

Hypertension and its complications

- 1) Blood pressure varies physiologically. In order to study physiological changes of blood pressure with a total of 8 medical students, the blood pressure was recorded after running up stairs till 6th floor. The systolic blood pressure and pulse rate were significantly raised up. Regarding the diastolic pressure, interesting findings were obtained. Namely, 4 students who say they have endurance showed a decrease of diastolic blood pressure just after the exercise, while the remaining 4 students who say they lack endurance revealed an increase of diastolic pressure. The lowered diastolic pressure during hard exercise may allow a good volume of blood flow for the striated muscles in the “endurance” group.
- 2) Hypertension damages a variety of organs, representatively provoking ① heart diseases (angina pectoris, myocardial infarction, heart failure, cardiomegaly and atrial fibrillation), ② kidney diseases (chronic kidney disease, benign nephrosclerosis and essential hypertension), ③ diabetes mellitus, ④ hypertensive cerebral hemorrhage, and ⑤ malignant hypertension. Hypertensive kidneys (in both benign and malignant nephrosclerosis) and representative features of hypertensive cerebral hemorrhage are demonstrated.

Blood pressure varies physiologically

- ① **Exercise (provoking increase of oxygen needs, blood vessel compression by muscle contraction and activation of sympathetic nerves)**

systolic blood pressure & pulse rate: increased

diastolic blood pressure: either increased or decreased

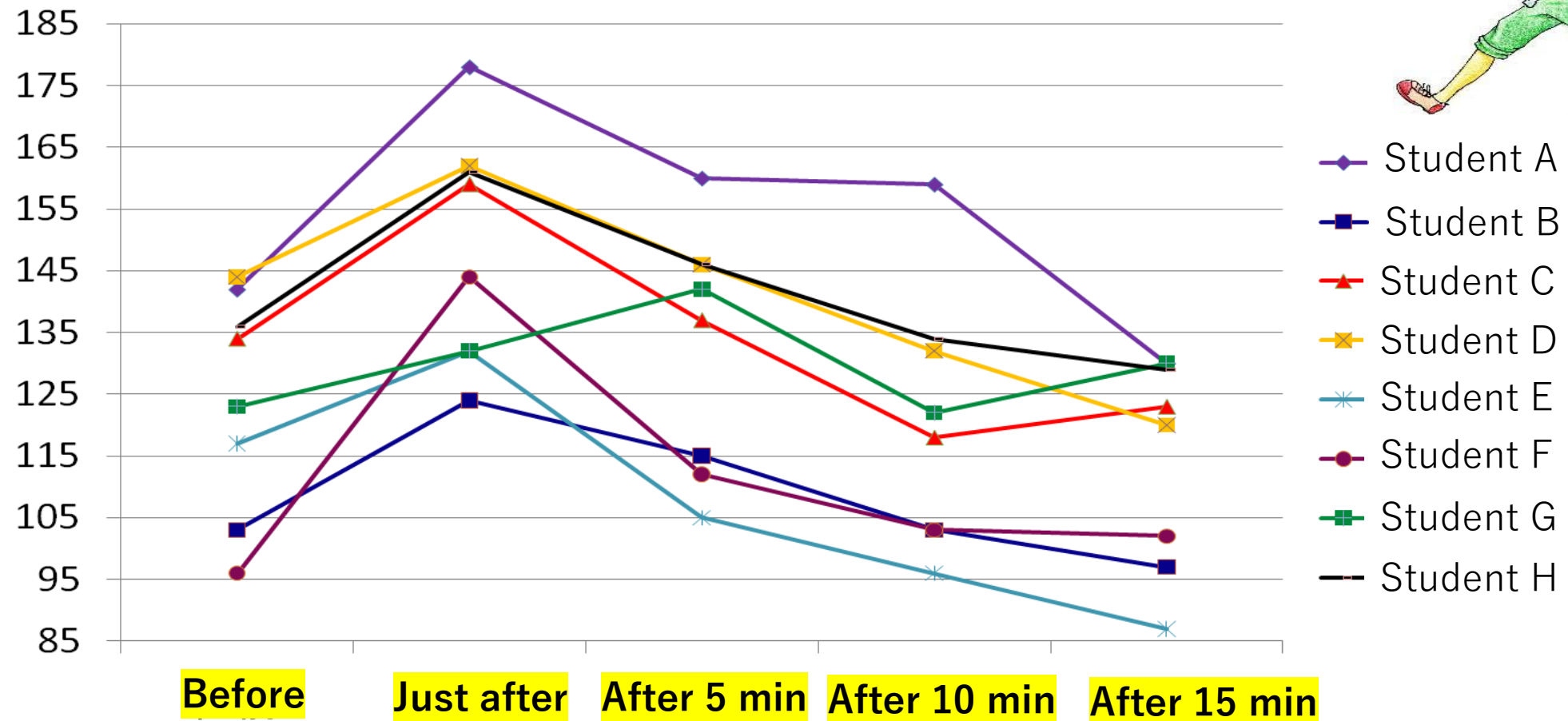
- ② **Bathing in hot springs (provoking blood vessel dilatation and activation of parasympathetic nerves)**

