地 黄 的 炮 制 研 究

Ⅰ.熟地黄中5-羟甲基糠醛的提取分离及含量测定

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摘要 地黄炮制过程中生成一化合物，经鉴定为5-羟甲基糠醛，并用薄层层析-薄层扫描法测定了在炮制中其含量的动态变化，结果表明，地黄炮制成熟地黄后5-羟甲基糠醛含量增加20倍左右。

关键词 熟地黄 炮制 5-羟甲基糠醛 薄层扫描法

熟地黄为玄参科植物地黄*Rehmannia glutinosa* Libosch的根茎，经加工炮制而成。本品性温，具有滋阴补血之功能。目前，地黄炮制方法较多，有蒸数小时至数天，也有加压蒸制。自古至今对熟地黄的质量要求均以“黑如漆，甜如饴”为标准，没有客观的质量检测指标，不能保证熟地黄的质量。为使地黄炮制标准有一个科学的客观指标，已从熟地黄中分得一个化合物，经化学方法和光谱解析鉴定为5-羟甲基糠醛。用薄层层析-薄层扫描法测定地黄炮制前后及不同炮制时间的熟地黄中5-羟甲基糠醛的含量，并将其作为地黄炮制的质量指标。

1 5-羟甲基糠醛（5-HMF）的提取、分离和鉴定

取熟地黄250g，用氯仿加热回流2次，合并滤液，减压除尽溶媒，得少量液体，通过硅胶柱层析，以石油醚（60～90°C）-乙酸乙酯（3∶1）洗脱，收集洗脱液，经薄层检查，合并相同流份，回收溶剂，得到棕色油状物，在0°C以下为淡黄色针状结晶。^{1}H-NMR和^{13}C-NMR谱解析鉴定，GC/MS完全相符。MS、IR和UV图谱和TLC、HPLC检查与化学合成的5-羟甲基糠醛相同。

2 熟地黄中5-羟甲基糠醛的含量测定

2.1 仪器与试剂：CS-930薄层扫描仪（岛津），CAMAG自动点样仪（瑞士），高效硅胶GF_{254}预制板（青岛海洋化工厂），5-羟甲基糠醛（从熟地中分离精制的纯品），所用试剂均为分析纯。

2.2 实验材料：生地黄：购于河南省武陟县；熟地黄：取上述生地黄按中国药典1985年版熟地黄项下的制备方法及加压140kPa压力蒸制不同时间的样品。

2.3 测定条件

2.3.1 薄层层析：薄层板为高效硅胶GF_{254}板，展开剂为石油醚（60～90°C）-乙酸乙酯（1∶1），展距5cm。

2.3.2 薄层扫描：在紫外灯254nm下定位，进行双波长反射法线性扫描，扫描波长：λ_s=280nm，λ_R=370nm。

2.4 标准曲线的制备：精密称取适量的5-HMF对照品，加无水乙醇制成1ml中含0.1152mg的对照品溶液，精密吸取2、4、6μl点于薄层板上，按上述条件展开，紫外灯254nm下定位，扫描、测定，以点样量为横座标（X），斑点吸收峰面积积分值为纵座标（Y），计算回归方

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程为Y = 4000.5X + 1.667，相关系数r = 0.9999，线性范围0.2～0.7μg。

2.5 样品的测定

2.5.1 样品的制备：取各样品5g，分别剪成直径约2mm的小粒，精密称定，各加入50ml蒸馏水煮沸20min，提取2次，合并滤液，定容至100ml，精密吸取3ml，置于10ml容量瓶中，加无水乙醇定容至刻度，振摇后放置4h取上清液作为供试品溶液。

2.5.2 样品的测定：在薄层板上点供试品溶液10μl，对照品溶液2、4、6μl，按上述方法扫描测定，由回归方程计算样品含量结果见表和图。

表 不同炮制时间的样品中5-HMF的百分含量(n = 5)

时间	0	4	6	8	16	24	32
常压蒸	0.01			0.090	0.149	0.231	0.360
加压蒸	0.01	0.304	0.447	0.536	1.104		

