



# **2021 Citizen's Health Forum**

## **Can Antioxidants Make Lifespan Longer?**

**Dr. Zhen-Yu Chen**

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**Interest in relationship between diet and ageing is growing. Research has shown that dietary calorie restriction extends lifespan in various ageing models. On the one hand, oxygen is essential to aerobic organisms because it is a final electron acceptor in mitochondrial. On the other hand, oxygen is harmful because it can continuously generate reactive oxygen species (ROS), which is believed of the factors to cause ageing of an organism. To remove these ROS in cells, aerobic organisms possess an antioxidant defense system which consists of a series of enzymes, namely superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase. In addition, dietary antioxidants including ascorbic acid, vitamin A, vitamin C,  $\alpha$ -tocopherol and plant flavonoids are also able to scavenge ROS in cells and theoretically extend the lifespan of organisms. The purpose of this presentation is to brief the literature of ageing theories and our research about the effects of various dietary antioxidants on ageing and underlying mechanisms by which antioxidants prolong the life using fruit flies as an model.**

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## How to Improve Health Protection through Nutrition in the Pandemic Period

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SARS-CoV2 outbreak globally has influenced this world since 2020, and greatly threaten the human health and life. Sanitary behavior, mask protection and vaccine are required, but nutrition plays an important role to improve health protection in this period. Nutrition is a critical determinant of immune responses and malnutrition the most common cause of immunodeficiency worldwide. Protein-energy malnutrition is associated with a significant impairment of cell-mediated immunity, phagocyte function, complement system, secretory immunoglobulin A, antibody concentrations, and cytokine production. Findings from recent studies indicate an important role for amino acids in immune responses by regulating: (1) the activation of T lymphocytes, B lymphocytes, natural killer cells and macrophages; (2) cellular redox state, gene expression and lymphocyte proliferation; and (3) the production of antibodies, cytokines and other cytotoxic substances. Arginine, glutamine and cysteine precursors are the best prototypes. Because of a negative impact of imbalance and antagonism among amino acids on nutrient intake and utilization, care should be exercised in developing effective strategies of enteral or parenteral provision for maximum health benefits. Deficiency of single nutrients also results in altered immune responses, this is observed even when the deficiency state is relatively mild. Of the micronutrients, zinc, selenium, iron, copper, vitamins A, C, E, and B-6, and folic acid have important influences on immune responses. Over nutrition and obesity also reduce immunity. In the elderly, impaired immunity can be enhanced by modest amounts of a combination of micronutrients and high quality protein. These findings have considerable practical and public health significance. Hydration is the way to prevent the virus infection effectively. Functional foods such as purple coneflower, berries, fish oil and phytonutrients also significantly suppress the virus attack. A suitable combined nutritional supplementation and smart action could help people to keep away SARS-CoV2 and reduce the severity of the illness and even death.

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## Molecular Mechanism for Cardiovascular Benefits of Soybean Protein

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Menopause has been linked with a higher risk and incidence of cardiovascular disease in women due to increased oxidative stress induced by menopause-associated estrogen deficiency. The use of isoflavones, an abundant phytoestrogen found in soybeans, have been shown to act as an antioxidant and a possible treatment for the lack of estrogen in postmenopausal women. Our preliminary data revealed that the loss of estrogen in ovariectomized (OVX) mice led to metabolic dysfunction and impaired endothelial-dependent relaxation. Furthermore, an increase in overall reactive oxidative species (ROS) in OVX mice aortas was coupled with elevated Fkbp5 levels, a newly proposed metabolic stress-response gene associated with stress hormones such as glucocorticoids (GCs) which are released during estrogen deficiency. It is unknown whether the increase in Fkbp5 and the manifestation of metabolic-related pathologies observed in postmenopausal women can be directly alleviated with the use of soy isoflavones. Consequently, our results revealed that the addition of soy-derived isoflavones in the diet of OVX mice decreased both levels of ROS and Fkbp5 levels while also restoring vascular function. Given the observations of the effects of soy isoflavones in OVX mice coupled with the reduction in Fkbp5, we hypothesize that 1) there is a novel and direct regulatory link between soy isoflavones and stress-response genes such as Fkbp5 in the presence of estrogen deficiency and 2) Mechanistically, we propose that soy isoflavones epigenetically suppress GC-induced Fkbp5 upregulation during estrogen deficiency, thereby increasing eNOS in endothelial cells. In summary, Soy proteins and isoflavones can improve the function of the nitric oxide synthase pathway and promote cardiovascular health.

