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## 97 學年度營養科學系碩博士班論文成果壁報展

姓名	題 目
袁家儀	The Effects of Aluminum on Neuron Development of the Hippocampus in Neonatal Rats
	高鋁對新生幼鼠海馬回神經細胞發育之影響
王惠瑜	Nutrition Status in Hemodialysis Patients by the Malnutrition-Inflammation Score
	以營養不良發炎分數探討血液透析患者的營養狀態
徐詩怡	The Effect of Intra-gastric Injection of High Aluminum on NMDA Receptors Expression in Hippocampus and Cerebral Cortex of Neonatal Pups
	胃外注射高鋁對新生幼鼠海馬迴及大腦皮質 NMDA 表現之影響
蕭偉君	ROS-mediated JNK Activation Involved in Heme Oxygenase-1 Induction by High Aluminum
	高鋁經由活性含氧化物-JNK 訊息途徑誘發第一型血基質氧化酶的表現
王倩雯	The effects of extracts from <i>Moringa oleifera</i> leaves on LPS-induced inflammatory response in mouse RAW264.7 macrophages
	辣木葉萃取物在脂多醣誘發 RAW264.7 巨噬細胞發炎反應之影響
許偉婷	Antihypertensive and antioxidative capacities of enzymatic hydrolysates from the organs of sea cucumbers
	海參內臟之酵素水解液對降血壓及抗氧化能力之研究
王姿萍	Folate Nutrition Modulates Inflammation-induced Invasion in Human Colorectal Carcinoma Cells
	葉酸對結腸癌化訊息途徑 Hedgehog 及 NF- $\kappa$ B 基因調節機制
唐銘圻	Mechanism of folate and Memantine improves Alzheimer's disease mice gene expression change of brain
	合併葉酸與 N-甲基-D-天門冬胺酸受器拮抗藥物改善阿茲海默症小鼠認知能力及腦部基因改變之探討
黃琦雲	Relationships between folate, one carbon metabolism gene polymorphism and risks of hepatocellular carcinoma

	葉酸、單碳代謝酵素基因多型性與肝癌風險之相關性。
楊惠雯	Biochemical assessment of thiamin and riboflavin status for Nutrition and Health Survey in Taiwan 2004 -2008
	93~97 年度國民營養狀況變遷調查之維生素 B1 與維生素 B2 營養狀況之探討
鄭淳蔚	Effects of Chronic Riboflavin Deficiency on Antioxidant System of Rats
	慢性維生素 B2 缺乏對大白鼠抗氧系統之影響
鄭秦樓	Nutritional status of patients with hepatocellular carcinoma, breast cancer, head and neck cancer and colorectal cancer in Taiwan
	台灣地區初診斷肝癌、乳癌、頭頸癌、結腸直腸癌患者營養狀況之探討
陳婉琪	Effects of the tumulosic acid from <i>Poria cocos</i> on innate immune response of healthy BALB/c mice
	以健康 BALB/c 小鼠探討茯苓純化物於免疫調節之影響
游書珊	The Effects of $\beta$ -glucan on the Modulation of IgA nephritis
	$\beta$ -葡聚醣對緩解甲型球蛋白腎絲球腎炎之研究
莊閱棋	Effects of conjugated linoleic acid supplementation on body composition, biochemical and biophysical profiles in taekwondo athletes
	補充共軛亞麻油酸對跆拳道運動員身體組成之影響

