A Novel Method Detecting Hypercoagulability in Small Experimental Animals :Comparison between Spontaneously Hypertensive and Normotensive Rats.

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Purpose: With progress of methods for testing the blood coagulation system, the hypercoagulable state has been detected in patients with ischemic heart disease, diabetes mellitus, disseminated intravascular coagulation, and so on. However, the screening test for thrombotic tendency in the hypertensive model animals has not been established. The purpose of the present study is to detect the hypercoagulable state in hypertensive rats. Coagulation time of whole blood using the highly-diluted tissue factor reagent (T.F) was compared between spontaneously hypertensive rats (SHR) and Wistar Kyoto normotensive rats (WKY).

Methods: Whole blood was collected into a plastic syringe containing 1/10 volume of 3.13% sodium citrate by puncturing the abdominal aortic under anesthesia with ether, stored at 0°C correctly for 40 minutes, and tests were performed by the STAGO automatic blood coagulation analyzer (Boehringer Mannheim). Coagulation time of whole blood (WPT/3) was measured following these procedures; i.e, two-hundred μ l of 3-fold diluted whole blood was incubated for 120 seconds, and 25 μ l of T.F (Boehringerwerke) diluted 600-fold with Tris buffer containing 67.5 mM CaCl₂ was then added on the blood. APTT, PT, and fibrinogen (Fib) were measured by an analyzer, CR-700 (Kokusai Reagent Co.). Blood cell counts were measured by an analyzer, K-4500 (Sysmex). Thrombin-antithrombin complex (TAT) was measured by ELISA (Boehringerwerke).

Results and Discussion: The systolic blood pressure was 177 ± 14.5 mmHg in SHR (n=16), and 132 ± 9.5 mmHg in WKY (n=15), respectively. The body weight and the pulse rate were similar between the groups. There were no significant differences in the time of APTT, PT and Fib concentrations between SHR and WKY, but coagulation time of whole blood in SHR was significantly shorter than that of WKY (76.0 ± 4.1 seconds in SHR, 81.0 ± 6.0 seconds in WKY, $p=0.011$). The level of TAT in SHR was higher than that in WKY (1.46 ± 0.46 μ g/l in SHR, 0.91 ± 0.51 μ g/l in WKY, $p=0.003$), and significant negative correlation was observed between (WPT/3) and TAT ($r=0.499$, $p=0.0043$). Also, there was a significant negative correlation between (WPT/3) and cell counts of erythrocytes ($r=0.71$, $p<0.0001$). The recent study has demonstrated that cell components, not only platelets but also white and red blood cells, play important roles on the blood coagulation. The shortening of coagulation time in SHR suggests hypercoagulable states in SHR. The underlying mechanism to cause the state has been left to be determined.