

绞股蓝对多刺裸腹蚤的生物学效应 ——一种抗衰老药物筛选的模型

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摘要 以多刺裸腹蚤为动物筛选模型,从药效学方面研究了绞股蓝提取液对多刺裸腹蚤生命活力和寿命的影响。结果表明:0.0125%、0.0250%、0.0500%及0.1000%的绞股蓝提取液对蚤的生长、发育、繁殖和寿命均有明显影响。

关键词 多刺裸腹蚤 绞股蓝 筛选模型 抗衰老

如何延缓衰老,是当前老年医学研究的主要课题。其中研究和应用抗衰老药物便是人们关注的一个方面,而动物实验则是研究工作中必不可少的重要环节。本研究采用多刺裸腹蚤 *Moina macrocpa* 为实验动物,用以观察绞股蓝 *Gynostemma pentaphyllum* Makino 对生物生长、发育、繁殖和寿命的影响,以探讨建立一种抗衰老药物的筛选模型。

1 材料和方法

动物:多刺裸腹蚤(下称水蚤)采自合肥市郊农田水沟。为获得遗传性状相同的实验动物,实验采用亲蚤孤雌生殖产生的同代仔蚤。

药物:将绞股蓝全草干品经2次煎煮,取煎液,再经沉淀,离心,去残渣,然后用蒸馏水配成10%提取液,调节pH至6.9,冷藏备用。

2 方法

2.1 预备实验:在绞股蓝浓度为0.001%~1%范围内,以等比级数分组,观察水蚤的适应性。实验发现适宜浓度在0.05%左右。

2.2 个体实验:分4个药液剂量组(0.0125%、0.0250%、0.0500%及0.1000%绞股蓝提取液)和对照组。每组由7个分别培养的亲蚤产的同代仔蚤组成。每日定时、定量更换试验液。用测微尺在显微镜下检测仔蚤体长,首次产仔时间,各代产仔数及水蚤寿命(对子蚤孤雌生殖产生的幼蚤,在计数后更换试验液时弃去)。试验水温为 $24 \pm 2^{\circ}\text{C}$ 。

群体实验:以亲蚤孤雌生殖产生的第3代仔蚤为实验动物。实验分4组,即3个药液剂量组(0.0125%、0.0500%及0.1000%绞股蓝提取液)和对照组,按完全随机分配的方法,每个实验组放养20个仔蚤。

2 结果

2.1 绞股蓝对水蚤生长、发育和繁殖的影响:见表1、2。各试验浓度的绞股蓝对水蚤均有增加体长,提前产仔的作用。在群体试验中,也发现绞股蓝使水蚤的首次产仔时间提前,A、C、D剂量组与对照组比较分别提前8.3%、16.6%和16.6%。各试验浓度的绞股蓝均使每次产仔数明显增加,并使2次产仔之间的间隔时间缩短,同时还有增加产仔次数的作用。

2.2 绞股蓝对水蚤寿命的影响:见表3。各试验浓度绞股蓝均有延长水蚤平均寿命的作用,不论是个体试验还是群体试验均取得同样的结果。一般延长10%,长的甚至达30%以上。

3 讨论

多刺裸腹蚤属节肢动物门甲壳纲、双甲目、枝角亚目、裸腹蚤科、裸腹蚤属。体长0.83

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~1.20mm。习居于小型水域中。夏季经常出现多周期繁殖,在5~30℃温度范围内适于进行孤雌生殖^[1]。这种生物有以下特点:容易培养;性成熟前死亡率低;生活周期短,便于研究整个生命过程;在同一环境下易于得到遗传性基本相同的个体;具有与哺乳动物相似的生长、发育、繁殖、衰老等阶段。因此在抗衰老药物筛选方面,比常用的果蝇模型优越,且实验时可在显微镜下进行直接观察^[2]。

表1 绞股蓝对个体试验水蚤首次产仔时体长和产仔时间的影响(̄x±S)

组别	药物浓度(%)	首次产仔时体长(mm)	体长Δ增加(%)	首次产仔时间(h)	产仔时间提前(%)
A	0.0125	1.36±0.02**	16.24	—	—
B	0.0250	1.32±0.05**	12.82	—	—
C	0.0500	1.25±0.05*	6.84	83.2±4.4	15.10
D	0.1000	1.25±0.04*	6.84	83.2±4.4	15.10
对照	—	1.17±0.04	—	98.0±10.4	—

