

# Forschende Komplementärmedizin

Wissenschaft | Praxis | Perspektiven

## Research in Complementary Medicine

Research | Practice | Perspectives

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### VegMed: «VegMed – Scientific Congress for Vegetarian Nutrition and Medicine»

April, 22–24, 2016, Berlin

#### ABSTRACTS

#### Editors

Christian Kessler;  
Andreas Michalsen,  
Berlin



Medicine and  
Vegetarian  
Nutrition

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*Christian Kessler;*

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## Lectures

NO. 1

### **Phytochemicals: Versatile Active**

*Leitzmann, C.*

Institute of Nutrition at the University of Giessen, Germany

As the name implies phytochemicals are formed only by plants and serve the plant, among other things, as defense substances against diseases, as growth regulators, as sunscreen and as color and fragrances. The at least 100,000 different phytochemicals consist of an abundance of chemically very different compounds, are found only in very small amounts and usually exert pharmacological effects. In addition to some others the main phytochemicals are carotenoids, phytosterols, saponins, glucosinolates, polyphenols, protease inhibitors, terpenes, phytoestrogens, sulfides and phytic acid.

Long-term experience and extensive scientific studies demonstrate the great potential of phytochemicals in the prevention of a variety of diseases and in strengthening health. The various properties of the phytochemicals are impressive because they act anti-carcinogenic, antimicrobial, antioxidative, antithrombotic, immunomodulatory, anti-inflammatory, digestive and can lower blood pressure and the cholesterol and blood glucose level. The data for phytochemicals were collected mainly in epidemiological studies. Although these studies were carried out partly with a hundred thousand or more participants, they can provide indications only but no evidence. In certain cases, the indications, however, are so strong that they can be considered as evidence. Meaningful data are now available for cardiovascular diseases, cancers, hypertension, infections and immune defense.

The protective effects of phytochemicals are particularly effective when an adequate supply is ensured with all essential nutrients. This is best to realize with a plant-based diet, because phytochemicals and nutrients are taken up simultaneously. The amounts of phytochemicals present in food do not lead to an oversupply, which is quite possible with secondary metabolites marketed as supplements. With a wholesome diet supplements are unnecessary for healthy persons.

NO. 2

### **Italian e-learning Experiences in Vegetarian Nutrition**

*Baroni, L.*

Polytechnic University of Marche, Italy

E-learning is the new challenge for professional training. With no need to leave the house, and practically at any time he/she wishes, the student can access a training program, which in our case is represented by the Master in Vegetarian Nutrition and Dietetics, which is a totally online postgraduate possibility. This master's course was accomplished through the collaboration between the Ibero-American Foundation University (FUNIBER), the Polytechnic University of the Marche Region, and leading Italian vegetarian experts, members of the Scientific Society of Vegetarian Nutrition. The master addresses all of the major topics of nutrition and dietetics applied to the vegetarian diet, providing students with the knowledge that will allow them to plan balanced vegetarian diets, offering customers all the information necessary for making this choice a responsible selection, and to work in the public food services. To this end, the master makes spreadsheets available for planning diets, but this aspect is

presently under further development, and will soon also be in the form of a dietary software.

Launched in the academic year 2010–2011, as of October 2015, the master already has 109 graduates, with 47 other students presently attending the course. Most alumni are medicine, biology, and dietetics post-graduates. Given the increasing interest in this area of nutrition, and the ever increasing requests from many countries, in collaboration with The European University of the Atlantic (Santander/Spain), for some months now, a version completely in English is available, capable of dealing with the challenge of world-wide training in such a strategic and complex area, and without constraints or limitations due to language.

NO. 3

### **The Environmental Impact of Vegan and Vegetarian Life Styles**

*Ciroth, A.*

Green Delta, Berlin, Germany

Food consumption is one of the highest environmental impacts of human life. Comparing an annual consumption of food consumed of an average consumer in Berlin, we show how differences in diet impact human health, ecosystems, and resource depletion, over the entire food supply chain, covering all production stages including waste treatment, in a life cycle assessment (LCA) approach.

Going more into detail, we show main drivers for the impact, and for differences in the impact of various food diets – covering also differences between organic and conventional food. A discussion of the stability of these findings leads to main drivers of environmental impacts of food consumption, and of the individual possibilities of everybody to reduce the environmental impact of its own life.

NO. 4

### **Vegan Nutrition in Oncology**

*Stenholtz, D.*

Physicians Committee for Responsible Medicine Europe, Stockholm, Sweden

Dietary guidelines for primary, secondary and tertiary prevention of cancer, such as those of World Cancer Research Fund states «Eat mostly food of plant origin». A gradual shift towards a whole foods plant based diet, where animal products as well as processed foods are reduced in favor of fresh produce have shown gradually increasing benefits for many chronic degenerative diseases such as cardiovascular disease, diabetes type 2 and obesity. These gradual benefits and the absence of a threshold where this shift no longer confers benefits suggests that a completely plant based diet may be ideal for prevention of many chronic diseases. Does this also hold true in regards to cancer? Should cancer patients be recommended a vegan diet? What advice are cancer patients given today?

During this lecture we will review current dietary guidelines and expert opinion as well as illustrative studies that show us the potential of food in preventing and slowing the progression of cancer.

NO. 5

### **Personalising Vegetarian & Vegan Diets Using Genomic Descriptors**

*Thangavelu, M.*

Research Council for Complementary Medicine, UK & Transdisciplinary University, Yelahanka, Bangalore, India

Man is a metaorganism. Every individual is unique and maintained in dynamic equilibrium with the environment. Food, derived from other «metaorganisms», offers not just the nutrients for the human body but forms the largest and most intimate interface in this complex and dynamic interaction between man and his environment in health and disease.

Food and its interactions with the intestinal microbiota offers another layer of complexity in this interaction. The food-intestinal microbiome interactions are now being recognized as a major layer in the inflammation response – in health and disease. Inflammation, one of the major triggers for most diseases poses even more challenges for understanding food and diet in health and ill-health.

Using genomic descriptors and variants of human genes for proteins in inflammation responses, genes and variants in plants and nucleic acid descriptors of other vegan foods and the rapidly growing evidence of the cross-talk between the human microbiota and the inflammation response and age-dependent changes in the human intestinal microbiota I will present the need for appreciating better the opportunities for individuation of vegetarian and vegan diets.

What if such individuation and the reality of the kind above conflicts with our constructs and in turn our contemporary theories and models of the world – not just those in Biology of Organisms but also the resulting impact on Economics, welfare and more? The representation of the human body as a «metaorganism» – a «metastructure» like a family, community, city, or a nation and so on as one scales out, offer firmer foundations for developing better and more sustainable solutions to health and well being and in turn health of economies of nations of the world. In this context I will raise and discuss the challenges to policy offered by such new knowledge. Details that are being unraveled impacts not only on a better understanding of human health and wellness and disease prevention based on vegetarian diets but also how using genomic descriptors can be used for approach the personalisation of vegetarian & vegan diets for promoting better health and wellness and preventing disease.

NO. 6

### **Results and Challenges Studying the Health Experience of U.S. Vegetarians**

*Fraser, G.*

Loma Linda University, CA, USA

The most recent study of American Adventists is the Adventist Health Study-2 (AHS-2) cohort that includes 96,000 U.S. and Canadian Adventists enrolled 2002–2007. About half of this population is vegetarian (8% vegan, 30% lacto-ovo-, 10% pesco-vegetarian). The non-vegetarian Adventists often used for comparison are on average low-meat consumers but a subset eats meats 5 times/week or more. Adventists have much lower mortality, higher life expectancy, and lower risk of cancer than the general American population. Vegetarians differ from non-vegetarian Adventists in many dietetic ways that may affect health, aside from meat and dairy intake. As compared to non-vegetarians, vegetarians have lower risk of all-cause mortality, some common cancers, and also heart attack. Possible reasons are that they are substantially less overweight, have lower values of lipids, C-reactive protein, fasting insulin and glucose, also lower blood pressures and less diabetes. Further, some foods preferred by vegetarians appear to be related to lower risk of heart disease and/or certain cancers, and some they avoid are related to higher risks. Thus there is internal consistency in these results, from comparisons between Adventists and the general population, to comparisons within Adventists according to dietary pattern, and then to foods choices that are characteristic of certain vegetarian dietary patterns. In summary, a vegetarian dietary choice ap-

pears well worthwhile from a health perspective. However, «vegetarian» can cover a wide range of dietary choices. We will show that risk profiles can differ within the vegetarian category, which may explain some differences in study results between different countries.

NO. 7

### **Nutritional Factors in Alzheimer's Disease Prevention**

*Barnard, N.*

George Washington University, DC, USA

It is well known that good nutrition can help prevent obesity, heart disease, hypertension, diabetes, and even some forms of cancer. New research suggests that our eating habits can also help prevent what might be the most worrisome condition of all – Alzheimer's disease. Even as the Alzheimer's epidemic continues to expand, we may now have exactly the tools we need to turn the tide.

Saturated fats – the «bad» fats found in dairy products, meat, and eggs – are linked with higher risk of Alzheimer's disease. The same is true for the trans-fats found in many snack foods. Certain metals, especially iron, copper, and aluminum may also play a role, and each of these easily comes to us in excess in certain food products. Even certain common medications can lead to dementia.

Vitamin E and certain B vitamins, on the other hand, have been shown to reduce the risk. These protective nutrients are found in plant foods such as leafy green vegetables, fruits, legumes, nuts, seeds, and whole grains. Some foods – especially blueberries, grapes, and sweet potatoes, seem to have special advantages for the brain. And we won't stop there. Getting regular exercise and plenty of sleep help protect the memory as well.

