43) Development of Autonomic Function on Heart Rate in newborn SHR.

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We observed that the heart rate (HR) in spontaneously hypertensive rat (SHR) 3 days old from 18, 20 days of gestation age tended to be at lower rate than in wistar kyoto rat (WKY) at the same stage. And these tendency decreased and was not observed until 7 or 14 days old. These might indicate that a developmental autonomic function was different between WKY and SHR. In the

In the present study, we investigated the developmental changes of autonomic balance in SHR and WKY, observing the changes of HR after injection of atropine and propranolol.

The newborn rats in WKY and SHR were at age of 3, 7, 14 days old. Atropine sulfate (ATRO) and propranolol (PROP) were used in this experiment. These drugs were administered by subcutaneous injection and the doses were 5 mg/kg of ATRO or 0.5 mg/kg of PROP. The HRs were measured from electrocardiogram (ECG) which recorded from newborn rats in freely moving by the method of lead II system. The HRs were measured during 20 min before and 30 min after injection of drug. And the changes of HR due to injection of drug were computed as percent of the basal HR before injection of the drug was 100 %. The intrinsic HR, the sympathetic tone (S-tone), the parasympathetic tone (P-tone) and the net autonomic tone (N-tone) were calculated from the single autonomic blockade data according to the equation which was reported by Lin, Y. C. (J. Appl. Physiol.) and Kuwahara M. (Jpn. J. Vet. Sci).

The effects of ATRO on HR : The changes of HR after injection of ATRO showed significant increase ($p < 0.01$) for the basal HR at 3, 7 days old in the both strains. At 3 days old in SHR, the change of HR showed greatest increase (to maximal 35%) and was significantly different ($p < 0.01$) between WKY and SHR. The increment HR was observed to become low with development in the both strains and no difference was indicated between WKY and SHR at 7, 14 days old.

The effects of PROP on HR : The HRs seemed to decrease after injection of PROP and these decreases of HR indicated significant difference for the basal HR in all tested with PROP. The change of HR showed the greatest decrement (-30%) at 3 days old in WKY and it showed the lowest decrement (-20%) in SHR at 3 days old, which showed significant difference between WKY and SHR ($p < 0.01$). The decrement at 7, 14 days old were nearly same value (-25%) in WKY and SHR.

The development of autonomic nervous tone : The S-tone was recognized to be in a rapid elevation between 3 days old and 7 days old in SHR, but in WKY it seen to be low during the same stage. The P-tone showed similar change in the both strains. The change in pattern of the N-tone was similar to the S-tone and it seemed to be in an opposite development between WKY and SHR.

The results of present study indicated that the effects of ATRO and PROP on the HR were different at 3 days old between WKY and SHR and it changed with development. Thus, we speculated as follows :

(1)- At 3 days old, the P-tone had no difference, but S-tine was elevated higher in WKY than in SHR, as a result the autonomic balance appeared in sight more dominant in P-tone than in S-tone at 3 days old in SHR. Because of this, the HR was at lower rate in SHR than in WKY.

(2)- With development the autonomic balance changed so that the sympathetic response dominated over the parasympathetic response in SHR.

(3)- The development of parasympathetic modulation was similar between WKY and SHR.