# **2021 Citizen's Health Forum**

## **Sports Nutrition: Improving Immunity and Healthy Aging**

**Professor Chia-Hua Kuo  
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Human body may be regarded as a society-like system made by living cells with different ages. Elimination of senescent cells in animals have been proven to increase health span and fitness. Exercise is a catabolic challenge which lowers senescent cell population of human body in a Darwinian natural selection fashion. Both high intensity aerobic exercise and resistance exercise mobilize bone marrow cells (CD34+) into circulation. These cells develop into immune cells and stem cells. Immune cells infiltrated into peripheral tissues to remove unhealthy senescent cells by phagocytosis, whereas stem cells colonize in the inflammatory site to repopulate the challenged tissues into a younger cell population. This is the fundamental basis of anti-aging effect of exercise training. During the cell regeneration phase, nutritional carbon and nitrogen are required for fast tissue regeneration. We have previously found a shortened time of immune cell infiltration in human skeletal muscle when high protein supplementation is readily available before and after exercise, compared with the low protein trial. In a human body with relatively larger cell population (greater body weight), the absolute number of senescent cells will trap more bone marrow cells (immune cells and stem cells) leading to relative inadequacy of the immune source against other external challenge, such as viral and bacterial infections. Therefore, the senolytic effect (removing aged cells) of exercise in human skeletal muscle is essential to spare more bone marrow-derived immune cells against infection.

**Conclusion:** Supplementation of fast release nitrogen (protein and amino acids) and carbon source is essential to accelerate for senolytic effect of exercise to lower the burden of immunity. Dietary based immunostimulant is a promising area for the development of senolytic sports supplements for fitness and survival.

# **2021 Citizen's Health Forum**

## **Physical Activity and Postprandial Metabolism**

**Dr. Masashi Miyashita**

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**Repeated daily episodes of elevated non-fasting triglyceride (TG) concentrations and prolonged residence in the circulation of TG-rich lipoproteins are a risk factor for cardiovascular disease and all-cause mortality in men and women (Nordestgaard and Vardo, Lancet 2014; 384: 626-635.). Thus, it is important to consider lifestyle modifications which may be effective in reducing repeated daily episodes of exaggerated postprandial TG. A large body of evidence supports the notion that an acute bout of aerobic exercise can reduce postprandial TG concentrations (Freese et al, J Appl Physiol. 2014; 116: 67-75.). The majority of these randomised, cross-over studies do not control energy status – the subjects in the exercise trial were in energy deficit compared with the resting control trial (Freese et al, 2014). However, it is difficult to translate these study findings to real life situations where individuals with normal free access to food and drink may replace the energy expended during exercise. This presentation will present data on the effect of multiple short bouts of brisk walking throughout the day, with and without dietary replacement of the exercise-induced energy deficit, on postprandial TG in postmenopausal, older (65 years) women. This presentation will also emphasise the importance of dietary approach to attenuate postprandial glycaemic responses (i.e., glucose and insulin) during the post-exercise period.**



# **2021 Citizen's Health Forum**

## **California Obesity Prevention Project- Key Learnings**

**Simon Sum, DCN, RDN, ACSM-CPT, FAND**

**Director-at-Large, California Academy of Nutrition and  
Dietetics Foundation**

**Obesity is already a global pandemic and with the recent COVID situation around the world that require people to stay home even more, the prevalence of obesity may be further increased. California Obesity Prevention Project is a 5-year project with the objective to reduce the risk and prevalence of obesity and reduce projected healthcare costs among low-income families. It is conducted by the California Department of Health Care Services and the Institute for Population Health Improvement at the University of California, Davis Health System. The project consists of formative research, program development, implementation, evaluation, analysis and recommendations. This session will discuss the key learnings from the project and how we can apply them to similar programs in other countries to fight against the obesity pandemic.**

