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#### *Basic Study*

**Morphological alterations and redox changes associated with hepatic warm ischemia-reperfusion injury**

Jawad R *et al.* Hepatic warm ischemia-reperfusion injury

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#### **Abstract**

##### *AIM*

To study the effects of warm ischemia-reperfusion (I/R) injury on hepatic morphology at the ultrastructural level and to analyze the expression of the thioredoxin (Trx) and glutaredoxin (Grx) systems.

##### *METHODS*

Eleven patients undergoing liver resection were subjected to portal triad clamping (PTC). Liver biopsies were collected at three time points; first prior to PTC (baseline), 20 min after PTC (post-ischemia) and 20 min after reperfusion (post-reperfusion). Electron microscopy and morphometry were used to study and quantify ultrastructural changes,

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