systolic blood pressure: unchanged

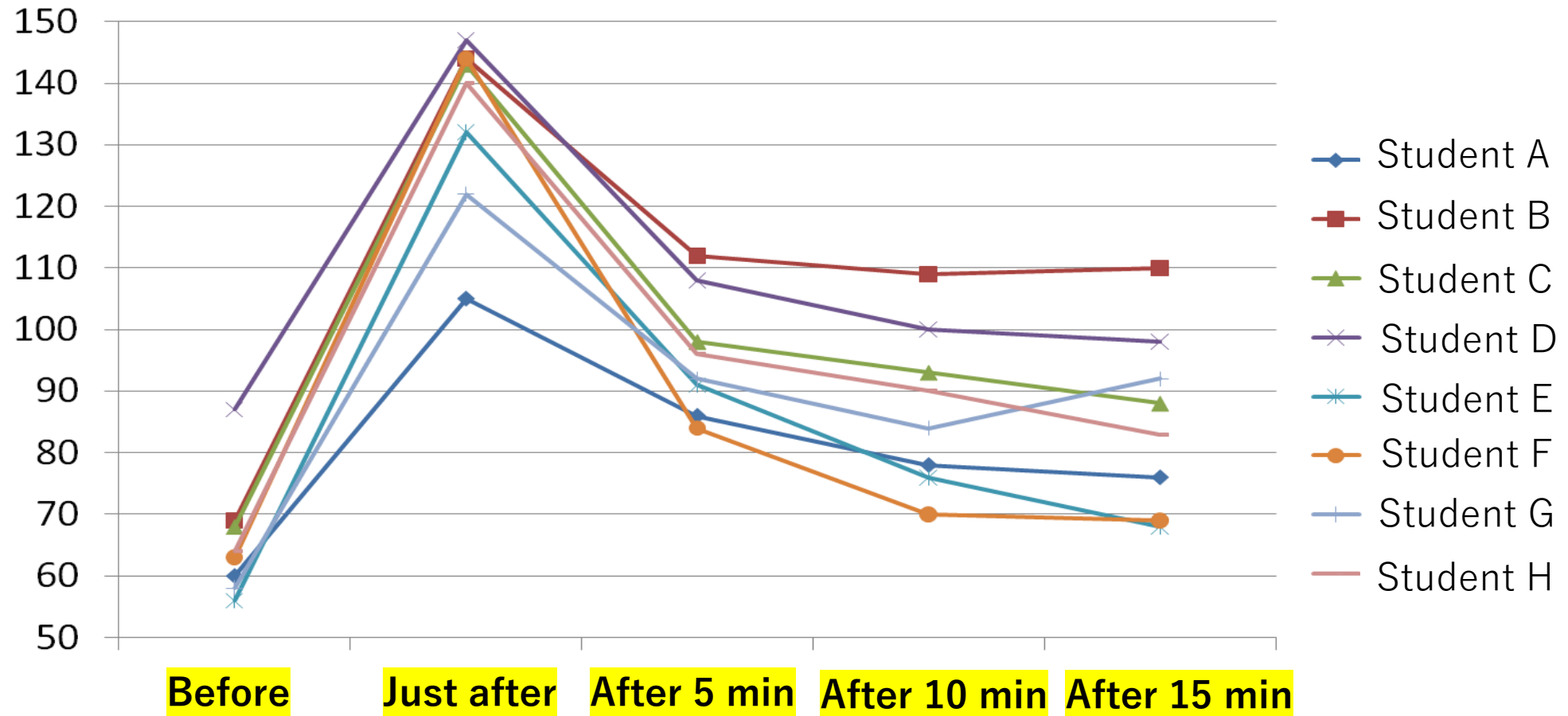
diastolic blood pressure: