The Menstrual Cycle Does Not Affect Diffuse Noxious Inhibitory Control (DNIC), Temporal Summation or Pain Tolerance

Presenting Author: Sebastian Ruehlmann MD
Presenting Author's Institution: Stanford University - Stanford, CA
Co-Authors: Ruth Landau MD - University of Washington - Seattle, WA
John C Kraft BSc - University of Washington - Seattle, WA
Lisa Y Flint BSc - University of Washington - Seattle, WA
Philippe Richebé MD, PhD - University of Washington - Seattle, WA
Brendan Carvalho MBBCh, FRCA, MDCH - Stanford University - Stanford, CA

Introduction: Studies in women examining the impact of the menstrual cycle on pain perception have found conflicting results (1,2). With an increasing interest in studying endogenous pain modulation, evaluating the effect of ovulation on pain perception has become paramount. Many studies have enrolled women without controlling for their hormonal status, thus introducing a potential bias. The aim of this study was to compare assessments of diffuse noxious inhibitory control (DNIC), temporal summation (mTs) and heat pain tolerance (PT) in the follicular and luteal phase of the menstrual cycle in healthy volunteers.

Methods: Healthy non-pregnant volunteers were enrolled into this longitudinal multi-center study. Subjects were studied during 4 cycles during the follicular phase (day 4-10) and the luteal phase (day 18-24); ovulation was confirmed with urine ovulation test strips (Kurkel Enterprises, Redmond, WA). The study involved 8 visits over 7-8 months, during which DNIC, mTs and PT were measured. mTs was determined with a 180g Touch-Test Sensory Evaluator (North Coast Medical, Morgan Hill, CA) on a visual analogue scale (VAS 0-100mm). PT was determined with a thermal sensory analyzer (TSA, Medoc, Israel) on the forearm of the dominant hand. DNIC was measured with the above TSA while the non-dominant hand was emerged in a hot 46.5°C water using a validated methodology (3). Follicular and luteal measures were compared using paired t-tests (P<0.05).

Results: 23 of 30 subjects are enrolled in this ongoing study. To date each subject has completed between 2 and 8 (average 4) of 8 visits. There were no significant differences between follicular and luteal phase in any of the measured pain parameters: DNIC, mTs, and PT (Table). Conclusion: Interim analysis suggests that there are no significant differences for both endogenous pain inhibitory systems (DNIC) or excitatory pain pathways (mTs, PT) between the follicular and luteal phases of the menstrual cycle. One explanation may be that differences in pain modulation, if any, appear at different time points during the hormonal cycle, or that hormonal fluctuations during the ovulatory cycle do not strongly influence pain modulation.

References:
1. Pain 2009;146:47-55

Additional File:
Table: DNIC score, mTs and PT during the follicular phase compared to the luteal phase of the ovulatory cycle

<table>
<thead>
<tr>
<th></th>
<th>Follicular Phase (n=23)</th>
<th>Luteal Phase (n=23)</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNIC score</td>
<td>-0.90 (1.1)</td>
<td>-0.92 (1.3)</td>
<td>0.95</td>
</tr>
<tr>
<td>mTs (0-100)</td>
<td>3.00 (4.3)</td>
<td>1.65 (2.4)</td>
<td>0.09</td>
</tr>
<tr>
<td>PT (°C)</td>
<td>49.17 (1.5)</td>
<td>49.18 (2.5)</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Data presented as mean (±SD)
A negative value for the DNIC score is indicative of efficient endogenous analgesia
A positive mTs value indicates hyperexcitation