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[Mechanisms of beneficial effects of exercise training on non-alcoholic fatty liver disease \(NAFLD\): Roles of oxidative stress and inflammation](#)

Abstract:

Non-alcoholic fatty liver disease (NAFLD) is a common chronic liver disorder which is associated with accumulation of fats in the liver. It causes a wide variety of pathological effects such as non-alcoholic steatohepatitis (NASH) and cirrhosis, insulin resistance, obesity, hypertension, dyslipidaemia, diabetes and cardiovascular disease. The molecular mechanisms that cause the initiation and progression of NAFLD are not fully understood. Oxidative stress (OS) induced by reactive oxygen species (ROS) and inflammation are likely a significant mechanism which can lead to hepatic cell death and tissue injury. Mitochondrial abnormalities, down-regulation of several antioxidant enzymes, glutathione (GSH) depletion and decreased activity of GSH-dependent antioxidants, accumulation of leukocytes and hepatic inflammation are the major sources of ROS overproduction in NAFLD. Excessive production of ROS suppresses the capacity of other antioxidant defence systems in NAFLD and causes further oxidative damage. Regular exercise can be considered as an effective strategy for treatment of NAFLD. It improves NAFLD by reducing intrahepatic fat content, increasing β -oxidation of fatty acids, inducing hepato-protective autophagy, overexpressing peroxisome proliferator-activated receptor- γ (PPAR- γ), as well as attenuating hepatocyte apoptosis and increasing insulin sensitivity. Exercise training also suppresses ROS overproduction and OS in NAFLD via up-regulation of several antioxidant enzymes and anti-inflammatory mediators. Therefore, an understanding of these molecules and signalling pathways gives us valuable information about NAFLD progression and a method for developing a suitable clinical treatment. This review aimed to evaluate sources of ROS and OS in NAFLD and the molecular mechanisms involved in the beneficial effects of exercises on NAFLD.

Keywords: Exercise, NAFLD, oxidative stress, inflammation, reactive oxygen species

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