

## **Nutritional systems biology approach for understanding homeostatic protection of botanical phytochemicals against vascular endothelial dysfunction in human clinical trials**

Oran Kwon

Ewha Womans University, Korea

Vascular endothelium functions to maintain normal vascular tone and blood fluidity with no or little proinflammatory cytokine release under normal homeostatic conditions. However, life risk factors such as obesity, smoking, aging, and extended postprandial state can induce unintended endothelial dysfunction, as manifested by the decrease of nitric oxide availability and/or the exaggeration of proinflammatory and procoagulatory procedures. These features increase the risks of cardiovascular disease (CVD), if not properly managed at the early stage of disease progress. Accumulating evidence from preclinical experiments has indicated that endothelial dysfunction can be modified by dietary measures. Therefore, endothelial dysfunction is considered as an important target for development of food supplements and functional foods. In our previous *in vitro* and *in vivo* studies, we demonstrated that Sanghuang-Danshen combination effectively suppressed the development and progression of vascular endothelial dysfunction in a rat model injected with a collagen-epinephrine mixture to induce platelet activation. These findings provided a rationale to perform further clinical intervention trials in apparently healthy subjects. However, there are many challenges we are facing ahead. The first is the limited availability of clinical samples, which are often restricted to blood at most. The second is about the markers. Traditional static markers are not appropriate to measure homeostatic protection. The last is about the design. The current clinical trial design does not allow to measure possible link between multiple phytochemicals and corresponding multiple targets in the human body. Fortunately, new analytical platforms and nutritional systems biology approach are now available, providing a unique opportunity to move forward. The presentation will provide further details on our current human clinical trials using a comprehensive systems approach to explore whether single administration of Sanghuang-Danshen can confer homeostatic protection against high fat/sugar-induced endothelial dysfunction in health subjects. The challenges and opportunities of the future will be discussed as well.