# **The Effects of Aluminum on Neuron Development of the Hippocampus in Neonatal Rats**

**Chia-Yi Yuan<sup>1</sup>, Guoo-Shyng Wang Hsu<sup>2</sup> and Yih-Jing Lee<sup>3</sup>**

Postnatal day 3 hippocampus neuron were treated with 0, 1, and 2  $\mu\text{g/ml}$  aluminum (Al) for 7 days, and 100 ng/ml of nerve growth factor (NGF) was added into the treatment medium at day 10. Results indicated that hippocampus neuron division and differentiation were found in creased along with Al exposure time. The cell viability of neurons was found increased in the 1  $\mu\text{g/ml}$  Al treated group, but not 2  $\mu\text{g/ml}$  Al treated group ( $p < 0.05$  indicates significant difference). It was also found that 2  $\mu\text{g/ml}$  of Al induced neural cell apoptosis. Study of immunofluorescence staining suggested that NMDAR 1A and NMDAR 2A/B were distributed both in the neuron cell membrane and the cytoplasm. The protein expressions of NMDAR 1A and NMDAR 2A/B were found decreased along with the increasing of Al dosage and exposure time ( $p < 0.05$  indicates significant difference). Furthermore, this Al-induced decrease of NMDAR 1A and NMDAR 2A/B was not altered by adding NGF to the neuron culture medium.

Keywords: aluminum, hippocampus neuron, immunofluorescence staining, NMDAR1A, NMDAR2A/B

## **Nutrition Status in Hemodialysis Patients by the Malnutrition-Inflammation Score**

**Hui-Yu Wang, Chia-Yi Yuan and Guoo-Shyng Wang Hsu**

The purpose of this study was to evaluate whether the malnutrition-inflammation score (MIS) is a subtle and easy tool to assess the nutrition status of hemodialysis patients. The 85 maintenance hemodialysis (MHD) patients at a dialysis clinic in Taipei were recruited during July and August, 2008. The median of MIS was 8 which represented a mild malnutrition status. Subjects with MIS < 8 had higher body weight, BMI, body fat mass, subcutaneous fat mass, bone mineral content, hip circumference and mid-arm circumference (MAC), and lower percentage of lean tissue mass than subjects with MIS ≥ 8 ( $p < 0.05$ ). Total cholesterol and serum iron were also lower at MIS ≥ 8 subjects ( $p < 0.05$ ). The daily dietary intake did not show the significant difference between two groups ( $p > 0.05$ ). The MIS revealed a significantly inverse correlation with body weight, bone mineral content, body fat mass, subcutaneous fat mass, serum iron, total iron binding capacity, and platelet count. Negative correlations also existed between MIS and crude fiber, potassium, magnesium, phosphorus, iron, niacin. There were positive correlation between MIS and the serum calcium and white blood cell count. 23.5% of male and 37.3 % of female subjects had calorie intake below 2/3 DRI while 3% of male and 19.6% of female subjects had protein intakes under 2/3 individual recommendation. In conclusion, MIS showed the strong correlation with body composition, anthropometry, dietary intakes and biochemical data. Therefore, it's an easy and comprehensive nutritional assessment tool for MHD patients.

Keywords: hemodialysis, malnutrition, malnutrition-inflammation score

# **The Effect of Intra-gastric Injection of High Aluminum on NMDA Receptors Expression in Hippocampus and Cerebral Cortex of Neonatal Pups**

**Shun-Yi Shi, Syr-Song Chen and Guoo-Shyng Wang Hsu**

The infant formula is one of the essential dietary sources for the neonates. Since the liver detoxification system and renal function in the neonates have not been completely developed, high aluminum (Al) ingestion from the infant formula may cause Al accumulation which may have adverse effect on development of infants. The purposes of this study are (1) to set up an *in vivo* animal model of aluminum intoxication through the intra-gastric injection of Al, (2) to study the effect of high dietary Al on neuronal development in neonatal rat pups. The 3-day old pups were divided into three groups with intra-gastric injection of 0 (Control, C), 547.2 (low Al, LAI), 5472 (high Al, HAI)  $\mu\text{g Al/pup (AlCl}_3\text{)}$  respectively within 18 days. The pups were sacrificed on the 21th day of the birth, and the serum, olfactory bulb, pituitary gland, cerebral cortex, hippocampus, thalamus, hypothalamus tissues, cerebellum and medulla oblongata were collected. Al content in brain tissues were determined by Inductively Coupled Plasma Mass Spectrometry (ICP/MS). The effects of aluminum on NMDAR subunits 1A and 2A/B proteins expression in hippocampus and cerebral cortex of intra-gastric injection pups were analyzed by Western blot. The results showed that there were no significant effects on body weight gains and relative organ weight, except whole brain. In HAI group, Al levels in various brain tissues were significantly higher than control groups ( $P < 0.05$ ). Meanwhile, the expressions of NMDAR 1A and 2A/B in hippocampus of Al-treated groups were significantly decreased, compared to the control.