In this session, we will identify simple steps for adopting a healthy, brain-protecting lifestyle, and explore how to put them to work.

NO. 8

### **Calorie Restriction and Vegetarian Diet**

*Michalsen, A.*

Charité-University Medical Center, Institute of Social Medicine, Epidemiology and Health Economics, Berlin, Germany & Immanuel Hospital Berlin, Department of Internal and Complementary Medicine, Berlin, Germany

Periods of deliberate fasting with restriction to intake of solid food are practised worldwide, mostly on a traditional cultural or religious background. There is large empirical and observational evidence that medically supervised modified fasting (fasting cure) with max. 500kcal nutritional intake/day and periods from 7–14 days is efficacious in the treatment of rheumatic diseases, chronic pain syndromes, depression, hypertension and the metabolic syndrome. Best Evidence is found for rheumatoid arthritis, where an initial 7 to 10 day fast was followed by a vegan and thereafter lactovegetarian diet over 12 months. Current data indicate that Intermittent fasting over 3 days may be also useful as an accompanying treatment during chemotherapy of cancer. Various mechanisms of the health-promoting effects of fasting were revealed, e.g. the fasting-induced neuroendocrine activation and hormetic stress response, the increased production of neurotrophic factors, reduced mitochondrial oxidative stress, the general decrease of signals associated with aging and the promotion of autophagy. A further beneficial effect of fasting relates to improvements in lasting lifestyle modification with better adoption of a plant-based diet, possibly mediated by fasting-induced mood enhancement. Most likely, regular intermittent fasting (5:2, a.o.) and periodic prolonged fasting achieve similar effects. Recent research further indicates that a significant proportion of the health-promoting effects of caloric restriction and fasting may be obtained by reduction of animal-derived protein. As wholesome vegan and vegetarian diets typically show a reduced energy density it seems possible to realize some benefits of fasting therapy by a low-calorie vegan diet (fasting mimicking diet).



NO. 9

### **Findings from the EPIC-Oxford Study**

*Key, T.*

University of Oxford, UK

EPIC-Oxford (the Oxford cohort of the European Prospective Investigation into Cancer and Nutrition) is a cohort of 65,500 participants (14,500 men and 51,000 women) recruited throughout the UK in 1993–2000, of whom 20,000 provided a blood sample. Recruitment was targeted at vegetarians and other people interested in diet and health, as well as the general population. The participants comprise 34,000 meat eaters, 10,000 people who eat fish but not meat, 19,000 lacto-vegetarians and 2,500 vegans. Participants have been followed-up for 20 years by means of repeat questionnaires and linkage to National Health Service medical records. Cross-sectional analyses have shown that the vegetarians have a relatively low body mass index and serum cholesterol concentrations, as well as relatively low serum concentrations of vitamin B12, vitamin D and long-chain n-3 fatty acids. Follow-up analyses have shown that vegetarians have a 32% lower incidence of ischaemic heart disease than non-vegetarians. For cancer, there is some evidence that the risk for all cancer sites combined is slightly lower in vegetarians and vegans than in non-vegetarians, and that vegetarians have a relatively low risk of cancer of the stomach and cancers of the lymphatic and hematopoietic tissue. Vegetarians have also been found to have lower risks for diverticular disease and eye cataract. The long-term health of vegetarians appears to be generally good, but much more research is needed, particularly on the long-term health of vegans.

NO. 10

### **Food as Medicine: Preventing and Treating Disease with Diet**

*Greger, M.*

Nutritionfacts.org, Takoma Park, USA

Dr. Greger has scoured the world's scholarly literature on clinical nutrition and developed this new presentation based on the latest in cutting-edge research exploring the role diet may play in preventing, arresting, and even reversing Germany's leading causes of death and disability. More than a thousand of his nutrition videos are freely available at NutritionFacts.org, with new videos and articles uploaded every day.

NO. 11

### **Healthy Food: Antioxidants and Skin Aging**

*Lademann, J.*

Charité Medical University Berlin, Germany

Skin aging is caused by genetic aspects, environmental factors and lifestyle. Metabolic processes, solar ultraviolet and infrared radiation, smoking and alcohol consumption can induce free radicals in human skin. These reactive molecules can destroy cells and cell compartments if their concentration exceeds a critical threshold. The human organism has developed an antioxidative protection system against the detrimental effect of the free radicals. These antioxidants have to be taken up with healthy nutrition rich in fruits and vegetables. In the presentation it will be demonstrated that optical methods like Raman spectroscopy or reflectance spectroscopy permit antioxidants, specifically carotenoids, to be detected in human skin non-invasively. The findings that carotenoids represent marker substances for the whole antioxidative status were obtained by electron resonance spectrometry. This presentation summarizes various studies on the interaction between antioxidants and free radicals performed at the Center of Experimental and Applied Cutaneous Physiology of the Charité – Universitätsmedizin Berlin. The studies demonstrate that a healthy diet rich in fruit and vegetables and reduction of stress factors are the best protection strategy against skin aging. Spectroscopic biofeedback measurements of the antioxidative status of the skin are therefore an important analytical method to motivate persons to follow a healthy lifestyle.

NO. 12

### **Preventive and Therapeutic Implications of Vegetarian Diet in Traditional Indian Medicine**

*Manohar, R.*

Amrita Vishwavidyapeetham University, Kollam, India

The classical tradition of Ayurveda has generated rich knowledge about the impact of diet on human health and well being in the course of its evolutionary history. The codified text books have documented the dietary habits of not only the people of the Indian sub continent but also other lands like China, Bactria and Greece to some extent. Ayurveda has not overtly emphasised the importance of vegetarian diet over a non-vegetarian diet but has rather highlighted importance of the correct choice of a particular diet in accordance with the situation considering factors like the constitution of the individual, the stage of growth, the climate, availability of bio-resources and particular diseases. However, we can see the undertones of a preference for vegetarian diet to cultivate robust physical and mental health that relegates the relevance of non-vegetarian diet for specific therapeutic purposes. While it may be a utopian idea to imagine converting the entire planet into vegans, Ayurveda professes the evolution of the individual into a vegetarian by informed choice, the discovery that a careful choice of greens can help to cultivate a gentle way of living that inflicts minimal harm on other forms of life without compromising the quality of nutrition needed to sustain and promote human life.

NO. 13

### **Vegetarian and Vegan Diets in Children**

*Keller, M.*

Institute of Nutrition at the University of Giessen, Germany

There has been an increasing interest in vegetarian and vegan diets in Germany. Nevertheless, the exact number of children reared on vegetarian or vegan diets is unknown. Studies with adults have shown health benefits but also potential nutritional shortcomings of vegetarian and vegan diets. In contrast, there is a lack of information concerning (long-term) health consequences of a vegetarian or vegan diet for children. The current knowledge about vegetarian and children (<12 y) is presented, based on studies in North America and Europe. On average, the energy and macronutrient intake of vegetarian and vegan children came closer to meet the recommendations than that of same-aged omnivorous children. Moreover, vegetarian and vegan diets resulted in favorable intakes and blood levels of several vitamins and minerals. However, there were deficits concerning vitamin B12, zinc, calcium, and iron. Growth and development of vegetarian and vegan children were in accordance with the national standards, but the children tended to be lighter in weight, thinner and (<5 y) smaller in stature. These results are based on only a small number of investigations. The majority of these studies are rather old, differ considerably in design, and include a limited number of subjects. Thus, there is an urgent need for future research on the health effects of vegetarian and vegan diets in children.

NO. 14

### **Evidence for the Antidiabetic Effect of Bitter Gourd in Humans**

*Krawinkel, M.*

University of Giessen, Institute of Nutritional Sciences, Giessen, Germany

For long time *Momordica charantia* (bitter gourd, bitter melon) has been known for some antidiabetic activity. Nevertheless, few data are available on the ways of action, strengths, dosage, and intended effects. After investigating the efficacy and tolerability of bitter gourd extracts in mice a human study was implemented in Tanzania. People with prediabetes were chosen for the study because patients with frank diabetes mellitus could not have been denied the full treatment for the study period. Main inclusion criteria were: fasting plasma glucose (FPG) 5.6–6.9 mmol/l, HbA1c 5.7–7.5%, BMI 27–35 kg/m<sup>2</sup>, blood pressure 90/60–160/110 mmHg, age

30–65 years. The trial was a cross-over randomized placebo-controlled single-blind study. It consisted of two intervention periods, eight weeks each, separated by a four week wash-out period. Fifty-two out of 61 initial participants completed the study. The change of FPG significantly differed with a decrease under bitter melon and an increase under placebo (−0.153 mmol/l vs. + 0.1069),  $p = 0.04$ . The change in blood glucose was inversely correlated with the baseline FPG levels ( $p = 0.001$ ). In this study, bitter melon exerted a significant hypoglycaemic effect lowering FPG levels. The effect was related to baseline data with a better effect among higher starting glucose levels. This observation points to the even higher potential of bitter melon extract for reducing higher elevated blood glucose levels. Dietary means of improving the management of diabetes mellitus are of increasing importance as the numbers of diabetics are increasing worldwide – and many of those patients do not have access to pharmaceutical treatment.

\* The study was performed by a multicenter study team from the World Vegetable Research Center in Tainan/Taiwan and the Kilimanjaro Christian Medical Centre, Moshi/Tanzania with cooperation of namely Ray-Yu Yang, PhD, Dr. Sandra Habicht, Christine Ludwig, MSc, Mark E. Swai, MD. An unrestricted grant was provided by the German Federal Ministry of Economic Cooperation and Development.

