n-3 脂肪酸對類似憂鬱症行為之大白鼠體內脂肪酸組成及行為表現上的影響

Effects of n-3 Fatty Acids on Fatty Acid Profiles and Behavior Performance in Depressive-Like Rats

中文摘要

繼癌症、愛滋病之後，憂鬱症已成為二十一世紀三大疾病之一。有許多研究指出體內多元不飽和脂肪酸 (polyunsaturated fatty acids；PUFA)的代謝與憂鬱症有著高度的相關性，其中又以 n-3、n-6 族最為明確。本研究的目的在了解攝取富含 n-3 脂肪酸飲食對於具有類似憂鬱症行為之大白鼠在行為表現-強迫游水試驗 (Forced Swim Test, FST)的影響，藉以了解 n-3 脂肪酸在憂鬱症生理代謝的角色。本實驗以 Sprague Dawley 品系大白鼠為實驗動物，依照所攝取的油類不同分為 2 大組；魚油組 (富含 n-3 族脂肪酸)和橄欖油組 (富含 n-9 族脂肪酸)，每一大組再以不同的類似憂鬱症動物誘導模式分為 4 組 (n=8)，包括藥物誘導 (reserpine)、行為誘導 (FST)以及上述兩組之對照組 (偽誘導組)。實驗為期四週，實驗動物於餵食實驗飼料 4 週後進行憂鬱症行為之誘導，誘導後二日，在行為測試評估之後立即以斷頭法犧牲。行為測試以計算動物在水中五分鐘內靜止時間及奮力掙扎時間長短來反應其類似憂鬱的嚴重程度。實驗動物於實驗期初、類似憂鬱症行為誘導前後各採集尾靜脈血一次，犧牲後取出腦組織，所有檢體取得後進行脂肪酸定性及定量分析。結果發現攝取橄欖油組別中，紅血球及腦部磷脂質中有較低的 n-3 脂肪酸百分比，有誘導類似憂鬱行為之組別則更低。在魚油組中，則發現在攝食四個星期富含 n-3 脂肪酸的飲食後，大白鼠紅血球細胞膜磷脂質 n-3 脂肪酸顯著的高於橄欖油組。在行為測試上，以靜止不動時間來評量類似憂鬱症行為，則發現魚油組呈現較短的靜止不動時間，與橄欖油組比較則具有顯著差異。由此結果發現，動物奮力掙扎時間與紅血球磷脂質及腦磷脂脂肪酸中的 n-3 脂肪酸含量呈現顯著正相關。由以上結果推測，n-3 脂肪酸具有改善類似憂鬱症行為的潛力。

英文摘要

The proposed study was to evaluate antidepressant efficacy of fish oil (n-3 fatty acid rich oil) on depressive-like animals. Eighty adult Sprague Dawley rats were housed and divided into two groups, fish oil diet (n-3 fatty acid rich) and olive oil diet (n-9 fatty acid rich) groups (7%, by weight). Each group has two subgroups, including behavior-induced (forced swim test, FST) and drug- induced (reserpine, 0.25 mg/kg body weight for IP injection) model and their controls. After six weeks of treatment, depressive-like behavior test was executed at the end of study. Blood samples were collected at the beginning of study, the day before and after behavior test for RBC phospholipid fatty acid profiles and cholesterol concentration analysis. After behavior test, animals were sacrificed; brain tissues were taken for phospholipid fatty acid profiles analysis. In results, the data showed that animals with depressive-like behavior have statistically lower eicosapentaeinoic acid (EPA) content on RBC and brain phospholipids, while fish oil consumption can recover the situation. In the behavior test, fish oil groups have less immobility time regardless drug- or behavior-induced. The results present a solid connection between fish oil and depressive-like disorder, it seems to imply RBC phospholipid EPA content might be a biomarker of depressive-like animals. In conclusion, fish oil (n-3 fatty acid rich oil) presents an effective antidepressive capability on depressive-like animals.