a special form of a classic eating disorder or an independent disease?

Vegan nutrition - does this form of nutrition pave the way for an eating disorder? How does a healthy eating behavior in the context of a vegan diet differ from symptoms of an eating disorder? Ethical-moral and health reasons for a vegan diet - is it possible to ensure the supply of critical nutrients through a selection of wholesome herbal foods as part of an eating disorder treatment? These questions will be answered within the framework of the workshop on the basis of theoretical basics and practical case studies with reference to the presentation.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 12

### **Paradigm shift in the treatment of the metabolic syndrome by plant-based nutrition**

*Riedl, M.*

medicum Hamburg MVZ GmbH, Hamburg, Germany

Optimized plant-based nutrition has multiple effects: It acts against the aspects of the metabolic syndrome, reduces weight and organ adiposity simultaneously, enabling remission rates of diabetes up to 86%. In combination with modern antidiabetic medication effective alternatives to bariatric surgery unfold which were previously not sufficiently taken advantage of. Prerequisite of this alternative is the duly started nutrition therapy as well as an individually suited change management. The medicum Hamburg, a center for diabetology, nutrition medicine and all adjacent areas of expertise, this concept has been successfully applied since over 20 years.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 13

### **Guide to a sustainable and plant-based diet in hospitals and other health care facilities in Germany**

*Blasius, M.<sup>1</sup>, Roehl, R.<sup>2</sup>*

<sup>1</sup>BKK ProVita, Munich, Germany

<sup>2</sup>a'verdis, Münster, Germany

A rethinking of a health-conscious, balanced, plant-based diet has been apparent for several years. The interest in sustainable and healthy nutrition is growing steadily in the population. Healthcare facilities play a special role as they take care of the health of their patients and provide food to millions of people every day.

The German public health insurer BKK ProVita, the German Hospital Institute and the consulting firm a'verdis developed a guideline for implementing a plant-based diet in hospitals and other healthcare facilities. It is designed as a handy working document for implementation in community catering settings considering the principles of structural and behavioral prevention. The focus is on everyday practicability. At the same time, the guide also serves as an argumentation and convincing aid and is directed at the hospital and kitchen management as well as at all other decision makers.

The guideline brings together what is needed for a hospital's practical implementation: background and practical knowledge, examples of good practice, examples of creative food planning, recipes that focus on taste experience, and it answers questions on profitability, promotion and internal and external communication. In addition, detailed information is available summarized in digressions and checklists for practical use.

Based on a holistic model the guideline defines three phases with different objectives and target groups:

Phase 1: Background knowledge and added value for hospitals and health-care facilities

Phase 2: Inventory and target definition

Phase 3: Implementation in five steps

Step 1: strategy purpose

Step 2: recipes and menu planning

Step 3: food quality, purchasing and processing

Step 4: economics and calculation

Step 5: internal and external communication

In the long term, the guideline is directed to enable every hospital in Germany to on-board on the journey to a healthy plant-based nutrition for staff and patients.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 14

### **Eating with children – education and relationship**

*Gätjen, E.*

Verband für Unabhängige Gesundheitsberatung e.V., Wettenberg, Germany

There are two major questions that need to be answered in the area of child nutrition. On the one hand: “What should children eat” and on the other: “How children eat and taste, experience and learn”. These two questions often result in a discrepancy in everyday family life, but also in day-care centres and schools. On the one hand there is the “should”, defined by the adults, and on the other hand the “want”, shaped by the development of taste, evolution and genetics, culture and age and last but not least by the personality of the child. In order for children to learn to eat self-determined, health-promoting and enjoyable wholefood and vegan food, the knowledge of a vegan wholefood diet is essential. Almost even more important, however, is the knowledge about the relationship with food and eating education.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 15

### **Plant-based nutrition research, and you: Practical approach to your scientific career**

*Selinger, E.*

3rd Faculty of Medicine, Charles University in Prague, National Institute of Public Health, Prague, Czech Republic

How to get your dream internship or money for your student research experiments? What is worthy to invest your time into? Where and how to find the right supervisor or prepare basic grant applications and other practical questions every student starts to face at some point in their career decision-making process. And by the way - how to select the career itself? Without burning out? One person's journey filled with tips and resources. From childhood dreams to vegan public health, practically explaining why doing the useless stupid stuff is the best career investment you can make. Period.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 16

### **Animal experimentation in science and research: An overview and the links to health and nutrition**

*Kühner, K.*

Doctors Against Animal Experiments Germany, Cologne, Germany

For years and years animal experimentation has been a main method in science and research. In the past only a few people have asked questions about the level of evidence or the meaningfulness of the results of such

experimentation. Since the 1970's this way of scientific research gets questioned more and more as far as there is very less progress compared to the enormous financial effort and the time that is required. It is a fact that animal experimentation is a relic from earlier times which has nothing in common with evidence-based medicine and research. The talk will focus on the proven facts that animal experimentation is not science but resource wastage. The bad and misleading results which are produced by animal experiments are presented and the ways to stop the wrong turn research has taken will be an important theme. Nutrition is a main factor to stay healthy and prevent lots of diseases and health complains and can in that way help to avoid animal experiments and bring forward reliable and good scientific methods to turn biomedical research and research in general into the right direction.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 17