NO. 15

### **Impact of Soyfoods on the Development of Breast Cancer and the Prognosis of Breast Cancer Patients**

*Messina, M.*

Nutrition Matters, Inc., USA

The relationship between soyfoods and breast cancer has been rigorously investigated for more than 30 years. The historically low breast cancer incidence and mortality rates in soyfood-consuming countries helped fuel initial interest in this relationship as did the identification of isoflavones as possible chemopreventive agents. These diphenolic compounds that are found in uniquely-rich amounts in soybeans possess both estrogen-dependent and independent properties that potentially inhibit the development of breast cancer. Observational studies consistently show that among Asian women higher soy consumption is associated with an approximate 30% reduction in risk of developing breast cancer. However, several lines of evidence suggest that for soy to reduce breast cancer risk consumption must occur early in life, that is, during childhood and/or adolescence. For example, exposure to genistein, the predominant soy isoflavone, for just a few weeks when rats are young reduces the development of chemically-induced mammary carcinoma by approximately 50%. In addition, retrospective observational studies show adolescent soy intake (approximately one serving daily) is associated with marked (25 to 50%) reductions in risk of breast cancer. Isoflavones appear to change cells in the developing breast in ways that make them permanently less likely to be transformed into cancer cells. Despite the interest in the role of soy in reducing breast cancer risk concerns have arisen that soyfoods, because they contain isoflavones, may increase the likelihood of high-risk women developing breast cancer and worsen the prognosis of breast cancer patients. However, extensive clinical and epidemiologic data show these concerns to be unfounded. Clinical trials consistently show that isoflavone intake, even at levels greatly exceeding typical consumption in Japan, doesn't adversely affect markers of breast cancer risk including mammographic density and cell proliferation. These data were recently recognized by the European Food Safety Authority when after a comprehensive review of the scientific literature it was concluded that isoflavones do not adversely affect breast tissue in peri- and postmenopausal women. Furthermore, prospective epidemiologic studies involving over 11,000 women with breast cancer from the United States and China show that post-diagnosis soy intake statistically significantly reduces recurrence and improves survival. These data also reveal that soy intake does not interfere with and may actually enhance the efficacy of tamoxifen and aromatase inhibitors.

NO. 16

### **Health Benefits of a Plant-Based Diet**

*Stenholtz, D.*

Physicians Committee for Responsible Medicine Europe, Stockholm, Sweden

To eat more plant foods, less animal products and less processed food such as sugar and white flour has been the message from health authorities worldwide for many decades now. The greater steps we take in this dietary transition the greater health benefits are seen. So far, scientists have been unable to specify a threshold in this dietary shift where health benefits no longer occur. In addition, for some chronic diseases, the encouragement of a completely plant based diet has shown superior effect in symptom relief and disease reversal, compared to more moderate dietary advice. This has led to a growing number of scientists and physicians to advocate a whole foods plant based diet for motivated patients. During this lecture we will review some of the available science on health benefits of a plant based diet. We will also reflect on the future prospect of further inclusion of plant based nutrition in standard health care.

NO. 17

### **Diabetes and Plant-Based Nutrition**

*Barnard, N.*

George Washington University, DC, USA

Dr. Barnard's clinical research revolutionized the treatment of type 2 diabetes, and in his talk he will share information about how to not only control, but even reverse, this condition. He will also reveal how the same simple diet changes that benefit diabetes patients also bring a wide range of health benefits including weight control, lower cholesterol levels, protection from memory loss, and greater vitality to last a lifetime. Many people are looking to lose weight healthfully, and we will show a proven way for weight control that relies on food choices, rather than starvation diets or gimmicks.

NO. 18

### **A Critical Evaluation of the Controversies Surrounding Soyfoods**

*Messina, M.*

Nutrition Matters, Inc., USA

For centuries soyfoods have played important roles in the cuisines of many Asian populations and over the past few decades these foods have become popular in Europe and the United States. Soyfoods have gained in popularity in part because of the general trend toward plant-based diets and specifically because the soybean is unique among legumes. For example, the soybean is one of the few good plant sources of both essential fatty acids and soy protein is similar in quality to animal protein and directly lowers blood cholesterol levels. More importantly, the soybean is a uniquely-rich source of isoflavones. Isoflavones are classified as phytoestrogens although they differ from the hormone estrogen at the molecular and clinical levels. Proposed benefits of isoflavones include protection against coronary heart disease, osteoporosis and certain forms of cancer and alleviation of menopausal symptoms. Despite the benefits of soyfoods these foods are not without controversy. Claims have been made that isoflavones cause male feminization, worsen the prognosis of women with breast cancer and disrupt thyroid function. In addition, concerns have been raised that soyfoods adversely affect mineral status because of the phytate they contain and cause gastrointestinal disturbances because of the presence of protease inhibitors. However, concerns about soy are based almost entirely on animal data which is of questionable relevance to understanding the health effects of soyfoods. In contrast, the clinical and epidemiologic data are clearly supportive of the safety of soyfoods and their ability to play a favorable role in healthful diets.

NO. 19

### **Vegan? Vegetarian? VEBU**

Joy, S.

German Vegetarian Society (VEBU e.V.), Berlin, Germany

Increasingly more people opt for a plant-based nutrition. The arguments in favor of this kind of nutrition are manifold. The VEBU (Vegetarian Association Germany) names «5 good reasons» for a plant-based diet: The environment, health, fairness, animal rights and pleasure.

Sebastian Joy, CEO of VEBU, will discuss those reasons and will argue that our diet is of crucial relevance not only for our health but also with regard to ethics and morals, the protection of the environment, and world hunger. The presentation will also outline VEBU's strategies to enhance a plant-based lifestyle within society.

NO. 20

### **The Veg-Industry and its Responsibility for Man and Environment**

Jacob, L.

Dr. Jacobs Institute for Complementary Medical Research, Heidesheim, Germany

«The Vegetarian Food Industry and its Responsibility towards People and the Environment» The popularity of plant-based diets has not gone unnoticed by the big corporations. In the latest Nestlé study we find the major dietary trends for the upcoming decades. The large food corporations will increasingly focus on products that could be described as being «sustainable, ethical, organic, vegan, vegetarian, healthy, local and preferably exotic and low-cost». This is primarily due to the demand of a majority of customers and because it is more profitable. At the same time people expect the preparation of food to be both healthy and quick, as the importance of convenience foods is increasing.

With an eye to the future of mankind, the policy of Bill Gates and his foundation – the largest charity worldwide – is geared towards plant-based and low-salt meat substitutes. Thus they are completely in line with the trend of WHO recommendations. Likewise the UN assumes that mankind will only be able to survive on a plant-based diet. Thus the Vegetarian Food Industry faces the great responsibility to not only save the planet with their products and satisfy the palate of the consumers, but to also maintain their health. After all, with an increase in life expectancy health is the most valuable asset. People are becoming more aware of the obvious facts. All-you-can-eat buffets, avarice and greed are neither cool nor healthy, rather for an increasing number of health conscious individuals they are simply out of the question.

But how can this wave of vegetarianism and veganism develop into a permanent mass movement, which is so critical for ensuring our survival on earth? When looking at vegan shelves in a supermarket, from a nutritional viewpoint one frequently gets the impression that for customers the situation goes from bad to worse. Of course consumers look for meat alternatives, and they rightly expect them to be healthier than meat products. For this trend to be actually sustainable, it not only needs to provide a good taste experience or ensure a good life for business people, animals and the environment, but it has to keep customers healthy in the long run. Due to the high increase of food intolerances, small companies find interesting niches for developing and providing personalized products. Ludwig Manfred Jacob M.D., physician, innovator and entrepreneur, demonstrates pragmatic principles of healthy plant-based foods and convenience foods in accordance with the most current scientific findings.

## **Workshops**

NO. 21

### **Vegan During Pregnancy, Lactation and Childhood**

Gätjen, E.

Freelance Lecturer, Consultant and Author, Bergisch Gladbach, Germany

Pregnant and breastfeeding women are subject to various recommendations regarding their optimal nutrition. As a consequence, these women quickly gain the impression that they cannot optimally feed their children without food supplements, meat, fish, milk and dairy produce. In addition, there are long lists of foods that should be avoided in any case.

This workshop will answer the question how you can feed your children while maintaining a complete and balanced vegan nutrition. The workshop will consider critical nutrients and the increased energy demand during pregnancy and breastfeeding, with the targeted use of food supplements.

The provision of critical nutrients can be achieved in the vegan cuisine, for instance by clever combining, preparing and processing of foods, which will be explained with concrete and handy examples.

NO. 22

### **Mindfulness for Medical everyday – Nourishment for Body, Mind and Soul**

Seifert, P. F.

Resident general physician, Leipzig, Germany

In this fast-moving world, it isn't always easy to cultivate a healthy connection to one's self and to other human beings. This workshop will provide a space to experience the potential of the human encounter by listening to ourselves and to others in a very mindful, present and heart-centered way. There will be time to learn about different communication skills and how we can create more nurturing relationships. We will also try to distinguish more clearly between the feeling of hunger and other human needs (i.e. social, emotional spiritual, physical nourishment). Methods include guided mindfulness meditations / body scan, dyadic exercises, elements of Nonviolent Communication.

NO. 23

### **Are Yogis vegetarian? The Path Leads from Nonviolence and Compassion to an Ethical Diet**

Peters, A.