decreased

pulse rate: increased

Changes of systolic blood pressure after running up stairs till 6th floor

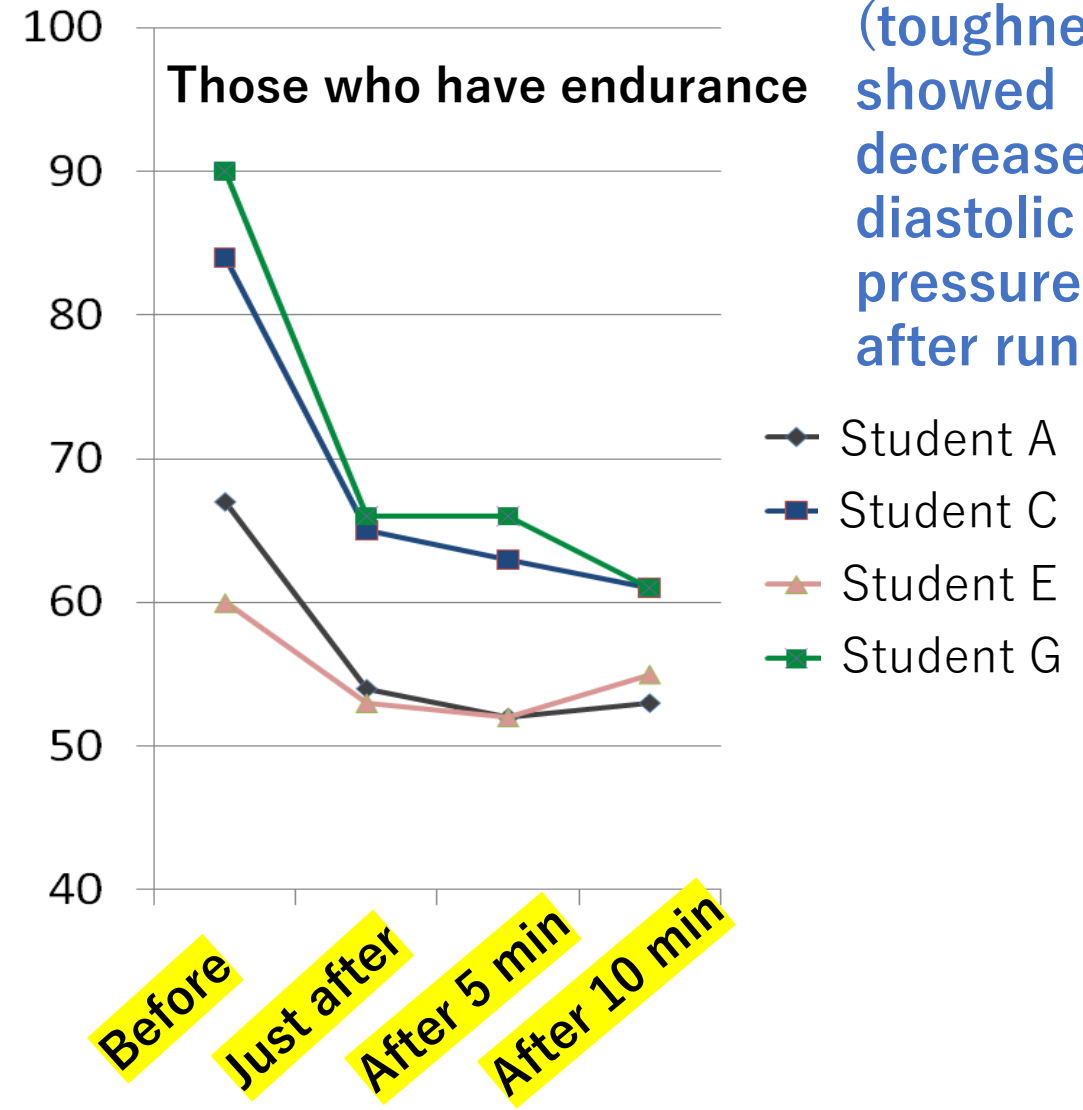
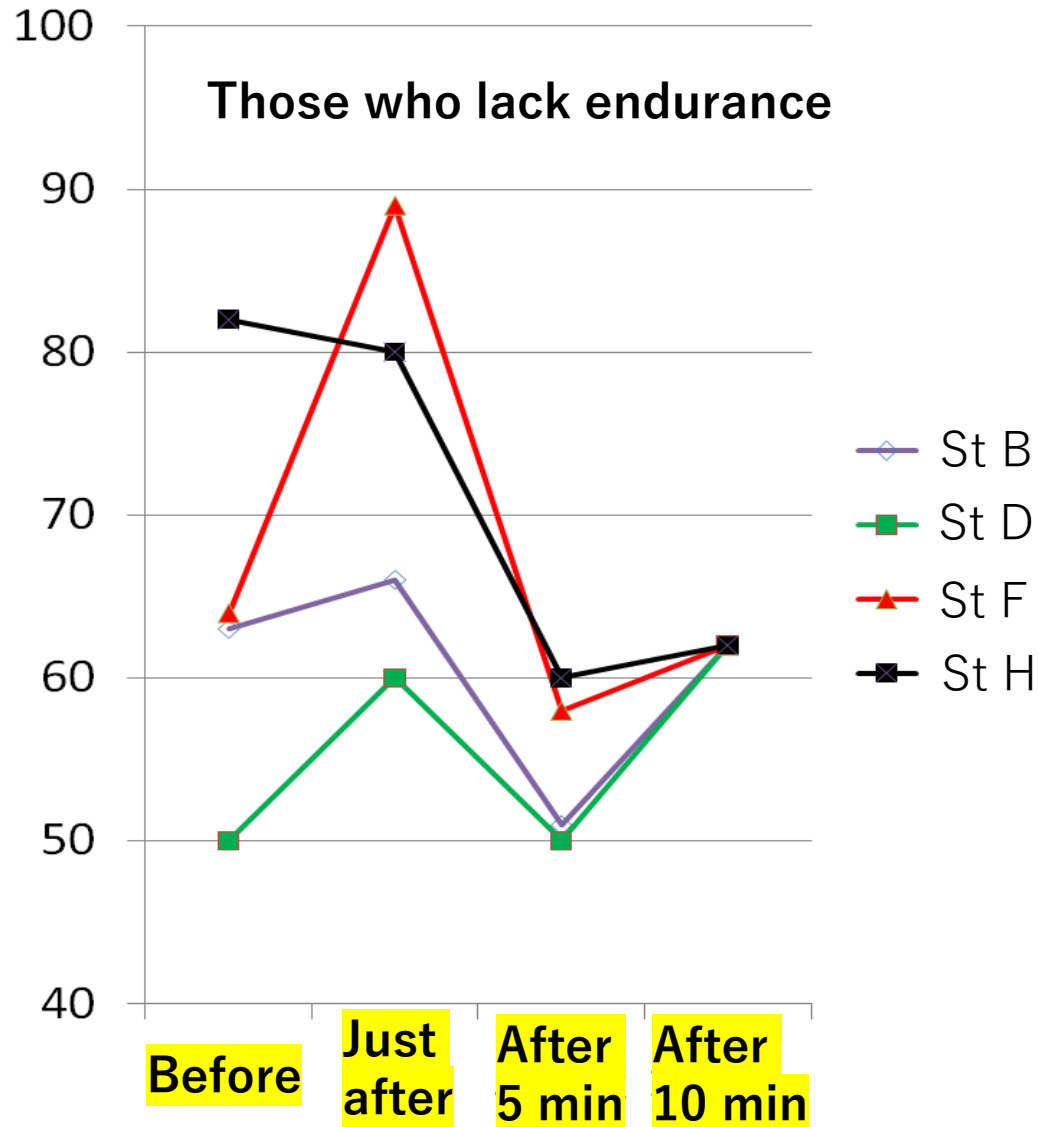


