Learning Ability of SHR and SHRSP in the Water E Maze.
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Introduction
Several water maze tasks have been widely used on behavioral and learning ability tests in teratology studies. These tasks can examine many animals at a relatively short time in a simple apparatus without hard stress such as deprived food in the growing period. The purpose of this study is to investigate the learning ability of SHR, SHRSP and WKY by using the water E maze apparatus.

Materials and Method
SHR, SHRSP and WKY mature male rats (16-20 weeks of age) bred in our laboratory were examined for the water E maze test. Number of rats of each strain were 10, respectively. Average systolic blood pressure and body weight of SHR, SHRSP and WKY at day 0 in the test period was 185±12, 207±12, 121±9 mmHg and 308±25, 258±16, 327±36 g, respectively. The water E maze apparatus was made of plastic E shape tank, each arm being 45 cm in length, 50 cm in depth and 15 cm in width. The maze was filled with 22±2 °C water to a depth of 30 cm. A start gate was set at the middle arm of E and escape ladder (goal) was placed under water at the end of one arm. The procedure on each trial consisted of placing the rat into the water at the end of start alley, releasing it, and immediately activating a stopwatch.

Test schedule: day 0 (pretest day), straight channel (3 trials); day 1, 1st session (free choice of the direction, the escape ladders were set at the both arms), 2nd-11th session (E maze learning test, an escape ladder was placed at the end of side arm opposite to the arm the rat chose in the 1st session); day 2 and day 3, 1st-10th session (E maze learning test); day 4, 1st-10th session (E maze learning test with the goal reversed).

The swimming time between placement of the test animal into the water and its escape onto the ladder was recorded. Escape was operationally defined as the rat's grasping the ladder with both forepaws. The whole swimming route was exactly recorded on each trial. Errors were defined as selecting error, entries into non-goal arm, and backing error, reversals in the direction away from the goal.

Results and discussion
There were no significant difference in the swimming time among three strains from day 1 to day 3 trials. In the goal reversed trials on day 4, the swimming time of SHR and SHRSP was significantly shorter than that of WKY. In the error counts, there were no significant differences over the all trials. The errorless performance of SHR, SHRSP and WKY were 69%, 69%, 60% at day 1, 95%, 90%, 82% at day 2, 94%, 95%, 98% at day 3, 94%, 68%, 40% at day 4, respectively. At the day 1 trial, the rate of errorless performance of SHR and SHRSP showed higher tendency as compared to WKY, and at the day 4 trials the scores of SHR and SHRSP were significantly higher than WKY. However, there were no significant differences among three strains at day 2 and 3. It is concluded that SHR and SHRSP showed the better learning ability as indicated in the increase of rats with the errorless performance in this water E maze test system. In the previous study, SHR also showed the advanced learning process in the single water T maze test (Matsuo et al.: Jpn. Heart J., 1987), in the Biel maze test (Matsuo et al.: Jpn. Heart J., 1988) and in the under water T maze test (Matsuo et al.: Jpn. Heart J., 1989). However, SHR showed the retardation of learning process compared to WKY in the avoidance conditioning test (Matsuo et al.: Jpn Heart J., 1983). Further studies are necessary to clarify the significance of those learning abilities.