The molecular mechanisms behind the benefits of exercise

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Leading a sedentary lifestyle increases risk of developing type 2 diabetes. European scientists focused on delineating the mechanisms responsible for the beneficial effects of exercise on our metabolism.

The past years have seen a dramatic increase in the incidences of type 2 diabetes, obesity and metabolic syndrome. Urgent measures are required to prevent the cost of this epidemic from becoming overwhelming for healthcare systems.

Although genetic factors may predispose certain individuals to

developing these conditions, environmental determinants also play a crucial part. Obesity and insulin resistance, both precursors of type 2 diabetes, arise due to an imbalance between energy intake and energy expenditure. It is now well established that regular exercise, combined with an improved diet, provides protection against the development of these conditions, as well as a first line of treatment.

The EU Exgenesis consortium aimed to provide a better understanding of the molecular mechanisms that provide these beneficial effects of exercise. Project partners analysed the effects of bed rest in young men with increased risk of type 2 diabetes due to genetic or environmental factors.

Results indicated that bed rest caused insulin resistance which could not be compensated by carriers of the TCF7L2 gene variant that predisposes to type 2 diabetes. Gene expression analysis led to the identification of genes involved in mitochondrial function and other novel genes that may be responsible for the development of insulin resistance.

Interestingly, many of the gene expression changes were different between the genetic and the environmental factor risk groups providing clues as to how these groups may respond differently to a lack of physical activity. Furthermore, epigenetic changes due to environmental factors were suggested to influence susceptibility to type 2 diabetes.

The Exgenesis project findings should lead to the identification of novel targets and treatments against type 2 diabetes, as well as encouraging new policies to promote healthier lifestyles.

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