Changes of pulse rate after running up stairs till 6th floor



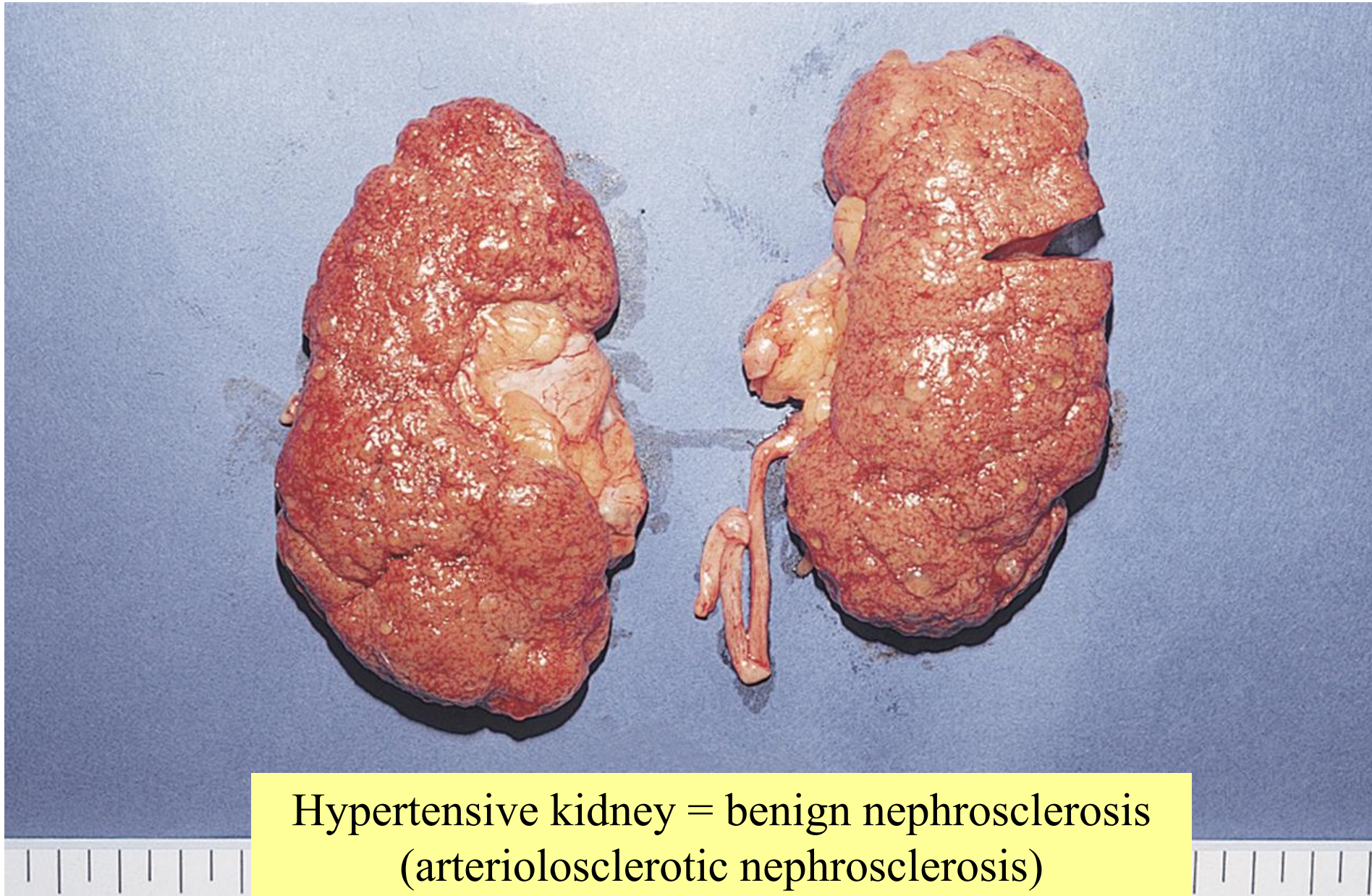
Changes of diastolic blood pressure after running up stairs till 6th floor

It is of note that the students who have endurance (toughness) showed decreased diastolic pressure just after running.

