Hyperinsulinemia is closely related to low urinary clearance of D-chiro-inositol in men with a wide range of insulin sensitivity.

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We have previously shown that women with polycystic ovary syndrome (PCOS) have increased urinary clearance of D-chiro-inositol (uCl(DCI)), which was positively associated with hyperinsulinemia. The objective of this study was thus to determine if such relationship also exists in men with a large range of insulin sensitivity and levels. A cross-sectional study was performed on 11 brothers of women with PCOS and 21 control men. In this study, brothers served as a model of insulin resistance. We assessed uCl(DCI), urinary clearance of myo-inositol, and insulin levels with a standard 75-g oral glucose tolerance test, a 2-hour euglycemic-hyperinsulinemic clamp, and a 24-hour urine collection. Our results showed in all men together that low uCl(DCI) was strongly associated (P < .001) with hyperinsulinemia, for which uCl(DCI) was a significant predictor independent of other classic factors. Brothers were heavier than controls (P = .02), with increased glucose-stimulated glucose (P < .001) and insulin levels (P < .001) and reduced insulin sensitivity (P = .001). In this group, plasma DCI was increased by 3-fold (P = .02), with a 3-fold decrease in the uCl(DCI) to urinary clearance of myo-inositol ratio, which was almost significant (P = .07). Low uCl(DCI) is strongly associated with hyperinsulinemia in all men, and brothers of PCOS women who are more insulin resistant display increased plasma DCI and borderline decreased uCl(DCI). Thus, compensatory hyperinsulinemia might suppress renal clearance of DCI to increase plasma DCI levels and partially compensate for insulin resistance by improving DCI availability in men. The apparent discrepancy with PCOS women might be explained by higher insulin levels in men as compared with women and requires confirmation.

Greek hyperinsulinemic women, with or without polycystic ovary syndrome, display altered inositols metabolism.

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BACKGROUND We have shown that American women with polycystic ovary syndrome (PCOS) have decreased glucose-stimulated release of a putative mediator of insulin action, D-chiro-inositol (DCI)–containing inositolphosphoglycan (DCI-IPG), and increased urinary clearance of DCI (uCl(DCI)), which was associated with hyperinsulinemia. METHODS: DCI levels and the release of insulin and DCI-IPG during an oral glucose tolerance test (AUCs) were assessed in 27 Greek PCOS and 10 normal Greek women. RESULTS: PCOS women were heavier than controls (BMI = 28.4 versus 23.7 kg/m(2), P = 0.05) with higher waist-to-hip ratios (WHR = 0.78 versus 0.71, P = 0.009) and increased free testosterone (P = 0.048) and AUC(insulin) (P = 0.04). In PCOS women, incremental AUC(DCI-IPG) was significantly decreased by 59% (2158 versus 5276% min, P = 0.01), even after correction for BMI and WHR. Finally, increased uCl(DCI) (r = 0.35, P = 0.04) and decreased AUC(DCI-IPG) (r = 0.46, P = 0.004) were significantly associated with hyperinsulinemia in all women together, even after correction for BMI and WHR (Ps = 0.02 and 0.007), and regardless of PCOS status. CONCLUSIONS: Greek women, with or without PCOS, display increased uCl(DCI) and decreased AUC(DCI-IPG) in association with higher insulin levels but independent of adiposity. Increased clearance of inositol might reduce tissue availability of DCI and decrease the release of DCI-IPG mediator, which could contribute to insulin resistance and compensatory hyperinsulinemia in Greek women, as previously described in American women.

Myo-inositol administration positively affects hyperinsulinemia and hormonal parameters in overweight patients with polycystic ovary syndrome.

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OBJECTIVE: To evaluate the effects of administration of myo-inositol (MYO) on hormonal parameters in a group of PCOS patients. DESIGN: Controlled clinical study. SETTING: PCOS patients in a clinical research environment. PATIENTS: 20 overweight PCOS patients were enrolled after informed consent. INTERVENTIONS: All patients underwent hormonal evaluations and an oral glucose tolerance test (OGTT) before and after 12 weeks of therapy (Group A (n = 10): myo-inositol 2 gr plus folic acid 200 mug every day; Group B (n = 10): folic acid 200 mug every day). Ultrasound examinations and Ferriman-Gallwey score were also performed. MAIN OUTCOME MEASURES: Plasma LH, FSH, PRL, E2, 17OHP, A, T, glucose, insulin, C peptide concentrations, BMI, HOMA index and glucose-to-insulin ratio. RESULTS: After 12 weeks of MYO administration plasma LH, PRL, T, insulin levels and LH/FSH resulted significantly reduced. Insulin sensitivity, expressed as glucose-to-insulin ratio and HOMA index resulted significantly improved after 12 weeks of treatment. Menstrual cyclicity was restored in all amenorrheic and oligomenorrheic subjects. No changes occurred in the patients treated with folic acid. CONCLUSIONS: Myo-inositol administration improves reproductive axis functioning in PCOS patients reducing the hyperinsulinemic state that affects LH secretion.

Dietary myoinositol results in lower urine glucose and in lower postprandial plasma glucose in obese insulin resistant rhesus monkeys.

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In a previous study, D-chiroinositol added to a meal (0.5 g/kg) resulted in significantly lower postprandial plasma glucose concentrations without an increase in insulin concentrations in obese insulin-resistant monkeys. The present report describes the effects of another isomer of inositol, myo-inositol, on postprandial plasma glucose and insulin concentrations and on urine glucose concentrations in 6 similar insulin-resistant monkeys. The three 5 day study periods included a control period (liquid diet ad libitum) and 2 experimental periods (liquid diet ad libitum with either 1.5 g/kg/day myoinositol or D-chiroinositol added). Twenty-four hour urine samples were collected during each 5 day period. On the sixth day of each period the monkeys were anesthetized 110 min after completing either the
control meal (15 ml/kg) or the experimental meals (1.5 g/kg myoinositol or D-chiroinositol) and plasma samples were obtained at 120, 150, 180, 210, 240, 270 and 300 min. The plasma glucose concentration was lower after the meal with myoinositol compared to the control meal at 120, 150 and 180 min (p's < 0.05). The plasma insulin concentration was lower after the meal with myoinositol compared to the control meal at 150 and 180 min (p's < 0.05). In addition, 24 hour urine glucose concentrations were lower during the myoinositol diet compared to the control diet (p < 0.001). The plasma glucose concentration was lower after the meal with D-chiroinositol compared to the control meal at 150, 240, 270 and 300 min (p's < or = 0.05). In obese insulin-resistant monkeys, myoinositol added to the diet lowers urine glucose concentrations and both myoinositol and D-chiroinositol added to a meal lower postprandial plasma glucose concentrations without increasing postprandial insulin concentrations. Therefore, myoinositol, like D-chiroinositol, may be a useful agent for reducing meal-induced hyperglycemia without inducing hyperinsulinemia in insulin-resistant subjects.