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Nandrolone decanoate interferes on testosterone biosynthesis and alters blood-testis barrier

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Nandrolone decanoate (ND) is a synthetic testosterone analogue considered one of the most commonly abused anabolic androgenic steroids by adolescents and athletes. ND is alleged to promote an increase in muscle mass and improves both physical appearance and sporting performance, but ND abuse is often associated with serious adverse effects, interfering with the endocrine system and the reproductive system. In a previous study, we demonstrated that ND treatment of Leydig cells interferes with the biosynthesis of testosterone in a dose increase-dependent fashion [1]. As a consequence of the results obtained in vitro, in this study an animal model was utilized to better understand the side effects of ND administration in sedentary and trained mice. A group of mice underwent endurance training while another set led a sedentary lifestyle. All experimental groups were treated with either ND or peanut oil at different doses for 6 weeks. Testosterone serum levels were measured via liquid chromatography–mass spectrometry. Western blot analysis and quantitative real-time PCR were utilized to determine gene and protein expression levels of the primary enzymes implicated in testosterone biosynthesis and gene expression levels of the blood–testis barrier (BTB) components. Immunohistochemistry and immunofluorescence were conducted for testicular morphological evaluation. The study demonstrated that moderate to high doses of ND induced a diminished serum testosterone level and altered the expression level of the key steroidogenic enzymes involved in testosterone biosynthesis. At the morphological level, ND induced degradation of the BTB by targeting the tight junction protein-1 (TJP1). ND stimulation deregulated metalloproteinase-9, metalloproteinase-2 (MMP-2) and the tissue inhibitor of MMP-2. Moreover, ND administration resulted in a mislocalization of mucin-1. In conclusion, ND abuse induces a decline in testosterone production that is unable to regulate the internalization and redistribution of TJP1 and may induce the deregulation of other BTB constituents via the inhibition of MMP-2. ND may well be considered as both a potential inducer of male infertility and a potential risk factor to a low endogenous bioavailable testosterone.

References

[1] Pomara et al (2016) Effects of Nandrolone Stimulation on Testosterone Biosynthesis in Leydig Cells. J Cell Physiol. 231: 1385–91.

Key words

Nandrolone decanoate, testosterone, blood–testis barrier.

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