* 百分含量均以干燥品计算

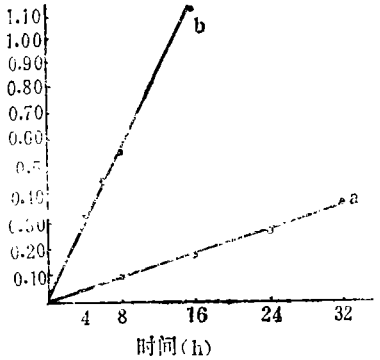

图 5-HMF含量变化图

a 常压蒸 b-加压蒸

2.6 稳定性试验：分别吸取对照品的溶液4μl、6μl点于薄层板上，按上述方法测定其不同时间吸收峰面积积分值，结果表明8h内积分值稳定。

2.7 精密度试验：在同一薄层板上精密点6个相同量的对照品溶液，按上述方法测定，6个斑点面积积分值平均值为X = 28176，CV = 1.28%。

2.8 加样回收试验：精密吸取对照品溶液4、6、8μl点于薄层板上，另点供试品溶液8、10μl，并在其相同位置上分别点对照品溶液4、5μl，同含量测定项下操作，测得平均回收率为97.0%，CV = 3.1%（n = 7）。

3 讨论

3.1 生地黄在蒸制过程中生成5-HMF，随着蒸制时间的增加，熟地黄中5-HMF含量也增加，炮制成熟地黄后5-HMF含量比生地黄增加20倍左右，符合传统的熟地黄质量标准。

3.2 常压蒸制24h或加压蒸制4h的熟地黄能达到“黑如漆、甜如饴”的传统的质量标准，其5-HMF含量在0.2%～0.3%之间，蒸制时间太短或太长均不能达到传统的质量标准，因此，采用5-HMF的含量作为地黄炮制的质量标准是可行为。

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ABSTRACTS OF ORIGINAL ARTICLES

Studies on the Chemical Constituents of Pedate Pinellia (*Pinellia pedatisecta*)

Qin Wenjuan, Ma Libin, et al

From the alkaloid extraction of rhizoma of *Pinellia pedatisecta* schott, seven compounds were isolated and identified by chemical and spectroscopic methods. They are L-prolyl-L-alanine anhydride (XXV), 3-acetamino-2-piperidone (XXVI), adenosine (XXVII), L-phenylalanyl-L-seryl anhydride (XXVIII), L-tyrosyl-L-alanine anhydride (XXIX), pedatisectine D (XXX), pedatisectine E (XXXI). All above compounds were obtained from this plant for the first time, among which XXX and XXXI are new compounds.

(Original article on page 3)

Studies on the Glucoside Constituents of Shengengzhangyacai (*Swertia elongata*)

Kong Deyun, Jiang Yi, Yao Ying, et al

Swertia elongata S. W. Lioa dt T. N. He (*Gentianaceae*) has been found to be effective in the treatment of liver disease. The present investigation resulted in the isolation and structure elucidation of four xanthone glycoside, two secoiridoid glycosides and a lignan glycoside in the plant. According to the chemical transformation, spectral (UV, IR, ^{1}H and $^{13}CNMR$, MS) properties and comparison with reference samples, the structures of four xanthone glycosides were established as: 4-β-D-glucopyranosyl-1, 3, 6, 7-tetrahydroxyxanthone (Ⅶ), 2-β-D-glucopyranosyl-1,3,6, 7-tetrahydroxyxanthone (Ⅵ), 8-O-β-D-glucopyranosyl-1, 3, 5-trihydroxyxanthone (Ⅳ) and 8-O-β-D-glucopyranosyl-1, 5-dihydroxy-3-methoxyxanthone (Ⅴ). The structures of two secoiridoid glycosides were identified as swertiamarin (Ⅱ) and desacetylcentapicrin (Ⅰ). The structure of lignan glycoside was identified as (+) hydroxypinoresinol-1-β-D-glucoside (Ⅲ).