### **Food as a source of resistant bacteria for humans.**

*Tenhagen, B.A.*

Head of Unit Epidemiology, Zoonoses and Antimicrobial Resistance, Berlin, Germany

The role of food as a source of resistant bacteria is frequently discussed. In case of bacterial infections, food animals are exposed to the same groups of antimicrobials as human beings are. Therefore resistance to these antimicrobials can develop and be spread in animal associated microorganisms. These bacteria in turn can be transmitted to food during food harvest, i.e. slaughter or milking. Foodborne infections such as Salmonellosis or Campylobacteriosis are evidence of the transmission of bacteria from animals to humans through food. The role of food for the spread of resistant bacteria is, however, complex and differs between the different types of bacteria. For bacteria causing foodborne infections such as Salmonella or Campylobacter, resistance acquired on farm is directly important to humans once the bacteria have been ingested. For other bacteria the major risk is transmission of resistance mechanisms to other bacteria in the human gut, as the bacteria themselves are not necessarily harmful to humans. Other less frequently discussed aspects are the potential role of food of plant origin as a source of these bacteria due to environmental contamination and trade of food between continents and the associated risk of importing resistant bacteria to Europe from areas that have different, frequently worse situations with respect to antimicrobial resistance. The presence of resistant bacteria in food is routinely monitored in Germany. Results give evidence of the complexity of the challenge and underline that kitchen hygiene in any case is key to food safety in the private sector despite all efforts taken on the production level to avoid contamination of food with resistant bacteria.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 18

### **Omega-3 Fatty Acids: Myth and Reality. Time for Scientific Facts on Supply and Vegan Nutrition**

*von Schacky, C.*

Omegamatrix, Martinsried, Germany

From plant-derived alpha-linolenic acid, humans form eicosapentaenoic acid (EPA) in small amounts and are almost unable to form docosahexaenoic acid (DHA) from EPA. Since DHA is needed, e.g., as a structural fatty acid of brain and eye, but cannot be formed endogenously, humans depend on intake of DHA. EPA and DHA are found in fish and other food sources not usually ingested by vegans or vegetarians. However, intake of EPA and DHA is less relevant than levels of EPA and DHA measured in red blood cells, expressed as a percentage of all fatty acids measured (Omega-3 Index). On a standardized analytical method (HS-Omega-3 Index®), >300 scientific publications are based, as are some 50 ongoing research projects, providing the largest scientific database of any fatty acid analytical method. Using this method, it has been demonstrated that, in comparison

to a low HS-Omega-3 Index (e.g., <4%), an optimal HS-Omega-3 Index (8-11%) is associated with lower total mortality, lower rate of fatal and non-fatal myocardial infarctions, strokes and other vascular health issues. Other health issues less prevalent with an optimal HS-Omega-3 Index are cognitive impairment, dementia, psychiatric diseases, and many other important health issues, like premature birth and perinatal mortality. Many intervention trials compared intake of EPA and DHA with no intake, and neither respected baseline Omega-3 Index nor evaluated clinical events from the perspective of levels of EPA and DHA reached during or after the trial. Those who did, found substantial improvements in all health issues mentioned, like reductions in total mortality by 40% or stroke by 50% in the REDUCE-It trial. As measured by the HS-Omega-3 Index method, Vegans and Vegetarians have exceptionally low levels of EPA and DHA, in keeping with the absent intake. Especially for Vegans and Vegetarians, algae, i.e., plant-derived sources of EPA and DHA have been made available, that have already been demonstrated to increase the HS-Omega-3 Index.

**Disclosure:** This presentation is sponsored by NORSAN.

NR. 19

### **Food system resilience in times of pandemics**

*Qaim, M.*

Professor of International Food Economics at the University of Göttingen (Germany)

COVID-19 was first detected as a human disease in late-2019 and then spread very quickly to all parts of the world, rich and poor. The number of people infected globally and the death toll skyrocketed during 2020 and continues to rise. In addition to the people directly affected by the disease, many more are affected indirectly through the lockdown measures implemented in many countries, the resulting economic downturn, and associated losses of jobs and income-earning opportunities. Especially in poor countries, where social safety nets hardly exist, poverty and food insecurity are on the rise, reversing the positive development trends observed during the last few decades. Preliminary projections based on global economic outlooks suggest that the COVID-19 pandemic may add around 100 million people to the ranks of the undernourished in the short and medium run, making achievement of the zero hunger goal by 2030 rather unlikely. This lecture will review projected global trends in hunger and undernutrition and analyze the main reasons for people's worsened access to nutritious foods and healthy diets during the COVID-19 pandemic. Case-study examples from various countries will be presented. Furthermore, important lessons to be learned on how to make local and global food systems more resilient and be better prepared for possible future pandemics will be discussed. It will be shown that popular calls – such as focusing on regional production and reducing international food trade – may actually be counterproductive. More diverse, efficient, and open food systems and a stronger focus on poverty reduction and social safety nets will be required to address the various challenges ahead, including climate change, possible future pandemics, and continued population growth.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 20

