

紫苏子油对小鼠学习记忆能力的影响

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摘要 分别给予幼龄小鼠灌胃不同剂量的紫苏子油,连续15d,可减少小鼠跳台错误次数,能明显提高小鼠水迷路测验的正确百分率,缩短到达终点时间,并能促进小鼠脑内核酸及蛋白质的合成,调节小鼠脑内单胺类神经递质水平。结果提示紫苏子油能促进小鼠学习记忆功能并与小鼠脑内的核酸,蛋白质及单胺类神经递质含量有关。

关键词 紫苏子油 学习记忆 蛋白质 单胺类递质

紫苏子油来自唇形科植物紫苏 *Perilla frutescens* (L.) Britt 的干燥成熟果实及种子,通过冷榨法所得的一种富含 α -亚麻酸的脂肪油。本试验通过跳台法和水迷路法观察了紫苏子油对小鼠学习记忆能力的影响,并观察了紫苏子油对小鼠脑内核酸、蛋白质及单胺类神经递质含量的影响。

1 实验材料

动物:昆明种小鼠,雌雄各半,体重 $16\pm 2\text{g}$,由本院动物室提供。

药品:紫苏子油为黄色透明油状液体,相对密度为0.9642,由本院植化室提供。阳性对照药脑复康,由广州白云山制药厂总厂生产(910651)。东莨菪碱,由中国医学科学院药物研究所提供。

2 方法与结果

2.1 紫苏子油对东莨菪碱造成小鼠记忆获得障碍的影响(跳台法)^[1]:取60只小鼠,随机分为6组,按表1所示剂量灌胃给药,每日一次,连续给药15d,同时东莨菪碱组给予等体积的蒸馏水,末次给药后20min,除对照组外,其余均腹腔注射东莨菪碱 5mg/kg ,10min后进行小鼠跳台训练,24h后测验,结果见表1。东莨菪碱可造成小鼠记忆获得障碍,使其错误次数增加,与对照组比较 $P<0.01$,而紫苏子油各剂量组均能对抗东莨菪碱的作用,使其记忆获得能力得到改善。

2.2 紫苏子油对小鼠水迷路记忆的影响^[2]:取50只小鼠,随机分为5组,给药剂量同上,连续灌胃给药10d后,开始训练小鼠,连续训练5d,每天每鼠训练10次(水深10cm,水温 25°C),训练过程中继续给药,于末次给药30min后进行试验,记录小鼠到达终点时间及正确次数。结果见表2。紫苏子油的不同剂量组均能明显提高小鼠水迷路测验的正确百分率;缩短到达终点时间,与对照组比较,差异显著。

2.3 紫苏子油对小鼠脑内核酸及蛋白质含量的影响:取50只小鼠,随机分为5组,给药剂量与方法同前,于末次给药30min后,将动物断头处死,取脑。按Rowland方法分离^[3],RNA测定用Dricinol试剂显色法^[4],DNA测定用二苯胺试剂显色法^[5],蛋白质测定按Lowry法^[6]。结果见表3。紫苏子油的不同剂量组都能使小鼠脑内RNA, DNA, 蛋白质含量有不同程度增加,与对照组比较,差异显著。

2.4 紫苏子油对小鼠脑组织中单胺类神经递质含量的影响:取小鼠50只,随机分为5组,给药剂量及方法同上,于末次给药30min后,快速断头取脑,按匡氏法^[7]测定小鼠脑内5-HT, NE, DA的含量,结果见表4。紫苏子油的不同剂量组能明显增加小鼠脑组织中NE和DA含量,降低5-HT的含量。从5-HT/NE和5-HT/DA的比值来看,各给药组与对照组比较都

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表1 紫苏子油对东莨菪碱造成小鼠记忆获得障碍的影响 ($\bar{x} \pm SD$)

