Time-dependent changes in inflammatory markers in a rat model of colitis by leisure sport activity

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Introduction

A regular exercise has a beneficial effect on chronic inflammatory disorders, but little is known about the influence of exercise on inflammatory bowel disease.

Methods

After 3, 6 and 10 weeks self-administered exercise (running wheel) male Wistar rats were treated with TNBS (10 mg) to induce colitis. Groups are: absolute control, running control, non-running TNBS and running TNBS-treated. 72 h after TNBS treatment colon samples were collected to measure inflammatory parameters (3/6/10 weeks), myeloperoxidase (MPO, 6/10 weeks), heme-oxygenase (HO) and nitric-oxide-synthase (NOS) activities (6 weeks running).

Results

The TNBS treatment increased the inflammatory parameters, enhanced the activities of MPO and HO, decreased the activity of constitutive NOS (cNOS) and increased the activity of inducible NOS (iNOS) compared to the absolute control group. There was no difference between running TNBS and the non-running TNBS-treated group in inflammatory parameters after 3 weeks running.

The 6 weeks running significantly increased the activity of HO (from 1.3±0.2 to 2.8±0.3 nmol bilirubin/h/mg protein) and cNOS (from 321.1±35.2 to 438±30.1 pmol/min/mg protein) compared to the absolute control group.

In the 6 and 10 weeks running TNBS-treated groups, inflammatory markers including extent of lesions (6 weeks: from 58.2±3.9% to 42.9±3.2%; 10 weeks: from 63.5±2.7% to 54.1±3.1%), severity of mucosal damage (6 weeks: from 8.1±0,5 to 6,6±0,3; 10 weeks: from 8.5±0.4 to 7.3±0.3) and MPO activity (6 weeks: from 880.6±79.3 to 568.4±59.9 mU/mg protein; 10 weeks: from 999.8±63 to 691.2±98 mU/mg protein) were decreased.

After 6 weeks running in the TNBS treated group there was no difference in the HO activity, while the cNOS activity increased (from 108.9±25.6 to 333.9±32.3 pmol/min/mg protein) and the iNOS activity decreased (from 217.5±26.4 to 128.9±15.8 pmol/min/mg protein) compared to the non-running TNBS group.

Conclusion

These data suggest that recreational physical exercise is able to ameliorate the acute colonic inflammation induced by TNBS challenge. This beneficial effect may be mediated through the modifications of activity of HO/NOS enzymes.

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