Δ体长增加%和产仔时间提前%是指与对照组比较而言
*P<0.05, **P<0.01(下同)

表2 绞股蓝对个体试验水蚤各次产仔时间间隔的影响

组别	药物浓度(%)	各次平均产仔数(个,̄x±S)					各次产仔时间间隔(d)			
		第1次	第2次	第3次	第4次	第5次	第6次	1~2次	2~3次	3~4次
A	0.0125	14.1±1.3	20.7±2.4	11.8±3.4	17.8±5.4	12.7±1.6	7.0	0.7	0.9	2.0
B	0.0250	11.8±1.4	19.6±2.0	15.1±3.6	18.2±3.1	14.5±0.7	8.0±1.4	0.7	1.2	1.8
C	0.0500	12.6±1.9	17.4±4.0	11.2±4.2	20.4±4.7	12.0±3.6	8.5±1.1	0.8	1.3	1.6
D	0.1000	14.4±2.2	20.7±4.1	11.4±3.1	16.8±4.0	16.3±5.5	—	0.8	1.3	1.6
对照	—	8.7±1.9	7.0±2.0	9.0±1.8	9.0±1.0	—	—	1.4	1.5	2.2

表3 绞股蓝对水蚤平均寿命的影响

组别	药物浓度(%)	个体试验			群体试验		
		平均寿命(d)	延长(%)	最高寿命(d)	平均寿命(d)	延长(%)	最高寿命(d)
A	0.0125	11.93±1.73**	32.26	14.1	8.58±1.33**	15.9	11.5
B	0.0250	9.86±2.28**	9.31	12.3	—	—	—
C	0.0500	9.94±1.94**	10.20	12.1	8.27±1.90**	11.8	10.5
D	0.1000	9.70±1.08**	7.54	11.1	8.95±2.55**	21.3	13.5
对照	—	9.02±1.04	—	10.1	7.40±1.63	—	10.5

绞股蓝属葫芦科植物,主要分布在我国南方,资源丰富。据报道,已从全草中提得50余种皂甙。其中6种与人参皂甙相同^[3],还含有多种人体必需氨基酸和微量元素^[4]。

本次实验中发现,绞股蓝提取液对多刺裸腹蚤有显著的促进生长,加速代谢和提高生育能力,延长动物平均寿命等作用。此结果与文献^[5]的结果^[5]是吻合的。

多刺裸腹蚤易受环境因素的影响,如水温、水pH值,种群密度等。我们在实验时对有关环境因素进行了控制,并做了个体和群体对照试验,其结果趋势基本一致。

本实验仅就绞股蓝对多刺裸腹蚤的生物学效应进行了初步的观察研究,发现多刺裸腹蚤作为抗衰老药物筛选模型具有经济、快速、敏感、重现性好及便于观察等优点,在使用高等动物实验之前,作为筛选手段是一种理想的动物模型。

参 考 文 献

1 蒋燮治,等.中国动物志.北京:科学出版社,1979. 1566

2 许士凯等.抗衰老药物的药理与应用.上海:上海中医学院出版社,1987. 27

3 郭生祯,等.中草药,1987, 18(7): 37

4 李若存,等.中国中药杂志,1989, 14(1): 41

5 沈一雨,等.食品科学,1990, 8: 38

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ABSTRACTS OF ORIGINAL ARTICLES

Studies on the Chemical Constituents of Balsampear (*Monordica charantia*)

Chang Fenggang

Four compounds were isolated from 80% EtOH extract of the fruits of *Monordica charantia* L., and identified by chemical reactions and spectral data (UV, IR, ^1H NMR, ^{13}C NMR and MS). They were momordicoside F1, I, G and daucosterol. This was the first reported isolation of daucosterol from this plant.

(Original article on page 507)

Studies on the Chemical Constituents of Mashaqianhu

(*Peucedanum mashaense*)

Huang Ping, Lu Chunqiong, Lai Maoxiang, et al

Six compounds isolated from the root of *Peucedanum mashaense* Shan et Sheh, were identified as deltoin, marmesin, phellopterin, oxypeucedanin hydrate, bergapten and β -sitosterol on the basis of physical and chemical properties and spectral data.

