實踐大學一〇一學年度研究所碩士班甄試入學招生考試試題

所　別：食品營養與保健生技學系碩士班　　80 分鐘

科　目：專業英文期刊閱讀能力測試　　共 4 頁第/ 頁

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Paper 1

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Omega-3 fatty acid deficiency selectively up-regulates delta6-desaturase expression and activity indices in rat liver: prevention by normalization of omega-3 fatty acid status

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Abstract

This study investigated the effects of perinatal dietary omega-3 (*n*-3) fatty acid depletion and subsequent repletion on the expression of genes that regulate long-chain (LC) polyunsaturated fatty acid biosynthesis in rat liver and brain. It was hypothesized that chronic *n*-3 fatty acid deficiency would increase liver *Fads1* and *Fads2* messenger RNA (mRNA) expression/activity and that *n*-3 fatty acid repletion would normalize this response. Adult rats fed the *n*-3–free diet during perinatal development exhibited significantly lower erythrocyte, liver, and frontal cortex LC*n*-3 fatty acid composition and reciprocal elevations in LC omega-6 (*n*-6) fatty acid composition compared with controls (CONs) and repleted rats. Liver *Fads2*, but not *Fads1*, *Elovl2*, or *Elovl5*, mRNA expression was significantly greater in *n*-3–deficient (DEF) rats compared with CONs and was partially normalized in repleted rats. The liver 18:3*n*-6/18:2*n*-6 ratio, an index of delta6-desturase activity, was significantly greater in DEF rats compared with CON and repleted rats and was positively correlated with *Fads2* mRNA expression among all rats. The liver 18:3*n*-6/18:2*n*-6 ratio, but not *Fads2* mRNA expression, was also positively correlated with erythrocyte and frontal cortex LC*n*-6 fatty acid compositions. Neither *Fads1* or *Fads2* mRNA expression was altered in brain cortex of DEF rats. These results confirm previous findings that liver, but not brain, delta6-desaturase expression and activity indices are negatively regulated by dietary *n*-3 fatty acids.

Keywords: Omega-3 fatty acid; Delta5-desaturase (*Fads1*); Delta6-desaturase (*Fads2*); Elongase-2/5 (*Elovl2*, *Elovl5*); Erythrocyte; Liver; Frontal cortex; Rat

Abbreviations: *n*-3, omega 3; Fads1, fatty acid desaturase-1; Fads2, fatty acid desaturase-2; PUFA, polyunsaturated fatty acid; GAPDH, glyceraldehyde 3-phosphate dehydrogenase; mRNA, messenger RNA; LC, long-chain; *n*-6, omega 6; Elovl2, Elovl5; ALA, α-linolenic acid; LA, linoleic acid; CON, control; cDNA, complementary DNA; DEF, n-3–deficient; REP, n-3–repleted, SREBP1c.

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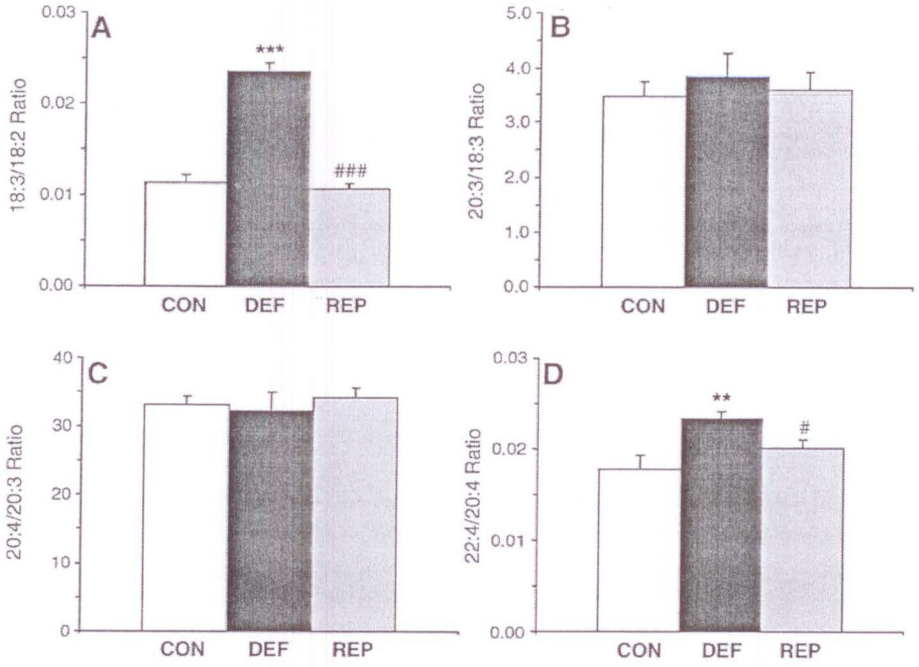