Keywords: aluminum, hippocampus, cerebral cortex , NMDAR 1A,  
NMDAR 2A/B

## **ROS-mediated JNK Activation Involved in Heme Oxygenase-1 Induction by High Aluminum**

**Wei-Chun Hsiao, Chia-Yeh Lin and Guoo-Shyng Wang Hsu**

Heme oxygenase-1 (HO-1) is one type of stress-responsive proteins induced by various stimuli. Previous study in our lab showed that intraperitoneal injection of high dose of aluminum chloride ( $\text{AlCl}_3$ ) enhanced liver HO-1 expression in Sprague-Dawley (SD) rat. However, the underlying mechanism has not been fully elucidated. In this study, the SD rat hepatocytes (Clone 9) were used to investigate if the Al-induced HO-1 expression is thru signaling pathways of the reactive oxygen species (ROS)-mitogen activated protein kinase (MAPK). Clone 9 hepatocytes ( $3 \times 10^6$  per well) were treated with 0, 5, 10, 15  $\mu\text{g}$  Al/ml respectively and cells were harvested at 0, 4, 8 hours to determine the Al level as well as the time point of maximum HO-1 expression. The activated extracellular-regulated kinase (ERK), c-Jun N-terminal kinase (JNK) and p38 expressions were analyzed by using the western blotting to investigate signaling pathways involved in Al-induced HO-1 expression. In addition, N-acetyl-L-cysteine (NAC, a ROS scavenger) were added in the cell culture medium to examine the contribution of ROS to HO-1 stimulation. Results showed that the strongest increase of HO-1 expression was in 5  $\mu\text{g}$  Al/ml treated cells at 8 hr incubation while activation of JNK (p-JNK) was found at 6.5 hr. On the other hand, NAC added in the medium inhibited Al-induced p-JNK and HO-1 expression. These findings suggest that the ROS-mediated JNK activation is responsible for Al-stimulated HO-1 induction.

**Keywords:** aluminum, heme oxygenase-1, reactive oxygen species, mitogen activated protein kinase, Clone 9

# **The effects of extracts from *Moringa oleifera* leaves on LPS-induced inflammatory response in mouse RAW264.7 macrophages**

**Chien-Wen Wang and Yi-Fa Lu**

Inflammation is implicated in the pathogenesis and progression of many diseases. Many studies were done for searching foods ingredients which can exert inhibition of over-inflammation and have no side effects. *Moringa oleifera* (*M. oleifera*) is a traditional herbal medicine in India. *M. oleifera* have anticancer and antioxidant function. The purposes of this study were to evaluate influences of the ethyl acetate (LEA) or methanol extracts (LM) from *M. oleifera* leaves on LPS-induced inflammatory response in RAW 264.7 macrophage cell line. The results indicated that LM (50-150 µg/mL) and LEA (50-150 µg/mL) didn't affect cell viability in LPS-induced RAW 264.7 cells. Moreover, LEA and LM inhibited Nitric oxide (NO), interleukin-1 (IL-1 $\beta$ ) and IL-6 production in dose dependent. In addition, LEA is a more potent inhibitor than those of LM. LEA and LM trended to decrease tumor necrosis- (TNF- ) production. LM didn't affect IL-10 and PGE<sub>2</sub> production in LPS-induced RAW264.7 cells, while, LEA inhibited IL-10 production and significantly increased PGE<sub>2</sub> production in LPS-induced RAW 264.7 cells. In protein level, western blotting shows that LEA and LM significantly inhibited iNOS (inducible NO synthase) protein expression in a dose-dependent manner. But, LEA and LM didn't affect cyclooxygenase-2 (COX-2) protein expression. LEA and LM had a direct NO-scavenging activity in the cell-free system. NO-scavenging activity of LM was better than that of LEA. In conclusion, the data indicated that both LEA and LM might exert anti-inflammatory properties, and effectiveness of the former seems better than that of the latter.

