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Keynote Forum Day 1

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Controlling obesity-derived hepatic lipidosis and carcinogenesis through dietary broccoli

Diets rich in fat and sugar, often termed 'Western' diets, have become popular worldwide. Unfortunately, such diets result in an increase in body fat accumulation and development of nonalcoholic fatty liver disease (NAFLD), with the potential to lead to hepatocellular carcinoma (HCC), a cancer with very poor outcome. Brassica vegetable consumption, particularly broccoli consumption, has grown significantly in popularity within the United States and many other parts of the world. Studies report protection against many different cancers by dietary broccoli. However, liver cancer and even liver health in obesity has not been evaluated before our present study. We hypothesized that broccoli slows or prevents both NAFLD and HCC, in a model of mice fed a Western diet and treated with the hepatic carcinogen diethylnitrosamine (DEN). Male B6C3F1 mice received a powdered, control diet or a diet containing 19% lard and 31% sucrose, +/- 10% freeze-dried broccoli, wt:wt,

with weekly DEN, 45mg/kg i.e. for 6 weeks. Mice were terminated 6 months later, at 9 months of age. Broccolifed mice had lower hepatic triglycerides ($P < 0.001$) and NAFLD scores ($P < 0.0001$), associated with changes in several biomarkers supporting a correction in handling hepatic lipid metabolism. Hepatic neoplastic initiation and progression were both slowed. These findings suggest the need for a clinical study to evaluate the impact of broccoli and/or other brassica vegetables on liver health in general and hepatic handling of lipids in particular.

Biography

Elizabeth Jeffery joined the University of Illinois in 1983 and has joint appointments in the Department of Food Science and Human Nutrition, Pharmacology (College of Medicine) and the Interdisciplinary Division of Nutritional Sciences. She performs research in the area of diet, bioavailability and disease prevention, with a focus on cancer prevention using whole foods, including broccoli. She has served as Program Director for a multi-State research program on bioactive food components, on committees for the National Academy of Science focused on safety and efficacy of dietary supplements. She has a PhD in Biochemistry from the University of London, England.

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Nancy D Turner
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Suppression of intestinally mediated diseases by consumption of polyphenol rich sorghum brans

Polyphenols may protect against intestinally mediated diseases such as obesity, type 2 diabetes, chronic inflammation and cancer by influencing the colonic bacteria and their metabolites. We demonstrated diet induced modifications to the microbiota and their metabolites in rodent models of disease and overweight humans. When sorghum brans containing 3-deoxyanthocyanins, condensed tannins or their combination were included in a purified diet, they almost completely prevented microbial shifts that occurred in rats given the polyphenol free diet. Microbiota changes with the purified diet were suggestive of a pro-inflammatory state. In animals challenged with dextran sodium sulphate to initiate colitis, sorghum bran diets mitigated intestinal inflammatory tone. This response may result from the retention of Bacteroidetes and inhibition of an increase in Firmicutes in rats consuming the control diet. The condensed tannins increased Akkermansia, a microbe considered protective against metabolic diseases including diabetes. In addition to affecting the microbiota, inclusion of condensed tannins also causes a shift from rapidly digestible starch to slowly

digestible and resistant starch in the diet, which likely contributed to a reduction in blood glucose levels that occurred after a meal. Similar changes in the microbiota and importantly, microbe derived plasma metabolites occurred in humans consuming a cereal containing condensed tannins. Finally, rats fed these sorghum brans had fewer early colon cancer lesions, and this was associated with changes in the expression of pro-inflammatory mediators and regulators of apoptosis induction. Overall, our data suggest the potential for polyphenol rich brans derived from sorghum to suppress multiple intestinally mediated chronic disease states that negatively affects millions of people around the world.

Biography

Nancy D Turner is a Research Professor in the Nutrition & Food Science Department. Her research is focused on characterizing the mechanisms whereby dietary chemoprotective compounds mitigate colon carcinogenesis and inflammatory bowel disease, with special attention given to the interaction between colon microbiota and the colonocytes. She has published 69 peer-reviewed papers, 6 book chapters, and co-edited a book entitled "Potential Health Benefits of Citrus". She is the Director of PhD Training Program in Space Life Sciences and Co-Director of a Postdoctoral Training Program in Nutrition, Biostatistics and Bioinformatics. She serves on the editorial boards of Advances in Nutrition, Molecules, and Experimental Biology and Medicine.

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Microbiome and antioxidant system of the gut in chicken: Food for thoughts

The microbiome of the gastrointestinal tract in poultry is one of the major factors affecting health of birds (especially the immune system), their productivity and period of productive use. Furthermore, pathogens and agents of food toxicoinfections in humans (e.g. campylobacteriosis) may result from contamination of eggs and meat with bacteria that are normal in the gastrointestinal tract of poultry. There is also an antioxidant-prooxidant balance in the gut that interacts with microbial population and determines gut integrity and inflammation. Our studies indicate that superoxide dismutase and heat shock proteins are major protective mechanisms in the gut, while mycotoxins and oxidized fat in the diet represent negative effectors of gut health. We find that by using vitagene-activating supplements it is possible to improve feed conversion ratio in growing chickens and layers due to improvement of gut antioxidant/redox status and health. Intestinal microflora impact on egg production and meat quality has not been studied well using molecular genetics and genomic techniques in relation to feed additives (e.g. probiotics, anti-stress additives, etc.) that should be safe for human. Neoteric metagenomic profiling of bacterial communities using T-RFLP, RT-PCR and NGS technology provides a powerful toolbox for monitoring intestinal microflora at all stages of chicken development and performance. Combined with gene expression analysis in the chicken guts, microbiome studies can aid in understanding of

nutritional, microbiologic and genetic factors forming poultry health and productivity, and in improving biosafety and quality of poultry products. It seems likely that pathogenic bacteria and prooxidants are on one side of the balance while antioxidants, probiotics and normoflora are on the other side of the balance determining chicken health and their productive and reproductive performance. Understanding this balance is a new promising direction of the research.