组别	剂量 (g/kg)	动物数 (只)	错误次数 (次)
对照	0	9	0.44 ± 0.53**
东莨菪碱	0 + 0.005	8	1.25 ± 0.46
脑复康 + 东莨菪碱	0.5 + 0.005	9	0.44 ± 0.73*
紫苏子油 + 东莨菪碱	5.4 + 0.005	8	0.38 ± 0.74*
	2.7 + 0.005	10	0.10 ± 0.32**
	1.35 + 0.005	8	0.38 ± 0.52**

表2 紫苏子油对小酸水迷路记忆实验的影响 ($\bar{x} \pm SD$)

组别	剂量 (g/kg)	动物数 (只)	到达终点时间 (s)	正确百分率 (%)
正常组		9	23.54 ± 15.12	0.53 ± 0.23
脑复康	0.5	9	15.83 ± 6.88	0.77 ± 0.15*
紫苏子油	5.4	9	8.40 ± 3.20**	0.87 ± 0.10**
	2.7	8	9.59 ± 3.96*	0.79 ± 0.19*
	1.35	9	10.76 ± 3.68*	0.81 ± 0.09**

* $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$ (以下同)

表3 紫苏子油对小鼠脑内核酸及蛋白质含量的影响

组别	剂量 (g/kg)	动物数 (只)	RNA (mg/mg脑)	DNA (μg/mg脑)	蛋白质 (mg/mg脑)
对照组		10	0.1126 ± 0.0118	0.9660 ± 0.3012	44.89 ± 2.67
脑复康	0.5	10	0.1471 ± 0.0216***	1.0769 ± 0.3155	54.36 ± 7.47**
紫苏子油	5.4	10	0.2019 ± 0.0475***	1.3182 ± 0.1187**	55.50 ± 7.60***
	2.7	10	0.1932 ± 0.0768***	1.2612 ± 0.2427*	56.32 ± 5.64***
	1.35	10	0.1209 ± 0.0164	1.1870 ± 0.1060*	50.54 ± 7.40*

表4 紫苏子油对小鼠脑组织中单胺类神经递质含量的影响

组别	剂量 (g/kg)	动物数 (只)	5-HT (OD/g脑)	NE (OD/g脑)	DA (OD/g脑)	5-HT/NE	5-HT/DA
正常组		10	280.01 ± 61.08	100.08 ± 19.27	58.41 ± 17.88	2.7979	4.7939
脑复康	0.5	10	260.57 ± 27.78	136.55 ± 21.13***	81.98 ± 14.92**	1.9082	3.1804
紫苏子油	5.4	10	205.78 ± 13.03**	129.74 ± 16.33**	85.61 ± 11.06**	1.5861	2.4037
	2.7	10	215.53 ± 78.18**	126.90 ± 27.67*	74.30 ± 38.28	1.6084	2.9008
	1.35	10	181.98 ± 24.08***	105.86 ± 15.65	61.61 ± 15.28	1.7191	2.9537

有大幅度的下降。

3 讨论

紫苏子油中所富含的 α -亚麻酸为 ω -3系列多烯不饱和脂肪酸。由于这种不饱和脂肪酸在体内不能自身合成,必须靠食物供给,所以被称之为必需脂肪酸。现在越来越多的证据表明 ω -3系列不饱和脂肪酸在生物膜的结构和功能上起着特殊作用,据文献报道[8] α -亚麻酸在体内以二十碳五烯酸(EPA)和二十二碳六烯酸(DHA)的形式存在,而DHA除富集于主动脉以外,还大量存在于视网膜、大脑皮质及生殖细胞中,与各自的功能有关。动物实验证明,如果在食物中加入富含 α -亚麻酸食料进行子鼠二代培养,可提高子代小鼠的学习记忆能力[9],使子代小鼠视网膜中的DHA增加,视网膜反射能增强[10]。所以在脑和视力发育期补充 ω -3脂肪酸已经引起国内外专家学者的重视,我们的实验结果也说明:给予小鼠富含 α -亚麻酸的紫苏子油能提高学习记忆能力,促进小鼠脑内新蛋白质生成,调节小鼠脑内单胺类神经递质水平。

