Background and Rationale

- Limited time, instructions, and access to brain tissue keeps students and faculty from performing complex brain dissections.
- Plastinated brain dissections provide an alternative; plastinated tissues are dehydrated and impregnated with polymers. They are dry, durable, safe, easy to manipulate and anatomically precise, yet few studies have demonstrated their use in neuroanatomy education.
- There are no available instructions for a complete central nervous system (CNS) extraction in the anatomical literature.

Aim 1: to produce quality dissections for a plastinated brain library and to determine best methods, tools, and practices for CNS extraction.

Aim 2: to determine best methods, tools, and practices for CNS extraction.

Aim 3: to produce a key educational atlas for student use.

Methods

Methods for Aim 1

- Nervous tissue was obtained from the Colorado State Anatomical Board and the pathology department of the University of Colorado.
- The VH Dissector Pro software was used to remove individual brains and spinal cords.
- An experimental approach was taken for CNS removal. Three CNS extractions were performed and detailed notes, photos, and footage were recorded.
- Various tools and approaches were compared and dissection techniques refined to determine best practices for efficient and quality dissection.

Methods for Aim 2

- Summer 2015: attended Annual Plastication Workshop at the University of Toledo Plastication Lab
- Techniques learned: Silicone (S10) (this method was used for the library), Epoxy (E12), Polyester (P40)
- 5 basic steps for plastination, regardless of technique:
  1. Specimen preparation and fixation
  2. Dehydration
  3. Defatting/degreasing
  4. Forced impregnation
  5. Curing
- After dissections were completed, step 1 of plastination was performed at the University of Colorado Anschutz Medical Campus (AMC). Brains were soaked in 20% formalin for 3-6 months, then sent to the University of Toledo Plastication Lab for subsequent plastination steps.

Methods for Aim 3

- After completing brain and CNS dissections, photos of the specimens were taken and used to create an educational atlas for student use.

Results

Results for Aim 1

Figure 3. Results of the first CNS extraction.

Figure 5. Results of the third CNS extraction.

Results for Aim 2

Table 2. Comparison of steps between first and last CNS extractions.

<table>
<thead>
<tr>
<th>Step</th>
<th>First Extraction</th>
<th>Last Extraction</th>
<th>Comparison of approaches/best practices determined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cleaning and preparation</td>
<td>0.5 hrs</td>
<td>0.5 hrs</td>
<td>None</td>
</tr>
<tr>
<td>2. Lauramine O (Lauran)</td>
<td>5 hrs</td>
<td>5 hrs</td>
<td>None</td>
</tr>
<tr>
<td>3. Formalin</td>
<td>10 mins</td>
<td>10 mins</td>
<td>None</td>
</tr>
<tr>
<td>4. Defatting/degreasing</td>
<td>15 mins</td>
<td>5 mins</td>
<td>None</td>
</tr>
<tr>
<td>5. Cure</td>
<td>30 mins</td>
<td>30 mins</td>
<td>None</td>
</tr>
</tbody>
</table>

Comparison of approaches/best practices determined:
- Frontal bone removal: remove in one step, then put bone back in place.
- Bone cuts medial to mastoid processes improves outcome.
- Use forceps/probe to remove bone.
- Use same tools to loosen tissue until optic canal is reached.
- Use清除 modeling tools/probe to remove fat.