Peter F Surai is supported by a grant of the Government of Russian Federation, Contract No. 14.W03.31.0013

Biography

Peter F Surai has his expertise in animal and human nutrition and published a number of papers as well as two books ("Natural Antioxidants in Avian Nutrition and Reproduction", 2002; and "Selenium in Nutrition and Health", 2006) which became textbooks for animal nutritionists. His recent research is devoted to the development of effective strategies to fight commercially relevant stresses in livestock/animal production. He successfully transferred vitagene concept from Medical Sciences (Calabrese et al., 2007-2016) to Animal and Poultry Science and developed stress-prevention programs based on supplying vitagene-regulating nutrients to farm animals via drinking water. He held Honorary Professorships in Nutritional Biochemistry at various universities in the UK, Hungary, Bulgaria and Ukraine, and became a Foreign Member of Russian Academy of Sciences. For the last 15 years he has been lecturing all over the world visiting more than 70 countries.

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Benjamin M Bohrer
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Density and value of nutrients in plant-based food products when compared with traditional animal-based food products

In recent years, consumers are becoming more diverse when choosing foods to consume. Specifically, there is an increase around the world in the population and percentage of people who choose to consume diets without or limited in animal-derived foods. Utilization of non-meat foods as a complete source of protein, vitamins, and minerals warrants careful consideration. This research focused on 1) comparing nutrient density, nutritional value, and cost of nutrients of meat products and non-meat foods high in protein and 2) comparing nutrient density, nutritional value, and cost of nutrients of dairy milk and plant-based milk alternatives. Twenty-five meat products (beef, pork, lamb, and poultry), six fish products, and eighteen non-meat foods were compared for nutrient composition. Seven dairy-derived milks and six plant-based milk beverages were compared for nutrient composition. Nutrient composition information was used to assign value based on nutrient density. Nutrient cost was expressed in nutrients available per US dollar and prices were assessed from the USDA economic research service and the USDA agricultural marketing service when available,

and with a marketplace assessment when information was unavailable otherwise. Energy, protein, amino acid composition, total fat, saturated fat, cholesterol, vitamin B12, sodium, phosphorus, iron, and zinc content in protein-rich foods and milk beverages were analyzed for nutrient density and value. Individual comparisons for the cost of nutrients was generated from this dataset that will enable further research and categorization of high protein foods. Careful consideration needs to be made when replacing meat in the diet with non-meat foods, because most non-meat foods contain only 20 – 60% total protein density on an equal (raw, unprepared) serving size basis. Likewise, consideration needs to be made when replacing dairy milk with plant-based milk alternatives, as plant-based milk alternatives can range from 5 to 70% of the protein density of whole cow milk.

Biography

Benjamin M Bohrer is a Meat Scientist with training and expertise in animal and food sciences. He recently completed his graduate education in animal sciences at the University of Illinois with a focus on meat science and muscle biology and began his career as an Assistant Professor in Food Sciences at the University of Guelph. Much of his previous research has been completed on the impacts of on-farm production practices on muscle development, carcass characteristics, fresh meat quality, and processed products of pork, beef, and poultry.

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M Usman

Pakistan Agricultural Research System, Pakistan

Major food nutrients and food chemistry is the most powerful tool for the health, reduction in global poverty and hunger in the developing countries of the world like South Asia

The aim of presentation consists of major food nutrients, food chemistry and poverty alleviation were studied and reported that food is the basic need of our life and the food chemistry deals with the production, processing, preparation, and utilization of food like plants and animals which are the main source of food and food nutrients. Similarly, the basic food chemistry deals with three major food components such as carbohydrate, lipids and protein which are found in plants and animals cells. It is also called as the food science. Food carbohydrates include sugar, starches and fibres, lipids include fats, oil, waxes and cholesterol. Protein is very important component of food and necessary for the life of human being. All the components are the basic source of energy. In the light of above study, food chemistry and nutrition are not only the basic need of food but also fulfills the maximum requirements of human beings from the integrated agricultural products of agro based industries like livestock and dairy development, poultry, aqua cultural, apiculture, crops production, fruits, vegetable, seed

industries and processing plant. Similarly, agro based industries, food science, food chemistry and nutrition absorbs millions of technical and non-technical people like doctors, engineers, agricultural scientist, technical experts etc thus generating source of income, create employment as well as reduction of global poverty and hunger in the World. It is concluded that agricultural, food science, food chemistry and nutrition are the basic need of our lives which in turn generate income, create employment, consequently reduction in poverty and hunger. It was also concluded that in the absence of it life is almost impossible.

Biography

M Usman was a Former Director General of Agricultural Research System, Government of Pakistan who retired from service after a spotless career of about 35 years with senior level experience on research and development of agricultural industry with regard to Food Chemistry, Food science and Nutrition, renewable energy, sustainable agriculture of oil seed, cereal, fruits, vegetable and other cash crops. He has presented paper in FCF, Geneva. He is basically an Agricultural Scientist with specialization in agriculture in Switzerland and food chemistry working as plant breeder with regard to the yield and quality of various agricultural crops as well as nutrition. He has also worked on Biosciences of lipids, food legumes crops and Bio-energy. He is being a scientist, has released several oil seeds varieties, presented and published research papers on various oil seeds, and renewable energy in different conferences like Geneva. He established "Prominent Agro Based Industries SDN BHD" in Malaysia and aims to work on integrated agricultural project like livestock and dairy development, renewable energy etc. His research area focuses on Food & Nutrition.

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