

Abstract citation ID: bvac150.132

## Adrenal

### ODP053

#### ***Serum Free Cortisol and Free Cortisol-to-Cortisone Ratio Increase After 10 Days of Overfeeding and After 10 Days of Fasting***

*Caitlin Colling, MD, Miriam Bredella, MD, Pouneh Fazeli, MD, Gisela Pachón-Peña, MD, Ravinder Singh, PhD, Anne Klibanski, MD, Clifford Rosen, MD, and Karen Miller, MD*

**Introduction:** Chronic caloric deprivation and obesity are complicated by elevations of serum total cortisol levels. The effects of acute overfeeding and fasting on circulating free cortisol levels and interconversion of cortisone to free cortisol are unknown. We hypothesized that serum free cortisol and free cortisol-to-cortisone ratio (a surrogate measure of 11 $\beta$ -hydroxysteroid dehydrogenase [11 $\beta$ -HSD] activity) would increase after both overfeeding and fasting. **Methods:** We prospectively studied 22 healthy volunteers who underwent a 10-day high-calorie protocol followed by a 10-day fast, separated by a 2-week wash-out period, in a Clinical Research Center. Fasting morning free and total cortisol and free cortisone levels (liquid chromatography-tandem mass spectrometry, Mayo Labs) and percent body fat (dual-energy x-ray absorptiometry) were performed at baseline before and after 10 days of each intervention. **Results:** High-calorie feeding increased total and free cortisol and the free cortisol-to-free cortisone ratio ( $p < 0.001$  to  $p = 0.046$ ). Total and free cortisol, the free cortisol-to-free cortisone ratio, and the free cortisol-to-total cortisol ratio increased after fasting ( $p = 0.001$  to  $0.021$ ). During the high-calorie protocol, there was no significant interaction between sex and time for any of the cortisol parameters. During the fasting visit, the changes in free cortisol and free-to-total cortisol ratio were modified by sex ( $p = 0.014$  and  $0.004$ , respectively for interaction term), with a trend toward a significant interaction between sex and time in the change in free cortisol-to-free cortisone ratio ( $p = 0.054$ ). In subset analyses stratified by sex examining the effect of fasting on free cortisol and the free-to-total cortisol ratio, there were significant increases in men ( $p < 0.001$ ) but not women ( $p = 0.898$  and  $1.000$ , respectively). Baseline percent body fat, measured at the start of the fasting visit, was inversely associated with change in free cortisol ( $\rho = -0.52$ ,  $p = 0.013$ ), free cortisol-to-total cortisol ratio ( $\rho = -0.49$ ,  $p = 0.021$ ) and free cortisol-to-cortisone ratio ( $\rho = -0.47$ ,  $p = 0.029$ ) during fasting. **Conclusion:** Overfeeding and fasting both increase circulating free cortisol levels and appear to alter 11 $\beta$ -HSD activity. The effect of fasting, but not overfeeding, on free cortisol levels is modified by sex. Greater percent fat mass may be relatively protective against starvation-induced hypercortisolemia in women. Further study is warranted to determine whether elevated cortisol levels contribute to complications of starvation and obesity, such as bone fragility.

*Presentation:* No date and time listed