



## Exercise Biochemistry Review

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### **The influence of different intensity exercise on DEN-induced hepatocellular carcinoma and liver metabonomic study**

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**Objective** To study the influence of high intensity exercise and long-term moderate intensity endurance exercise on DEN-induced hepatocellular carcinoma (HCC) by metabonomics approach, and compare the anti-tumor effect between the different intensity exercise.

**Methods** From 8 to 26 weeks of age, mice with DEN treatment run on the treadmill at different intensity. NC: injection saline only. DEN: injection DEN only. HIT: treatment DEN, running on the treadmill at 1.5km/h, alternating run 2 minutes and rest 2 minutes for 40 minutes once a day, 5 days a week. ET: treatment DEN, running on the treadmill at 0.8 km/h for 40 minutes once a day, 5 days a week. Gas chromatograph time-of-flight mass spectrometry (GC-TOFMS) test liver samples of mice and multi-dimensional statistical methods found differential metabolites in all group.

**Results** We observed that tumor incidence was similar between DEN and HIT; however, it was significantly smaller in ET compared to DEN and HIT. Orthogonal partial least squares analysis (OPLS) model was generated based on identified metabolites and showed clear discrimination from only DEN injection group and endurance exercise group, endurance exercise group and high intensity interval exercise group. Compared to DEN group, the level of galactinol, timonacic, glycine, cholesterol, carbamate and palmitic acid significantly decreased in endurance exercise group. Nevertheless, the level of malonic acid, ornithine and glutamic acid obviously increased in endurance group.

**Conclusions** Long-term endurance exercise inclines the hepatic tumor incidence by regulating the level of liver palmitic acid and glutamic acid metabolism. In addition, high intensity interval exercise does not have the effect to prevent tumor development.