Differences in habenula kisspeptin expression and its effects on stress coping styles in zebrafish, *Danio rerio*

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### Background

**Stress Coping Styles**

<table>
<thead>
<tr>
<th>Proactive</th>
<th>Reactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggressive</td>
<td>Avoidance</td>
</tr>
<tr>
<td>Sociable</td>
<td>Avoidant</td>
</tr>
</tbody>
</table>

**Physiological Characteristics**

- **Habenu Activity:** Low
- **Raphe Activity:** High
- **Habenu-Raphe Connection:** Weak
- **Neuronal Connectivity:** Few

### Results

**Hypothalamus**

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Hybridization Temp</th>
<th>Blocking Buffer</th>
<th>Antibody</th>
<th>Staining</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>65°C</td>
<td>1X</td>
<td>HRP</td>
<td>Fluorescent/</td>
</tr>
<tr>
<td>II</td>
<td>67°C</td>
<td>1X</td>
<td>Poly-HRP</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>67°C</td>
<td>0.5X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>67°C</td>
<td>0.25X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>67°C</td>
<td>0.1X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>67°C</td>
<td>0.05X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VII</td>
<td>67°C</td>
<td>X</td>
<td></td>
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</tr>
</tbody>
</table>

**Habenu-Raphe Connection**

- **Svets (5-hydroxytryptamine, 5-HT)**
- **Kisspeptin expression from the habenula (presynaptic) and raphe (postsynaptic)**
- **Camera lucida drawings**
- **Cytometric analysis**

### Materials and Methods

- **Materials:** Probes, 5-HT
- **Methods:** Hybridization

### Conclusion and Discussion

- **Proactive and Reactive Zebrafish:**
  - 12 proactive and 12 reactive zebrafish
  - Half male/half female
  - 12 per condition

### Acknowledgments

We would like to thank S. Bresnahan, J. Russ, M. Baker, J. Davila, J. Bargstadt, and A. Goodman for providing critical feedback on the FUSE grant proposal and this project in general. This study was funded by a FUSE grant provided by the University of Nebraska-Omaha's Office of Research and Creative Activity to AW. Additional funding was provided by National Institutes of Health (R15MH113074), Nebraska EPSCoR First Award (CITA-1557417), Nebraska Research Initiative, University of Nebraska-Omaha start-up and University Committee on Research and Creative Activity grants to RW.

### References


**In situ Hybridization**

- **Materials:** Probes, 5-HT
- **Methods:** Hybridization

**Materials and Methods**

- **Materials:** Probes, 5-HT
- **Methods:** Hybridization