Health Center Sonne & Mond in Berlin, Germany

For more than 2500 years, the idea of non-violence (ahimsā) and compassion (karunā) have played an important part of yogic training, a discipline which aims to live in unity and harmony with all beings. Yogic practices and lifestyle can lessen the alienation many experience between man and nature. Because diet is a crucial interface between personal interests and the surrounding world, Yoga has always pointed out the importance of an ethical and responsible diet. The source texts of the Yoga tradition give us interesting information regarding vegetarianism and explain the effects of different forms of nutrition in relation to the mind and spiritual growth. Is Yoga a forerunner for vegetarianism or even a catalyst? What does a vegetarian lifestyle mean from a Yogic outlook for the development of human consciousness?

NO. 24

### **Physicians Committee for Responsible Medicine Europe**

*Stenholtz, D.*

Physicians Committee for Responsible Medicine Europe, Stockholm, Sweden

The physicians organization Physicians Committee for Responsible Medicine (PCRM) have been working for spreading information on health benefits of a plant based diet in the US since 1985. As of today there have been founded two similar organizations in Europe, one in Sweden (Physicians for the Future) and one in Norway (HEPLA). How can we further this development? Are there possibilities of founding more similar organizations in other European countries? Should we work for a European umbrella organization?

Please join to discuss these issues and create more momentum to further plant based nutrition.

NO. 25

### **Meeting Nutrients Needs on a Vegetarian Diet**

*Messina, G.*

Central Michigan University, MI, USA

With the exception of vitamin B12 and vitamin D, plant foods can provide all essential nutrients. However, because usual dietary recommendations assume that animal foods are a part of the diet, vegans and others who depend largely on plants for nutrition need to give some attention to meeting nutrient needs. This presentation focuses on the following issues:

- the importance of choosing foods that are rich in the amino acid lysine, which is the limiting amino acid in vegan nutrition
- plant sources of well-absorbed calcium
- the role of fats in plant-based diets and the importance of meeting needs for the essential omega-3 fat alpha-linolenic acid
- the importance of supplements for providing vitamin B12, vitamin D, iodine and long-chain omega-3 fats
- strategies for enhancing absorption of iron and zinc.

The material is organized into seven simple guidelines that will allow medical and health practitioners to communicate the essentials of plant-based nutrition to clients and the public in a way that is simple and practical.

NO. 26

### **The Vegan Plate – Practical Implementation of a Balanced Vegan Diet**

*Siebert, S.*

Stiftung Reformhaus-Fachakademie, Oberursel, Germany

The concept of the «vegan plate» helps to realize a balanced and diversified vegan diet in a consulting practice.

The plate illustrate the daily food choices and uses food symbols for the basic food components. The concept allows to design individual food plans by reverting to different numbers and sizes of food, respective food groups. The more space a food component has on the plate, the higher the portion of daily consumption. Examples of a daily vegan diet can be helpful when implementing a vegan diet.

When consulting a person to follow a vegan diet, it is also important to consider further components such as: personal preferences, body types, food tolerances or the ability to enjoy, since they have an influence on the patients compliance.

NO. 27

### **Beyond Carnism**

*Joy, M.*

Founder and President of Beyond Carnism, USA

Cardiovascular disease is the most common cause of death worldwide. Today, there is ample evidence that eating a plant-based diet can help prevent and reverse cardiovascular disease – and it can help control many other chronic diseases as well. Yet, often the science on the benefits of a plant-based diet is denied or ignored in favor of what are considered less «extreme» options (e.g., medications, surgeries) that support longstanding and unexamined beliefs about food and eating. In this presentation, psychologist Dr. Melanie Joy examines the unconscious beliefs that prevent us from making the most effective choices for human health, and for the overall health of the planet.

NO. 28

### **Vegan Nutrition in the First Year of Life – How does it Work?**

*Gätjen, E.*

Freelance Lecturer, Consultant and Author, Bergisch Gladbach, Germany

The average female vegan is between 18 and 30 years of age, has a higher educational level and in the future is likely to have children she wishes to raise as vegans too. This is indeed possible, but it requires careful planning. It is not sufficient to simply follow one's heart, but it is essential to use an intelligent approach and to wisely apply certain guidelines. During the first year vegan feeding means: Minimum of 4 months breast milk only, then slowly starting a complementary feeding with vegan wholefoods in combination with 2 daily breastfeedings at least up to the first birthday. This is, of course, assuming that the mother follows a very balanced whole-food diet and regularly takes Vitamin B12 supplements. It is required to also provide the infant with Vitamin B12 as well as the commonly recommended Vitamin D supplements. From month 5 to month 10 gradually 3 meals are getting introduced. Starting with vegetable and potato purée with added cereals and DHA-enriched flaxseed oil, followed by a fruit and cereal purée containing fresh fruits and grains such as oats and millet as a source of iron. Finally there will be a baby cereal with a soy-based infant formula. The baby's requirement for fluids is met by calcium-rich water.

NO. 29

### **Clean Eating, Raw Vegan & Super Foods**

*Rittenau, N.*

Free lance cook and nutritionist, Hamburg, Germany

A return to more unprocessed and natural foods means taking an important step forward in improving our health. If you wish to lose weight, enhance your physical and mental performance, or optimize your all-round physical well-being – Vegan Clean Eating helps to achieve all of those goals and much more. By combining unique methods of preparation for a higher nutritional value with latest findings in dietetics, nutritionist Niko Rittenau takes the concept of Clean Eating to a whole new level. In his presentation he will eagerly highlight diet options which are beneficial for increased sustainability and health. The way we cook, prepare and eat our food is equally as important for our well-being as the exact ingredients and the quality of our food. Niko Rittenau will also take an in-depth and straight-forward look at nutritional trends of recent years.

## Research Sessions

NO. 30

### Medicine from the Kitchen – Pharmacy from the Vegetable Shelf

Kerckhoff, A.

Hochschule für Gesundheit & Sport, Technik & Kunst, Berlin, Germany

Over decades women passed on sanitary knowledge orally from one generation to another. Living at home and being responsible for the health of the family members, they developed an enormous empirical knowledge about the use of domestic resources for health promotion, self-healing strategies and healing purposes. Here, home-grown vegetables constituted an important ingredient. These vegetables were used both internally and externally in form of various applications such as fortifiers and tonics, alcoholic or acid dilutions, poultices, ointments etc. Access to regional and seasonal vegetables therefore provided autonomy regarding not only food supply but also medical care.

This detailed knowledge, possessed still by our grandmothers' generation, is currently dying out. Only a systematic documentation of the valuable knowledge of the generation «female 50+» can counter this trend.

Concentrating on common vegetables this project aims to gather data through interviews with elderly women from different cultures, compare this data with the present state-of-the-art concerning active ingredients and clinical trials. Furthermore, a second research objective is a comparative evaluation, looking for differences and conformities across cultures such as similar strategies and matching patterns in the application. One outcome of this project will be a manual about reliable and safe interventions using common vegetables, aimed at teaching people with low income or local initiatives such as urban gardening about supporting their health and self-efficacy.

NO. 31

### Vitamin B-12-fortified Toothpaste Improves Vitamin B-12 Status Markers in Vegans: A 12 Week Placebo Controlled Study

Siebert, A.-K.<sup>1</sup>; Müller, S.<sup>1</sup>; Awwad, H.<sup>2</sup>; Sputtek, A.<sup>3</sup>; Obeid, R.<sup>2</sup>; Keller, M.<sup>1</sup>

<sup>1</sup>Institute of Alternative and Sustainable Nutrition, Biebertal/Giessen, Germany

<sup>2</sup>Saarland University Medical Center, Department of Clinical Chemistry and Laboratory Medicine, Homburg/Saar, Germany

<sup>3</sup>Center for Laboratory Medicine and Microbiology, Essen, Germany

**Background:** Vegans are at risk for vitamin B-12 deficiency due to the absence of cobalamin in plant foods. In addition to active intrinsic factor-mediated absorption, vitamin B-12 can be absorbed via passive diffusion by the sublingual epithelium. Therefore, using a vitamin B-12-fortified toothpaste could facilitate the vitamin B-12 supply in vegans.

**Purpose:** To investigate the effect of a vitamin B-12-fortified toothpaste on vitamin B-12 status markers in vegans in a 12-w study.

**Methods:** The study included 66 healthy vegans (age:  $29.2 \pm 7.3$ ; women: 66.7%) adhering to a vegan diet for at least 2 y and who were currently not using a vitamin B-12-fortified toothpaste. Subjects were randomly assigned to the verum or placebo group. Members of the placebo group used a non-fortified toothpaste of the same appearance. Both groups were instructed to brush their teeth twice a day for 2 min with the test toothpaste. Blood samples were taken at the beginning and at the end of the intervention period. Concentrations of serum cobalamin, holo-transcobalamin (holoTC), methylmalonic acid (MMA) and total homocysteine (tHcy) were measured.

**Results:** Compared with baseline, subjects of the verum group showed significant increases of serum cobalamin (256 vs. 355 pmol/L [ $p = 0.001$ ]), and holoTC (34 vs. 64 pmol/L [ $p < 0.001$ ]) after 12 w. Furthermore, a significant decrease of MMA could be observed (301 vs. 212 nmol/L [ $p = 0.016$ ]). tHcy also decreased, but changes were not significant (n.s.) (10.5

vs. 9.7  $\mu\text{mol/L}$ ). In the placebo group serum cobalamin and holoTC decreased (n.s.), whereas MMA and Hcy increased (n.s.).

**Conclusion:** The use of a vitamin B-12-fortified tooth paste for 12 w improved blood markers of vitamin B-12 status in vegans.

