

A commentary on “Testosterone and cortisol jointly modulate risk-taking” by P.H. Mehta, K.M. Welker, S. Zilioli, J.M. Carre, *Psychoneuroendocrinology*, 2015, 56, 88–99 (Letter to the Editor)

Lawrence D. Hayes, Nicholas Sculthorpe, Fergal M. Grace

Psychoneuroendocrinology Vol 63, Jan 2016, pgs. 380–381 DOI:
10.1016/j.psyneuen.2015.05.011

Dear Editor,

We read with interest the work of Mehta et al. (2015) who investigated the influence of salivary testosterone (sal-T) and salivary cortisol (sal-C) on risk-taking behaviors in a mixed gender and ethnicity sample. Authors report a positive relationship between basal sal-T and risk-taking, which was measured using the Balloon Analog Risk Task of Lejuez et al. (2002).

While we found the topic of interest to the psychoendocrinology community, we have concerns with the methodology employed to derive a relationship between sal-T and risk-taking behavior. Firstly, the authors state saliva samples were collected between 10.30 and 17.30 h, which is a sizeable time-frame when considering the known circadian oscillation of steroid hormones in saliva (Riad-Fahmy et al., 1983). Moreover, an anticipatory effect of sal-T and sal-C is known prior to a task (Hayes et al., 2015) and therefore, it is possible that samples analyzed were measures of the anticipatory rise (rather than basal concentrations) of sal-C and sal-T. Furthermore, the mixed gender and ethnicity of the sample may have further confounded potential error rates as a result of increased heterogeneity in androgen status (Litman et al., 2006). Moreover, we recently demonstrated high variability in sal-T and sal-C in a highly controlled laboratory environment (Hayes et al., 2014), which was epitomized by the large standard deviations (SD) observed in this study (the SD of sal-C was greater than the mean). Furthermore, when sal-C was high (+1 SD), the association between sal-T and risk taking was non-significant. These issues, considered alongside the innate variability and pulsatile nature of steroid hormones, suggest the interaction between risk-taking behavior and sal-T may be artifactual and the authors may have fallen victim to classic type I error.

Overall, we find the authors’ conclusion that there were “consistent positive slopes between testosterone and risk-taking only among low-cortisol individuals” to be unsubstantiated as the association was not statistically significant ($p = 0.051$) and only self-reported and informant-reported risk-taking was statistically significant ($p < 0.05$) suggesting that perceived rather than observed risk-taking was associated with sal-T. Finally, we find the absence of “salivary” in title, abstract, and conclusion is misleading as salivary hormones do not consistently demonstrate acceptable agreement with serum values (Granger et al., 2004). With respect to the aforementioned issues with salivary hormone measurement cited herein, the conclusions of Mehta et al. (2015) which infers a cause-and-effect relationship between sal-T and risk-taking are speculative.

References

Granger et al., 2004

D.A. Granger, E.A. Shirtcliff, A. Booth, K.T. Kivlighan, E.B. Schwartz
The trouble with salivary testosterone
Psychoneuroendocrinology, 29 (2004), pp. 1229–1240

Hayes et al., 2015

L.D. Hayes, F.M. Grace, J.S. Baker, N. Sculthorpe
Exercise-induced responses in salivary testosterone, cortisol, and their ratios in men: a meta-analysis
Sports Med., 45 (2015), pp. 713–726

Hayes et al., 2014

L.D. Hayes, N. Sculthorpe, J.D. Young, J.S. Baker, F.M. Grace
Critical difference applied to exercise-induced salivary testosterone and cortisol using enzyme-linked immunosorbent assay: distinguishing biological from statistical change
J. Physiol. Biochem., 70 (2014), pp. 991–996

Lejuez et al., 2002

C.W. Lejuez, J.P. Read, C.W. Kahler, J.B. Richards, S.E. Ramsey, G.L. Stuart, D.R. Strong, R.A. Brown
Evaluation of a behavioral measure of risk taking: the Balloon Analogue Risk Task (BART)
J. Exp. Psychol. Appl., 8 (2002), pp. 75–84

Litman et al., 2006

H.J. Litman, S. Bhasin, C.L. Link, A.B. Araujo, J.B. McKinlay
Serum androgen levels in black, Hispanic, and white men
J. Clin. Endocrinol. Metab., 91 (2006), pp. 4326–4334

Mehta et al., 2015

P.H. Mehta, K.M. Welker, S. Zilioli, J.M. Carre
Testosterone and cortisol jointly modulate risk-taking
Psychoneuroendocrinology, 56 (2015), pp. 88–99

Riad-Fahmy et al., 1983

D. Riad-Fahmy, G.F. Read, R.F. Walker
Salivary steroid assays for assessing variation in endocrine activity
J. Steroid Biochem., 19 (1983), pp. 265–272