(Original article on page 7)

Studies on the Active Constituents and Their Contents of stem and Leaf of Qianhu by RP-HPLC

Li Yi, Kong Lingyi

Chemical constituents of the aerial parts of Qianhu were compared with those present in the roots by RP-HPLC. It was found that the constituents in aerial parts of *Peucedanum praeruptorum* are similar and higher in content than that in the roots. So it is possible that the aerial parts can be used instead of the roots of the plant. But the chemical constituents in the aerial parts and the roots of *P.decursivum* are quite different, rendering it impossible to use the aerial parts instead of the roots of the plant.

(Original article on page 11)

Studies on Processing Adhesive Rehmannia (*Rehmannia glutinose*) I. Extraction, Separation, Identification and Assay of 5-Hydroxymethyl-Furfurol

Liu Mei li, Bai Mei, Bai Rongzhi, et al

In the study on processing of Dihuang, a traditional Chinese drug composed of the

rhizome of *Rehmannia glutinose* Libosch, attention was paid to reveal the chemical changes occurred in the course of processing. In order to find some clues for the process control, changes in the TLC spechrograms were examined and one of the component peak was found changing gradually as the processing went on. Phytochemical separation and identification revealed that the component peake features 5-hydroxy-methyl-furfurol (5-HMF). TLCS spectrometric estimation of the 5-HMF contents was developed and used to monitor the process. It was found That the 5-HMF content at the end of processing was 20 times higher than that he start.

Biological assay indicated that 5-HMF possesses marked antiplatelet activity, which supports the use of Dihuang as a blood activating agent in traditonal Chinese medicine.

(Original article on page 13)

The Effects of Injection Stauntoniae on the Conduction of the Saphenous Nerve in Rat

Ye Wenbo, Liu Qiang, Ye Qing, et al

Injection Stauntoniae (IS) was applied on a part of the saphenous nerve of rat 4mm in length. With 50% IS, amplitudes of Aαβ, Aδ and C components of the compound action potential were reduced and their latencies were delayed. In particular, the amplitudes of Aδ and C components reduced to 47.0%±23.0% and 44.0±20.0% (MEAN±SD, n=8, $P<0.01$) of the control's, respectively. With 10% IS, the amplitudes of all components did not reduced ignificantly, but the latencies of Aαβ, Aδ and C were delayed 0.05±0.01ms ($P<0.05$), 0.28 ±0.07ms ($P<0.05$) and 6.99±1.48ms ($P<0.01$) (n=5) respectively. There was dose-dependency between concentration of IS and its effect on nerve conduction. The effects on Aδ and C components were greater than that on Aαβ component. The effects of blocking conduction of nerve fibers were reversible.

(original article on page 20)

Studies on the Chinese Drug Shasheng V. Comparison of Antitussive and Expectorant Activities

Tu Pengfei, Zhang Hongbin, Xu Guojun, et al

Shasheng is a common Chinese drug used as antitussive and expectorant. A survey showed that the original plants of Shasheng on the current market consist of more than 30 species. To appraise the qualities of Snasheng scientifically, the antitussive and expectorant activities of ten species of Shasheng were compared. Results showed that the EtOH extracts of the roots of *Glehnia littoralis*, *Adenophora stricta* subsp. *henanica*, *A. potaninii* and *A.liliifolioides* are very effective as antitussive, while those of *A.liliifoliolioides*, *A.stricta* subsp. sessilifolia and *A. potaninii* are very effective as expectorant.

(Original article on page 22)

Studies on Antiinflammatory and Immune Effects of Triptophenolide

Yang Jun, Yu Dongfang, et al

Triptophenolide (TN) is a colorless crystalline plate isolated from ethyl acetate extracts of *Tripterygium wilfordii*. It can obviously inhibit the edema caused by xylol and mixture croton oil; and decrease the concentration of Vitamin C in the adrenal gland of mice. TN can remarkably inhibit the delayed type hypersensitivity (DTH) reaction induced by DNCB and BSA; and diminished the peripheral blood ANAE+lymphocytes in rats and mice. More-