### **An introduction to public health nutrition**

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The global food system, including food production and consumption, has important direct and indirect implications for human health, environmental sustainability, and animal welfare. Dietary intake strongly influences human health and well-being both in the short and long term. At the same time, food production is a key driver behind global environmental

change, including climate change, land degradation, biodiversity and habitat loss, and deforestation, which in turn have relevant implications for human health. Moreover, food production directly impacts the welfare of billions of farmed and wild animals. Over the past decade, a number of major international political and scientific initiatives have attempted to take a broad perspective on the global food system, and to address relevant interdependencies, synergies and trade-offs between human health, environmental sustainability, and animal welfare. This talk will critically review these initiatives, including the underlying evidence and key political and scientific controversies. Moreover, it will discuss implications and policy recommendations for a variety of actors, including international organizations, national governments, local initiatives and the scientific community.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 21

### The role of nutrition in cancer prevention and treatment

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This talk will summarize data on the role of diet and nutrition for cancer prevention and treatment. In addition to summarizing international recommendations, the talk will highlight recent studies and evidence, which lend further support for predominantly plant-based diets and provide data on novel mechanisms by which diet can impact all aspects of cancer development.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 22

### Plant-based nutrition for families

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**Disclosure:** The authors have no conflicts of interest to declare.

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## Research Sessions

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NR. 23

### Predictors of vegetarian life style among yoga practitioners

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**Introduction:** Yoga practitioners commonly lead a vegetarian life style. One may assume that this decision is based on the ethical principles (yama/niyama) related to eight-limbed path outlined in the Yoga Sutras.

**Objectives:** We intended to analyze predictors of strictness to follow a vegetarian life style (VLS).

**Methods:** Cross sectional survey among German yoga practitioners (N=901; 88% women; age: 49±10 years, yoga since 13±9 years) with standardized questionnaires.

**Results:** 40% are very strict vegetarians, 32% somewhat strict, 17% not that strict, 11% not at all strict. Referring to two strictness groups, these differ significantly for their yoga related ethical principles ( $F>14.1$ ;  $p<0.0001$ ), but not for Ahimsa ("not hurting others"). There were no gender-related differences. The perceptions of yoga as a life style, or conscious way

of living, or spiritual way were weakly related ( $r>2.5$ ) to VLS strictness. Stepwise regression analyses revealed that the best predictors for VLS ( $R^2=0.23$ ) were 1) lack of alcohol consumption, 2) yoga as a spiritual way, 3) yoga as conscious way of living, 4) conscious behaviors as ethical principle (i.e., Satya, Brahmacharya, Saucha), 5) yoga as a life style. Duration of yoga practice, perceived health status, wellbeing (WHO5), inner congruence with yoga practices (ICPH), or mindfulness (CPSC) were not among the significant predictors.

**Conclusion:** The reasons why yoga practitioners follow a VLS are complex and involve circumscribed ethical principles related to yoga philosophy and the intention to follow a spiritual / conscious way of life, that is, to be more conscious, even in the choice of diet.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 24

### Physical activity levels in vegetarian and non-vegetarian adults from the NutriNet-Santé cohort study

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**Introduction:** The relationships between vegetarian diets on health are increasingly studied but little is known about physical activity levels, an important health determinant, according to the type of vegetarian diet.

**Objectives:** This cross-sectional study compared total and work, leisure or commuting physical activity levels between vegetarians and non-vegetarians from the NutriNet-Santé cohort.

**Methods:** The sample consisted of 33,048 participants (77.7% women), with a mean age of  $49 \pm 14.5$  years, classified according to their diet type: non-vegetarians ( $n = 32,237$ ), pesco-vegetarians ( $n = 307$ ), lacto-ovo vegetarians ( $n=313$ ) and vegans ( $n = 191$ ). Total as well as work, leisure or commuting physical activity was estimated using a web-based version of the Sedentary Transportation and Activity Questionnaire (STAQ). Associations between diet types and physical activity levels (in metabolic equivalent hours per week), were analyzed using multivariable linear regressions adjusted for sociodemographic characteristics.

**Results:** Total physical activity was significantly different between diets ( $p = 0.002$ ), with pesco-vegetarians displaying a significantly higher total physical activity level than non-vegetarians ( $\beta$  for one-point increase = 0.18; IC = 0.09 – 0.27). All vegetarian diet groups were associated with a significantly higher physical activity level for commuting than non-vegetarian diet group (pesco-vegetarians:  $\beta=0,14$ , IC=0,07–0,21; lacto-ovo vegetarians:  $\beta=0,15$ , IC=0,08–0,22; strict vegetarians:  $\beta=0,10$ , IC=0,01–0,19), but not for leisure or work.

**Conclusion:** Vegetarians displayed higher levels of total physical activity than other diet groups, pesco-vegetarians being the more active. These differences result from more active commuting habits.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 25

### A plant-based diet and healthy lifestyle lower C-reactive protein levels

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**Introduction:** Many disease processes are accompanied and promoted by increased inflammation in the body. Increased concentrations of high-sensitivity C-reactive protein (hs-CRP) in the blood are an indicator of

subclinical inflammation, increased disease risk, and an increased risk of early death. A healthy plant-based diet and increased physical activity have been shown to reduce hs-CRP concentrations.

