

## **Akt Activation Protects Liver Cells from Apoptosis in Rats during Acute Cold Exposure**

Jiye Wang, Yaoming Chen, Wenbin Zhang, Gang Zheng, Shanshan Meng, Honglei Che, Tao Ke, Jingrun Yang, Jingyuan Chen?, Wenjing Luo?

Department of Occupational and Environmental Health, Faculty of Military Preventive Medicine, Fourth Military Medical University, 169 Changle West Road, Xi'an, Shaanxi 710032, China.

**Abstarc :**

Accidental deaths due to exposure to extremely low natural temperature happen every winter. Exposure to extreme cold causes injury of multiple organs. However, early responses of the bodies to acute extreme cold exposure remain incompletely understood. In this study, we found that hepatic glycogen was rapidly reduced in rats exposed to -15°C, and the key enzymes required for glycogenesis were upregulated in the livers of the cold-exposed rats. In line with the rapid consumption of glycogen, acute cold exposure induced a transient elevation of cellular ATP level, which lasted about one hour. The ATP level went back to basal level after two hours of cold exposure. Four hours of cold exposure resulted in cellular ATP depletion and cell apoptosis. The dynamic change of cellular ATP levels was well associated with Akt activation in cold-exposed liver cells. The activation of Akt was required for cold exposure-induced ATP elevation. Blockade of Akt activation diminished the transient increase of intracellular ATP content and exacerbated cell apoptosis during acute cold exposure. These results suggest that Akt activation plays a pivotal role in maintaining cellular bioenergy balance and promoting liver cell survival during acute cold exposure.

**Key Word :**

Cold exposure, Rat, Liver, Apoptosis, ATP, Akt.

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