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Η συμμετοχή αυτή έγινε με σκοπό την παρουσίαση των αποτελεσμάτων ερευνητικής σπάθειας προ

’ την οποία έφεραν σε πέρας οι μαθητές με την καθοδήγηση του αρχιάτρου Αναστασιάκη Αθανασίου

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του Harvard κυρίου Χρήστου Μαντζώρου (επιτίμου μέλους του ΣΑ/ΣΣΑΣ), ο οποίος χει επιδειξει

τεράστιο ενδιαφέρον κι έχει αφιερώσει πολύ χρόνο και ενέργεια σε μια προσπάθεια να παράσχει

διαχρονικώς στους μαθητές της Σχολής μας μια πιο ολοκληρωμένη κλινική και ακαδημαϊκή εκπαίδευση

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SAT-123

Circulating follistatin and irisin in young, healthy individuals: A one-year prospective cohort study

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Abstract

Follistatin and irisin are both increased during exercise and affect body composition and glucose homeostasis. The main aim of the study was the evaluation of circulating follistatin and its association with anthropometric and biochemical parameters, as well as with insulin resistance. The secondary aim was to study the seasonal variation of follistatin and irisin. This was a one-year prospective cohort study. Eighty young, apparently healthy individuals (42 males/38 females; age 21.9±0.1 years; BMI 23.8±0.3kg/m²) were recruited. They were subjected to anthropometric measurements, dietary questionnaires, and blood sampling at baseline and one year later, without any intervention. A sub-group of 20 randomly selected individuals were subjected to additional, mid-season blood sampling (seasonal sub-study). No significant correlation was observed between follistatin and irisin levels, lean or fat body mass; both at baseline and year 1. Follistatin levels were similar between males and females at baseline and year 1. Furthermore, follistatin levels were similar regardless Mediterranean Diet Score or Healthy Eating Index or the day of menstrual cycle in women. Although BMI, waist circumference and fasting glucose remained statistically unchanged at year 1, fasting triglycerides (p=0.02), insulin (p=0.003) and HOMA-IR (p=0.005) were significantly increased at year 1. A significant reduction in follistatin levels was observed at year 1 (572±20 pg/ml) compared to baseline (907±51 pg/ml; p<0.001). Follistatin levels at baseline and year 1 were correlated (r=0.57; p<0.001). After sequential adjustment of follistatin levels (baseline to year 1) for sex, delta (Δ) BMI (or Δ waist circumference), Δ triglycerides, and Δ HOMA-IR, the reduction in follistatin levels at year 1 remained statistically significant (estimated marginal means at baseline 810.32 and 574±21 at year 1; p<0.001), with only Δ HOMA-IR to significantly, albeit minimally, affect the within group comparison (p=0.01). There was no seasonal variation in either circulating follistatin (p=0.31) or irisin (p=0.11) levels. In conclusion, follistatin levels were decreased, whereas triglyceride and insulin levels, as well as HOMA-IR were increased in this cohort of healthy, young individuals at year 1. Only Δ HOMA-IR seems to affect the reduction in follistatin levels, which remained statistically significant independently from other study's parameters. Baseline anthropometric, nutritional or biochemical parameters were not predictive of follistatin levels at baseline.

Introduction/Aims

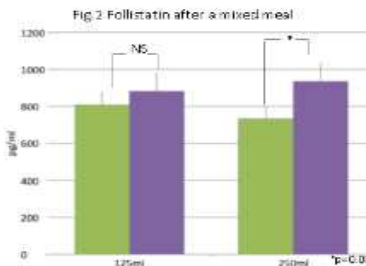
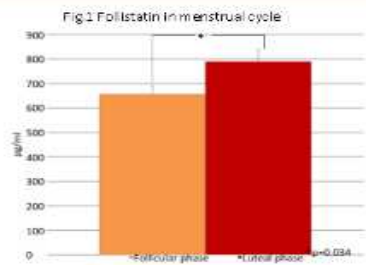
- ▶ Follistatin is a hormone which binds to Transforming Growth Factor-beta (TGF-β) superfamily members, antagonizing their action.
- ▶ Follistatin stimulates muscle growth, through the inhibition of myostatin; it inhibits inflammation and fibrosis, by binding to activin.
- ▶ Recently, follistatin has been shown to promote adipocyte browning, as well as to improve insulin sensitivity.
- ▶ Irisin is a newly-discovered myokine, which is increased by short term exercise, and induces fat adipose tissue browning.
- ▶ The main aim of our study is to evaluate predictors of circulating follistatin in a young, healthy population, and primarily its association with anthropometric, lifestyle, nutritional, and biochemical parameters.
- ▶ Secondary aims were to study the seasonal variation of follistatin and irisin, as well as the effect of a mixed meal in serum follistatin levels.

