INTRODUCTION

- Chronic prostatitis/chronic pelvic pain syndrome affects 5-10% of men and is characterized by persistent genital discomfort in the absence of infection.
- Suspected peripheral pathophysiological correlates of CP/CPPS pain (prostate inflammation, endocrine abnormalities, pelvic floor muscle dysfunction, and voiding symptoms) have failed to aid clinical subtyping efforts to improve treatment.
- The role of the brain in CP/CPPS has been essentially unexplored, and the identification of brain CP/CPPS biomarkers can potentially advance diagnosis of mechanistically distinct pain subtypes and direct individualized interventions.

METHODS

- Right-handed men with CP/CPPS (n=19) with 1) negative prostate cultures, 2) ≥ 15 score on the NIH-CPSI (including ≥ 1 pain subscale score), and 3) pelvic pain duration ≥ 3 of the previous 6 months were age- and gender-matched with healthy controls (n=16).
- Functional magnetic resonance imaging (fMRI) was conducted in 14 CP/CPPS men as they rated their spontaneous pelvic pain using a finger span device to rate pain intensity.
- Visual rating fMRI scans were obtained from patients and direct individualized interventions.

CONCLUSIONS

- This investigation constitutes the first assessment of brain activity of CP/CPPS pain. CP/CPPS shares some overlap with brain activity evoked by other types of visceral pain (i.e., interstitial cystitis, irritable bowel syndrome), yet a larger sample size will determine whether there is a unique CP/CPPS brain signature, as is seen in other types of chronic pain.
- Anterior insula function and structure covaries with pelvic pain intensity, suggesting a central role of this structure in CP/CPPS. The correlation between magnitude of pelvic pain and anterior insula function supports previous findings that the structure encodes perception of magnitude.
- Preliminary evidence suggests a massive, global reorganization of the intrinsic gray and white matter properties in CP/CPPS. The toll of living with pelvic pain thus appears to reshape the CP/CPPS brain locally and globally.

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**References:**
http://www.apkarianlab.northeastern.edu/publications/supplemental/cpps_supplement.pdf

### Table 1. Clinical characteristics of CP/CPPS sample recruited from a urology clinic population

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>VAS (0-100)</th>
<th>Pain duration (years)</th>
<th>Spontaneous Pain</th>
<th>McGill Pain Questionnaire Pain Scale</th>
<th>NIH-CPSI Total</th>
<th>NIH-CPSI Pain Subscale</th>
<th>NIH-CPSI Voiding Subscale</th>
<th>NIH-CPSI QoL Subscale</th>
<th>NIH-CPSI Depression Inventory</th>
<th>NIH-CPSI Anxiety Inventory</th>
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<td>(0.66)</td>
<td>(0.87)</td>
<td>(0.53)</td>
<td>(1.50)</td>
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</tbody>
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**Brain functional and anatomical changes in Chronic Prostatitis / Chronic Pelvic Pain Syndrome**

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**Brain activity for pelvic pain rating, visual rating, and their contrast**

- A. CP/CPPS group average brain activity maps for spontaneous pelvic pain rating task and visual rating task.
- B. Statistical contrast between CP/CPPS pain and visual rating tasks indicating brain regions that were more active during spontaneous pelvic pain (red - yellow), including right anterior insula and parietal regions. Brain regions that were more active during the visual task (Visual - Pain contrast) are shown as negative activity (blue - green).

**Regional gray matter density is related to CP/CPPS characteristics**

- A. Anterior insula activity is increased in the pain versus visual task (bar graph), and its activity positively correlates with pain intensity.
- B. Pearson correlations between peak anterior insula activity and the McGill Pain Questionnaire global score.
- C. Peak anterior insula gray matter density did not differentiate between CP/CPPS and controls, yet it was positively correlated with pain intensity on the day of the scan.
- D. Peak anterior cingulate cortex gray matter density did not differentiate between CP/CPPS and controls, yet it was positively correlated with pelvic pain duration (in log units).