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Korean red ginseng as an anti-stress immune-potentiator via ER- β modulation

Panax ginseng C.A. Meyer has long been used in Asian countries for stimulating immunity and inhibiting various cancers. Although the role of ginseng in regulating the development of cancer is well defined, the mechanisms by which it protects brain cells from oxidative stress or immune cells from lethal pneumococcal infections is not well understood. Since brain myelin sheaths contain relatively large amounts of iron and lipids and have high rates of oxidative metabolism with limited antioxidant capacity, brain is highly susceptible to oxidative damage. Although *P. ginseng* has been advocated to have adaptogenic activity, how *P. ginseng* can modulate biological activities remains largely unknown. Here we show that *P. ginseng* might exert adaptogenic activity via ER- β modulation. Korean Red Ginseng (KRG) extract was shown to inhibit oxidative stress-induced apoptosis in brain cells by ER- β up-regulation via the PI3K/AKT signaling pathway. The up-regulation of PI3K/AKT signaling inhibited apoptotic signals by decreasing p-p53 and caspase-3 expression, but increasing BCL2 expression. Therefore, KRG protected brain cells from oxidative stress-induced cell death. Pre-treatment of KRG protected the mice from lethal D39 pneumococcus infection and protected mice from pneumococcal sepsis and meningitis. In pneumococcal meningitis model, KRG pretreatment has up-regulated ER- β in mice brain. Also, when Raw264.7 macrophage cells were infected with pneumococcus, expressions of Toll-like receptor 4 and TNF- α were significantly induced, whereas they were significantly diminished by KRG pre-treatment *in vitro*. Taken together, KRG seems to repress expression of inflammation related genes, clear bacteria, and enhance mice survival via ER- β up-regulation in the brain.

Biography

Dong-Kwon Rhee has completed his PhD at University of Illinois at Chicago in 1988 and Postdoctoral studies from Yale University School of Medicine. He was the Director of World Class University at Sungkyunkwan University (SKKU) one of the fastest rising universities in the World and School of Pharmacy. He has published 159 papers in reputed journals and is serving as a President of Korean Society of Ginseng.

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