(Original article on page 511)

Determination of γ -Aminobutyric Acid in Manyinflorescenced Sweetvetch

(*Hedysarum polybotrys*) and Its Granular Preparation

Zhou Lihong, Hu Gengyong

Isolation of γ -aminobutyric acid in *Hedysarum polybotrys* was accomplished by HPT-LC, and the content of the said component in the herb and its preparation determined by dual wave length scanning at λ_S 530 nm and λ_R 700 nm. The method was simple and accurate.

(Original article on page 518)

Studies on the Fatty Acid Composition of Seed Oil of Several Plants in Changbaishan Region

Yang Shijie, Chen Guangrong, Li Qianmei, et al

Fatty acid composition and content in seed oil of plants in Changbaishan region was studied by gas chromatography and reported.

(Original article on page 519)

Determination of Tanshinone II_A in "Prostate Healthcare Bag" by TLC Scanning

Li Xiangyang, Tu Wanqian

TLC scanning technique was used for the determination of tanshinone II_A in "Prostate Healthcare Bag" at λ_S = 470 nm, and λ_R = 620 nm. This method is simple and highly sensitive, with an average recovery of 97.45% and a variation coefficient of 1.28%.

(Original article on page 520)

Biological Effect of Fiveleaf Gynostemma (*Gynostemma pentaphyllum*) on Thorny Nude Belly Water Flea —A Model for the Screening of Antiaging

Chen Qingyao, Ji Yuantang, Sun Yulin, et al

Effect of *Gynostemma pentaphyllum* Makino extract on the vitality and life-span of thorny nude belly water flea was studied. Results showed that all 0.0125%, 0.0250%, 0.0500% and 0.1000% extract of *G. pentaphyllum* significantly effected the growth, development, reproduction and life span of the water flea.

(Original article on page 527)

Effect of Jinyingzi (*Rosa laevigata*) Aqueous Extract on Urinary System

Lu Yin, Sun Zhiguang, Xu Huiqi, et al

Jinyingzi is the dry ripe fruit of *Rosa laevigata* Michx.. It contains mainly tannic acid, malic acid, citric acid, vitamin C and saponins. Its effect on urinary system was studied on mouse pollakiuria model by severing hypogastric nerve. Results showed that the water extract of *R. laevigata* can decrease the frequency and prolong the interval of urination and increase the quantity of each urination. The said extract can inhibit the automatic contraction of isolated rabbit jejunal smooth muscle and antagonize the spasmodic contraction aroused by acetylcholine and barium chloride of isolated rabbit jejunal smooth muscle, and isolated vesical smooth muscle of mouse, and antagonize reaction of contractility aroused by noradrenalin on isolated thoracic aorta strips of rabbit. All of the three inhibitions of smooth muscle contraction showed significant dose-response curve.

(Original article page 529)

Influence of Safflower (*Carthamus tinctorius*)

on Ca^{2+} Transmembrane Influx in Rat Aorta

Mo Shangwu, Chen Zhiheng, et al

Influence of *Carthamus tinctorius* L. has been studied on Ca^{2+} transmembrane influx in rat aorta when its extract was used at 5, 50, 500 $\mu\text{g/ml}$. It was shown that the resting ^{45}Ca influx in rat aorta ring was not altered by *C. tinctorius* but the ^{45}Ca influx evoked by norepinephrine (1.2×10^{-6} mol/L) and KCl solution (100mmol/L) was inhibited in a concentration-dependent manner. The results demonstrated that the receptor-operated Ca^{2+} channel (ROC) and potential-dependent Ca^{2+} channel (PDC) in cell membrane of smooth muscle could be blocked by *C. tinctorius* as well as by verapamil.

(Original article on page 532)

Tissue Culture of Thickstem Gentian (*Gentiana crassicaulis*)

and Plant Regeneration Through Somatic Embryogenesis

Meng Yuling, Jia Jingfen

Callus of *Gentiana crassicaulis* was initiated from hypocotyl and cotyledon on MS medium supplemented with 2mg/L 2,4-D and 0.5 mg/L BA. Induction frequencies of callus were 100%. Somatic embryos were formed on MS medium containing 2mg/L BA, 3mg/L ZT, 1mg/L NAA, 3mg/L GA, three time MS organics and vitamins, 6% sucrose and 500 mg/L LH and three time FeSO_4 (Na_2EDTA) .40%. Callus produced somatic embryos. It developed into complete plants on hormon-free MS medium.

(Original article on page 537)