NO. 32

### Empfehlungen für eine veganes Speisenangebot – eine «Checkliste»

Volkhardt, I.<sup>1</sup>; Semler, E.<sup>2</sup>; Keller, M.<sup>3</sup>; Meier, T.<sup>1</sup>

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<sup>3</sup>Institut für alternative und nachhaltige Ernährung IFANE, Biebertal/Gießen, Germany

Vegan liegt im Trend. So ist es kein Zufall, dass vegane Angebote zunehmend auch in der Außer-Haus- und Gemeinschaftsverpflegung eine Rolle spielen. Allerdings stellen vegane Speisepläne, durch fehlende Empfehlungen zur Gestaltung einer veganen Ernährungsweise seitens der nationalen Fachgesellschaften und dem Fehlen von Konzepten im Umgang mit dieser Kostform, die Verpflegungsverantwortlichen oftmals (noch) vor eine Herausforderung. Dabei müssen gerade Veganer auf eine spezielle Zusammenstellung ihrer Speisen achten, um Defizite langfristig zu vermeiden, so z. B. bezüglich Zink, Kalzium oder Iod sowie der Vitamine A, D und B12.

Ziel der zugrundeliegenden Arbeit war es daher, in Anlehnung an die Checkliste der DGE für Mischkost in der Betriebsverpflegung, praxisnahe Richtlinien für vegane Angebote zu schaffen. Hierfür wurden zunächst aus der Gießener vegetarischen Ernährungspyramide, die analog zur aid-Ernährungspyramide lebensmittel(gruppen)basierte Vorgaben für den täglichen oder wöchentlichen Verzehr enthält, Empfehlungen für eine fünf-tägige Mittagsverpflegung abgeleitet. Angaben aus der Checkliste der DGE sowie weitere Vorgaben nach Plausibilität und Praktikabilität dienten zur Ergänzung oder Variation. Zusammen mit Beispiellebensmitteln, Anmerkungen zu Portionsgrößen sowie zur Häufigkeit bietet die vegane Wochencheckliste einfach anzuwendende Empfehlungen auf Basis von Lebensmittelgruppen, ohne jedoch die Kreativität der Köchinnen und Köche zu stark einzuschränken.

Da keinerlei Nährwertberechnungen nötig und Lebensmittel austauschbar sind, bleibt die Flexibilität erhalten, die gerade für den Einsatz der Checkliste in Großküchen von Bedeutung ist. Somit kann die vegane Checkliste als Arbeitsgrundlage für Rezepturplaner, Einkäufer und Köche sowie weitere im Verpflegungsmanagement tätige Personen dienen, um den ernährungsphysiologischen Bedürfnissen vegan lebender Konsumenten gerecht zu werden.

NO. 33

### Vitamin B12 and Vegan Diet – Quantitative Analysis of Everyday Supply

Gebhardt, S.

University of Applied Sciences, Münster, Germany

**Background:** Veganism is a growing trend in Germany. Expert opinion differs on whether a vegan diet is beneficial or harmful to personal health. Based on present scientific knowledge, vitamin B12 cannot be sufficiently supplied with plant based foods and should therefore be supplemented. Dietary supplements and/or enriched foods seem to be necessary.

**Purpose:** The survey was designed to investigate how vegans handle vitamin B12 supply in everyday life. This includes taking appropriate measures such as taking supplements or having their vitamin B12 blood status checked.

**Methods:** An online survey with 479 adult Germans was conducted. Recruiting for the survey was via online social networks.

**Results:** Most of the survey participants (82.8%) rate the importance of proper vitamin B12 supply as «important» or «very important». 76% of participants use supplements, mostly in form of pills or tooth paste. Half of

the participants have had their vitamin B12 blood levels tested by their physician. No relation was found between the duration of the vegan diet and the consumption of supplements.

**Conclusions:** The survey indicates that participants are interested in sufficient supply with vitamin B12 and that the majority acts accordingly. How this behavior influences the actual blood status has not been determined in this study.

The frequency of vitamin B12 supplementation is therefore not necessarily related to an adequate supply. Because of the study design, the results may not be applicable to all German vegans.

Studies which examine the relation between supplementation and blood status are needed.

NO. 34

## **Der Boden – die wichtigste Ressource für unsere Lebensmittel und Gesundheit**

*Kratz, W.*

Freie Universität, Berlin, Germany

Der Boden ist nicht nur die wichtigste Ressource für unsere Lebensmittel, sondern auch für die menschliche Gesundheit.

Dies belegt ua eine aktuelle Publikation in Nature (12/2015) mit dem Titel «Soil biodiversity and human health»

In der Veröffentlichung wird deutlich, dass die Biodiversität im Boden von großem Nutzen ist und dass die pathogenen Organismen nur eine Minderheit darstellen.

Abgesehen von den schwerwiegenden Krankheiten, wie z.B. Anthrax, Listeriose, Tetanus und Toxoplasmose, wird das Immunsystem durch die Auseinandersetzung mit einigen Erregern verbessert. Das verringert auch die Gefahr von Allergien.

Stadtbewohner weisen eine geringere Vielfalt an Mikroorganismen auf ihrer Haut auf und besitzen daher eine geringere Immunabwehr und eine stärkere Neigung zu Allergien.

Der Boden ist auch die Quelle für die meisten Antibiotika, das hat der Bodenmikrobiologe Dr. Selman Waksman bereits in den 1940er Jahren herausgefunden. In seinem Labor hat er dutzende Antibiotika aus verschiedenen Bodenbakterien gewonnen. Dafür wurde der aus der Ukraine stammende und in die USA emigrierte Wissenschaftler 1952 mit dem Medizin-Nobelpreis ausgezeichnet. Waksman ist der bislang einzige Bodenkundler, der mit dem Nobelpreis ausgezeichnet wurde. Da die Bodenbakterien aber kontinuierlich den Antibiotika anderer Bodenmikroorganismen ausgesetzt sind, entstehen Resistenzen.

Hier besteht auch die Verbindung zu den Antibiotika aus der Tiermast, die über die Gülle u den Stallmist in erheblichen Mengen in die Böden, das Grundwasser u die Feldfrüchte, auch von Vegetariern u Veganer, gelangen (DFG Projekt ua JKI/TU)

Aufgrund der hohen Biodiversität ist der Boden aber das ideale Labor für die Entwicklung neuer Antibiotika und Medikamente. Einige Bakterien sind bereits in der engeren Wahl. Erst kürzlich wurde ein Bakterium in einem natürlichen Boden entdeckt, dessen Antibiotika gegen die Tuberkulose wirken. *Mycobacterium vaccae* besitzt eine antidepressive Wirkung. Das Bakterium aktiviert Zellen im Gehirn, die das Glückshormon Serotonin ausschütten. *Bacteroides fragilis* soll einer Untersuchung am Californian Institute of Technology zufolge Autismus-Symptome beheben. Französische Mikrobiologen haben herausgefunden, dass sich viele Bodenbakterien im menschlichen Verdauungstrakt wiederfinden und dass ein genetischer Austausch zwischen den aufgenommenen Bodenbakterien und den Darmbakterien stattfindet. Japanische Wissenschaftler haben bei Seetang-Bakterien herausgefunden, dass sie die gleiche genetische Zusammensetzung besitzen wie zwei Bakterienarten, die im menschlichen Darm siedeln. Dadurch war auch die Nährstoffverdaulichkeit für den Seetang erhöht.

Die menschliche Gesundheit wird indirekt durch die landwirtschaftlichen Bewirtschaftungsmethoden beeinflusst.

Dabei gibt es Wechselwirkungen zwischen Schaderregern und dem Nährstoffniveau sowie der Qualität.

Um zu überleben haben die betroffenen Pflanzen gegen die meisten Schaderreger im Laufe der Evolution natürliche Gegenmaßnahmen entwickelt. Diese Gegenmaßnahmen werden durch eine hohe Biodiversität im Boden unterstützt.

Durch eine zu intensive landwirtschaftliche Bewirtschaftung kann die Biodiversität und die Vielzahl an nützlichen Bakterien herabgesetzt werden.

Dazu zählen u.a. die intensive Bodenbearbeitung mit dem Pflug sowie der intensive Einsatz von Pflanzenschutzmitteln (D 2014 >140.000 t) und Düngemitteln.

Kommen mehrere negative Faktoren zusammen können an sich nützliche Mikroorganismen zu Killern werden. Ein Beispiel ist der Bodenpilz *Coccidioides immitis*, der normalerweise tote organische Rückstände (Wurzeln) abbauen hilft und den Boden stabilisiert. Durch eine zu intensive Bewirtschaftung (Pflügen mit Schwarzbrache, Abbrennen der Stoppel) entwickelt er Sporen, die in der Folge von Staubstürmen zum berüchtigten «Valley-Fieber» führen können.

Im Jahr 2004 erkrankten in den USA 6000 Menschen am Valley-Fieber. Durch reduzierte Bodenbearbeitung verringert sich auch die Belastung mit Feinstaubpartikeln. Feinstaub ist auch in der EU verantwortlich für den frühzeitigen Tod vieler Menschen.

Eine weniger intensive Bewirtschaftung wie sie in Ökobetrieben praktiziert wird, fördert die Biodiversität und dadurch die Gesundheit von Pflanze, Tier und Mensch.

Durch die Fülle an nützlichen Organismen in den Böden wird der Einfluss der Pathogene zurückgedrängt.

Somit ist eine nachhaltige Bewirtschaftung unserer Böden essentiell für eine lang-anhaltende Bodenfruchtbarkeit und für die Gesundheit beim Menschen.

In den gemäßigten Klimazonen wird die Produktivität der Feldfrüchte durch die Regenwürmer und viele tausend andere Bodentierarten und Mikroorganismen unterstützt; in den tropischen Gebieten übernehmen Termiten diese Aufgabe.

