# 甲巯丙脯酸加阿魏酸钠对原发性高血压患者降压效果及尿中血栓素$B_2$排泄影响

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**内容提要** 本实验将原发性高血压患者44例随机分为两组，观察单独口服甲巯丙脯酸(CAP)和CAP与阿魏酸钠(SF)联合服用后平均动脉压(MAP)、尿中$TXB_2$浓度及血中血管紧张素转化酶(ACE)活性的变化。结果表明，CAP使原发性高血压患者血中ACE活性减低，有显著降压作用，但尿中$TXB_2$排泄增加；SF无降压作用。与CAP联合应用可使原发性高血压患者服用CAP后尿中$TXB_2$排泄增加受到抑制，降压作用得到加强。

**关键词** 甲巯丙脯酸 阿魏酸钠 高血压 血管紧张素转化酶 血栓素$A_2$

近年来，有些学者报道，甲巯丙脯酸(CAP)在降压的同时可引起原发性高血压患者尿中血栓素$B_2$($TXB_2$)排泄增加[1,2]。川芎和当归的有效成份之一阿魏酸钠(SF)可以抑制血栓素$A_2$($TXA_2$)的合成[3]。本实验目的是观察SF对原发性高血压患者口服CAP的降压效果及尿中$TXB_2$排泄的影响。

## 资料与方法

本组原发性高血压患者44例，男21例，女23例，平均年龄48.8±11.1岁。均符合1979年世界卫生组织高血压病诊断标准，高血压Ⅰ期35例，Ⅱ期9例；伴有冠心病5例，糖尿病2例。全部参试患者肾功能均正常，除外继发性高血压，男性患者除外前列腺肥大，并除外结节病、肺结核及慢性阻塞性肺部疾患。实验期间嘱进普通饮食，实验前停服一切降压药物和对前列腺素代谢有影响的药物1周以上。

患者随机分为两组，口服安慰剂1周后，第一组禁食、禁水10h，一次口服CAP 50mg，分别于服药前2 h，服药后1.5h、4 h测右臂肱动脉血压（卧位、安静5 min，MAP表示）及血中血管紧张素转化酶（ACE）活性（紫外线法，药盒由海军总医院提供），并测定用药前2 h，用药后0～2 h、2～4 h尿中$TXB_2$浓度（放免方法，药盒由中国医学科学院基础所提供）。第二组禁食、禁水10 h，口服SF100mg，每日3次；一天后再次禁食、禁水10h，口服SF 100 mg、CAP 50 mg一次，测单独服SF前、联合服药前、后的血压，血中ACE及尿中$TXB_2$浓度，时间、方法同第一组。

## 结 果

治疗前，原发性高血压患者16例单独口服SF 300 mg 1日，MAP无显著变化（用药前16.25±1.38 kPa，用药后16.33±1.41 kPa），$P>0.05$。全部患者其他治疗结果详见表1、2。

表1 两组用药前后MAP与ACE变化比较 ($\bar{x}\pm S$，下同)

| 组别 | MAP(kPa) | | | ACE (u) | | |
|---|---|---|---|---|---|---|
| | 用药前 | 药后1.5h | 药后4h | 用药前 | 药后1.5h | 药后4h |
| 第一组 | 16.25±0.85 | 13.65±1.14** | 14.60±0.90** | 36.88±12.73 | 10.75±4.25** | 18.88±6.96** |
| 第二组 | 16.33±1.41 | 14.07±1.52** | 13.83±1.77**△ | 27.43±7.28 | 12.49±7.76** | 18.01±5.95** |

注：与第一组比较，△$P<0.05$；与用药前比较，*$P<0.05$，**$P<0.01$，下同

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表2 两组用药前后尿中 $TXB_2$ 变化比较 (pg/min)

| 组 别 | 用药前 | 用药后 0～2h | 用药后 2～4 h |
|---|---|---|---|
| 第一组 | 119.12±57.12 | 157.59±87.35* | 183.32±78.61* |
| 第二组 | 155.89±69.64 | 141.10±66.12 | 133.43±60.01△ |

## 讨 论

一、CAP 的降压效果及对血 中 ACE 活性的影响：本实验表明，原发性高血压患者口服CAP50mg后血压明显下降，以服药后1.5h最为显著，与文献报道的结果一致[4]。血中ACE活性在用 CAP 后明显受抑制，也于 用药后 1.5h为著，与Onoyama，Jarrott 等报告的一次口服 CAP 后血中 CAP 浓度变化一致[5,6]。说 明，一次口服 CAP 50 mg 后0～4 h 内 降压效果与血中 ACE 活性是一致的。4 h后及 长 期 服 用 CAP 时血压及血中 ACE 活性未做观察。

二、CAP 对尿中 $TXB_2$ 排泄的影响：原发性高血压患者口服 CAP 50mg 后，尿 中 $TXB_2$ 排泄增加，和 Keikudo 于 1986、1988 年 两次观察的结果及其他学者的实验 结 果一致[1,2]。CAP 可阻止缓激肽的降解，使缓激肽水 平 升高，后者可激活磷脂酶 $A_2$，刺激肾脏产 生 各前列腺种素[7]。另 外，动物实验和细胞培养还观察到，CAP可以直接刺激肾小球和肾髓质间质细胞合成和释放前列腺素[8,9]。尿中 $TXB_2$ 的排泄反映了肾脏合成和释放 $TXA_2$ 的能力。因此，CAP使原发性高血压患者尿中 $TXB_2$ 排泄增加，可能 是直接或间接地作 用于磷脂 酶 $A_2$ 或环氧化酶，使肾脏合成 $TXA_2$ 增加的结果。

