

The Anti-carcinogenic Effect of L-sulforaphane and Chinese Cabbage Extracts on the Inhibition of Gap Junctional Intercellular Communication by Hydrogen Peroxide

Jae-Woong Hwang¹, Sung-Dae Cho¹, Ji-Won Jung¹, Se-Ran Yang¹,
Joon-Suk Park¹, Eun-Hye Jo¹, Byoung-Su Yoon², Sung-Hoon Kim³,
Yong-Soon Lee¹ and Kyung-Sun Kang¹

¹Department of Veterinary Public Health, College of Veterinary Medicine, Seoul National University, Seoul 151-742;

²Department of Biology, College of Natural Science, Kyonggi University, Suwon 442-760;

³Graduate School of East-West Medical Science, Kyunghee University, Yongin 449-701, Korea

Consumption of cruciferous vegetables is thought to protect against cancer. The anti-cancer properties of cruciferous vegetables such as chinese cabbages and broccoli come from phytochemicals called L-sulforaphane. We examined the anti-carcinogenic properties of L-sulforaphane and the chinese cabbage extracts (DF-01, DF-02, DF-03, Sol, GM-A, GM-B) on the inhibition of GJIC by hydrogen peroxide (H₂O₂) in WB-F344 rat liver epithelial cell. The cells were pre-incubated with L-sulforaphane and Chinese cabbage extracts within non-cytotoxic concentration for 24 h followed by co-treatment with extracts and H₂O₂ (750 μM) for 1 h. L-sulforaphane, DF-01, DF-02, and DF-03 prevented the inhibition of GJIC by H₂O₂. To find out the action mechanism of L-sulforaphane and Chinese cabbage extracts, western blot analysis was performed to show whether they block connexin 43 hyperphosphorylation or inhibit extracellular signal-regulated protein kinases (ERK) 1/2 activation by H₂O₂. All of L-sulforaphane and Chinese cabbage extracts such as DF-01 and DF-03 prevented H₂O₂-induced GJIC inhibition through inactivation of ERK1/2 mitogen-activated protein (MAP) kinases. Therefore, it is suggested that the Chinese cabbage extracts might have the potential chemopreventive effects by the inhibition of GJIC.