Fig. 3. Liver indices of delta6-desaturase (18:3n-6/18:2n-6) (A), elongase-5 (20:3n-6/18:3n-6) (B), delta5-desaturase (20:4n-6/20:3n-6) (C), and elongase-2 (22:4n-6/20:4n-6) (D) activities in CON (n = 10), DEF (n = 10), and REP (n = 10) rats. Values are group mean ± SEM. $^{**}P \leq .01$, $^{***}P \leq .0001$ vs CONs, $^{\#}P \leq .05$, $^{\#\#\#}P \leq .0001$ vs DEF rats.

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5. What are the functions of desaturase and elongase? 10%
6. How about the results of this experiment? 10%

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Paper 2

Food Chemistry 131 (2012) 741–747

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Food Chemistry

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Antioxidant and hepatoprotective activity of ethanolic extract of leaves of *Solidago microglossa* containing polyphenolic compounds

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ABSTRACT

The antioxidative and hepatoprotective potential of *Solidago microglossa* D.C, a widely used medicinal plant from Brazil was investigated. The leaf extract showed inhibition against thiobarbituric acid reactive species (TBARS) induced by different prooxidants (10 μM $FeSO_4$ and 5 μM sodium nitroprusside SNP) in rat liver, brain and phospholipid homogenates from egg yolk. Moreover, the free radical scavenging activities of the extract was evaluated by the scavenging of 2,2-diphenyl-1-picrylhydrazyl (DPPH) (IC_{50}, 3.8 ± 0.5 μg/ml) and hydroxyl radical on benzoic acid hydroxylation (IC_{50}, 32.3 ± 1.3 μg/ml) and deoxyribose (IC_{50}, 39.1 ± 2.4 μg/ml) assays. The ethanolic extract showed significant hepatoprotective activity against paracetamol (250 mg/kg) induced liver damage in mice in a dose dependent manner. The phenolic composition and their quantification by high performance liquid chromatography (HPLC) resulted in the identification of gallic acid and flavonoids: quercetrin (quercetin-3-O-rhamnoside), rutin (quercetin-3-O-rutinoside) and quercetin.

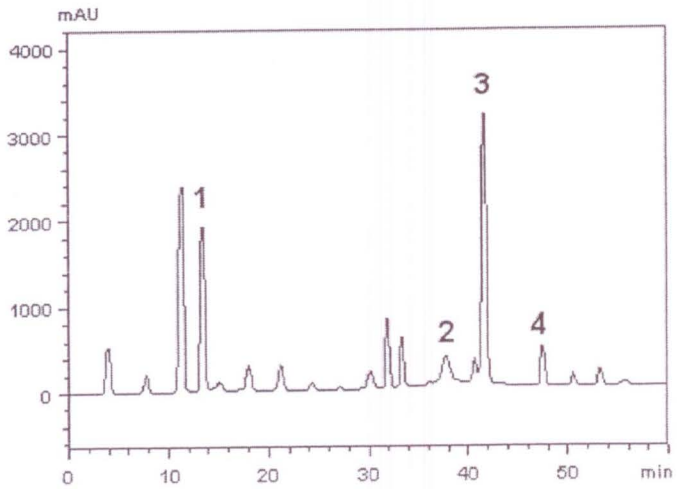

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Fig. 4. Representative HPLC phenolic profile of *S. microglossa* ethanolic extract. Peaks: (1) gallic acid (2) rutin (3) quercetrin and (4) quercetin. The mobile phase was: solvent A (water/acetic acid [98:2 v/v] and solvent B [methanol]. The gradient program was started with 95% of A and 5% of B until 2 min and changed to obtain 25%, 40%, 50%, 60%, 70% and 100% B at 10, 20, 30, 40, 50 and 60 min respectively.

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7. In Fig. 4, there are a few peaks in HPLC phenolic profile of *S. microglossa* ethanolic extract. What are the peaks 1-4 representative for? 10%
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