

芪甲丹注射液对丙线照射家兔 微循环障碍的改善作用

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内容提要 本文报道应用荧光微血管造影法测定丙线照射家兔的耳—眼循环时间和球结膜毛细血管通透性,显示 400 拉德照射兔的耳—眼循环时间明显延长,毛细血管通透性增高。经芪甲丹注射液治疗,上述指标减轻,表明该注射液可促进放射损伤的修复。

动物受丙线照射后全身微循环可出现明显的改变。微循环障碍使血液“泣而不行”,“血气不至”,组织细胞缺血缺氧导致功能继发性损害,此即祖国医学所称“血瘀证”。中西医结合的研究证明活血化瘀法有改善微循环障碍的作用⁽¹⁾,本文报道应用荧光微血管造影法测定循环时间和毛细血管通透性,观察益气祛瘀方药芪甲丹注射液对丙线照射家兔微循环障碍的改善作用。

实验动物和方法

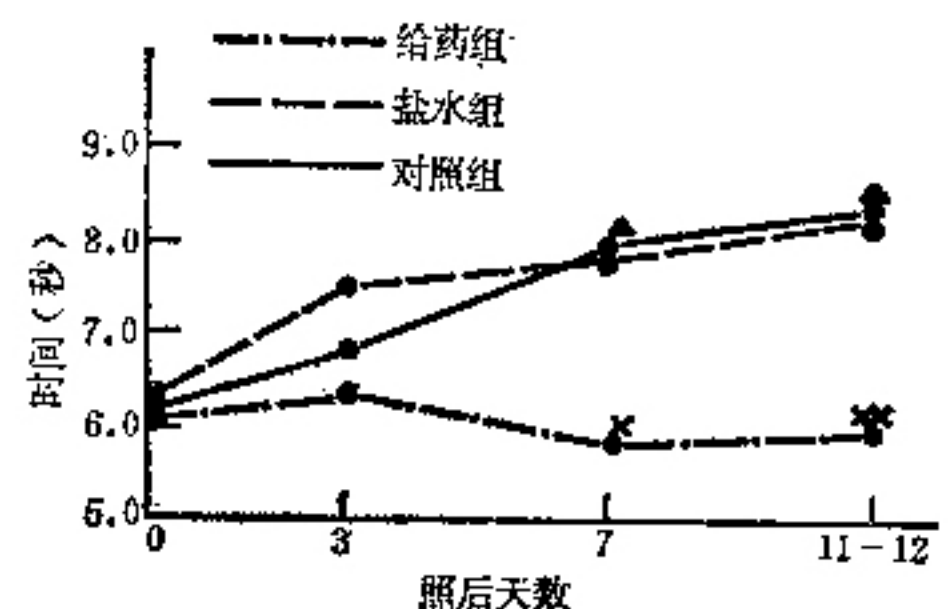
采用健康雄性白色家兔 30 只,体重 2.5~3.0kg。动物侧卧固定,不麻醉,用开睑器张开左眼睑,待动物安静后用显微镜直接观察球结膜微循环,选择微血管清晰、血流稳定,包含细动脉、毛细血管和细静脉的区域作观察视野。按金惠铭等报道的方法和判断标准作荧光微血管造影⁽²⁾。造影剂用 10% 荧光素钠溶液,剂量为 100mg/kg,在三秒钟内快速由右耳缘静脉推注完毕,用秒表记录从注射造影剂开始到观察视野中细动脉和毛细血管显影的时间,为耳—眼循环时间。毛细血管通透性,按荧光素钠快速流过毛细血管时的渗漏程度分为三度:(1)毛细血管显影清晰,荧光素钠局限在毛细血管内,与周围组织分辨清楚,表示毛细血管通透性正常;(2)毛细血管显影模糊,管壁周围有黄绿色荧光“晕”者,表示毛细血管通透性轻度增高;(3)毛细血管显影较浅,甚至与周围组织荧光无法分辨,视野中呈现一片黄绿色荧光,则表示毛细血管通透性明显增高。

实验家兔被分为照射不给药组(下称对照组)、照射给盐水组(下称盐水组)和照射给药组(下称给药组)。照射用⁶⁰钴丙线进行,剂量率 69.9~78.8 伦/分,总剂量为 400 拉德。于照射前和照射后 3、7、11~12 天

