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MOLECULAR ADAPTATIONS TO EXERCISE: THE DUAL ROLE OF IRISIN AND BDNF IN METABOLIC AND RESPIRATORY HEALTH

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Background and aim. Irisin and Brain-Derived Neurotrophic Factor (BDNF) are emerging as key mediators of exercise-induced health benefits. While both contribute to metabolic and neurophysiological regulation, their differential responses to varying exercise intensities and their combined effects on body composition and lung function in young adults remain inadequately explored. This study aimed to assess the acute and delayed responses of BDNF and irisin to physical exertion and their relevance to metabolic and respiratory health.

Materials and methods. Fifteen healthy adults (mean age: 25.47 years; BMI: 23.99 kg/m²) completed moderate- and high-intensity exercise sessions in a two-phase design. Blood samples were collected at baseline, 2 hours, and 24 hours post-exercise. Serum BDNF and irisin concentrations were quantified and analyzed in relation to anthropometric data, pulmonary function (via spirometry), and lifestyle factors. Statistical evaluation included Wilcoxon and t-tests, as well as Spearman correlation analysis.

Results. Exercise significantly elevated both BDNF and irisin concentrations ($p<0.05$). BDNF demonstrated a stronger response to high-intensity training and positively correlated with FEV_1 and lean body mass. Irisin responses were more heterogeneous: while lean participants showed pronounced increases post-exercise, obese individuals exhibited elevated baseline levels without significant post-activity changes. These patterns suggest distinct regulatory mechanisms and potential compensatory responses in differing body compositions.

Conclusions. BDNF and irisin exhibit intensity-dependent secretion patterns and correlate with metabolic and pulmonary health indicators. Their divergent yet complementary roles underscore their utility as biomarkers and possible therapeutic targets for optimizing physical and cognitive function through individualized exercise interventions in young populations.

Keywords. BDNF; irisin; exercise intensity; metabolism; pulmonary function; adolescent health.