Die Biodiversität erhöht die Nährstoffverfügbarkeit, insbesondere bei vielen Spurenelementen. Häufige Mangelerscheinungen in Feldfrüchten, die dann zu Nährelementmangel bei den Menschen führen u.a. Zink, Mangan, Lithium u.v.a.m. Ferner verbessert sich die Grundwasserqualität und damit das Trinkwasser.

Durch eine zu intensive landwirtschaftliche Bewirtschaftung wie in der konventionellen Landwirtschaft werden die Biodiversität und die Vielzahl an nützlichen Bakterien und Pilzen und damit deren ökosystemaren Leistungen herabgesetzt.

NO. 35

## **Vitamin B12 Deficiency, an Unrecognized Epidemic?**

*Peeters, C.*

COBALA good care feels better, Netherlands

Although a plant based diet has many health benefits, a deficiency in one of the crucial vitamins for human life might occur. Vitamin B12 deficiency is extremely common in strict vegetarians and vegans who do not use any supplements. Vitamin B12 in natural form is only present in animal sources of food. The few plants that are sources of B12 are B12 analogues and block the inclusion of the true B12. So the body's need for the nutrient actually increases. Cobalamin, which is the scientific name for vitamin B12 is stored in the liver, lungs, kidneys and other body tissues. As a result a deficiency might not show for a number of years. Medicine prescribed for chronic diseases can worsen the vitamin B12 deficiency. A miss diagnosis of vitamin B12 shortness or deficiency might happen in such situations Cobalamin in various forms plays a role in 300 enzymatic reactions leading to DNA synthesis, strong immunity, up to happy feelings. Blood tests for vitamin B12 deficiency aren't as clear as they are for other nutritional deficiencies. MMA and homocysteine levels in serum are suggested to be additional indicators for a vitamin B12 deficiency. Worldwide there is much dispute about a healthy range serum levels. Nowadays many laboratories transfer to the Holo Trans Cobalamin assay which measures

the active form of vitamin B12. The HTC assay is believed to be more accurate in presenting the real vitamin B12 status in the human body. In this presentation a case study is shown with a miss diagnosis by various medical doctors and as a result a severe vitamin B12 deficiency. The recovery of a severe B12 deficiency needs a careful guidance with personalised integrative care and may take several years to rebalance the body.

NO. 36

### The NURMI Study: Methodology and First Results of the Prevalence of Vegetarians and Vegans in Running Events

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**Purpose:** Considering the growing background numbers of vegetarians and vegans, the number of vegetarian and vegan runners is likely to rise, too. Therefore, the main goal of the Nutrition and Running High Mileage (NURMI) Study was to establish a broad body of scientific evidence on the endurance performance of vegetarian but especially vegan runners.

**Methods:** The NURMI Study was conducted following a cross-sectional design. Step 1 determines epidemiological aspects of endurance runners. Step 2 depicts dietary habits and running history from eligible participants (at least finishing a half-marathon). Step 3 displays data after a running event. Data collection (1/10/2014 to 31/12/2015) was accomplished using standardized questionnaires. Analysis will be performed using SPSS software package (SPSS Inc., Chicago, IL, USA). All data derived from the statistical methods will be given in mean  $\pm$  standard deviation.

**Results:** Data collected built a basic sample size of 3,163 runners (1,779 or 56.2% women; 1,384 or 43.8% men) predominantly from German-speaking countries (Austria, Germany, Switzerland: n = 2,788) with lower numbers from the rest of Europe (n = 375). The overall prevalence of omnivorous, vegetarians and vegans in running events was 1,434 (45.3%), 665 (21.0%) and 1,065 (33.7%), respectively. Vegan runners were found to be significantly (p < 0.001) younger and leaner (age: 35.2  $\pm$  10.2 y; body weight: 65.3  $\pm$  10.4 kg; BMI: 21.9  $\pm$  2.5 kg.m<sup>-2</sup>) compared to vegetarians and omnivores (age: 36.2  $\pm$  11.0 vs. 39.2  $\pm$  11.1 y; body weight: 65.0  $\pm$  10.5 vs. 69.0  $\pm$  10.9 kg; BMI: 21.8  $\pm$  2.4 vs. 22.7  $\pm$  2.5 kg.m<sup>-2</sup>).

**Conclusions:** Since scientific data about endurance athletes following a vegetarian but particularly a vegan diet are limited, the NURMI Study is the first study to assess this issue considering a bigger sample size. Therefore, the results will provide new information and a major contribution by adding knowledge to overcome the lack of data on the prevalence and exercise performance of vegetarian but especially vegan runners in endurance events.

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NO. 37

### Impact of Elimination or Reduction of Dietary Animal Proteins on Cancer Progression and Survival

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**Background:** There is evidence that the incidence of cancer is low in vegan populations but currently there is little data available on the effect of a pure plant-based diet on the progression of diagnosed cancer.

**Hypothesis:** A reduction or total elimination of animal protein from the diet can positively influence the course of an existing cancer disease and – in addition to oncological standard therapies – increase the remission rate. We expect a higher effect the lower the consumption of animal protein.

Purpose of the pilot study:

1. To test the hypothesis that elimination/reduction of dietary animal proteins leads to an improved tumor prognosis. Tumor behavior (numbers and percentage of tumor remissions) at 6 months was chosen as primary end point in the respective diet forms (omnivore/lacto-ovo vegetarian/vegan)
2. To estimate the effect size and thus to enable sample size calculations in further studies
3. To test the feasibility of the different diets especially of a vegan diet, in cancer patients
4. To test the tolerance of different diets and to proof that a vegan diet does not lead to a deterioration of health, tumor progression or malnutrition
5. To test the online portal as a study platform (technical aspects, sequence of displayed questionnaires)
6. To test the validity of self reported and online-generated data

The concept of this ongoing pilot study and first experiences with its setting as a patient driven online-study are presented.

NO. 38

### Fasting Protects Against Experimental Colitis and Commensal Microbial Gut Dysbiosis

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Inflammatory Bowel Disease (IBD) is an auto-inflammatory disease of the gastro-intestinal system with unknown aetiology. Many studies suggest that an imbalance in the interplay between diet, the gut microbiota and the intestinal epithelial barrier contribute to the pathogenesis of the disease. Our Western diet dramatically alters the makeup of our gut microbiota, which can in turn, lead to weakened gut barriers and microbial dysbiosis. This is characterized by loss of beneficial microbes and an increase in potentially pathogenic bacteria. Inflammation results when these bacteria interact with an impaired epithelial surface or leak across the epithelial barrier and stimulate the underlying immune cells.

Experiments from our lab demonstrate that fasting greatly reduces inflammation in two models of experimental colitis: A 48 hour fast ameliorates Dextran Sulfate Sodium (DSS)-induced colitis and leads to a significant decrease in IL-1 $\beta$ , IL-6 and TNF $\alpha$  expression in the colon along with changes in the make-up of the gut microbiota of C57BL/6 mice. In experiments using a mouse model of Salmonella typhimurium induced colitis, we found that – following streptomycin pre-treatment – a 48h fast completely protects C57BL/6 mice from the expected pathogen-induced intestinal damage. Preliminary data show that fasting alters the resident microbiota, and increases microbiota-based colonization resistance thereby preventing S. typhimurium from infecting the intestine and triggering inflammation. We therefore conclude that fasting beneficially modulates the gut microbiota and shapes host-microbe interaction in a way that promotes resistance to exogenous stressors and prevents microbial dysbiosis and inflammation.

## Gesundheitsorientierte Ernährung im Spannungsfeld zwischen Richtlinien, Werbewirtschaft und staatlicher Prävention

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Ähnlich wie in vielen materiell wohlhabenden Volkswirtschaften zeichnen ernährungsbedingte Gesundheitsrisiken («dietary risks») auch in Deutschland für die größte Anzahl verlorener disability-adjusted life years (DALYs) verantwortlich. Hierbei identifiziert u.a. die breit angelegte «Global Burden of Disease»-Studie (GBD) den Konsum von «high processed meat» als das größte Ernährungsrisiko.

Im Rahmen eines interdisziplinären Beitrags an der Schnittstelle zwischen Gesundheitsforschung und Wirtschaftswissenschaften wird untersucht, inwieweit das individuelle sowie das gesamtgesellschaftliche Ziel einer gesunden Ernährung (a) seitens der Wirtschaft bzw. (b) seitens des Staates adäquat forciert wird.

Hierzu werden Nahrungsmittel – den unterschiedlichen Ernährungsempfehlungen von DGE bzw. VEBU folgend – entsprechend ihrer Gesundheitswirkung in Kategorien geclustert. Im nächsten Untersuchungsschritt wird die lebensmittelkategorie-spezifische Intensität der Werbeaktivität untersucht. Zudem werden die laufenden ernährungsspezifischen Kampagnen der Bundeszentrale für gesundheitliche Aufklärung (BzgA) sowie die Gesundheitsziele des neuen Präventionsgesetzes (§20 Abs. 3 SGB V) in Bezug zu den seitens der GBD-Studie quantifizierten Ernährungsrisiken gesetzt.