Keywords: *Moringa oleifera*, RAW 264.7 macrophage, LPS, nitric oxide, inflammatory response

# **Antihypertensive and antioxidative capacities of enzymatic hydrolysates from the organs of sea cucumbers**

**Wei-Ting Hsu and Yi-Fa Lu**

Hypertension is a common chronic disease and an important risk factor for cardiovascular disease in the developed countries. Recent studies demonstrated that free radicals induced oxidative stress is associated with atherosclerosis, cancer, hypertension, and aging. Recently, there are a number of studies regarding the bodies of sea cucumbers. However, their organs are usually discarded without further application. The purposes of this study were to investigate the antihypertensive and antioxidative capacities of enzymatic hydrolysates from the organs of sea cucumbers (OSC). The hydrolysates obtained by proteolized with pepsin and chymotrypsin (PC) or Protease 6 and Flavourzyme (P6F). In vitro studies, results indicated that P6F hydrolysate had higher angiotensin converting enzyme inhibition (ACEI) as well as higher activity in Trolox equivalent antioxidant capacity, 2,2-diphenyl-1-picryl-hydrazyl (DPPH) radical scavenging activity, and reducing power. The P6F hydrolysates were separated by ultrafiltration membranes, the fraction of MW<1 KDa was found having the highest ACEI and antioxidativity activity. The fraction of MW<1 KDa was further separated by gel filtration chromatography. The peptide with molecular weight of approximately 990 and 430 Da possessed the strongest activity of ACEI and antioxidation respectively. In animal studies, oral administration of P6F hydrolysate with the dose of 900 mg/kg bw to spontaneously hypertensive rat (SHR) exerted a significant lowering effect ( $p<0.05$ ) on SBP after 3 h and lasted to 6 h. In addition, the fraction of MW<1 KDa of the hydrolysate had an antihypertensive effect significantly in SHR. In conclusion, the enzymatic hydrolysis of OSC may generate the hydrolysate with ACEI and antioxidative capacities, and exert an antihypertensive effect in SHR.

**Keywords:** sea cucumber 、 hypertension 、 antioxidative peptide 、 enzymatic hydrolysates 、 spontaneously hypertensive rat

# **Folate Nutrition Modulates Inflammation-induced Invasion in Human Colorectal Carcinoma Cells**

**Zi-Ping Wang and Rwei Fen Syu Huang**

Folate malnutrition is crucial for risk of colorectal carcinoma in many epidemiology research, however, the mechanism remains unclear. Inflammation has been reported to be associated with the growth of colorectal carcinoma. The objectives of this study were to determine folate-depletion induced inflammation, therefore it changes cell adhesion and invasion in colorectal carcinoma cell. We also investigated the effect of cell adhesion to and invasion into the extracellular matrix. Using human colorectal carcinoma epithelial cell HCT116, cultured in folate deficiency medium. Then cells were treated with Lipopolysaccharide (LPS) was used to induce inflammatory responses. Therefore, we investigated colorectal carcinoma cell invasiveness through Matrigel. Cell showed spontaneous adhesion to extracellular matrix protein such as collagen I by adhesion assay. Matrix metalloproteinases (MMPs) take part in degradation of extracellular matrix, which activity and protein expression was assessed by gelatin zymography and Western blotting. The result showed that folate deficiency enhanced human colorectal carcinoma cell HCT116 attachment to collagen I and promoted HCT116 cell invasion through the Matrigel in association with a increased activation of MMP2. Moreover, MMP2 plays an important role in the invasive ability mediated by LPS. When folate deficiency cotreated with LPS, regulated expression of invasion, adhesion and MMP2 activation. Therefore, our results indicated that folate deficiency modulated inflammation-induced colorectal carcinoma cell invasion. In the future, we needed to define how these interactions are regulated.

