

脉冲电场和磁场对高血粘和高凝血影响的比较研究

文峻¹、谢恒堃¹、钟力生¹、杨继庆²、张建保²、屈学民²

1 西安交通大学电力电气国家重点实验室

2 第四军医大学生物医学工程系物理学教研室

比较研究脉冲电场和脉冲磁场对高血粘和高凝血的影响, 探寻降低血液粘度, 抑制凝血过快、过强的物理方法。每份血样等分9份, 1份作对照, 对另外8份分别作不同的脉冲电场或磁场处理。结果显示: 不同上升沿速率的脉冲电场和磁场对高血粘和高凝血的影响程度不同, 上升沿速率为 $2.5 \times 10^5 \text{Ts}^{-1}$ 的脉冲磁场使全血表观粘度 η 降低($P < 0.01$)、复钙凝血时间 t_r 变长($P < 0.01$), 血块的最大剪切应力 τ_{\max} 变小($P < 0.01$)。脉冲磁场作用能改善高血粘和高凝血状况。

COMPARATIVE RESEARCH OF EFFECTS OF PULSED ELECTRIC FIELDS AND PULSED MAGNETIC FIELDS ON HYPERVISCOSITY

The effects of pulsed electric fields or pulsed magnetic fields on hyperviscosity and hypercoagulation of blood have been studied and a new physical way to reduce blood viscosity and restrain coagulation was explored. A blood sample is equally divided into nine portions, one was used as control, and the other eight were respectively treated with pulsed magnetic or electric fields of different strength. With radiation of pulsed magnetic field of $2.5 \times 10^5 \text{Ts}^{-1}$, blood apparent viscosity (η) decreases ($P < 0.01$), the coagulation time (t_r) gets longer ($P < 0.01$), the biggest clotting stress (τ_{\max}) decreased ($P < 0.01$). The pulsed magnetic field can improve the status of hyperviscosity and hypercoagulation of blood.

关键词

脉冲(Pulse); 电磁场(Electromagnetic fields); 辐照(Radiation); 血液粘度(Blood viscosity); 凝血(Blood coagulation)