三、SF 与 CAP 的联合作用：原发性高血压患者单独服用 SF，MAP 无明显变化，SF与 CAP 联合应用可使原发性高血压患者服 用 CAP后尿中 $TXB_2$ 排泄增多现象受到抑制，降压效果得到加强。1989 年，美 国 的 Nigel R Levens 报道，$TXA_2$ 合成酶抑制 剂 CGS-12970 与三种结构不同的ACE抑制剂联合应用于自发性高血压大鼠(SHR)，后者的降压作用明显地被 加 强[10]；Keikudo 把CAP 与 $TXA_2$ 合成酶抑制剂 OKY-046 联合应用于原发性高血压患者，也观察到了同样的效果[2]。本 实 验 中，CAP 单独应用和与 SF 联合应用，ACE 受抑制的程度是一 致 的，说明SF对ACE 无影响。SF 是一种 $TXA_2$ 合 成酶抑制剂[3]，设想其可通过抑 制 $TXA_2$ 合成酶，一方面使 $TXA_2$ 合成减少，另一方面使内过氧化物($PGH_2$、$PGD_2$)向着合成$PGI_2$的方向发展，使 $PGI_2$ 的合成增加，而使CAP的降压作用得到加强。然而，曾有人报 道，SF 对 $PGI_2$的生成并没有影响[3]。从作用时间上看，SF 抑制了服用 CAP 的高血压 患者尿中 $TXB_2$ 排泄增加是在服 药 后 2～4 h 最明显，加强 CAP 的降压效果也是以联合用药 4 h最显著，两者相符。因此推想，SF加强 CAP 降压作用的机理有可能是通过抑制 $TXA^2$ 的形成而实现的。但尚待进一步证实。

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point of ear needling. Comparison of hypotensive effect of short-term between Heart point and Stomach point of ear needling showed that there was markable hypotensive effect by Heart point, whose hypotensive rate of short-term was 100% and forward effect rate was 63.3%. There was inefficacy for hypotensive by Stomach point. There was marked effect of left cardiac function, with II, III stage of hypertension, which was improved by Heart point. There was inefficacy for left cardiac function of normal being.

**Key Words** hypertension, ear needling, Heart point, left cardiac function

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## The Influence of Sodium Ferulate on Hypotensive Effect and Urinary Excretion of $TXB_2$ after Captopril in Essential Hypertensive Patients

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In the present study, the influence of sodium ferulate (SF) on hypotensive effect and urinary excretion of $TXB_2$ after captopril (CAP) was observed in 44 patients with essential hypertension. A single oral dose of CAP (50 mg) decreased mean arterial pressure (MAP) from 16.25±0.85 to 13.65±1.14 kPa, n=28, ($P<0.01$), and increased urinary $TXB_2$ excretion significantly from 119.12±57.12 to 183.32±78.61 pg/min, n=16, ($P<0.05$). The administration of SF 300 mg/d for one day did not affect the MAP. CAP in combination with SF induced a decrease both in MAP from 16.33±1.14 to 13.83±1.77kPa, n=16, ($P<0.01$) and urinary $TXB_2$ excretion from 155.89±60.64 to 133.43±60.01 pg/min, n=16, ($P>0.05$)though the latter was not so significant. Compared with the administration of CAP alone, the combination of CAP and SF induced stronger hypotensive effect ($P<0.05$) and the increased urinary $TXB_2$ excretion could be inhibited by SF, but the inhibition to angiotensin converting enzyme was the same. These results suggested that the increased urinary $TXB_2$ excretion by CAP can be inhibited and the hypotensive effect of CAP is potentiated by SF in essential hypertensive patients.

**Key Words** captopril, sodium ferulate, hypertension, angiotensin converting enzyme, thromboxane $B_2$

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## The Beneficial Effect of Qigong (气功) on the Ventricular Function and Microcirculation of Deficiency of Heart-Energy Hypertensive Patients

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Ultrasonic cardiogram was performed on 120 aged subjects. Experiment showed that the left ventricular function in the hypertensive aged group (n=80) was lower than that in the aged group (n=40), while the left ventricular function in the deficiency of heart-energy hypertensive patients (n=46) was the lowest in the non-deficiency of heart-energy hypertensive patients (n=34). After practising Qigong for 1 year, the cardiac output (CO) was increased, the total peripheral resistance (TPR) was decreased, ejection fraction (EF) mitral valve diastolic closing velocity and mean velocity of circumferential fiber shortening (mvcf) tended to be increased. The results indicated that Qigong had a regulatory effect on haemodynamic alteration as well as on improvement of left ventricular function. Nailfold microcirculation detection of 120 aged subjects was made. It found that hypertension had an accelerating effect on the disturbance of microcirculation. The incidence of disturbance of microcirculation was 73.91% in the deficiency of heart-energy hypertensive patients, after 1 year Qigong practice, the incidence of disturbance of microcirculation was 39.13% ($P<0.01$). The result suggested that Qigong had an effect to improve the disturbance of microcirculation. The above data indicate that Qigong can benefit heart-energy and regulate the blood channel.

**Key Words** hypertension, deficiency of heart-energy, ultrasonic cardiogram, microcirculation

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