**Objectives:** Our objective was to test if a healthy lifestyle intervention program can improve hs-CRP levels and other risk factors.

**Methodology:** We are conducting a non-randomized, controlled intervention study with 6 times of measurement (baseline, after 2.5, 6, 12, 18 and 24 months). Participants in the intervention group (n = 104) took part in a 2.5-month intensive lifestyle program focusing on a plant-based diet (PBD), physical activity, stress management and group support. Currently they are in the less intensive phase (monthly seminars) which will be completed after 24 months. The control group (n = 62) did not take part in any program. In both groups hs-CRP was assessed, and participants with an infection/common cold at any of the times of measurement were excluded from the analyses.

**Results:** In the intervention group (n = 97) we observed a reduction in hs-CRP from baseline to 2.5 months (p < 0.001). In the control group (n = 46) hs-CRP levels increased non-significantly. The changes from baseline to 2.5 months were significantly different between intervention and control (p < 0.01).

**Conclusion:** Our program led to a clinically relevant reduction in hs-CRP. Continued follow-up will show if this improvement can be maintained in the intervention group. Our study confirms that a PBD and healthier lifestyle choices can lower hs-CRP.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 26

### Effects of religiously motivated intermittent dry fasting on healthy adults: an observational clinical trial on Bahá'í fasting

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**Introduction:** Followers of the Bahá'í religion around the globe adhere to an intermittent dry fast without eating and drinking for 10-13 hours daily for nineteen consecutive days every year. Until now no data have been published on its health effects.

**Objective:** We wanted to test safety and effects of intermittent dry fasting as practiced by Bahá'ís.

**Methodology:** Thirty-four healthy volunteers (19 men), followers of the Bahá'í religion, participated in this observational trial at our clinical research centre. In four visits before, during and after the fasting month (follow up= 3 months after fasting) from all volunteer's blood and urine samples were taken, anthropometric variables were measured and bio-electrical impedance analysis was performed. Before and during the fast, 24- and 12-hour urine samples were collected, serum osmolality, metabolic markers and ketosis were measured and in a subpopulation changes in metabolism were monitored including microdialysis from adipose tissue and skeletal muscle. During the first three visits circadian clock changes were monitored in a subpopulation (n=17) through a blood test in monocytes.

**Results:** BMI significantly reduced between V0 and V1 (n=34, p < 0.001) and in the bioelectrical impedance analysis total body fat mass sank during fasting (n=32, p < 0.001) although the metabolic rate also reduced (n=32, p < 0.001). Body cell mass remained unchanged while body water increased paradoxically (significantly higher (n=32, p=0.047). Creatinine and Cystatin C did not show significant changes. Serum osmolality decreased in V1 compared to V0 and V2. 24h urine osmolality is significantly lower in

V1 than in V0 (n=32, p=0.001). The 12h urine osmolality changes significantly between V0 and V1 in the 6 p.m. to 6 a.m. samples (n=33, p=0.002), while there is no significant change in the 6 a.m. to 6 p.m. samples. Clock gene activation patterns in monocytes showed a significant shift in circadian patterns, especially for late chronotypes. Most observed changes were not detectable anymore three months after fasting.

**Conclusions:** Our data indicate that intermittent dry fasting over nineteen days as practiced by Bahá'ís is safe, has no negative effects on hydration, can improve fat metabolism and can cause significant shifts in circadian rhythms.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 27

### A purely plant-based diet in day nurseries – analysis and optimization of a meal plan

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**Objective:** Some day nurseries (DN) offer a vegan menu, since increasingly also children are fed vegan. To ensure a sufficient nutrient intake and the requirement-based implementation of a purely plant-based diet in childhood scientifically sound nutritional recommendations are needed for the private households as well as for the public catering for those who opt for a vegan diet. The aim of this project was to analyze the menu of a vegan DN regarding nutrient supply in comparison to the physiological requirements, and to possibly derive suggestions for optimization.

**Methodology:** Based on an existing checklist for a vegan lunch menu in public catering, an equivalent checklist for DNs was developed. Comparing to this checklist, the menu of a DN was analyzed quantitatively, options for improvements were derived, an optimized meal plan developed, and finally an analysis of the nutrient supply of the optimized plan was performed.

**Results:** The menu barely included whole grains, parboiled rice, nut spreads and fruits. Iodized table salt, fortified plant drinks, sea algae and rapeseed oil were not used. After adapting the recipes, all criteria of the developed checklist could be fulfilled. Nutrient supply analysis showed that the recommendations for almost all nutrients could be reached except for calcium, protein and carbohydrates. As expected, the reference values for vitamin B12 and vitamin D could not be reached.

**Conclusion:** Even a vegan diet has the potential to meet the energy and nutrient requirements of children if the preparation of food complies with some guidelines. The use of a checklist should be investigated further and be evaluated in practice.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 28

### From Science 2 School: Sustainably healthy – active & veggy. Survey of the prevalence of vegetarian diets linked to sports among Austrian pupils, teachers and principals of secondary level I and II

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**Introduction:** Health is one of the great topics for the future in education, matching the UN SDGs No 3 “Good Health and Well-Being” and No 4 “Quality Education”. Physical inactivity and overweight have been

identified as global health issues of urgent concern. 30 % of Austrian children are overweight and 85 % fail to achieve the recommended 60 min/day of exercise. 10 % of Austrians eat vegetarian or vegan (880,000). However, there is no information about the trends on plant-based diets of pupils and teachers.

