

## CURRENT TOPICS IN NUTRACEUTICAL RESEARCH

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- 124-131      **GROWTH INHIBITORY EFFECT OF CHLOROPHYLLS IN CULTURED U87 GLIOBLASTOMA CELLS**  
Seung Ae Kim, Wooseok Im, Hyo Gun Lee and Seung Chan Kim
- 132-139      **ABSORPTION AND ANTIOXIDANT ACTIVITY OF LYCOPENE NANOLIPOSOMES *IN VIVO***  
Yuanjing Fan, Xuan Xie, Bifang Zhang and Ziran Zhang
- 140-147      **ACUTE EFFECT OF H<sub>2</sub>O ON OXYGEN CONSUMPTION RATE, INTRACELLULAR ATP AND ROS IN FRESHLY ISOLATED HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS**  
T. Reyes-Izquierdo, L. E. Hammond, R.S Sikorski, B.Nemzer and Z. Pietrzkowski
- 148-155      **ANTIOXIDANT PROPERTIES OF PHENOLIC EXTRACTS FROM DRIED JUJUBE (*ZIZIPHUS JUJUBA* MILL.) PEEL AGAINST OXIDATIVE DAMAGE IN ERYTHROCYTES**  
Dongdong Cao, He Li, Huilian Che, Jiankang Cao, Ziping Xue and Weibo Jiang
- 156-167      **NEW AWARENESS ON MUSHROOMS AND CANCER: FOCUSING ON *GANODERMALUCIDUM* AND BREAST CANCER**  
Alice W. Chen
- 168-172      **Instruction to Authors**

Current Topics in Nutraceutical Research 9 (4): 124-131

- 124-131 **GROWTH INHIBITORY EFFECT OF CHLOROPHYLLS IN CULTURED U87 GLIOBLASTOMA CELLS**  
Seung Ae Kim, Wooseok Im, Hyo Gun Lee and Seung Chan Kim

**ABSTRACT:** *We employed glioblastoma (human-derived U87 cells) cells as an experimental model for our present investigation. Chlorophyll a and b, purified from Spinacia Oleracea, were incubated together with glioblastoma cells at concentrations ranging from 10 nM to 1  $\mu$ M. Assessment of growth was determined by cell counting by using a hemocytometer or by WST-1 assay. Changes in survival signals (Akt, ERK, and p-ERK), apoptosis (Bax, caspase 3, and p21), levels of cell cycle cdk1/cdc2 protein and PTEN/p-PTEN were observed and Hoescht 33342 nuclear staining was also performed. Box plotting and Student t test was used for statistical analysis. It was observed that at concentrations higher than 10 nM, there was a decline in the rate of cell proliferation. At a concentration of 100 nM, proliferation of cells stopped with decreased phosphorylation of PTEN. Whereas, there were no changes in other cell survival related proteins. Chromatin condensation or nuclear fragmentation was not detected by Hoescht 33342 staining. Combination of chlorophylls a and b neither exhibited an additive nor any synergistic effect on the cells. In conclusion, chlorophylls inhibited the growth of cultured U87 glioblastoma cells, indicating its function as a cytostatic agent.*

Current Topics in Nutraceutical Research 9 (4): 132-139

- 132-139 **ABSORPTION AND ANTIOXIDANT ACTIVITY OF LYCOPENE NANOLIPOSOMES IN VIVO**  
Yuanjing Fan, Xuan Xie, Bifang Zhang and Ziran Zhang

**ABSTRACT:** *The mice were fed daily with lycopene nanoliposomes or lycopene-rich oil by gavage. Liver and serum levels of lycopene and activities of superoxide dismutase (SOD), peroxidase (POD), catalase (CAT), and the content of malonaldehyde (MDA) in liver were determined. Liver lycopene content as well as activities of SOD, POD, and CAT were higher in the mice treated with lycopene nanoliposomes compared to that of lycopene-rich oil treated mice. In contrast, MDA content was significantly decreased by lycopene nanoliposomes treatment. These results indicate that nanoliposomes can robustly increase the antioxidant capability of lycopene in vivo. In summary, our results suggest that nanoliposome delivery systems may be useful as a means to improve the bioavailability of lycopene in liver.*