进行荧光造影。给药组动物照后每日耳缘静脉推注芪甲丹注射液一次,共 5 次(照后 3 天在荧光造影后给药)。芪甲丹注射液由黄芪、山甲、丹参、红藤、川芎按 0.4:0.2:0.17:0.15:0.08 比例,经水煎、酒沉,浓缩液加 3% 葡萄糖液助溶制成。每毫升含生药 1.0g, pH 为 6.8。给药剂量为 0.84g/kg。盐水组动物每日静脉推注生理盐水 2 ml,次数同上。

结 果

一、对照射家兔耳—眼循环时间的影响:30 只正常家兔的耳—眼循环时间为 6.20 ± 0.94 秒。400 拉德丙线照射后耳—眼循环时间延长,于第 7 天和 11~12 天为明显,分别为 7.92 ± 1.89 秒($P < 0.01$)和 8.27 ± 1.59 秒($P < 0.01$),较照前延长 30% 左右。给药组家兔的耳—眼循环时间照射后未见明显延长,照射前为 6.09 ± 0.84 秒,照后分别为 6.37 ± 1.43 秒、 5.78 ± 1.27 秒、 5.88 ± 0.99 秒,第 7 天和 11~12 天比其余两组明显缩短($P < 0.01$)(附图)。



附图 不同组照射家兔的耳—眼循环时间

注: * 与对照比 $P < 0.05$ * * 与对照比 $P < 0.01$

△照后与照前比 $P < 0.01$

二、对照射家兔球结膜毛细血管通透性的影响:照射前全部实验动物的球结膜毛细血管通透性均正

常。400 拉德丙线照射后第 3 天即见毛细血管通透性增高,以第 7 天为最明显,多数动物呈现明显增高(表 1)。

表 1 不同组照射兔球结膜毛细血管
通透性增高的发生率(%)

组别	照后 3 天		照后 7 天		照后 11~12 天	
	轻度	明显	轻度	明显	轻度	明显
给药组	50.0	0	70.0	20.0	40.0	20.0
盐水组	77.8	11.1	28.6	71.4	12.5	87.5
对照组	54.5	35.4	20.0	80.0	37.5	62.5

给药组家兔的毛细血管通透性改变较轻,多数呈现轻度增高,明显增高的发生率较低。

三、照射家兔球结膜微循环的形态改变:对 18 只照射家兔(每组 6 只)球结膜微循环形态观察的结果表明,芪甲丹注射液治疗家兔的微循环形态改变也有不同程度的改善(表 2)。表现在微血管扩张较轻,血流改善和渗出减轻,出现粒摆流和停滞例数较少,多数表现为轻度或中度障碍。

表 2 不同组照射兔球结膜微循环障碍发生情况

组别	照后 3 天			照后 7 天*			照后 11~12 天**		
	轻度	中度	重度	轻度	中度	重度	轻度	中度	重度
给药组	3/6	2/6	1/6	2/5	2/5	1/5	2/5	1/5	2/5
盐水组	0	1/6	5/6	0	0	4/4	0	1/4	3/4
对照组	0	1/6	5/6	0	0	5/5	0	1/3	2/3

注:轻度障碍:微血管轻度扩张、流速稍慢、轻度渗出
中度障碍:微血管明显扩张、流速缓慢、呈粒流或粒缓流、泥沙样流、明显渗出

重度障碍:出现钟摆流和停滞、出血

* 观察兔中各有 1、2、1 只死亡

** 观察兔中各有 1、2、3 只死亡

讨 论

在研究“血瘀”病证中经常需观察血液流速和毛细血管通透性。荧光微血管造影方法简单,成象清晰,用以测定家兔耳一眼循环时间,可作为实验研究反映

体内血流速度的指标,又可同时观察毛细血管通透性。我们对正常家兔的测定结果为 6.20 ± 0.94 秒,与金惠铭等报道一致⁽²⁾。丙线照射后由于血液粘度增加、细胞电泳率变慢和微血管扩张、血细胞聚集出现粒流、泥沙流或粒摆流,甚至停滞等改变^(3~5),导致血流缓慢、瘀滞不畅,使照射家兔的耳一眼循环时间延长,这种延长以第 7 天为明显,11~12 天继续延长。同时可见毛细血管通透性增高,在毛细血管周围有大量荧光物质的渗漏。这与毛细血管的辐射敏感性较高、照射后内皮细胞退变、脱落、细胞间质破坏和基底膜损伤有关。与此同时,可见球结膜微循环形态的明显改变,出现微血管明显扩张、血流缓慢呈粒流、粒缓流,甚至粒摆流和停滞,表现为中度或重度障碍。

