TRIMETAZIDINE – A METABOLIC MODULATOR IN PERFORMANCE SPORTS

Cocman Valeria[1], Timercan Tatiana[1]
[1]Department of Biochemistry and Clinical Biochemistry, Faculty of Medicine No.1, State University of Medicine and Pharmacy *Nicolae Testemitanu*, Chisinau, Republic of Moldova

Background: Trimetazidine, used in the treatment of angina pectoris, is a metabolic modulator that optimizes cellular myocardial energy metabolism in hypoxia. Due to its potentially ergogenic effects, in 2014 it was included in the World Anti-Doping Agency (WADA) class S4 Hormones and Metabolic Modulators list of prohibited substances.
Objective of the study: To elucidate the metabolic effects of trimetazidine at the cellular and tissue level, its influence on physical performance, and the potential health risks associated with its unauthorized use in competitive performance sports.
Materials and methods: Scientific articles (clinical trials, meta-analyses) published in the period 2015–2025 in PubMed, Medline, ResearchGate, Google Scholar databases and official reports of the National Anti-Doping Agency of the Republic of Moldova were critically analyzed to define the realities of trimetazidine use in performance sports.
Results: During ischemia, when oxygen supply is limited, trimetazidine inhibits fatty acid oxidation and promotes glucose utilization, a metabolic mechanism that significantly improves mitochondrial and cellular myocardial energy efficiency. This metabolic adaptation reduces intracellular acidosis, prevents accumulation of toxic fatty acid metabolites, and provides important cardioprotective effects. These metabolic effects underlie its potential adaptogenic role during intense physical overload, explaining its use by athletes to enhance metabolic efficiency and exercise endurance. However, abusive or unauthorized use may cause neurological adverse effects, including extrapyramidal syndromes.
Conclusions: Trimetazidine, through its metabolic and cardioprotective actions, remains a significant concern in sports medicine. The controversial data regarding its doping potential justify continued monitoring by WADA.
Keywords: Trimetazidine, metabolic modulation, cellular metabolism, doping, performance sports, WADA.