**Objectives:** Therefore, this study aims to determine the prevalence of omnivorous, vegetarian and vegan diets among Austrian pupils and teachers of secondary level I and II, based on a large sample size.

**Methodology:** The study is supported by the Federal Ministry of Education, Science and Research, and approved by all the 9 federal educational authorities. 860,748 Austrians at 2,688 secondary schools will be invited to participate. The short standardized online survey is provided in German. Data will be collected Oct 2019-May 2020.

**Results:** Latest research suggests that for every 20-25 pupils, 2-8 are vegetarian/vegan (10-30 % prevalence), 6-9 are overweight and 16-18 do not achieve the minimum recommended amount of exercise.

**Conclusions:** Childhood lifestyles and habits track into adulthood, so improving childhood health is critical for achieving public health goals. This study will provide a major contribution to overcome the lack of information about vegetarian diets at Austrian secondary schools, and aid to transfer the results to healthy actions in the school setting.

**Funding:** The present study is funded by a grant from the Tiroler Wissenschaftsförderung (TWF).

**Disclosure:** The author has no conflicts of interest to declare.

NR. 29

### **A randomized controlled trial (RCT) of a multidisciplinary lifestyle program in patients with (increased risk for) rheumatoid arthritis and osteoarthritis: design and inclusion rate**

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**Introduction:** Lifestyle is associated with rheumatoid arthritis (RA) and osteoarthritis (OA), which often coincides with metabolic syndrome (MetS). A whole food plant-based diet (WFPD), exercise and stress management were effective when tested separately in RA as well as in OA, but were not yet tested in combination. A lifestyle program based on a WFPD, exercise and stress management was effective in coronary heart disease, a related chronic disease.

**Objectives:** To test the effect of a lifestyle program (WFPD, exercise and stress management) on disease activity (DAS28 measured blindly, RA), RA-risk score (arthralgia), and pain, stiffness and function (WOMAC, OA).

**Methodology:** 16-week RCT comparing the program with usual care in mixed groups of 6-12 patients with (1) RA (low-moderate disease activity and stable drug therapy, n=80); (2) ACPA positive arthralgia (increased risk for RA, pilot n=16) and (3) OA (hip/knee & MetS, n=80). The program includes 10 group meetings, which cover a WFPD (including a cooking class with partner), moderately-intense exercise, sleep and stress management (relaxation, breathing and mindfulness). Control group patients enter the program after 16 weeks. All are followed 2 years in a less intensive program, investigating adherence and if possible standardized drug tapering.

Mechanistic studies include MRI (liver/muscle) and microbiome (mouth/gut).

**Results:** From June 2019 to date in November 2019, 54/176 patients were included and 26 patients concluded the RCT. No dropouts occurred.

**Conclusion:** The study will be completed end 2020 and will provide important information on the effects of lifestyle medicine in rheumatic diseases.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 30

### **Young adults from Belgium, Denmark, the Netherlands and Spain differ in attitudes towards plant-based, vegetarian and vegan diets.**

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**Introduction:** Plant intensive diets are gaining more attention, especially among younger generations in Europe, due to its positive effects on health and the environment. Vegetarian, and particularly vegan diets, are consolidated concepts that might be difficult for mainstream consumers to adopt due to its ethical and restrictive status. We hypothesized that a plant-based diet could be a promising concept for young adults who would like to adopt a diet including predominantly plant-based foods and limited amounts of food from animal origin.

**Objectives:** This study aims to explore current attitudes towards plant-based, vegetarian and vegan diets among young adults from Belgium (BE), Denmark (DK), the Netherlands (NL) and Spain (ES).

**Methodology:** Data was collected via a web-based survey in October 2018 in BE, DK, ES and NL.

**Results:** 438 respondents from BE (n=110), DK (n=119), ES (n=93) and NL (n=116) completed the online survey. ES respondents had more positive attitudes towards plant-based, vegetarian and vegan diets than BE, DK and NL respondents; in particular in terms of 'taste' and 'enjoyment'. Overall, respondents from DK, ES and NL were more positive towards vegetarian diets compared to plant-based and vegan diets, while BE respondents were more neutral towards the three diets.

**Conclusion:** Respondents from BE, DK, ES and NL do not perceive a plant-based diet more positive than vegetarian and vegan diets, whereas vegetarian diets were perceived most positive in DK, ES and NL. These results can be useful for future health campaigns and marketing purposes in the promotion of plant-based food consumption.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 31

### **Low-protein diet for patients with chronic kidney disease (CKD): is a plant-based (vegan) diet a good option?**

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**Introduction:** Decades of research and experimental studies have investigated the role of low protein diet for patients with CKD, but the specific advantages of plant-based diet (PBD) compared to animal-based diet (ABD) are still under review.

**Objectives:** This systematic review I assessed the latest evidence investigating the effects of plant-based diet in CKD.

