The following abstracts from The Endocrine Society Journals have been selected by the editors as being particularly relevant to readers interested in translational science.

Heterozygous Orthodenticle Homeobox 2 Mutations Are Associated with Variable Pituitary Phenotype

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(*J Clin Endocrinol Metab*, published December 4, 2009, 10.1210/jc.2009-1334)

ABSTRACT

Context: Although recent studies have suggested a positive role of *OTX2* in pituitary as well as ocular development and function, detailed pituitary phenotypes in *OTX2* mutations and *OTX2* target genes for pituitary function other than *HESX1* and *POU1F1* remain to be determined.

Objective: We aimed to examine such unresolved issues.

Subjects: We studied 94 Japanese patients with various ocular or pituitary abnormalities.

Results: We identified heterozygous p.K74fsX103 in case 1, p.A72fsX86 in case 2, p.G188X in two unrelated cases (3 and 4), and a 2,860,561-bp microdeletion involving *OTX2* in case 5. Clinical studies revealed isolated GH deficiency in cases 1 and 5; combined pituitary hormone deficiency in case 3; abnormal pituitary structures in cases 1, 3, and 5; and apparently normal pituitary function in cases 2 and 4, together with ocular anomalies in cases 1-5. The wild-type Orthodenticle homeobox 2 (OTX2) protein transactivated the *GNRH1* promoter as well as the *HESX1*, *POU1F1*, and *IRBP* (interstitial retinoid-binding protein) promoters, whereas the p.K74fsX103-OTX2 and p.A72fsX86-OTX2 proteins had no transactivation functions and the p.G188X-OTX2 protein had reduced (~50%) transactivation functions for the four promoters, with no dominant-negative effect. cDNA screening identified positive *OTX2* expression in the hypothalamus.

Conclusions: The results imply that *OTX2* mutations are associated with variable pituitary phenotype, with no genotype-phenotype correlations, and that *OTX2* can transactivate *GNRH1* as well as *HESX1* and *POU1F1*.

Identification and *In vitro* Characterization of Follicle Stimulating Hormone (FSH) Receptor Variants Associated with Abnormal Ovarian Response to FSH

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(*J Clin Endocrinol Metab*, published January 8, 2010, 10.1210/jc.2009-1304)

ABSTRACT

Context: Follicle stimulating hormone (FSH) mediates cyclic follicle growth and development and is widely used for controlled ovarian stimulation in women undergoing infertility treatment. The ovarian response of women to FSH is variable, ranging from poor response to ovarian hyperstimulation.

Objective: We investigated whether genetic alterations of the FSH receptor (FSHR) contribute to this variability.

Design and Patients: Our approach was to study women undergoing treatment with *In Vitro* Fertilization (IVF) falling into the edges of the normal distribution of ovarian response to FSH, with respect to age.

Setting: Yale Fertility Clinic.

Methods: We extracted RNA from cumulus cells surrounding the oocytes of women undergoing IVF and analyzed the FSHR mRNA by RT-PCR and sequencing.

Results: We identified four abnormal FSHR splicing products (3 exon deletions and 1 intron insertion) in the FSHR mRNA in 37% (13/35) of women tested. All alterations affected the extracellular ligand-binding portion of the receptor without causing a frameshift. When transfected in HEK293T cells, all four splicing variants showed markedly decreased cAMP activation compared to controls. Untransfected cells showed no response to FSH, while all the cell lines showed normal cAMP activation when treated

with Forskolin, a non-receptor mediated cAMP stimulant. None of the normal or mutant forms showed any response to luteinizing or thyroid stimulating hormones.
Conclusions: Our findings strongly indicate FSHR variants as being an intrinsic genetic cause of some forms of infertility and identify a need for functional characterization of these variants and the investigation of more individualized ovarian stimulation protocols.

Insulin Modulates Food-Related Activity in the Central Nervous System

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(*J Clin Endocrinol Metab*, published December 8, 2009, 10.1210/jc.2009-1677)

ABSTRACT
Context: Previous data suggest a key role of central nervous insulin action in regulating energy homeostasis.
Objective: We therefore investigated whether insulin modulates brain responses to food and nonfood pictures in a functional magnetic resonance imaging study.
Design and Patients: Nine healthy, normal-weight subjects underwent two functional magnetic resonance imaging measurements to compare the effects of insulin and placebo administration during a visual recognition task with food and nonfood pictures. Insulin was administered intranasally to raise insulin concentrations in the cerebrospinal fluid without altering systemic effects in the periphery. Metabolic parameters were continuously determined during the experiments.
Main Outcome Measure: We measured the changes in brain activity after intranasal insulin administration.
Results: Food pictures were detected faster when compared to nonfood pictures in all conditions without any effect of placebo or insulin. After insulin application, fMRI measurements showed a significantly reduced activity in the presence of food pictures compared to placebo in the right and left fusiform gyrus, the right hippocampus, the right temporal superior cortex, and the right frontal middle cortex. The brain activation induced by nonfood pictures remained unaffected by insulin.
Conclusion: We demonstrate that intranasal insulin led to a reduction of activity in brain areas related to object processing and memory and may have an effect on brain activation with regard to the processing of food pictures. This effect might be part of a mechanism that terminates food intake in the postprandial state.

Are There Any Sensitive and Specific Sex Steroid Markers for Polycystic Ovary Syndrome?

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(*J Clin Endocrinol Metab*, published December 16, 2009, 10.1210/jc.2009-1908)

ABSTRACT
Context: Despite the high prevalence of hyperandrogenemia, the principal biochemical abnormality in women with polycystic ovary syndrome (PCOS), a definitive endocrine marker for PCOS has so far not been identified.
Objective: To identify a tentative diagnostic marker for PCOS, we compared serum levels of sex steroids, their precursors, and main metabolites in women with PCOS and controls.
Design and Methods: In this cross-sectional study of 74 women with PCOS and 31 controls, we used gas and liquid chromatography/mass spectrometry to analyze serum sex steroid precursors, estrogens, androgens, and glucuronidated androgen metabolites; performed immunoassays of SHBG, LH, and FSH; and calculated the LH/FSH ratio.
Results: Androgens and estrogens, sex steroid precursors, and glucuronidated androgen metabolites were higher in women with PCOS than in controls. In multivariate logistic regression analyses, estrone and free testosterone were independently associated with PCOS. The odds ratios per sd increase were 24.2 for estrone [95% confidence interval (CI), 4.0-144.7] and 12.8 for free testosterone (95% CI, 3.1-53.4). In receiver operating characteristic analyses, the area under curve was 0.93 for estrone (95% CI, 0.88-0.98) and 0.91 for free testosterone (95% CI, 0.86-0.97), indicating high sensitivity and specificity.
Conclusion: Women with PCOS have elevated levels of sex steroid precursors, estrogens, androgens, and glucuronidated androgen metabolites as measured with a specific and sensitive mass spectrometry-based technique. The combination of elevated estrone (>50 pg/ml) and free testosterone (>3.3 pg/ml) appeared to discriminate with high sensitivity and specificity between women with and without PCOS.