



# **The Possible Association between Thyroid Dysfunction in Male Rat Model and Serum Irisin Level and Glycemic Status**

**Thesis**

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**By**

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## SUMMARY

Thyroid hormones play a fundamental role in the regulation of vital activities, such as metabolism, muscle physiology and maintain baseline energy expenditure, also play a critical role in thermogenesis by increasing uncoupling protein 3 (UCP3) mRNA expression in muscle tissue.

Thyroid dysfunction is one of the most common endocrine disorders. It is closely associated with glucose intolerance by various mechanisms including energy homeostasis, pancreatic beta cell function, insulin resistance and oxidative stress.

Irisin is a novel adipomyokine discovered in 2012 by Boström et al., secreted mainly by myocytes and acts as a crosstalk between skeletal muscle and other organs and tissues, especially adipose tissues. It has been the focus of intensive research since its identification, because it has been associated with beneficial effects on several metabolic conditions such as obesity, type 2 diabetes mellitus (T2DM), hypothyroidism, PCOS, and other endocrine and metabolic disorders via its capability to influence adipose tissue and glycemic homeostasis.

Regarding the actions of irisin, both in animals and humans, the results are contradictory but interesting. Owing to numerous similarities in action between irisin and thyroid hormones it seems imperative to explore these substances'. **The aim of the present study** was to determine the effect of experimental thyroid dysfunction on circulating irisin levels in rat model and to see the association with glycemic status.

Forty-five adult male albino rats were included in this study divided into three groups (15 rats/group):

**Group (I): Control normal:** Healthy rats received tap water, fed on normal standard diet and kept without any medications.

**Group (II) Hypothyroid group:** Rats in this group received PTU 50 mg/kg body weight/day for 4 weeks (*El-Tantawi and Abozeid, 2019*).

**Group (III) Hyperthyroid group:** In this group, rats received Eltroxin in increasing doses, beginning from 50 µg to reach 200 µg/Kg body weight daily for 4 weeks (*Guerrero et al., 1999*).

At the end of the experiment blood samples were collected and the separated sera were analyzed for: Estimation of TSH, fT4, fT3, irisin and insulin by ELISA techniques. Biochemical analysis of serum glucose was performed as well and calculation of HOMA-IR and HOMA-B. Additionally, the weights and lengths of rats were measured at the beginning and at the end of the experiment for calculation of the BMI.

The results revealed a significant increase in serum TSH, irisin, fasting glucose, fasting insulin and HOMA IR in hypothyroid group which also exhibited a significant decrease in serum fT3, fT4, HOMA B and BMI compared to the control group.

However, a significant decrease in serum irisin, TSH, BMI and HOMA B in hyperthyroid group which showed a significant increase in serum fT3, fT4, fasting glucose, fasting insulin and HOMA IR.

Moreover, serum irisin was directly correlated with TSH levels and negatively correlated with fT3 and fT4 levels.

**In conclusion,** this study demonstrated increased irisin concentration in hypothyroid group and its decrease in hyperthyroid one, this confirms the speculated interaction between irisin and thyroid hormones and suggests that THs could be in vivo regulators of irisin secretion.