**Methodology:** A systematic search of PubMed was performed using pre-defined criteria: PBD, vegetable proteins, CKD. Eleven studies met the selection criteria and were considered for review.

**Results:** In healthy individuals PBD decreases renal hyperfiltration blood pressure and sodium intake when compared to ABD.

In nephropathic patients PBD reduces dietetic acid load, improves lipid profile and insulin sensitivity; furthermore, PBD reduces the intake of uremic toxin, like phosphorus that in plants is less bioavailable as it is in form of phytate and nitrogen compounds, which are broken down by the intestinal microbiota to produce p-cresol, indoxyl sulfate and TMAO. In patients with CKD PBD reduces oxidative stress and inflammation by

increasing intake of vegetable antioxidant, by reducing intake of advanced glycation end products (AGEs) and by incrementing intake of fibers that promote production of short-chain fatty acids, which strengthens intestinal barrier integrity and reduces bacterial translocation.

A lower caloric intake and higher potassium intake can be a problem in PBD, the latter especially in patients taking ACE-inhibitors.

**Conclusion:** The data collected shows some evidence that low protein plant-based diet offers numerous advantages over a low protein animal-based diet for patients with CKD.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 32

### Unconventional eating behaviour and its effect on brain circuits and on gut-brain-communication

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**Introduction:** Restricting animal-based products from diet may exert beneficial effects on weight status, however whether this is also true for emotional health is unclear. Indeed, differential personality traits may underlie restrictive eating habits and therefore potentially confound diet-health associations. Moreover, besides investigated top-down processes involved in self-control and dietary choices, bottom-up mechanisms remain largely unexplored.

**Objectives:** The aim of this project is to assess, whether plant-based diets, i.e. a high-fibre diet, influence our daily food decisions via bottom-up processes. We postulate that potential effects are mediated by the gut microbiome.

**Methodology:** The project is divided into 4 sub-studies: in observational studies (study 1+2) we investigate the effect of a single meal choice on well-being and satiety. In a cross-sectional study (study 3) we investigate whether the frequency of consumption of animal-derived products is associated with weight status, emotional health and personality traits. In an intervention study (study 4) we examine, whether a 2-week high-fibre dietary intervention affects food wanting, memory performance and their neural correlates as well as brain structure and microstructure. Further, we test whether biomarkers, such as microbial status, serum levels of proteins and hormones mediate the observed effects.

**Results:** Preliminary results from study 3 indicate that a putative link between animal-restricted diet patterns and depressive symptoms may be explained by differences in demographics and personality traits. This may be in part due to confounding effects between obesity and depression, as these two conditions are assumed to share not only certain symptoms but also mechanistic pathways and both weight gain and weight loss may relate to depressive symptoms.

**Conclusion:** Long-term interventional trials are needed to test this hypothesis and to clarify the underlying mechanisms, which may additionally involve the gut microbiome.

NR. 33

### A whole food plant-based diet parallel to treatment in juvenile idiopathic arthritis – a pilot study on feasibility: the NutriJIA-study

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**Introduction:** Juvenile Idiopathic Arthritis (JIA) is the most common rheumatologic condition in childhood and affects around 15 000 children in Germany, with an incidence of 1000 new cases per year. Little is known about the causes of the disease. In adults with Rheumatoid Arthritis (RA) dietary patterns with increased consumption of fruits and vegetables and reduction in animal products show beneficial effects regarding pain, mobility limitations and overall inflammatory activity.

**Objectives:** The NutriJIA-Study will examine feasibility and provide first data on the effects of a whole food plant based diet in children with JIA.

**Methodology:** Children and adolescents from 8 to 18 years from the Charité pediatric rheumatology outpatient clinic with a diagnosis of JIA will be randomly assigned to a nutritional intervention group or to a waiting list control group. The patients in the intervention group will receive a whole food plant-based diet change for 12 weeks additionally to the conventional therapy. Patients from the waiting list control group act as a control group for these 12 weeks after which they will change their diet to a whole food plant-based diet as well. Patients in the intervention group eat as desired from weeks 13 to 24. The change in general well-being will be compared between the two groups. Additional parameters that will be examined are clinical and anamnestic disease activity markers, quality of life, nutrient intake and supply, laboratory data and the feasibility of the dietary change as assessed by parents and children.

**Conclusion:** The results of the study will provide first data that can be used for subsequent clinical trials with regard to suitable outcome parameters and sample size calculation.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 34

### Identifying attitudes and their ability to decrease meat consumption among non-vegetarians from the NutriNet-Santé cohort

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**Introduction:** Previous studies identified different dimensions of attitudes towards a decrease in meat consumption, but they did not assess which one had the greater ability to change this consumption.

**Objectives:** This cross-sectional study aimed to describe sociodemographic profiles associated with attitudes and the ability to decrease meat consumption in a large sample of French adults.

**Methods:** This study included 30,318 non-vegetarian participants from the NutriNet-Santé cohort. Twelve dimensions of attitudes towards meat consumption evolution such as taste, health, ethics, environment, animal welfare or social pressure, have been assessed using a web-based questionnaire. For each dimension, attitude and its corresponding ability to change meat consumption were evaluated with two 5-point Likert scales, respectively. Participants were classified into three different groups: no concern, concern but no ability to change, concern with ability to change. Associations between sociodemographic profiles and involvement levels in changing were evaluated using multivariable polytomous logistic regressions.

