Vascular Complications in Long-term Breedings
of either Spontaneously Hypertensive Rats or
Wistar Kyoto Rats, with Relation to Hypertension
and Aging.

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Patients with sustained hypertension tends to
be complicated with cardiovascular events.
Therefore, this study is aimed to clarify the
relationship between hypertension and vascular or
tissue lesions using spontaneously hypertensive
rats (SHR) as hypertensive rats and Wistar Kyoto
rats (WKY) as normotensive rats.

Methods: 1 Total 1617 rats aged until 37 months
were recruited, which had been bred under 22°C with
constant humidity in the animal research center,
consisting of 285 male stroke-prone SHR (SHRSP), 322
female SHRSP, 247 male stroke-resistant SHR (SHRSR),
268 female SHRSR, 213 male WKY and 282 female WKY.
Systolic blood pressure was measured by tail-cuff
method. These rats were always autopsied when they
died or were killed, and the presence of bead-like
lesions in mesenteric artery was investigated
microscopically. Under anesthesia with urethan
solution several tissues were removed for
preparing microscopic specimens and rarely
electron microscopic specimens. 2 Microscopic
specimens were stained with Azan in mesenteric
artery, testis, kidney and myocardium.
Results: Systolic blood pressure was the following;
SHRSP > SHRSR > WKY. Bead-like lesions of mesenteric
artery were found in 16% of male SHRSP aged 8 to 9
months, in 6% of female ones, then in 78% of male
SHRSP aged 12 to 13 months, in 64% of female
SHRSP aged 18 to 19 months, in 18% of male SHRSR
aged 24 to 25 months and in 9% of female SHRSR aged
28 to 29 months, while those did not appear even in
WKY aged 30 to 33 months. Electron microscopically
subintimal fibrin deposits and the migration of
smooth muscle cells were found in mesenteric
artery and testis small artery. Microscopically,
fibrous changes in myocardium of both-sex rats
were shown clearly by Azan stain; this change
occurred earliest in 8.7% of SHRSP aged 9 to 12
months, then in 55.6% of SHRSP aged 13 to 16 months,
in 10% of SHRSR aged 13 to 16 months, thereafter in 8.
3% of SHRSR aged 17 to 20 months and in 33.3% of WKY
aged 17 to 20 months, indicating the acceleration
of fibrous changes by both hypertension and aging.
Severe lesions of renal small artery were found in
11.1% of SHRSP aged 5 to 8 months, then in 77.8% of
SHRSP aged 13 to 16 months, in 8.3% of SHRSR aged 17
to 20 months, while those were not observed in WKY.
Almost complete glomerular damages were found in
17.4% of SHRSP aged 9 to 12 months and in 100% of
SHRSP aged 13 to 16 months, while those did not
occur in SHRSR and WKY. In this latter
investigation periarteritis nodosa of mesenteric
artery and testis small artery occurred
exclusively in SHRSP.
Conclusion: Fibrous changes of myocardium were
accelerated by hypertension, but slightly by aging.
However, severe vascular lesions in this study
were caused by hypertension.