Bei der Untersuchung verschiedener Lebensmittelkategorien und der kategorie-spezifischen Werbetätigkeit kann mittels regressionsanalytischer Methoden gezeigt werden: Je weniger von einem (tendenziell ungesunden) Nahrungsmittel konsumiert werden soll, desto höher ist das Werbebudget. Bei der Auswertung des 'Tätigkeitsfokus' der BzgA sowie der Untersuchung der Gesundheitsziele des PräVg wird deutlich, dass staatliche Präventionsmaßnahmen die – inzwischen klar nachgewiesenen Gesundheitsrisiken von Fleischkonsum (vgl. GBD) unberücksichtigt lassen. Vor dem Hintergrund dieser Ergebnisse stellt sich die Frage inwieweit Unternehmen im Nahrungsmittelsektor sowie der Staat Verantwortung für individuelle und gesamtgesellschaftliche Gesundheit tragen. Seitens der Wissenschaft gilt es, Disziplinen übergreifend darauf hinzuwirken, die Inhalte des 2015 verabschiedeten deutschen Präventionsgesetzes mittels gesundheitsorientierter Maßnahmen zugunsten einer überwiegend pflanzenbasierten Ernährung weiterzuentwickeln.

NO. 40

## Data Driven Approach Restoring and Maintaining Wellness in a Seemingly Healthy Person – A Case Study

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<sup>3</sup>LeanLabMed, Stockholm, Sweden

**Background:** Wellness is an emerging core of future healthcare. A data supported model demonstrates the potential and simplicity in preventing early disease perturbation, resetting and maintaining wellness on an individual level.

**Methods:** the individual studied was male, 65 years of age, no diagnosed illness nor medication, non-smoker, moderate drinking habits, active lifestyle; however obese (BMI 31) and sensing slow health deterioration. The procedure encompassed 1) aspects of wellness deterioration, 2) a temporary nutritional model to reset the sensation of wellness, 3) nutritional content 4) pre- and post-procedure measurements of physiological and biochemical parameters and 5) following a protocol of test phase, goal setting and implementation for sustainable wellness improvement. The nutritional regimen was plant based, low calorie, 86/11/3% in carbohydrate/protein/lipid content but high in minerals, vitamins, and complex phyto-

chemicals however low in fiber as a consequence of juicing. The regimen was followed over 28 days with normal physical work activity, regular 8 hours sleep and a daily water intake of 1L. The measurements combined weight/BMI/waist/blood pressure/resting pulse with 200 biochemical parameters covering hematology, electrolytes, minerals, carbohydrates, lipids, proteins, vitamins, fatty acids, amino acids, endocrinology, functional tests, urine tests and the gut microbiome.

**Results:** Weight reduction was 23.4 kg, BMI improved from 31 to 24 and the waist reduction was 16 cm. Blood pressure improved from boarder line high to normal and the resting pulse from 84 to 60. No discomfort and unbroken satiation was felt during the procedure. All listed sensations of deteriorating wellness were eliminated. The biochemical parameters indicated significant changes within reference intervals. Wellness associated biochemical changes (WABC) of highest significance were oxidized LDL, HOMA2-IR, Omega-3-Index and Urine pH.

**Conclusion:** Nontoxic Plant Based Nutrition and Lifestyle maintained Wellness must be designed an integral part of Future Healthcare.

NO. 41

## An Exploration of Motives for Becoming Vegan and their Relation to Gender, Age and Current Health Behaviors

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Motives for becoming vegan and their relation to gender, age, and current health behaviors were investigated in 132 German-speaking vegans (56% women; M = 30.3 years) using a paper-pencil-questionnaire. Virtually all vegans endorsed «respecting animals» (98%), «inhumane livestock treatment» (96%), and «slaughter» (95%). Other major motives were avoiding «wasting resources» (67%), «rainforest destruction» (64%), «world hunger» (58%), «climate change» (55%), and «water pollution» (54%). A substantial minority endorsed «taste preference for plants» (48%), «living healthier» (42%), «criticizing mainstream society» (40%), «disgust for meat» (36%), «unhealthfulness of meat» (35%), «living in harmony with nature» (32%), «vegan partner/friends» (30%), and «avoiding food scandals» (26%). A small minority endorsed «animal food allergy/intolerance» (15%), «losing weight» (11%), «religion» (9%), «own illness» (5%), «fashion trend» (2%), and «vegan parents» (2%). Spearman's rho was used to correlate motives with gender, age, and health behaviors (only significant results reported). Women endorsed «respecting animals» ( $r = 0.19$ ), «losing weight» ( $r = 0.21$ ), and «taste preference for plants» ( $r = 0.20$ ) more strongly than men. Older individuals were more likely to endorse «avoiding meat scandals» ( $r = 0.21$ ), «living in harmony with nature» ( $r = 0.18$ ) and «taste preference for plants» ( $r = 0.25$ ). Alcohol use was less pronounced in those going vegan because of food allergies/intolerances ( $r = -0.26$ ). Tobacco use was higher when the following non-health-related motives were reported: «inhumane livestock treatment» ( $r = 0.22$ ), «respecting animals» ( $r = 0.22$ ), «world hunger» ( $r = 0.24$ ), «water pollution» ( $r = 0.20$ ), and «criticizing mainstream society» ( $r = 0.22$ ). Exercising behavior was negatively related to the non-health-related motives «inhumane livestock treatment» ( $r = -0.24$ ), «respecting animals» ( $r = -0.19$ ), «world hunger» ( $r = -0.18$ ), but positively correlated with «vegan partner/friends» ( $r = 0.23$ ).



### Motivations and Processes of Adopting a Vegan Diet in Adulthood – A Qualitative Study

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**Background:** Vegan diet is increasing in popularity and the proportion of individuals following an animal-free diet is continuously growing. The aim of this study is to elucidate the motivations underlying a vegan diet and the process of changing from an omnivore to a vegan diet.

**Methods:** Six narrative interviews with vegans between 24 and 48 years who followed a vegan diet for at least two to ten years were carried out and the data were analyzed using basic elements of Grounded Theory.

**Results:** There are various reasons for adopting and maintaining an animal-free diet. Besides several secondary reasons like mental, ecological, political, culinary, aesthetic, cosmetic as well as economic motives, health and ethics could be identified as the main motivators. As an overall superior motive the improved physical and psychological well-being could be determined. Furthermore, a process model of adopting a vegan diet was developed.

**Conclusions:** The results expand the understanding of the choice of a vegan diet and may be applied interdisciplinary. In future studies the physical and psychological well-being as well as the associated health-related quality of life (HRQOL) of vegans has to be investigated in a quantitative study design.

### Wellness Disrupts Healthcare, Education and Business: e-Learning Tool for Individual and Organizational Well Being

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**Background:** Biological knowledge revolution drives fundamental change. New data on living system genome, transcriptome, epigenome, ncRNAome, proteome, metabolome connect data on role of nutriome, microbiome, energetics, pollution and communication. Big data and analytics promote disruptive knowledge singularity that translates into disease prevention and wellness management. Digital Learning Tools are needed to drive individual wellness in communities and workplaces.

Design a digital wellness learning tool: a major asset in life is wellness. Complex life statistics appear fragmented and disconnected causing public confusion and hampering knowledge that promotes wellness. Integrating existing wellness data for complex analytics has the potential to pinpoint essentials. Designing e-learning tools builds on the vision that wellness is becoming the focus of personalized healthcare. Key elements of physical wellness – water, air, activity, nutrition/intermittent fasting, energy, communication, lifestyle – will be integrated. Nutrition will be designed in relation to biological system true operation and wellness promoting evidence. Measurements will focus on parameters that represent wellness associated biochemical/physiological changes. Existing lifestyle and occupational health data will integrate nutritional evidence based data to support the personal wellness story. Aggregation of wellness related knowledge in an internet accessible digital tool will address crowd learning to promote spreading of new understanding, behavior and practices.

**Concluding remark:** initiative is taken to build the Integrated Digital Wellness Learning Tool – LifeStats – for individuals and organizations to promote wellness/prevent disease in community and workplace. Focus on wellness will disrupt established practices in healthcare, education, and industries. In essence the intended transformation builds on enabling participation and responsibility in maintaining sustainable personalized wellness.

### The Effects of Short-term Fasting on Quality of Life and Tolerance to Chemotherapy in Patients with Gynecological Cancer: A Randomized Cross-over Pilot Study

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**Background:** Preclinical research showed that short-term fasting protects healthy cells against the adverse effects of chemotherapy while making tumor cells more vulnerable to it. This pilot study investigated the feasibility and effects of short-term fasting during chemotherapy cycles in patients with gynecological cancer.

**Methods:** In a randomized individual cross-over trial 34 patients with breast cancer (n = 30) and ovarian cancer (n = 4) with at least 4 planned chemotherapy cycles were included. Patients were randomized to fast the first half of chemotherapy cycles followed by an ad libitum healthy diet in the second half of cycles or vice versa. Quality of life was assessed by the FACT questionnaire, Fatigue by the FACIT questionnaire, graded by Likert scales.

**Conclusions:** In this pilot study we showed that chemotherapy under caloric restriction seems to be significantly better tolerated than chemotherapy with regular diet or request food.

### Fasting and Plant-based Proteins Induce Global Changes in Gene Expression in Patients with Metabolic Syndrome

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**Background:** There is growing interest in the potential health benefits of different kinds of fasting. While animal studies have provided compelling evidence that feeding patterns such as alternate-day fasting can increase longevity and reduce incidence of many chronic diseases, the evidence from human studies is much more limited and equivocal. Additionally, although several candidate processes have been proposed to contribute to the health benefits observed in animals, the precise molecular mechanisms responsible remain to be elucidated.

**Methods:** The study described here examined the effects of a five days fast on gene transcription profiles in white blood cells from subjects suffering from metabolic syndrome. Samples were hybridized to GeneChip® PrimeView™ Human Gene Expression Array from Affymetrix. We applied qPCR and the  $\Delta\Delta$ -CT method for quantification.