- 140-147     **ACUTE EFFECT OF HH2O ON OXYGEN CONSUMPTION RATE, INTRACELLULAR ATP AND ROS IN FRESHLY ISOLATED HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS**  
T. Reyes-Izquierdo, L. E. Hammond, R.S Sikorski, B.Nemzer and Z. Pietrzkowski

*ABSTRACT: Human peripheral blood mononuclear cells (PBMC) were used as a biological model to measure intracellular ATP (iATP) reactive oxygen species (ROS), Oxygen Consumption Rate (OCR) and extracellular acidification rate (ECAR), in response to acute ex vivo treatments with HH2o. "HH2o", a fermented, food-based material commercially marketed as "Mitochroma™" has been identified as a potential modulator of iATP, OCR and ROS in these cells. PBMC were exposed to HH2o (0.1, 0.01 and 0.001% w/v) and Carbonyl-cyanide p-trifluoro-methoxy-phenyl-hydrazone (FCCP) or Oligomycin, two known modulators of mitochondrial activity were used as controls. Results showed that treatment of the cells with HH2O resulted in increase of iATP up to 220% and reduction of iADP by up to 40% while iROS levels remained unchanged. At the same time, OCR level was increased up to 24% compared to initial baseline. These results suggest that HH2o acts similarly to uncoupling protein 2 (UCP2) when induced and that it may have potential use in developing healthpromoting products. These results support the use of freshly isolated human PBMCs as an experimental ex vivo model to detect the effects of nutraceutical products on dynamic cell metabolites, such as oxygen consumption, ATP, ADP and ROS.*

- 148-155     **ANTIOXIDANT PROPERTIES OF PHENOLIC EXTRACTS FROM DRIED JUJUBE (ZIZIPHUS JUJUBA MILL.) PEEL AGAINST OXIDATIVE DAMAGE IN ERYTHROCYTES**  
Dongdong Cao, He Li, Huilian Che, Jiankang Cao, Ziping Xue and Weibo Jiang

*ABSTRACT: This study investigated the antioxidant properties of phenolic extracts of dried jujube fruit (Ziziphus jujuba Mill.). The phenolic content in jujube peel was 53 times higher than that found in the pulp. A phenolic assay revealed that p-coumaric acid, catechin, epicatechin, and rutin were the major phenolic components in jujube peel. The damage caused to rat erythrocytes induced by hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) was ameliorated by treatment with the jujube peel phenolic extracts. Compared with the control, the hemolytic level in erythrocytes treated with 10 μmol Γ<sup>-1</sup> free or bound phenols from jujube peel was reduced by 42.1% or 44.0%, while the malondialdehyde level was reduced by 31.2% or 29.3%, respectively. H<sub>2</sub>O<sub>2</sub>-induced ferryl hemoglobin formation in erythrocytes was also inhibited by free or bound phenolics extracted from jujube peel. These results demonstrated that jujube phenolic extracts could prevent hemolysis of and lipid peroxidation in the erythrocytes and could be a promising source of antioxidants.*

156-167

**NEW AWARENESS ON MUSHROOMS AND CANCER:  
FOCUSING ON *GANODERMALUCIDUM* AND BREAST CANCER**

Alice W. Chen

**ABSTRACT:** *Ganoderma lucidum* extract (GL extract) shows potential antitumor and chemoprevention effects on three types of breast cancer: estrogen-receptor dependent, estrogen-receptor independent, and inflammatory. Such positive effects are primarily due to the bioactive constituents in the GL extract, triterpenes and polysaccharides. There seems to be a common GL extract anticancer mechanism at the molecular level for breast cancer and other types of cancers. Studies at cellular, molecular and genomic levels on the topic reveal the formulation of the molecular sequence of events in the GL extract antitumor mechanism. Such sequence facilitates the identification of GL extract antitumor molecular targets; such as Nuclear Factor Kappa Beta (NF- $\kappa$ B), a cancer promoter, a protein that acts as a switch to turn inflammation on and off in the body. Insights from studies of GL extract or its bioactive constituents on breast and other cancers, including practical applications, give rise to recommendations for how and when GL extract should be used, and what age group in the population may benefit the most from its use.