**Results:** Higher concerns towards varying protein sources, health and environment appeared to be factors associated with the reduction of meat consumption. Sex, age and educational level were more likely to be associated with attitudes having the ability to reduce meat consumption. For example, a dislike for meat taste was more likely to have the ability to reduce meat consumption in women compared to men (concern with ability to change compared to no concern: OR = 3.19, 95% CI = [2.65; 3.84]).

**Conclusion:** In a context of food sustainability, our results improved the understanding of the determinants associated with a change in meat consumption.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 35

### Associations of vegan and vegetarian diets with inflammatory biomarkers – Results from the RBVD study and systematic review with meta-analysis

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**Introduction:** A vegan or vegetarian diet may be protective against many chronic diseases. Scientific evidence suggests links between low-grade inflammation and increased risk of various diseases. Recent research proposed that inflammatory biomarker profiles can be modulated by plant-based diets.

**Objectives:** This study aimed to investigate the associations of vegan and vegetarian diets with a comprehensive spectrum of inflammatory biomarkers compared to omnivores.

**Methodology:** The “Risks and Benefits of a Vegan Diet” (RBVD) study, a cross-sectional study comprising 36 vegans and 36 omnivores (18 men and 18 women each), was performed in 2017 at the German Federal Institute for Risk Assessment. Participants were age and sex matched (age range: 30-60 years). In 2020, a systematic review and meta-analysis investigated the associations of vegan and vegetarian diets with inflammatory biomarkers.

**Results:** The vegans and omnivores in the RBVD study did not differ in important general characteristics. No significant differences in any of the investigated inflammatory biomarkers (high-sensitivity C-reactive protein (hsCRP), interleukin-18 (IL-18), interleukin-1 receptor antagonist (IL-1 RA), intercellular adhesion molecule-1 (ICAM-1), adiponectin, omentin-1 and resistin) were observed. Regarding CRP, the meta-analysis noticed that a vegan diet was associated with lower levels of CRP compared to omnivores [effect size  $-0.54$  mg/l, 95%-CI:  $-0.79$  to  $-0.28$ ,  $p < 0.0001$ ], in vegetarians this association was less pronounced [effect size  $-0.25$  mg/l, 95%-CI:  $-0.49$  to  $0.00$ ,  $p = 0.05$ ].

**Conclusion:** Our RBVD study is the first study providing a wide spectrum of inflammatory biomarkers in vegans. This systematic review and meta-analysis provide evidence that as well vegan as vegetarian diet is associated with lower CRP concentrations compared to omnivores. However, further research is highly warranted, as several biomarkers of interest were only investigated in single studies so far.

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### Food Based Dietary Guidelines for a Vegan Diet in Infants, Children and Adolescents

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**Introduction:** In vegan diets several nutrients are regarded as potential critical, e.g. vitamin B12, calcium, and iron, in particular during infancy, childhood and adolescence.

**Objective:** To develop food based dietary guidelines (FBDG) providing adequate energy and nutrient intake for infants, children and adolescents on vegan diets.

**Methodology:** The standard German FBDG for infants, children and adolescents were adapted to a vegan diet.

**Results:** For infants, three types of meals are traditionally recommended during weaning. In the first meal, a vegetable-potato-meat-mash, the meat can be replaced by whole grain, e.g. oat or millet, to provide sufficient amounts of iron. The second meal made from grain and milk can be prepared with a soy-based infant formula. The third meal, a mash made from grain and fruit, is already vegan.

For children and adolescents, FBDG have been calculated on a basis of vegan 7-day-menus which had been derived from food records of vegan children, with a subsequent optimization to meet the current German nutrient reference values. Common, non-fortified foods had been preferred in the calculation. However, in order to meet the reference values for calcium and vitamin B2, the incorporation of fortified foods was necessary. All calculated food groups have been visualized in a vegan food pyramid. Vitamin B12 supplements are generally recommended for all infants, children and adolescents on vegan diets.

**Conclusion:** Our FBDG offer guidance how to meet the energy and nutrient reference values during infancy, childhood and adolescence with plant foods only, including some fortified foods and vitamin-B12-supplements.

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### Anthropometrics, energy and nutrient intake of vegetarian, vegan and omnivorous children (1-3 y) in Germany – Updated results of the VeChi Diet study

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**Introduction:** There is an ongoing debate whether vegetarian (VG) and especially vegan (VN) diets are adequate in early childhood.

**Objektiv:** To examine anthropometrics and the dietary intakes of 1-3 y old VG, VN, and omnivorous (OM) children (n=430) in Germany.

**Methodology:** In the cross-sectional Vegetarian and Vegan Children (VeChi Diet) study, dietary intake was assessed using 3-day weighed dietary record, body weight and height using a questionnaire.

