Effect of Manganese on the AV Node of Dog
in situ

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CHIBA, S., SATOH, K. and HASHIMOTO, K. Effect of Manganese on the AV Node of Dogs in situ. Tohoku J. exp. Med., 1973, 111 (4), 405-406 — MnCl₂ induced negative dromotropic effect on the AV node of dogs in situ. At a dose level above 10 mg, a transient AV block was observed. The injection of 1-3 mg of MnCl₂ suppressed the acceleration of AV nodal rhythm, which was induced by administration of 1 μg of norepinephrine. —— AV node; MnCl₂; nodal rhythm; AV block

In the previous paper (Chiba and Hashimoto 1973), the present authors studied effects of manganese on pacemaker activity of the SA node, using a direct perfusion technique of the sinus node artery of the dog heart in situ (Hashimoto et al. 1967). They reported that 1-3 mg of manganese given into the sinus node artery inhibited the positive chronotropic response to 0.03-0.3 μg of norepinephrine.

In this study, the authors examined effects of manganese administered into the AV node artery on the AV conduction and also on norepinephrine-induced AV nodal tachycardia, using a direct perfusion technique of the AV node artery (Nadeau and Amir-Jahed 1965; Chiba and Hashimoto 1968). Five mongrel dogs, weighing 10 to 13 kg, were anesthetized with sodium pentobarbital, 30 mg/kg, i.v., and were tracheotomized for the artificial respiration. The threshold dose for induction of AV block by MnCl₂ was about 1-3 mg. At a dose level above 10 mg, a various degree of AV block was frequently observed which, however, recovered the normal conduction within 10 to 20 min. The injection of norepinephrine into the AV node artery shortened PR interval and then converted to AV nodal tachycardia at a dose of 1 μg. Fig. 1 and Table 1 show inhibitory effect of manganese on norepinephrine-induced nodal tachycardia.

Fig. 1. Blocking effect of 3 mg of MnCl₂ on the AV nodal tachycardia induced by 1 μg of norepinephrine. SBP, systemic blood pressure: HR, heart rate (beats/min).

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TABLE 1. Effect of MnCl₂ on AV nodal tachycardia induced by norepinephrine

<table>
<thead>
<tr>
<th>Number of dogs</th>
<th>Initial sinus rate (beats/min)</th>
<th>Maximum rate of AV nodal rhythm induced by 1 µg of norepinephrine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>MnCl₂ treatment (1 to 3 mg)</td>
</tr>
<tr>
<td></td>
<td>After 30 sec</td>
<td>After 10 min</td>
</tr>
<tr>
<td>5</td>
<td>137±10</td>
<td>194±9</td>
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<tr>
<td></td>
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<td>160±17</td>
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<td>182±11</td>
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</tbody>
</table>

In this study, the present authors demonstrated that manganese chloride induced negative dromotropic effect and depressed the automaticity of the AV node activated by norepinephrine.

References