业已表明,祖国医学的“血瘀”证与微循环障碍有密切关系⁽¹⁾。射线照射后可引起明显的微循环障碍,从而表明“血瘀”是放射损伤早期病理征象之一。我们已往的实验表明,益气祛瘀方药芪甲丹注射液对丙线照射小鼠和犬均有一定治疗作用⁽⁶⁾。球结膜荧光微血管造影的测定显示芪甲丹注射液可使照射家兔的耳一眼循环时间保持在照前水平,比对照动物明显缩短,毛细血管通透性有所减轻,形态观察也显示微血管扩张减轻,流态改善和渗出减轻。由此似可表明,芪甲丹注射液通过改善微循环功能,维持一定的血液流速,以利组织细胞的物质代谢,促进放射损伤的修复。

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欢迎订阅 欢迎投稿

**Effects of Qi Jia Dan Injection (芪甲丹注射液) on Improving Microcirculatory
Disturbances of Rabbits Irradiated with γ -rays
— Determination of Blood Circulation Time and Capillary Permeability by Fluorescence Angiography**

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The blood circulation time from ear to eye determined by fluorescence angiography of bulbar conjunctival microvessels of rabbits may be taken as an index of blood velocity in the laboratory. It may also be used to observe the capillary permeability. This paper reports that the ear to eye blood circulation time of normal rabbits was found to be 6.20 ± 0.94 sec, and the circulation time of rabbits irradiated with 400 rads of γ -rays was prolonged, especially on the 7th and 11-12th day which was found to be 7.92 ± 1.89 sec and 8.27 ± 1.59 sec respectively. The capillary permeability also increased markedly after irradiation. The blood circulation time of rabbits given Qi Jia Dan injection (芪甲丹注射液) after irradiation returned to normal. The capillary permeability was also mitigated. Morphologic changes were found improving.

(Original article on page 295)

Effect of *Typha Angustata* on Experimental Acute Myocardial Infarction in Rabbits

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In traditional Chinese medicine *Typha angustata* (TA) was stated to possess the function of promoting tissue blood perfusion and eliminating circulatory stasis. It has the function of improving microcirculation, inhibiting-exudation effect and reducing aggregation of platelets. It may be used to protect myocardial cells from ischemic injuries or infarction.

Acute myocardial model was produced by ligation of the left ventricular branch of coronary artery of the rabbit, and effects of TA treatment were observed and compared with those of verapamil, and normal saline and blank control.

N-BT staining was used to identify the extent of infarction and the injured myocardium was examined histologically in detail. The results showed that TA treatment can significantly reduce the size of infarction as verapamil does. It is suggested that TA might be introduced to further clinical trials.

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The Labor-Induction Effect of Injectio Typha and Its Pharmacological Properties

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The labor-induction effect of injectio typha was confirmed in 14 pregnant albino mice and 16 pregnant guinea pigs. The effective dosage was 2-3g/kg. Results of common pharmacological experiments of injectio typha are as follows: The LD_{50} is 35.57g/kg. The effective dosage of injectio typha in labor-induction experiments was 12-18 times lower than that of the LD_{50} dosage in mice, therefore it is rather safe. Intraperitoneal injection of injectio typha shows hypersensitivity. It causes haemolytic effect, shortens the time of blood coagulation and thus promotes the said process. It decreases total count of both red and white cells, and has a temporal inhibitory effect on the excised toad heart and also decreases the blood pressure of rabbits. Injectio typha has an excitatory effect on the uteri of rabbits both in vitro and vivo, smaller dosage has the effect of enhancing the contraction of uteri, but with larger dosage, the excitatory effect is so obvious that irregular and spasmodic contraction is observed.

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