Effects of Chlorophyll-Related Compounds on Hydrogen Peroxide Induced DNA Damage within Human Lymphocytes

Ching-Yun Hsu, Chi-Ming Yang, Chiao-Ming Chen, Pi-Yu Chao, and Shene-Pin Hu
Hsu CY;Yang CM;Chen CM;Chao PY;Hu SP

Abstract

Chlorophylls (Chl's) are the most abundant natural plant pigments. Four chlorophyll-related compounds (CRCs), including chlorophyllide a and b (Chlide a and b) and pheophorbide a and b (Pho a and b), were investigated for their antioxidative capacities to protect human lymphocyte DNA from hydrogen peroxide (H2O2) induced strand breaks and oxidative damage ex vivo. Lymphocytes exposed to H2O2 at concentrations of 10 and 50 μM revealed an increased frequency of DNA single-strand breaks (ssb's; as measured by the comet assay) and also an increased level of oxidized nucleoside (as measured by 8-hydroxydeoxyguanosine, 8-OHdG). All Chl's reduced the level of DNA ssb's and 8-OHdG within human lymphocytes following exposure to 10 μM H2O2. Only Pho a and b were able to decrease DNA ssb's and 8-OHdG following treatment of lymphocytes with 50 μM H2O2, in a concentration-dependent fashion. It was demonstrated herein that Pho a and b were more antioxidative than others. We applied DPPH free-radical scavenge assays in vitro, and got similar results. Pho a and b had higher ability in scavenging capacities than others. We conclude that water-extract Chl's are able to enhance the ability of human lymphocytes to resist H2O2-induced oxidative damage, especially for Pho a and b.