Keywords: Folate, inflammation , invasion, colorectal carcinoma

## **Mechanism of folate and Memantine improves Alzheimer's disease mice gene expression change of brain**

**Ta-Fu Chen, Jyh-Feng Lu, Ming-Chi Tang and Rwei-Fen Syu Huang**

Using Tg2576 transgenic mice that produce endogenous amyloid- (A $\beta$ ) protein to induce Alzheimer diseases (AD)-associated lesions, we have previously reported that high dose of folic acid supplemented to Alzheimer drug memantine (MT)-treated AD mice significantly improved the neuronal functional performance on Morris water maze test. To further understand effects of folate on the brain gene expression profile of MT-treated transgenic mice, a total of 6 A $\beta$  mice brains (3 from MT mice and 3 from folate+MT mice) were analyzed by cDNA microarrays. Expression data were analyzed using GeneSpring GX 10. Set up cell model by human microglia cell line C13NJ and human neuroblastoma cell line SK-N-MC, and determine viability, oxidative stress, intracellular calcium and gene expression. Only genes with net expression changes of > 2-fold occurring among 20-100th percentile of expression levels in each hybridized arrays were considered for further analysis. Compared to MT-treated A $\beta$  mice brains, folate+MT brains showed a generalized up-regulation of 73 gene transcriptions involving in neurogenesis, memory, action potential production, neurotransmitter receptors and immune modulation. Down regulations were only found in 9 transcripts. Validation of gene expressions by real-time PCR and the significance of modulated expression profiles by folate will be further discussed. In cell study, the viability of SK-N-MC were significantly decrease at 24 and 48 hours by 40 and 60  $\mu$ M A $\beta$ ; C13NJ were significantly decrease at 48 hours by 50 and 100  $\mu$ M A $\beta$ , and folate supplement were return viability. Oxidative stress was significantly increased at 48hr by 40  $\mu$ M A $\beta$ . However, we want to confirm the interaction of between folate supplement and MT treat AD of animal study by cell model.

Key words: Folate, Alzheimer's disease, amyloid- $\beta$ , oxidative stress, N-methyl-D-aspartate receptor

## **Relationships among folate, one carbon metabolism gene polymorphism and risks of hepatocellular carcinoma**

**Chyi-Yun Hwung, Chang-Sheng Kuo, Ching-Yih Lin,  
Chin-Li Lu and Rwei-Fen Syu Huang**

Epidemiologic studies suggest that folate malnutrition increased risks of hepatocellular carcinoma (HCC). Genetic polymorphisms of enzymes in folate-mediated one carbon metabolism may interact with folate status to modulate HCC progression, yet the evidence is scanty. The aims of the study are to investigate the relationships between folate, one carbon metabolism gene polymorphisms and HCC risks. In this case-control study, 130 HCC cases who were first time diagnosed as HCC patients, and 130 age- and sex- paired healthy controls were recruited from Chi -Mei Medical Center, Tainan, Taiwan. Blood samples were collected for the analysis of red blood cell (RBC) folate, serum folate, glutamicoxaloacetic transaminase (GOT), glutamicpyruvic transaminase (GPT), alpha-fetoprotein (AFP). Total DNA of lymphocytes was assayed for methylenetetrahydrofolate reductase (MTHFR) C677T and thymidine synthase (TS) polymorphisms by PCR. Results of the study revealed that 50% of HCC patients were in folate deficiency (serum folate level < 14 nM). Serum folate concentration was inversely correlated with HCC tumor size ( $r = -0.368$ ,  $p = 0.000$ ), tumor numbers ( $r = -0.236$ ,  $p = 0.004$ ) and tumor metastasis ( $r = -0.328$ ,  $p = 0.000$ ). Odds ratio of large-sized tumor (>3cm) were 0.222 (95% C.I. = 0.08-0.62,  $p=0.004$ ) in HCC patients with 677CT genotype compared to those in 677CC genotype. Compared with individuals having 3R/3R genotype, 3R/2R and 2R/2R those having the higher tumor size ( $6.1\pm 4.4$ ,  $p=0.03$ ) and tumor number ( $2.5\pm 0.94$ ,  $p=0.035$ ). In summary, we found that low folate was associated with HCC progression. Variant with 677CT genotype had reduced risk of HCC progression. Polymorphisms on TS, to the contrast, were associated with HCC progression. The mechanisms require further studies.

