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（Pd-Pm=7 kPa）

（Pm=74 kPa）

实验发现，改变瞬间动脉血量的

3 讨论

比值颅前道部的值血压力

机理，调节与控制，其实验测

量出，仪器，测量，脑血流

关，脑血管，颅内压，脑灌注压，

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皮细胞和培养血管内皮细胞，其结构和功能均有损伤性改变。以往的实验发现，高速投射物伤后 4～6 h 神经体液因子的变化最为明显，为尽可能排除神经体液因子的变化对血管 内皮细胞的损伤作用，本实验在动物伤后 6 h 解剖，结果，大体见心、肺、脑等脏器均有不同程度的血管破裂，出血或毛细血管充血，表明远达效应的存在。

高速高能致伤时，产生较强的冲击波（压力波），作用于循环管路，引起体液（主要是血液）的剧烈扰动。这种扰动以血锤效应的方式迅速向远隔部位传播，直至终末脏器。在这一过程中伴有大量的能量释放，接受了这种能量的内皮细胞可能导致其形态结构和功能的改变[4]。这可能构成远达效应的病理基础。继发性神经体液因子的变化则进一步加速和加剧这种损伤性改变。从而使伤后某些严重并发症的发生发展成为可能。

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Pathomorphological observations on distant vascular endothelial cells after high－velocity projectile wounding in swine

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Abstract In order to provide experimental basis for the hypothesis of blood disturbance, which is used to explain the remote injurious effects of high－velocity projectile wounding, pathomorphological observations on distant vascular endothelial cells were carried out after the soft tissues of one thigh of pigs werre injured with high－velocity projectiles. It was found that in the 6th hour after wounding, rupture of blood vessels and bleeding or congestion in various degrees of capillaries were seen in the lower lobes of the lungs, posterios wall of the left ventricle and posterior and ventral surface of the cerebrum. Under optical microscopy, edema of the endothelium and 'Shoe-nail shaped' sloughing endothelium hanging into the lumen were found in the aortic arch. On serial sections, slonghing of the endothelium could be demonstrated. Under transmission electron microscopy, separation of intercellular junctions, swelling or rupture of the cell membrane, loosening of the cytoplasm and increase of the cytoplasmic vacuoles and decrease of organelles in number of the vascular endothelial cells were shown.

The findings suggest that the pathomorphological changes of the distant vascular endothelial cells result obviously from the remote effects of high－velocity projectiles which induce violent disturbance of the blood throughout of the body at the time of wouding and subsequently the neuro－humoral system is also involved.

Key words wounds, gunshot; endothelium/PA; remote effect

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