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Interstitial Cystitis: The Estrogen Connection

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Interstitial Cystitis: The Estrogen Connection
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Abstract

Interstitial cystitis (IC), or painful bladder syndrome, is an autoimmune condition with an unknown etiology. Common symptoms include urinary urgency, frequency, and bladder and urethral pain and burning. This condition, like many autoimmune disorders, disproportionately affects females; therefore, female sex hormones are hypothesized to play a role in the disorder. My hypothesis is that estrogen, both endogenous and synthetic, affects the severity of IC symptoms. Through surveying the available literature on interstitial cystitis, I have found that IC symptoms often correlate with low estrogen. My hope is that by understanding more about how hormones affect IC, we can come up with better treatment plans for IC sufferers.

Methods

Literature survey was conducted using Google Scholar. Search terms were “interstitial cystitis” and “estrogen”, and “estrogen” and “autoimmunity.” The dates of the referenced publications ranged from 2007 to 2015.

Results

Table 1. Low estrogen is likely to play a role in interstitial cystitis. The perimenstrual phase of the menstrual cycle is associated with the highest amount of interstitial cystitis pain. In addition, mice who lacked an estrogen receptor developed a phenotype resembling IC, implying that estrogen signaling is required for normal bladder homeostasis.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>He, et al., 2015</td>
<td>Estrogen is likely to play a role in interstitial cystitis.</td>
</tr>
<tr>
<td>Yamamoto et al., 2015</td>
<td>An increase in interstitial cystitis symptoms is associated with the perimenstrual phase of the menstrual cycle.</td>
</tr>
<tr>
<td>Powell-Boone et al., 2007</td>
<td>The perimenstrual phase of the menstrual cycle is associated with the highest amount of interstitial cystitis pain.</td>
</tr>
<tr>
<td>Imamov et al., 2007</td>
<td>Female mice who were deficient in estrogen receptor developed a phenotype resembling human interstitial cystitis.</td>
</tr>
</tbody>
</table>

Table 2. Estrogen plays various roles within the immune system, depending upon its concentration, the estrogen receptor type expressed by the immune cell in question, and the type of immune cell.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Immune Cell Type</th>
<th>Estrogen’s Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tan, et al., 2015</td>
<td>Th1, Treg</td>
<td>Concentration-dependent: stimulated Th1 cells at low concentration and Treg cells at high concentrations.</td>
</tr>
<tr>
<td>Andersson et al., 2015</td>
<td>Th17</td>
<td>Increases migration of Th17 cells to lymph nodes during early stages of autoimmune arthritis, but decreases migration of Th17 cells to joints during the later stages of the disease.</td>
</tr>
<tr>
<td>Laffont and Guéry, 2015</td>
<td>Dendritic Cells</td>
<td>Estrogen activates dendritic cells.</td>
</tr>
<tr>
<td>Muñoz-Cruz et al., 2015</td>
<td>Mast cells</td>
<td>Estrogen causes histamine release from mast cells of female rats, but not male rats.</td>
</tr>
</tbody>
</table>

Conclusions

- The relationship between estrogen and the immune system is highly complex.
- The correlation between IC symptoms and the perimenstrual phase of the menstrual cycle suggest that using a form of birth control which uses a constant level of estrogen and skips the menstrual phase may provide symptom relief. Anecdotal evidence from the #icstrong support group suggest that some women are already doing this, and find it helpful in alleviating their IC symptoms.
- A controlled study using the method suggested above would be helpful to IC patients and their healthcare providers.

References


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