**Keywords:** hepatocellular carcinoma, folate, methylenetetrahydrofolate reductase, thymidine synthase.

# Effects of Chronic Riboflavin Deficiency on Antioxidant System of Rats

Chun-Wei Cheng and Feili Lo Yang

According to the Nutrition and Health Survey in Taiwan, the prevalence of vitamin B<sub>2</sub> deficient is 45.6% and total energy sources from lipid was 34%. Previous study indicated that riboflavin deficiency may block  $\beta$ -oxidation therefore induce lipid accumulation. In addition, high fat diet induced liver lipid peroxidation on rat. The purposes of this study were to investigate the effects of chronic riboflavin deficiency on antioxidant system in liver, heart and kidney of rats. Male weanling Sprague-Dawley rats were randomly assigned to receive diets of riboflavin-adequate (ad lib and pair-fed) groups or riboflavin-deficiency (ad lib and plus high fat) groups for 4, 8 or 13 weeks. After the end of each experimental period, antioxidants and activities of antioxidant enzymes of liver, heart and kidney such as glutathione (GSH), glutathione peroxidase (GPx), glutathione-S-transferase (GST), catalase (CAT) and superoxide dismutase (SOD) were analyzed. Oxidative damage indices such as conjugated diene (CD), 8-hydroxy 2'-deoxyguanosine (8-OHdG) and thiobarbituric acid reactive substance (TBARS) levels will be determined. The results showed that liver CAT activity increased with increasing age, and increased significantly in riboflavin-adequate group (ad lib) compared to riboflavin-deficiency plus high fat group. Liver CAT activity of 13 weeks increased significantly compared with those of 4 and 8 weeks in riboflavin-deficiency group. Liver CAT activity increased significantly in riboflavin-adequate (ad lib and pair-fed) groups compared to riboflavin-deficiency plus high fat group on 4 Weeks and in riboflavin-deficiency group compared to in riboflavin-deficiency plus high fat group on 13 weeks. Liver GST activity increased with increasing age, but diets and ages had no interaction. Liver TBARS concentration increased significantly in riboflavin-adequate (ad lib and pair-fed) groups compared to riboflavin-deficiency (ad lib and plus high fat) groups and liver TBARS concentration of 4 weeks was significantly high than of 8 and 13 weeks, but diets and ages were no interaction. Further, analysis on activity of other antioxidant enzymes and oxidative damage index are currently underway.

**Keywords:** chronic, riboflavin deficiency, antioxidant system, high fat, oxidized damage

# **Biochemical assessment of thiamin and riboflavin status for Nutrition and Health Survey in Taiwan 2004 -2008**

**Hui-Wen Yang and Feili Lo Yang**

From the findings of the previous Nutrition and Health Surveys in Taiwan, the percentage of marginal and deficient status of thiamin and riboflavin were still high among various age groups of Taiwanese. Therefore, the purposes of this study were to monitor the prevalence of thiamin and riboflavin status of Taiwanese and the possible associations with related factors. The project served the biochemical assessment of the nutritional status of vitamin B1 and vitamin B2 for Nutrition and Health Survey in Taiwan 2004-2008 (NAHSIT- ) by measuring their functional indicators, erythrocyte activity coefficients of transketolase (ETKAC) and erythrocyte activity coefficients of glutathione reductase (EGRAC). The quality control of biological samples were by choosing one of every ten samples and proceeding duplicate tests. The percentage of coefficient of variation (CV%) of these samples were less than 10%. The results showed that the thiamin and riboflavin status of Taiwanese above 19 years old slightly improved comparing with previous NAHSITs. The percentage of normal and deficient status for thiamin were over 80% and around 10%, respectively. The percentage of normal and marginal deficient status for riboflavin were over 70% and around 20%, respectively. Among age strata, men and women of 19-30 years and women of 31-50 years had worse the thiamin and riboflavin status than other age strata, more severe in women. Among regional strata, Peng-Hu islands had the lowest percentage of normal thiamin and riboflavin status, followed by Middle and Hakka regions. Among various population, aboriginals and Hakka descents had higher percentage of marginal deficiency and deficiency of riboflavin than other population. The relationship among vitamins B1 and vitamin B2 with possible factors are currently under analyses in order to provide more information about factors affecting thiamin and riboflavin status of the Taiwanese.