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Population & Methods

- ▶ 122 apparently healthy, young Caucasian medical students of both genders were recruited at baseline.
- ▶ To study the effects of nutrient intake on follistatin, a sub-group of 34 randomly selected individuals participated in a mixed-meal challenge.
- ▶ A sub-group of 20 randomly selected individuals participated in a seasonal evaluation study to determine the seasonal variation of follistatin and irisin.
- ▶ 93 of the individuals agreed to participate in a study with measurements after one year. Anthropometric characteristics, medical history, day of menstrual cycle in females were recorded, and blood was drawn after an overnight fast, both at baseline and year 1.
- ▶ Dietary and exercise habits of the participants were evaluated by using food frequency questionnaire and a modified version of the International Physical Activity Questionnaire. Dietary outcome measures were the MedDiet score, as well as energy and macronutrient intake. According to their responses to the exercise questionnaire, the participants were classified as having high, moderate, or low physical activity.
- ▶ Participants of the mixed meal sub-study, received a standardized meal consisting of 55% carbohydrates, 15% protein, 30% fat in two quantities, 125ml and 250 ml, and blood samples were collected at baseline and after 30 min.



Results at baseline

- ▶ 61 males and 61 females were recruited (20.0 ± 0.1 years and BMI 23.4 ± 0.2 kg/m²).
- ▶ In females, follistatin levels were lower (pg/ml) than luteal (790 ± 51 pg/ml) phase (Fig 1).
- ▶ Follistatin and irisin levels did not show seasonal variation (p=0.31, p=0.11, respectively).
- ▶ Follistatin increased significantly after the 62; post-meal 936 ± 72 pg/ml; p=0.002, which was observed after the 125 meal consumption.
- ▶ In unadjusted correlations with anthropometric parameters, follistatin levels were significantly correlated with lean body mass (r=0.22; p=0.020).
- ▶ After adjustment for BMI, only the correlation with muscle mass remained significant (r=0.22; p=0.017).
- ▶ In multiple regression analysis, the major determinant of leptin (table 1).
- ▶ After adjustment for leptin (as a surrogate for fat mass), irisin levels were significantly higher in males than females (means: 857 ± 35 and 704 ± 35 pg/ml, respectively).
- ▶ Follistatin levels remained significantly higher in males than females (estimated marginal means: 855 ± 39 and 705 ± 38 pg/ml, respectively; p=0.015).
- ▶ Fat mass (estimated marginal means: 861 and 705 pg/ml, respectively; p=0.004) were added, as covariate in the model.
- ▶ Follistatin was not significantly associated with intake of cereals, vegetables, fruits/nuts, pulses, fish, alcohol, nor with the Med Diet score.
- ▶ No significant correlation between follistatin and physical activity habits in individuals with low, moderate, or high physical activity.
- ▶ Additional analyses, including follistatin's association with energy expenditure, are being performed and the results are forthcoming.

Table 1. Independent predictors of follistatin

Variable	β	Standardized β
Sex (0: males; 1: females)	-139.9	-0.26
Age (years)	48	0.16
Leptin (ng/ml)	6.5	0.29

Conclusions

- ▶ Fat mass is an independent predictor of circulating follistatin in healthy individuals.
- ▶ Follistatin is increased after food intake.
- ▶ Neither irisin nor follistatin have seasonal variation.

Η παρουσίαση των εισηγημάτων στο Συνέδριο προκάλεσε το ενδιαφέρον των παρόντων, οι οποίοι ανταπάντησαν σε ερωτήσεις και έδειξαν μεγάλο ενδιαφέρον για να παραρευθεί ως ακροατήριος στην επόμενη συνέλευση του Συνδέσμου μας, καθώς και λειτουργικά σεβασμούς και ευχαριστίες για την φιλοξενία και τη φιλικότητα των εκτελεστικών μελών της Επιτροπής των Πανεπιστημίων που θα μπορούσαν με με...



Ακόμη οι μαθητές ξεναγήθηκαν στους χώρους όπου εδράζεται και λειτουργεί η
κατασκευαστική Μονάδα (Αναζωογόνηση) στο οποίο και πραγματοποιήθηκαν
τοπικά εργαστήρια με σκοπό να δοθεί στους μαθητές ευκαιρία να προσκαλεθθούν
στην ομάδα και να εργαστούν με την ομάδα που θα τους προσφέρει τα κατάλληλα
εργαλεία και υλικά για την υλοποίηση των έργων τους.



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