高温におけるポリオウイルスの安定化に対する塩酸濃度の効果
Effect of Hydrochloric Acid Concentration on the Stabilization of Poliovirus at High Temperature

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Abstract: Attenuated poliovirus Sabin strains type 1 LSc 2ab and type 3 Leon 12a1b have been stabilized in different concentration of hydrochloric acid (HCl) between pH 1.3 to 3.0 at 50°C for 15 minutes. These strains were temperature stable at pH 2.0 which corresponds to the concentration of HCl in human stomach.

The infection route of attenuated poliovirus strains administrated in the form of oral vaccine to children is similar to that of natural infection by wild strains of poliovirus. The mechanism of poliovirus distribution in human has already been explained by Sabin (1956) and Bodian & Horstmann (1965). Both these theories mentioned that neurovirulent as well as attenuated strain reaches to gut through stomach. The pH of human stomach is 1.3 to 1.6, because the concentration of hydrochloric acid is about 0.18%. Wallis and Melnick (1962) reported that maximum stabilization of attenuated poliovirus strain was observed at pH 4.0 against heating for 15 minutes at 50°C. In this study, we demonstrated the stabilization of attenuated poliovirus strain by hydrochloric acid, at pH 2.0 at high temperature.

Attenuated poliovirus Sabin strains type 1 LSc 2ab and type 3 Leon 12a1b were diluted to $6.5 \times 10^6$ PEU/ml in different concentration of HCl in physiological saline to final pH between 1.3 to 3.0, and samples were heated at 50°C for 15 minutes in a water bath. Control was also run in the same way but in saline without hydrochloric acid.

As shown in Table 1, maximum stabilization of poliovirus strains LSc 2ab and Leon 12a1b were observed at 0.0049 M HCl against 15 minutes heating at 50°C. This finding
suggested that the attenuated poliovirus strains were mostly temperature stable at pH 2.0 which is closer to the concentration of hydrochloric acid in human stomach.

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Table 1. Effect of different concentration of hydrochloric acid on the stability of poliovirus heated at 50°C for 15 minutes.

<table>
<thead>
<tr>
<th>Molarity of HCl</th>
<th>pH</th>
<th>Residual infectivity in log (PFU/ml)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0493</td>
<td>1.307</td>
<td>1.5</td>
</tr>
<tr>
<td>0.0049</td>
<td>2.309</td>
<td>6.5</td>
</tr>
<tr>
<td>0.0024</td>
<td>2.619</td>
<td>3.5</td>
</tr>
<tr>
<td>0.0009</td>
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<td>2.0</td>
</tr>
<tr>
<td>0.0000</td>
<td>7.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Initial infectivity of the virus in log (PFU/ml): 6.8

REFERENCES


高温におけるポリオウイルスの安定化に対する塩酸濃度の効果
Ashok Kumar Srivastava（長崎大学熱帯医学研究所ウィルス学部門）
Jirí Koza, Irena Mátyašová（チェコスロバキア、プラハ、衛生疫学研究所腸内ウィルス部）
ポリオウィルス弱毒株 Sabin 1 型、LSc 2ab と 3 型 Leon 12a1,b を pH 1.3から3.0の間の種々の濃度の塩酸溶液中で50℃、15分間処理してその安定性を検討したところ、ヒトの胃酸濃度に相当する pH 2.0で最も安定であるという結果が得られた。

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