

论著

## 三七总皂苷和红花总黄酮配伍对急性血瘀大鼠血液流变学的改善作用

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**摘要** **目的** 观察三七总皂苷(PNS)和红花总黄酮(ECT)配伍对急性血瘀模型大鼠血液流变学指标的影响。**方法** 大鼠按分组分别ig给予PNS 50 mg·kg<sup>-1</sup>、ECT 200 mg·kg<sup>-1</sup>及PNS+ECT、阿司匹林100 mg·kg<sup>-1</sup>。每日早晚ig给药各1次,共7次。第5次给药后,sc给予肾上腺素加冰浴造成急性血瘀模型。锥板法测定全血黏度和血浆黏度;微量毛细管法测定红细胞压积;光电比浊法测定二磷酸腺苷(ADP)诱导的血小板聚集;光电电磁法测定凝血参数。**结果** 与正常对照组相比,模型组大鼠全血黏度和血浆黏度升高,红细胞聚集指数和血小板最大聚集率显著增加,红细胞压积显著升高,纤维蛋白原(Fib)含量显著增加,凝血酶时间(TT)、活化部分凝血酶时间和凝血酶原时间(PT)均显著缩短( $P<0.01$ )。与模型组相比,单独应用PNS和ECT均能显著降低全血黏度及血浆黏度,明显降低红细胞压积、红细胞聚集指数和血小板最大聚集率,显著延长PT,其中PNS还能显著降低Fib含量,延长TT。与单独应用PNS或ECT相比,PNS+ECT配伍能进一步改善血液流变学指标,在降低红细胞压积上优于单用PNS( $P<0.05$ ),对血小板最大聚集率的抑制作用则优于单用PNS或ECT( $P<0.05$ )。与阳性对照阿司匹林相比,单用PNS或ECT抑制血小板聚集的作用不及阿司匹林,但PNS降低Fib的作用较好;PNS+ECT配伍对血液流变学的改善作用与阿司匹林相似,但在抑制红细胞聚集和血小板聚集,降低Fib含量,延长TT和PT等指标上无统计学差异,但有优于阿司匹林的趋势。**结论** PNS和ECT单用能显著改善血瘀模型大鼠血液流变学的异常,且二者配伍后能增强对血瘀模型大鼠血液流变学的改善作用。

**关键词** [三七总皂苷](#) [红花总黄酮](#) [血液流变学](#) [血瘀](#) [血小板聚集](#) [全血凝固时间](#) [纤维蛋白原](#)

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## Ameliorative effects of *Panax notoginseng* saponins combined with *Carthamus tinctorius* flavonoids on hemorheology in rats with acute blood stasis

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### Abstract

**OBJECTIVE** To evaluate effects of *Panax notoginseng* saponins extract (PNS) combined with *Carthamus tinctorius* extract (ECT) on the hemorheological abnormality in rats with acute blood stasis. **METHODS** Rats were randomly divided into normal control, model, PNS 50 mg·kg<sup>-1</sup>, ECT 200 mg·kg<sup>-1</sup>, PNS 50 mg·kg<sup>-1</sup>+ECT 200 mg·kg<sup>-1</sup>, aspirin 100 mg·kg<sup>-1</sup> (positive) groups. Rats were ig given corresponding drugs twice a day for consecutive 7 times. After the fifth administration, rats were sc given adrephrin and ice water soaking to set up acute blood stasis model. Whole blood viscosity and plasma viscosity were evaluated by cone-plate viscometer, hematocrit determined by micro-capillary method, platelet aggregation measured by photoelectric turbidimetry and coagulation parameters evaluated by optical electromagnetic method. **RESULTS** Compared with normal control group, blood viscosity and plasma viscosity of rats in blood stasis model group significantly increased; erythrocyte aggregation index (EAI) and the maximum platelet aggregation rate were also remarkably elevated. Simultaneously, hematocrit and fibrinogen (Fib) content were also increased, while prothrombin time (PT), activated partial thrombin time (APTT) and thrombin time (TT) were shortened( $P<0.01$ ). Compared with model group, PNS 50 mg·kg<sup>-1</sup> or ECT 200 mg·kg<sup>-1</sup> alone could obviously decrease whole blood viscosity and plasma viscosity, reduced EAI and hematocrit, inhibited ADP-induced platelet maximum aggregation rate, prolonged PT( $P<0.01$ ). Meanwhile, PNS 50 mg·kg<sup>-1</sup> significantly decreased Fib content but delayed TT. Compared with each single administration, PNS 50 mg·kg<sup>-1</sup>+ECT 100 mg·kg<sup>-1</sup> ameliorated the abnormal hemorheology further in rats with acute blood stasis, as revealed by lower hematocrit ( $P<0.05$ ) and greater platelet

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maximum aggregation inhibition (compared with PNS group,  $P < 0.05$ ). Compared with aspirin group, PNS and ECT showed less inhibition of platelet aggregation, while PNS had a little better effect in Fib content reduction. PNS+ECT exerted similar hemorheology improvement as aspirin, and it showed more potent effect in inhibiting EAI and platelet aggregation, reducing Fib content, prolonging TT and PT. **CONCLUSION** PNS+ECT improved the abnormal hemorheology in rats with acute blood stasis, and which was further strengthened than these two drugs alone.

**Key words** [saponins of Panax notoginseng](#) [flavonoids of Carthamus tinctorius](#) [hemorheology](#)  
[blood stasis](#) [platelet aggregation](#) [whole blood coagulation time](#) [fibrinogen](#)

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