麩醯胺對敗血症小鼠器官損傷及存活率之影響

Effects of glutamine on organ injury and survival rate in septic mice

胡雅梅 李正中 葉松鈴

台北醫學大學 保健營養學研究所

摘要

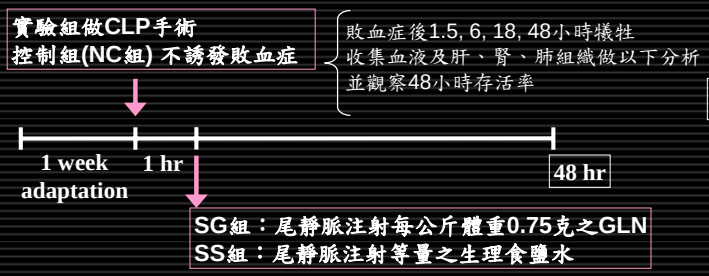
本研究探討於敗血症 (sepsis)時，由靜脈注射給予單一劑量麩醯胺 (glutamine, GLN)對敗血症所引起的器官損傷及存活率之影響。實驗將雄性ICR小白鼠分為三組，一組為控制組 (NC組)不誘發敗血症，兩組實驗組皆以盲腸結紮及穿刺(Cecal ligation and puncture, CLP)手術誘發敗血症1小時後，一組由尾靜脈注射每公斤體重0.75克的GLN (SG組)，另一組注射等量生理食鹽水作對照 (SS組)，於誘發敗血症後1.5, 6, 18, 48小時犧牲，取全血及肝、腎、肺組織進行分析，並觀察存活率。結果顯示48小時存活率SG組為67%，SS組為20%，SG組存活率顯著高於SS組；組織過氧化傷害方面，SG組肺臟組織在1.5小時、腎臟組織在6小時、肝臟組織在6, 18小時之骨髓過氧化酶活性皆顯著低於SS組；而組織蛋白質過氧化傷害nitrotyrosine生成量結果顯示，SG組肺臟組織在1.5, 6, 48小時、腎臟組織在18小時、肝臟組織在6小時時皆顯著低於SS組，此外SG組血中尿素氮在18, 48小時皆顯著低於SS組，故敗血症後給予單一劑量GLN注射可減少因敗血症引致之組織損傷並增加存活率。

關鍵字: 麩醯胺、敗血症、盲腸結紮及穿刺

材料與方法

實驗設計

使用25~30克重雄性ICR小鼠，Chow diet 和水皆自由進食。



分析項目

分析血漿中血中尿素氮(blood urea nitrogen, BUN) 。肝、腎、肺組織均質液分析骨髓過氧化酶活性(myeloperoxidase activity) 、蛋白質過氧化產物 nitrotyrosine 濃度，並觀察48小時存活率。

統計方法

數據以 mean ± SEM 表示，數據進行 two-way ANOVA 分析，以 Duncan's test 作事後檢定，另外以卡方檢定分析存活率， $p < 0.05$表示有統計上的差異。

結果

Table1
Myeloperoxidase activities in organ homogenates during sepsis

	Lung	Liver	Kidney
		(U/mg protein)	
NC	0.17±0.05	0.23±0.05	0.59±0.08
1.5h			
SS	0.63±0.12†#	1.10±0.08#	1.52±0.24#
SG	0.32±0.09*	1.12±0.27†	1.09±0.16#
6h			
SS	0.28±0.04	0.43±0.05†	1.59±0.60
SG	0.3±0.05	0.34±0.07	0.43±0.13*
18h			
SS	0.18±0.05	1.33±0.46	1.26±0.03
SG	0.22±0.01	0.4±0.1*	0.51±0.14
48h			
SS	0.29±0.04	1.48±0.31	0.64±0.44
SG	0.17±0.005	0.4±0.15*	0.35±0.07

Data are presented as the mean ± SEM. NC: normal control group; SS septic saline group; SG: septic glutamine group
*Significantly different from the SS group at the same time point.
†Significantly different from the same group at different time point.
#Significantly different from the NC group at 1.5h point.

Table2
Nitrotyrosine concentrations in organ homogenates during sepsis

	Lung	Liver	Kidney
		(μg/ml)	
NC	2.83±0.19	6.96±0.75	6.45±0.62
1.5h			
SS	5.18±0.74†#	11.8±1.05†#	9.84±1.15†
SG	3.08±0.14*	8.10±0.18	8.24±0.23
6h			
SS	4.56±0.27	9.39±1.37	6.08±0.40†
SG	3.33±0.21*	5.97±0.41*	6.98±0.97
18h			
SS	3.73±0.15	7.50±1.05	9.81±0.82
SG	2.94±0.11	7.09±0.42	5.37±0.50*
48h			
SS	3.47±0.18	8.77±1.37	7.68±3.31
SG	2.23±0.15*	5.89±0.38	4.95±0.40

Data are presented as the mean ± SEM. NC: normal control group; SS septic saline group; SG: septic glutamine group
*Significantly different from the SS group at the same time point.
†Significantly different from the same group at different time point.
#Significantly different from the NC group at 1.5h point.

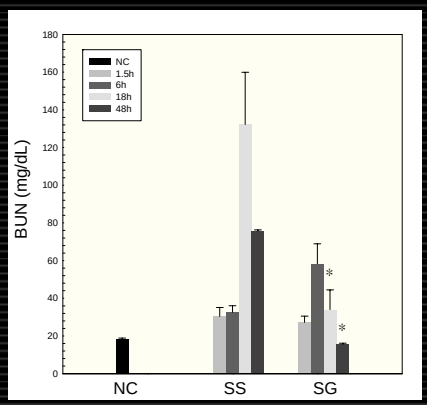


Figure1. Concentrations of blood urea nitrogen (BUN) in plasma. NC: normal control group; SS septic saline group; SG: septic glutamine group
*Significantly different from SS group at the same time point

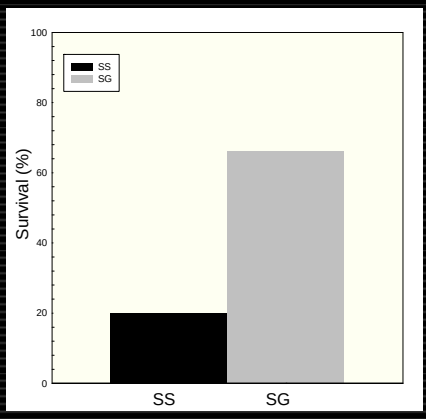


Figure2. Survival rate of septic mice at 48h point. SS: septic saline group; SG: septic glutamine group
Survival rate of SG group is significantly higher than SS group.

結論

敗血症後由尾靜脈注射單一劑量每公斤0.75克之GLN，在不同時間點可降低肝、腎、肺之組織損傷，並顯著增加48小時存活率。