

August 28 PM (Wed)

Room A1

Plenary Lecture I

Chair: Jung Han Yoon Park, *Hallym University, Korea*

PL-1 17:10-18:00

Functional Foods as Multi-target Holistic Medicines for Human Health

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Functional food compounds are bioactive signaling molecules that can modulate gene expression to influence cell homeostasis and human health. Both ancient Eastern and Western philosophies have regarded food and drugs as sharing similar origins. Traditional Eastern medicine emphasizes the holistic concept of curing the individual that harbors the disease, rather than the modern medical view of curing the disease within a patient. To this end, Eastern medicine has invariably prescribed drugs consisting of multiple components that act on multiple targets, in contrast to modern drugs that are predominantly specific for single targets. Healthy natural foods can therefore be thought of as holistic medicines comprised of thousands of components that exert influences on multiple signaling cascades. Prominent examples of food components that act on multiple targets relevant to human chronic diseases will be discussed. Soy isoflavone metabolites such as equol and trihydroxyisoflavone (THIF) exhibit diverse influences on signaling intermediates. The antitumor-promoting effects of equol arise from its ability to inhibit cell transformation, mainly by targeting MEK signaling. CDK1 and CDK2 are potential molecular targets of 6,7,4'-THIF for the suppression of human colon cancer cell proliferation *in vitro* and *in vivo*. Piceatannol, a phytochemical normally found in various fruits including grapes, protects neuronal cells from ROS-mediated apoptosis by blocking JNK activation and the down-regulation of Bcl-XL. Piceatannol blocks A β -induced accumulation of ROS, thereby protecting neuronal cells from oxidative stress. It also directly binds with PI3K in an ATP-competitive manner and suppresses its activity, resulting in anti-atherosclerotic effects. Similarly, coffee components including caffeic and chlorogenic acid exhibit many properties beneficial for human health. Caffeic acid targets MEK1 and TOPK, resulting in the suppression of colon cancer metastasis and neoplastic cell transformation. Caffeine-free decaffeinated coffee may also prevent memory impairment via the inhibition of NF- κ B activation and production of TNF- α . Pretreatment with caffeinated coffee, decaffeinated coffee, or chlorogenic acid has been found to inhibit ROS-induced down-regulation of the anti-apoptotic proteins Bcl-2 and Bcl-XL. In addition, the protective effects of cocoa polyphenol extract and procyanidin B2 against ROS-induced apoptosis in neuronal cells involves the downregulation of Bcl-XL and Bcl-2 expression via inhibition of JNK and p38 MAPK. Cocoa procyanidins are potent inhibitors of MEK and MT1-MMP, which may in part explain the molecular mechanisms behind the anti-atherosclerotic effects of cocoa. Cocoa polyphenol extract inhibits insulin receptor kinase activity, ERK, and Akt in 3T3-L1 preadipocytes, and also prevents the development of obesity in mice fed with a high-fat diet. A deeper understanding of the diverse mechanisms influenced by such food components is likely to pave the way for personalized approaches to chronic disease prevention in the future, based on each individual's genome, age, sex, and other personal characteristics.