Keywords: NAHSIT, ETKAC, EGRAC, thiamin, riboflavin

# **Nutritional status of patients with hepatocellular carcinoma, breast cancer, head and neck cancer and colorectal cancer in Taiwan**

**Chin-Lou Cheng and Min-Su Tzeng**

Malnutrition is a common problem in cancer patients and associated with poor prognosis. Few studies investigate nutritional status of cancer patient, especially on nutrient intakes. The purpose of the study was to assess the nutrient intakes and nutritional status of cancer patients in Taiwan. Totally 480 breast, head and neck, colorectal cancer and hepatocellular carcinoma patients were to be recruited before the beginning of their chemotherapy or radiotherapy from six medical centers in Taiwan. Nutritional status was assessed by anthropometrical measures, Complete Blood Count (CBC), serum total protein and albumin, Patient-generated Subject Global Assessment questionnaire (PG-SGA) and food frequency questionnaire. At present 150 patients (67 men and 83 women) were recruited. According to PG-SGA global rating, 28.19% of subjects were moderately or severely malnourished. PG-SGA score in head and neck cancer patients was significantly higher than breast and hepatocellular carcinoma. Twelve percent of cancer patients had weight lost more than 5% of their usual weight within previous one month. Percentage of subjects with low concentrations of hemoglobin, serum albumin and total protein were 43.75%, 6.25% and 1.56% respectively. Head and neck cancer patients had lower albumin level than those breast and hepatocellular carcinoma. The energy and protein intakes of cancer patients did not meet the estimated requirements. In conclusions, the preliminary results showed that these cancer patients in Taiwan had poor nutritional status assessed by PG-SGA, low hemoglobin levels, and did not consume enough energy and protein.

**Keywords:** cancer patients, nutrition status, nutritional assessment, nutrient intake, Patient-generated subject global assessment

## **Effects of the tumulosic acid from *Poria cocos* on innate immune response of healthy BALB/c mice**

**Wan-chi Chen, wen-mein, Wu**

*Poria cocos* is one of well-known herbs among Chinese medicine. It contains both edible and medical characteristics. According to our previous study showed that BALB/c mice administrated with the extract of *Poria cocos* (PC) inhibits the T<sub>H</sub>2 immune response. Base on this, we fed the different dosage as well as the duration of the triterpene purification of P C-lanostane-type-triterpene, the functional compound, with the airway inflammatory mice. The results show that the mice that had been fed under longer duration and lower dosage could enhance the T<sub>H</sub>1 cytokine secretion rather than ease the T<sub>H</sub>2 immune response. But the mice that was been fed under higher dosage inhibited both T<sub>H</sub>1 and T<sub>H</sub>2 immune response contrarily. Therefore, the novel purification of PC might have the immunoregulatory function on innate immune and apply to the effects on the immune system. We process the acute oral toxicity test in ICR mice for investigation the safety test of Tumulosic acid (TA) and Polyporenic acid (PA), the purification of PC. The results reveal that there were no abnormal on hematological and genotoxicity in micronucleus test. But both decrease the weight of immune organs, such as spleen and thymus. Besides, the TA feeding have lower incidence rate of histopathological findings than PA. To follow up the experiment, we will use the TA to feed health BALB/c mice for investigating the effects on immune system by analyzing the intestine and systemic immunity. Then, by the analysis the *in vitro* samples of Peyer's patches and splenocytes to search the transcription mechanisms of immunoregulatory of TA.

