Background:
Surgical site infections (SSI) are a major cause of morbidity and mortality in US hospitals. Airborne bacteria in operating rooms may contribute to SSI. In Europe but not the US, regulations exist to limit the airborne bacterial levels in the operating theater. In the first part of a multi-part study, we sought to determine whether airborne bacterial levels can be reduced by the HUAIRS system.

Methods:
A newly commercialized HUAIRS from Aerobiotix, Inc. (Dayton, OH) was evaluated as to its efficacy in reducing airborne bacteria present in a plastic surgery operating room at an outpatient surgery center. The reactor system of the HUAIRS utilizes C-band ultraviolet light focused on a reaction chamber filled with a multitude of clear cylindrical silicate quartz crystals to decrease bacteria from the air. An air sampling impactor and agar media plates were placed in multiple locations in the operating room and used to measure the number of colony forming units (CFU) per cubic meter of bacteria in the air before and after the utilization of the HUAIRS.

Results:
The samples of airborne CFU/m³ were measured during surgical procedures over a seven hour sampling period. 12 samples were taken for each of control and HUAIRS periods. The results are as shown below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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</tr>
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<tbody>
<tr>
<td>Control</td>
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<td>34</td>
<td>10</td>
<td>22</td>
<td>27</td>
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<td>16</td>
<td>8</td>
<td>22</td>
<td>14</td>
<td>33</td>
<td>22</td>
<td>23.8</td>
</tr>
<tr>
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<td>13</td>
<td>4</td>
<td>14</td>
<td>7</td>
<td>8</td>
<td>11</td>
<td>17</td>
<td>8</td>
<td>11</td>
<td>8</td>
<td>21</td>
<td>11.1</td>
</tr>
</tbody>
</table>

For the cultured samples obtained, there was a 67.7% reduction in CFU count in twelve paired samples. This reduction is statistically significant (p=.0163) using a paired T-test.

Conclusions:
The HUAIRS device significantly decreases the level of airborne bacteria present in the operating room. Further studies will demonstrate whether this reduction will translate into a decrease in SSI in surgical patients.

1. Aerobiotix, Inc., West Carrollton, Ohio
2. Dept. of Surgery, Weill Cornell Medical College, New York-Presbyterian Hospital-Weill Cornell Medical Center