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Effect of procainamide on platelet adhesion in rats

YANG You-Shu, ZHOU Yao-Xin, MA Fen-Bao, SHAN Chun-Wen[1] (*Department of Physics, [1]Department of Pharmacology, First Military Medical University, Guangzhou 510515, China*)

ABSTRACT Effect of procainamide on platelet adhesion in rats was studied with the improved rotating glass sphere method. Procainamide of 136.0, 34.0, 8.5 $\mu mol \cdot L^{-1}$ *in vitro* and 10 $mg \cdot kg^{-1}$ *in vivo* inhibited significantly the platelet adhesion with the inhibitory rates of 56 %, 28 %, 8 %, and 24 %, respectively. It showed that procainamide given *in vitro* or *in vivo* produced an inhibition on platelet adhesion.

KEY WORDS procainamide; platelet adhesiveness; rheology

Procainamide (Pro) given *in vitro* or *in vivo* causes inhibition of platelet aggregation induced by ADP and clonidine[1-3]. This study was to explore the effect of Pro on platelet adhesion and explain the mechanism of this effect with rheological principles.

MATERIALS

Pro (10 $mg \cdot ml^{-1}$) was made by Beijing Pharmaceutical Factory. Adhesiometer was made by Wuxi Shitangwan Medical Instrument Factory (Model WTP — AIII). Syringes, needles, test tubes were siliconized with 1 % methyl silicon oil. Twenty-two Sprague Dawley rats of both sexes, weighing 294 ± s 20.5 g, were supplied by the Animal Experimetal Centre of the First Military Medical University.

METHODS AND RESULTS

***In vitro* experiments** Rats were anesthetized with ether. The blood from inferior vena cava was anticoagulated with 3.8 % sodium citrate. Blood (1 ml) was added into each of 4 tubes. Pro (0.1 ml) was added into the first 3 tubes so that the final concentration of Pro in these tubes became respectively as 136, 34, 8.5 $\mu mol \cdot L^{-1}$. Normal saline was added into the 4th tube. Took 0.8 ml from each tube into a long-necked round bottle and loaded on a revolving tray (3.7 rpm) at 37 ℃ for 15 min. The platelet number before and after adhesion was counted with a hemocytometer. The rate of platelet adhesion was calculated by the following formula[4].

$$A_r = (N_1 - N_2)/N_1 \times 100\ \%$$

Where A_r is the platelet adhesive rate, N_1 and N_2 represent the platelet number before and after adhesion in a unit volume.

The Pro with final concentration of 136, 34, and 8.5 $\mu mol \cdot L^{-1}$ inhibit the platelet adhesion in rats and the inhibitory rates were 56 %, 28 %, and 8 %, respectively (Tab 1).

***In vivo* experiment** Sixteen rats were equally divided into 2 groups at random. In the first group, Pro 10 $mg \cdot kg^{-1}$ was injected into inferior vena cava, and equal volume of saline was injected in the second group. After 5 min, blood samples were obtained from inferior vena cava. The rates of platelet adhesion were measured by the same method as that *in vitro* experiment.

Pro 10 $mg \cdot kg^{-1}$ produced a 24 % inhibition of platelet adhesion (Tab 1).

DISCUSSION

It was found that the average platelet adhesive rate was lower in experimental groups than in control groups and it decreases with increasing concentration of Pro (Tab 1).

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Tab 1. Effect of procainamide (Pro) on rat platelet adhesion. $n=6$ *in vitro*, $n=8$ *in vivo*. $\bar{x}\pm s$. $^bP<0.05$, $^cP<0.01$ *vs* saline.

Drug	$10^{-10}\times$ Platelets·L^{-1} Before adhesion	After adhesion	Rate of adhesion/%	Rate of inhibition/%
Saline	86.5±2.7	58±4	33±6	
Pro μmol·L^{-1} 136.0	86.5±2.6	74±3	14±2^c	56±10
34.0	86.5±2.6	66±2	23±3^c	28±8
8.5	86.5±2.6	61±4	30±6^b	8±6
Saline	83.0±4.0	59.2±2.6	29.0±1.7	
Pro 10 mg·kg^{-1}	83.0±4.0	64.0±3.0	22.3±2.4^c	24±8

As the glass round bottle was rotating, the blood in the bottle flowed relative to the glass surface. Some platelets in the blood were activated by the tangential stress, and granules inside the cell were released, and the microfilaments and microtubules contracted. The platelet stretched out its pseudopodia. When these platelets came into contact with the internal surface of the glass bottle, they would adhere to the surface of the glass. Pro inhibited the release reaction of platelets and protected the platelet from harmful effects when activated, and as a result, reduced the platelet adhesive rates.

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普鲁卡因胺对大鼠血小板粘附的影响

杨有恕，周耀兴，马凤宝，单春文[1]（第一军医大学物理教研室，[1]药理教研室，广州 510515，中国）

摘要 我们用改进的旋转玻球法研究了普鲁卡因胺对大鼠血小板粘附的影响。普鲁卡因胺体外 136.0，34.0，8.5 μmol·L^{-1}和体内 10 mg·kg^{-1}显著抑制血小板粘附，其抑制率分别为 56 %，28 %，8 %和24 %，表明体内或体外给予普鲁卡因胺对血小板粘附产生抑制作用.

关键词 普鲁卡因胺；血小板粘附；流变学