Autoclaving as a Viable Sterilization Technique for PIT Tags and Comparative Analysis of Read Range Between Tag Size
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Introduction and Objectives

- PIT tags consists of a microchip encapsulated in a glass ampule that remains inactive (passive) until read by a scanner (Fig. 1)
- Passive integrated transponder (PIT) tags are identification devices used in many different applications in fish and wildlife research (Figs. 2 & 3)
- Tag sterilization is required for the welfare of the organism and to comply with animal care committees
- Current sterilization methods require expensive chemicals and are time intensive
- PIT tags have not been thought to withstand autoclave sterilization (Wagner et al. 2011)
- Biomark has not tested their tags for durability after autoclaving
- Autoclaving would be a simpler, cheaper, and more accessible form of sterilization if proven viable

OBJECTIVES:
- To test if PIT tags are readable after autoclaving
- To test if read ranges between four different sizes of PIT tags vary after autoclaving

Methods and Materials

- We tested 30 PIT tags of four sizes (MiniHPT8 [8 mm], HPT9 [9 mm], MiniHPT10 [10 mm], and APT12 [12 mm])
- We tested readability and measured detection distance twice for each tag both prior to and after autoclaving in field conditions
- We used Biomark’s HPR Plus with portable antenna, HPR Lite reader, and the HPR Plus with racket antenna to detect tags
- To determine read range, we used the HPR Plus with portable antenna and the HPR Plus with racket antenna, but only used HPR Lite reader to test detectability (Fig. 4)
- We determined read range by slowly lowering the antenna while sweeping it back and forth until the tag was detected and then measured the distance from tag to antenna
- After initial detection readings, we autoclaved PIT tags in a Sterilink model 533 HC vacuum sterilizer and repeated detection procedures

Results

Table 1. Mean Read Range Before and After Autoclaving

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>8 mm</th>
<th>9 mm</th>
<th>10 mm</th>
<th>12 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre autoclaving</td>
<td>110.5 mm</td>
<td>157 mm</td>
<td>122 mm</td>
<td>203.2 mm</td>
</tr>
<tr>
<td>Post autoclaving</td>
<td>134.5 mm</td>
<td>174.2 mm</td>
<td>155 mm</td>
<td>246.5 mm</td>
</tr>
</tbody>
</table>

- Autoclaving did not diminish PIT tag detectability (Table 1)
- HPR Lite reader detected all tags pre and post autoclaving
- Size 12 tags were detected at significantly greater distances than all other tags (Fig. 5)

Conclusions and Discussion

- Autoclaving does not alter PIT tag readability or detection distances
- 12 mm PIT tags have significantly greater detection than smaller tags
- If choosing a PIT tag size for a research project, negligible detectability is lost between 8 and 10 mm tags
- Additional studies to examine potential long-term changes in detectability within animals would provide further reliability assurances

Future Directions

- Additional studies to examine potential long-term changes in detectability within animals would provide further reliability assurances

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References

Wagner GN, SJ Cooke, RS Brown, KA Deters. 2011 Surgical Implantation Techniques for Electronic Tags in Fish. Reviews in Fish Biology 21:71-81

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