Stress can modulate pain (e.g., stress-induced analgesia), an effect that is partly mediated by endogenous opioids (e.g., beta endorphin). However, other stress-related hormones (i.e., cortisol) can also modulate pain. For example, cortisol sensitizes supraspinal regions involved with emotional processing and descending modulation of pain (e.g., amygdala). Thus, cortisol may influence pain via emotional modulation, but this has not been tested in humans. The present study examined salivary cortisol levels and emotional modulation of pain and the nociceptive flexion reflex (NFR, a physiological marker of spinal nociception) in healthy women. Emotional modulation was evaluated using a picture viewing paradigm shown to reliably modulate pain and the NFR, such that unpleasant pictures enhance pain/NFR and pleasant pictures inhibit pain/NFR. Cortisol levels were measured before and after picture viewing and a median split was used to divide the sample into low vs. high cortisol groups. These data were collected as part of a longitudinal study of pain and the menstrual cycle, but only data from the first testing session were used.

Numerical Pain Ratings (NRS): Pain ratings made following each stimulation using a computer-presented, vertically-oriented scale

### Results: Emotional Modulation of Pain

#### Picture Content main effect (p < .001): Valence ratings were lower for mutilation pictures and higher for erotic pictures, which exhibits higher disfluency for mutilation pictures and erotic pictures. No main effect of Cortisol Group or Picture Content by Cortisol Group interaction (p > .05).

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#### Conclusions

Taken together, these data suggest that high cortisol levels are associated with tonic inhibition of spinal nociception and a failure to modulate nociception in response to unpleasant pictures. Future studies should evaluate the individual differences associated with the acute neuroendocrine stress response and the mechanisms by which cortisol levels influence pain modulation. A lack of particular importance becomes clear when one considers that individuals with high cortisol levels are at an increased risk for developing both somatic and mental health problems.

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