**Results:** There were no significant differences in anthropometrics and energy intake between the study groups. OM children had the highest intakes of protein, fat, and added sugars, whereas VN children had the highest intakes of carbohydrates and fiber. VN and VG children had highest intakes of vitamin E, vitamin B1, folate, magnesium, iron, and PUFA, and lowest intakes of SFA. In contrast, OM children had highest intakes of vitamin B2, calcium, iodine, and DHA, however, neither OM, VG, nor VN children met the German Dietary Reference Values (DRV) for these nutrients. In addition, 56.7% of VG, 47.0% of OM, and 10.1% of VN children did not meet the DRV for vitamin B12 (including intake from supplements).

**Conclusion:** Our results indicate that a VG and VN diet in early childhood can provide sufficient amounts of energy and nutrients, leading to a normal growth. Intake of calcium, vitamin B2, iodine, and DHA was inadequate in all groups, with lowest intakes in VN children.

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 38

### **VESNA Network: Academic network for the study on vegan diets**

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The popularity of plant-based diets is expanding across Europe, as well as for ethical or environmental reasons, as for assumed positive health effects. This development results in a growing interest of policy makers and also the food industry in the practical impacts of lifestyles which avoid animal-based food. However, the growing public interest is still not adequately mirrored in high quality research, which could answer the emerging questions regarding the health impacts of the reduction or the avoidance of animal food consumption at an individual or a society level.

VESNA (Academic network for the study on vegan diets) is an informal network of European scholars and researchers who share their scientific interest in health effects of plant-based diets. The network was founded in January 2019 in Prague with founding members coming from 14 research institutions across nine European countries; since then the network is continuously involving professionals from more institutions and countries. Our scope of expertise is ranging from clinical science and epidemiology to food policy and environmental research. The network wants to invite you to learn more about our mission, achievements, current work, and future plans (<http://vesna.network/>).

**Disclosure:** The authors have no conflicts of interest to declare.

NR. 39

### **Milk consumption: An overlooked promoter of type 2 diabetes mellitus**

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**Introduction:** Cow milk is a major food component of Western diet. Increasing evidence links milk consumption to the pathogenesis of type 2 diabetes mellitus (T2DM).

**Objectives** This study investigates the impact of milk-derived branched-chain amino acids (BCAAs) and milk-transmitted exosomal microRNAs in the pathogenesis of T2DM.

**Methodology:** PubMed-listed experimental and epidemiological studies linking milk intake, BCAAs and microRNA-29b to the pathogenesis of T2DM are evaluated via translational research.

**Results:** Enhanced serum levels of BCAAs are metabolomic hallmarks of insulin resistance and T2DM. Measures decreasing dietary BCAA levels

reduce obesity and improve insulin sensitivity. High concentrations of the BCAA leucine repress  $\beta$ -cell differentiation in pancreatic bud cultures through the activation of the mTORC1 signaling pathway. Hyperstimulation of mTORC1 by high concentrations of leucine inhibits  $\beta$ -cell proliferation. Persistent combination of high glucose- and leucine-mediated stimulation of  $\beta$ -cell mTORC1 overstimulates insulin synthesis and enhances endoplasmic reticulum (ER) stress resulting in early  $\beta$ -cell apoptosis, the pathogenic hallmark of T2DM. Pasteurized milk transfers the diabetogenic microRNA-29b, which suppresses the key enzyme of BCAA catabolism. The European Investigation into Cancer and Nutrition and the Dutch Lifeline Cohort Study confirm an epidemiological association between milk consumption and T2DM.

**Conclusion:** Epidemiological and translational biochemical evidence link milk consumption with the pathogenesis of T2DM. Not only the intake of excessive amounts of glucose but also milk promote T2DM in a synergistic fashion. The intake of both, glucose and milk should be restricted to prevent the most devastating metabolic disease of Western civilization.

**Disclosure:** The author has no conflicts of interest to declare.

NR. 40

### **Effects of a whole-food plant-based diet on sports students at the Olympic Training Centre Berlin – a study protocol**

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**Introduction:** A whole-food plant-based menu will be introduced in the regular canteen supply of the Olympic Training Centre Berlin (Olympiastützpunkt Berlin), an interdisciplinary support and service facility for athletes and their coaches. Furthermore, regular information events and courses on a plant-based diet for athletes and events with prominent athletes are planned. The overall topics include the basics of a healthy plant-based diet, the influence of nutrition on health and disease (with a special focus on sports, cognitive performance, lifestyle diseases) and ecological as well as ethical aspects of nutrition.

**Objectives:** To examine the effects of a whole-food plant-based diet on sports students.

**Methodology:** A prospective explorative study will be conducted in 2021 with inclusion of all students who are interested in the study and have agreed to participate in the study. Nutritional behavior and changes will be recorded over the duration of the project in the cohort within one school year and correlated with variables such as sport as well as academic performance and health status. Additional parameters that will be examined are anthropometric data, nutrient intake and supply, laboratory data, psychometric questionnaires and the feasibility of the dietary changes as assessed by qualitative interviews.

**Conclusion:** The planned study may fill a gap in the available data and answer the question of whether the introduction of a plant-based/vegan menu line in the Olympic Training Centre Berlin can lead to improved academic and athletic performance.

**Disclosure:** The authors have no conflicts of interest to declare.