Key word: *Poria cocos*, tumulosic acid, immunoregulatory, innate immune response

# **The Effects of $\beta$ -glucan on the Modulation of IgA nephritis**

**Su-Shan Yu and Wen-Mein Wu**

IgA nephritis (IgAN) is the most common form of primary nephritis in East Asia which is caused by polymeric IgA1 and its immune complex deposited in mesangium constantly leading to glomerule damage and nephritis. In our previous study, BALB/c mice fed with  $\beta$ -glucan dairy product for 9 weeks represent decreased serum IgA levels as compared to control group. According to this, we hypothesize that  $\beta$ -glucan may play beneficial roles on IgA-mediated nephritis. To select effective animal model, 5 or 10 mg/day of bovine gamma-globulin (BGG) and continual 4 or 8 weeks oral immunization would be operated. Before the end of immunization, mice will be received BGG 1 mg/day through intravenous injection for 3 days. After all, animal model would be confirmed by kidney biopsy and the expression of serum BGG-specific antibody. In addition, we detected transforming growth factor- $\beta$ 1 and Th2 related cytokines secretion of BALB/c mice with being fed 0.5%  $\beta$ -glucan dairy product and pure compound for 2 or 6 weeks respectively. Eventually, IgAN mice with  $\beta$ -glucan in pre- or after-immunization will be applied for the relief of IgAN. In anticipation,  $\beta$ -glucan could modulate damages of glomerule in IgAN through reducing production of antibody and regulating Th2 immunity.

keywords : IgA nephritis,  $\beta$ -glucan, IgA immune complex,  
immuno-modulation

# **Effects of conjugated linoleic acid supplementation on body composition, biochemical and biophysical profiles in taekwondo athletes**

**Hung-Chi Chuang and Ning-Yuean Lee**

As to some weight graded kicking competition, control of body weight and body fat within suitable range is the important key strategy of winning. Conjugated linoleic acid (CLA) encompasses a group of 18-carbon polyunsaturated fatty acid isomers, which is derived from the linoleic acid. Some studies indicate that CLA inhibits adipocyte lipoprotein lipase activity, thereby reducing lipid uptake into adipocytes. A number of studies have demonstrated the fact, which shows supplementation of CLA may reduce body weight and body fat. The aim of this study is to demonstrate the effectiveness of 12 weeks supplementation of CLA on body weight, body fat, blood biochemistry and biophysical profiles of Taekwondo athletes. Twenty healthy Taekwondo athletes (age 18~25 years), are recruited as volunteer subjects. Experimental test will be designed in double-blinded and cross-over methods. Subjects will be divided into two groups randomly: (1) CLA group takes CLA capsule 5 grams per day (capsule weighted 6.25g, 80 % CLA, c9t11 : t10c12 = 1 : 1). (2) Placebo group takes soy oil capsule 6.25 grams per day. Body composition, basal metabolic rate, heart rate, blood pressure and blood biochemistry of subjects were measured at baseline and after 12 weeks supplementation. There was a 8-week washout period, then examine the body composition and blood biochemistry profiles of subjects after the second period of 12 weeks supplementation, so as to examine the safety of CLA. Subjects are asked to maintain their normal diet habits and training patterns during this experiment. After 12 weeks, no significant difference in body weight or body fat regain was observed between the treatments. The CLA group ( $n = 20$ ) regained a mean ( $\pm$ SD)  $-0.35 \pm 2.88$  kg body weight and  $0.10 \pm 1.75$  kg fat mass compared with a regain of  $0.13 \pm 2.91$  kg body weight and  $0.78 \pm 2.24$  kg fat mass in the placebo group ( $n = 20$ ). No significant differences in reported adverse effects or indexes of blood biochemistry were observed. A 5 g daily CLA supplementation for 12 weeks does not prevent weight or fat mass regain in taekwondo athletes.

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