

论著

## 肝硬化大鼠肝缺血再灌注损伤肝细胞死亡方式

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**摘要** 摘要:目的 研究肝硬化大鼠肝缺血再灌注(I/R)损伤时肝细胞死亡的主要方式。方法 采用四氯化碳复合法制作肝硬化大鼠模型,将肝硬化大鼠随机分为假手术(SO)组和I/R组,I/R组建立70%肝I/R模型,并于再灌注后0、1、6、24、48h取材。比较各组的血清丙氨酸转氨酶(ALT)、天冬氨酸转氨酶(AST)水平,肝细胞钠钾ATP酶、钙ATP酶活性,流式细胞仪检测肝细胞胀亡和凋亡百分比,电镜观察肝细胞形态学改变。结果 与SO组相比,I/R组再灌注后血清ALT、AST水平显著升高(P<0.05),6h达高峰,后逐渐下降;肝细胞钠钾ATP酶、钙ATP酶活性显著下降(P<0.05),于再灌注1h达低谷,后逐渐恢复;再灌注早期(6h内)肝细胞死亡方式以胀亡为主,后期(24h后)凋亡细胞逐渐增多;电镜下可见典型胀亡和凋亡改变。结论 胀亡是肝硬化大鼠肝脏I/R损伤肝细胞死亡的主要方式,肝功能损伤与胀亡密切相关。

**关键词** [肝硬化](#) [再灌注损伤](#) [胀亡](#) [凋亡](#)

分类号

## Patterns of Hepatic Cells Death during Hepatic Ischemia/Reperfusion Injury in Cirrhotic Rats

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**Abstract** ABSTRACT: Objective To research on the main pattern of hepatic cells death during hepatic ischemia/reperfusion(I/R) injury in cirrhotic rat. Methods Cirrhotic rat model was established by carbon tetrachloride replication. These rats were randomly divided into sham operation group and I/R group. In the I/R group, 70% I/R injury model was established and then the liver samples were taken 0, 1, 6, 24, and 48 hours after reperfusion. Serum alanine aminotransferase (ALT)/aspartate aminotransferase (AST) levels, Na<sup>+</sup>-K<sup>+</sup> ATPase, and Ca<sup>2+</sup> ATPase were compared. the percentage of apoptotic/oncotic hepatic cells was measured with flow cytometry, and the changes in hepatic cellular structures were observed under transmission electron microscope. Results Compared with the sham operation group, the levels of serum AST and ALT significantly increased in the I/R group (P<0.05), reaching their peak levels at the 6th hour. The activities of Na<sup>+</sup>- K<sup>+</sup> ATPase and Ca<sup>2+</sup> ATPase dramatically decreased one hour after reperfusion and then gradually recovered(P<0.05). Hepatic cells mainly suffered oncosis at the early stage after reperfusion (within 6 hours);at the late stage (around 24 hours after reperfusion), apoptosis became the main death pattern. Conclusion Oncosis is the main pattern of hepatic cells death during I/R injury in cirrhotic rat, and the severity of hepatic injury correlates with the oncosis.

**Key words** [liver cirrhosis](#) [reperfusion injury](#) [oncosis](#) [apoptosis](#)

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