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Effects of Compatibility Between Ginseng (*Panax ginseng*) and Trogopteris Dung of Complextoothed Flying Squirrel (*Trogopteris xanthipes*) Decoction On Immune Functions in Immunosuppressed Mice

Guo Guohua, Lu Yaohang, Jiang Maoheng, et al

Immunosuppression in mice was induced by intraperitoneal injection of cyclophosphamide 40mg/kg for 3 days. After administration of a decoction of *Panax ginseng* (5g/kg) or Trogopteris dung (5g/kg), alone or 1:1 mixture of the above two drugs at doses of 5g/kg and 10g/kg for 7 days, resulted in an increase of thymus gland weight ($P < 0.01$), promotion of hemolysin antibody formation ($P < 0.01$), and improvement of phagocytosis of macrophages ($P < 0.01$). These results illustrated compatibility between *Panax ginseng* and Trogopteris dung and without influences on immune-increasing action in mice as compared with each single drug.

(Original article on page 253)

A Comparative Study on the Morphology and Histology of Huangjing and Yuzhu

Lin Lin and Lin Shouquan

A systematic comparative study on the morphology and histology of the rhizomes of *polygonatum* including "Huangjing" and "Yuzhu" currently available on the Chinese market were presented. The differences between this two types of herbal medicines were given.

(Original article on page 261)

Dynamic Analysis of Crude Saponins in Crude Drugs and Callus of Fiveleaf Gynostemma (*Gynostemma pentaphyllum*)

Luo Guangming, Tang Fupu, Liu Xianwang, et al

Total saponins in crude drug and induced callus of *Gynostemma pentaphyllum* (Thunb.) Mak. grown in Jiangxi Province were analysed by spectrophotometry and TLC. Results showed that the quality and quantity of saponins in crude drugs varied considerably with culture area, the life cycle and their organs. The quality and quantity of saponins in callus also varied due to source of clone. It provided some evidence for the production and harvest of *G. pentaphyllum*.

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Wang Qiang, Yang Xianrong and Chen Jinquan

Three species of borneol from different origins, namely Borneol Camphor (extracted from *Dryobalanops aromatica* Gaerth. f.), Balsamiferous Blumea Borneol (extracted from *Blumea balsamifera* DC.) and synthetic borneol, were studied by macroscopic and microscopic identification and GC method. Their differences were revealed. The amount of borneol and isoborneol in the samples were determined.

(Original article on page 241)

Quantitative Determination of Tetrandrine in "Zhitong Ruanjiaonang" —An Analgesic Soft Gelatine Capsule Preparation

Ni Long, Zeng Xiaoying, et al

A method for the quantitative determination of tetrandrine in "Zhitong Ruanjiaonang" was developed by means of TLC densitometry. The method is easy, rapid, accurate, and reproducible. The average recovery was 99.98%.

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Effect of "Gusuibu" on Healing of Experimental Rat Bone-Injury

Zhou Tongshui, Liu Xiaodong and Zhou Ronghan

Fracture healing activity of aqueous extracts of rhizome of *Drynaria fortunei* (Kunze) J. Sm., *D. sinica* Diels ("Gusuibu"), and its main constituent naringin were examined and confirmed with an experimental bone-injury model rat femur inferior. Results showed that they were effective for healing of experimental rat bone-injury.

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Effects of Fatty Oil of Acute Common Perilla (*Perilla frutescens*) on the Learning and Memory of Mice

Zhou Dan, Han Daqing, and Wang Yongqi

Different doses of fatty oil of *Perilla frutescens* var. *arguta* (Benth.) Hand. -Mazz. (ig) to mice for 15 days can decrease errors in step-down test, improve percentage of accuracy and shorten the time to reach their goal in water maze experiments. It also facilitate the synthesis of RNA, DNA and proteins in brain and regulates the level of monoamine-like neurotransmitters. The above results indicated that fatty oil of *P. frutescens* var. *arguta* can improve learning and memory in mice related to the synthesis of RNA, DNA, proteins and neurotransmitters in brain.

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