**Results:** We found over 5000 differential expressed genes. After applying a fold change threshold of  $<-1.4$  and  $>1.4$  we further selected 247 down-regulated and 14 up-regulated genes. Gene ontology analysis revealed genes associated with fatty acid oxidation, alterations in cell cycling and apoptosis and decreased expression of pro-inflammatory genes and induction of autophagy. Down-regulated genes bearing interferone-stimulated response elements (ISRE) were highly enriched.

**Conclusion:** This study indicates a more fundamental anti-inflammatory response to fasting. The other processes provide indications of potential mechanisms that could contribute to the putative beneficial effects of fasting in humans suffering from metabolic syndrome. Further plant-based proteins with low sulfur amino acid content may represent a strategy to induce protective effects similar to fasting.

### Ayurvedic Versus Conventional Dietary and Lifestyle Counseling for Mothers with Burnout-syndrome: A Randomized Controlled Pilot Study

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**Purpose:** Ayurveda claims to be effective in the treatment of psychosomatic disorders by means of lifestyle- and nutritional counseling. This study aims to illuminate its potential clinical effects on mothers with burnout-syndrome in comparison to a conventional approach.

**Methods:** In a prospective, randomized, controlled pilot study mothers with burnout syndrome were randomized into two groups: (1) Ayurveda included tailored lifestyle- and nutritional counseling according to tradition and (2) conventional treatment consisted of lifestyle- and nutritional counseling according to current family medicine recommendations. All patients received 5 counseling sessions over 12 weeks, including one individual session and four group sessions. The primary outcome was the change of the mean score of the German Version of the Maslach Burnout Inventory (MBI-D) after 3 months. Secondary outcomes included quality of life (SF-36), sleep (PSQI), stress (CPSS), depression/anxiety (HADS) and spirituality (ASP) after 3 and 6 months. A per protocol-analysis was performed. Wilcoxon tests were used to compare mean differences between groups and within groups. In addition we conducted a qualitative evaluation of diagnostic and counseling sessions.

**Results:** We randomized 32 patients (n = 17 Ayurveda, n = 15 conventional). No significant between-group differences were found. However, significant and clinically relevant intragroup mean changes for the primary outcome burnout (MBI subscale PA), and secondary outcomes sleep (PSQI), stress (CPSS), depression (HADS) and mental health (subscale of SF-36) were found in the Ayurveda group only.

**Conclusions:** Summarized we found positive effects for both groups, more pronounced in the Ayurveda group. However, this pilot study had a small sample size. A power calculation revealed a sample size of 142 subjects, based on a moderate effect size (d = 0.5), a significance level of p < 0.05 and a power of 0.8 for a confirmatory trial. Possible beneficial effects of Ayurveda for burnout-patients would have to be analyzed in such larger trials accordingly.

### Application of Ayurvedic Nutrition Principles After Childbirth and During Breastfeeding

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Giving birth to a baby is like having second birth for the mother. During this process body and mind become tired and weak. There is also an extra need in terms of nutrition to cope with weakness and produce milk for the baby.

Ayurveda recommends series of vegetarian recipes with an intelligent use of medicinal herbs during these periods. In the presentation the following points are going to be discussed:

1. Ayurveda advises different types of vegetarian foods to meet needs at that particular time. For example: Immediately after childbirth ladies are given easily digestible and high-energy kind of foods.
2. Use of different recipes made with the same key ingredients serve multiple purposes during different time points during this period. For example: Lentils and rice are given with herbs in soup form in

the early days after childbirth. Later on the same ingredients cooked in a different way to meet lactating ladies nutritional needs are advised.

3. Application of these principles to Europe, presenting recipes using locally available ingredients for the best of the baby and mother after childbirth.

### Vegetarianism – A Boon for Patients of Cardiovascular and Metabolic Diseases

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A lacto-ovo-vegetarian is a person who does not eat meat, poultry, and fish. Vegetarians mainly eat grains, pulses, vegetables, fruits and dairy products. According to Ayurveda, milk, fruits, rice, and vegetables are of satva guna (goodness); garlic, onions and chilies are of raja guna (passion) and meat, fish, fowl and eggs are of tama guna (ignorance) [Sridhara-Swami's commentary on Bhagavad Gita-17/7]. A diet that augments vitality, energy, vigor, health, happiness and satisfaction, and which is sweet, unctuous, substantial and palatable, is preferred by sattva-dominant people. Foods that are bitter, sour, salty, pungent, hot, dry and producing burning sensations are rajas-dominant in nature and they may produce grief, sorrow and disease. Food cooked more than three hours before being taken and that is tasteless, stale, putrid, cold, rejected and that hampers intellectual functions are preferred by tamas dominant people [Bhagavad Gita-17/8–10]. Ayurveda proclaims that the biological body is born out of ahara (food) and that all diseases are produced due «wrong» ahara. Wholesome and unwholesome foods are responsible for happiness and misery respectively [Caraka-Samhita Sutra.-28/45]. Vegetarian nutrition plays a major role in Ayurveda in both preventive and therapeutic contexts.

The aim of this communication is to bring attention towards the importance of vegetarianism to combat different lifestyle disorders, especially cardiovascular and metabolic diseases, from an Ayurvedic perspective.

### A Critical Review of Intellect Promoting Medicines in Ayurveda

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*Ayurveda* literally means the «science of life» and is one of the most ancient systems of healthcare in the world. A comprehensive review of *Ayurveda* literature shows a profound description of Intellect Promoting Medicines and their mode of action. In *Charaka Samhita* (1500 BC) a separate group of drugs is defined for intellect promoting. These are designated as *Medhya Rasayana* which produces *Medhya* effect (Intellectual promoting). These improve *Medha* which comprises of; Dhee/Grahan shakti (Power of acquisition), Druthi/Dharan shakti (Power of retention), Smrithi/Smarana shakti (Power of recollection). Thus *Medhya Rasayana* forms a special category of rasayana drugs with a beneficial effect on memory and intelligence. According to main Ayurvedic Classics a group of 4 medicinal plants and their botanical identity are as follows; *Mandukaparni* (*Centella asiatica*), *Yastimadhu* (*Glycyrrhiza glabra*), *Guduchi* (*Tinospora cordifolia*), *Shankapushpi* (*Convolvulus pleuricaulis*). In addition to these, few more handful drugs with same pharmacodynamic properties also mentioned in *Ayurveda Classics*. *Aindri* (*Bacopa monniera*), *Jyotismati* (*Celastrus paniculata*), *Kusmanda* (*Benincasa hispida*), *Vacha* (*Acorus calamus*), *Jatamansi* (*Nardostachys jatamansi*). *Centella asiatica* is known as *Gotukola* in Sri Lanka. *Charaka Samhitha*, one of the oldest classics included a separate

chapter for Intellect promoting drugs. Basically, there are two types of *Medhya* drugs; some have specific properties in improving in the treatment of psychological and psychosomatic disorders. *Shankapushpi*, *Brahmi* and *Jatmanshi* are some of the examples for these and they have varying degree of psychotropic action. On the contrary, other type of drugs especially *Mandukaparni* (*Centella asiatica*) have more beneficial effects on *Medha* in spite of the antianxiety effects.

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### **Effect of Plant-based Diets on Inflammatory Profiles: A Systematic Review and Meta-analysis of Intervention Trials**

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**Background:** Persistent low-grade inflammation is considered an independent risk factor for the development of chronic diseases. Plant-based dietary interventions may reduce pro-inflammatory stimuli and hence prevent chronic disease risk; however human evidence remains unclear.

**Methods:** This systematic review and meta-analysis of intervention trials aimed to assess the effect of plant-based diets on inflammation-associated biomarker profiles. Medline, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched for articles published in the period between January 1946 and January 2016. Eligibility criteria included: (1) participants older than 18 years of age; (2) plant-based dietary intervention; (3) data on mean differences in biomarkers between individuals consuming plant-based diets and those consuming control diets. Exclusion criteria were: (1) intervention trials < 4 weeks; (2) studies among pregnant women or terminally ill patients; (3) concomitant interventions; (4) interventions based on individual food components rather than on overall dietary patterns. Data collected included: study design, baseline characteristics of the study population, information on dietary interventions, and outcome assessment (biomarker measurements). Data were pooled using random-effects models and quality ratings were based on Cochrane's tool for assessing risk of bias. Mean differences in biomarkers of inflammatory status: C-reactive protein (CRP), interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF- $\alpha$ ), soluble intercellular adhesion molecule 1 (sICAM), leptin, adiponectin and resistin.

**Results:** Of initially identified 2,583 publications, 28 met the meta-analysis inclusion criteria [a total of 2,689 participants; median age, 53 years]. Consumption of plant-based diets was associated with a reduction in the mean concentrations of the following biomarkers: CRP [effect size, -0.55 mg/l, 95% confidence intervals (CI): -0.78; -0.32,  $I^2 = 94.4\%$ ], IL-6 [effect size, -0.25 ng/l, 95%CI: -0.56; 0.06,  $I^2 = 74\%$ ], and, to some degree, sICAM (-25.07 ng/ml [95%CI: -52.32; 2.17,  $I^2 = 93.2\%$ ]). No substantial effects were revealed for the remaining biomarkers: TNF- $\alpha$ , resistin, adiponectin and leptin.

**Conclusion:** Plant-based diets are associated with an improvement in inflammatory profiles-as indicated by decreases in CRP and IL-6 concentrations-and could provide means for therapy and prevention of inflammation-related chronic diseases.

**Trial registration:** PROSPERO; registration number CRD42015027109