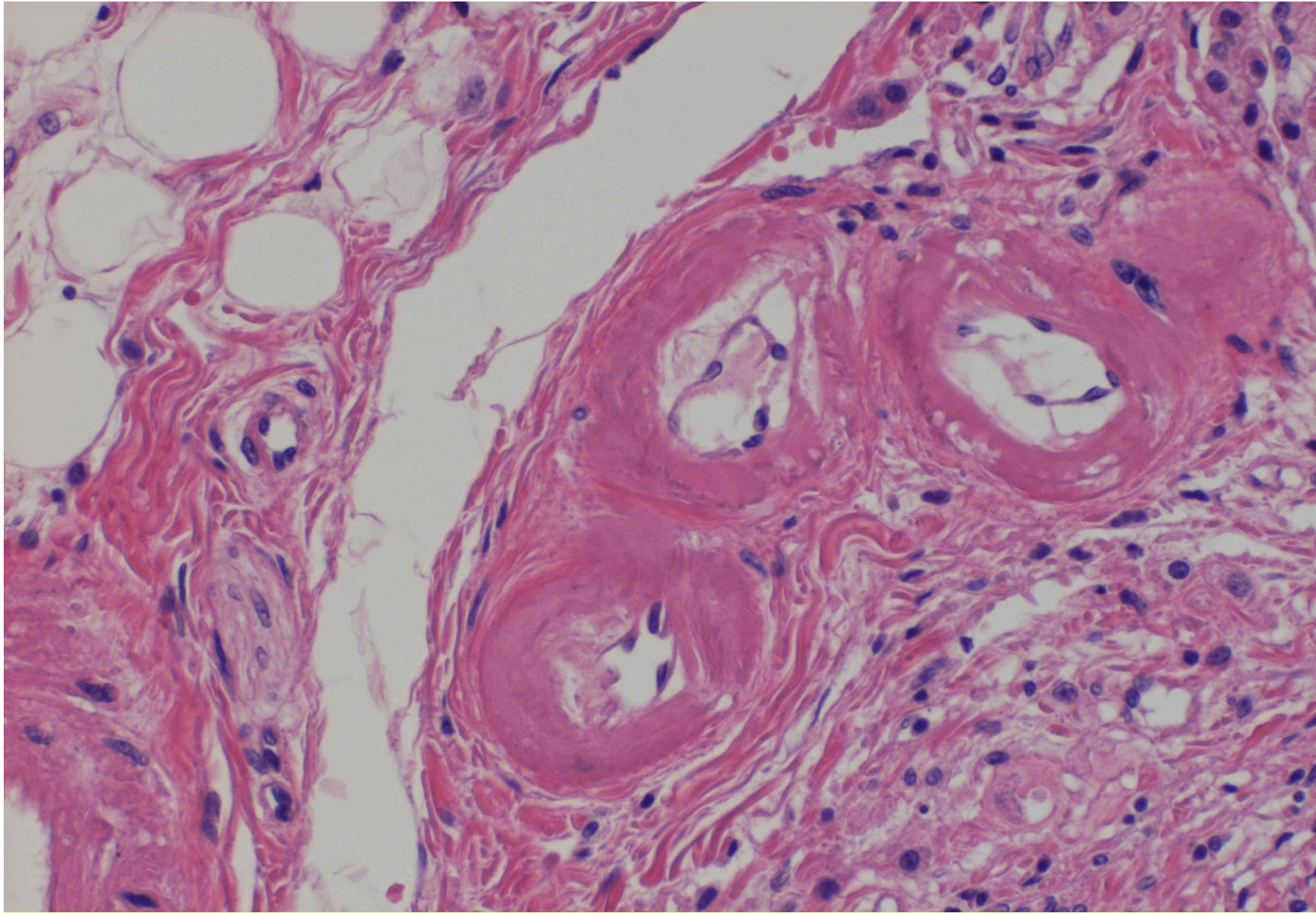


Hypertension and organ damages

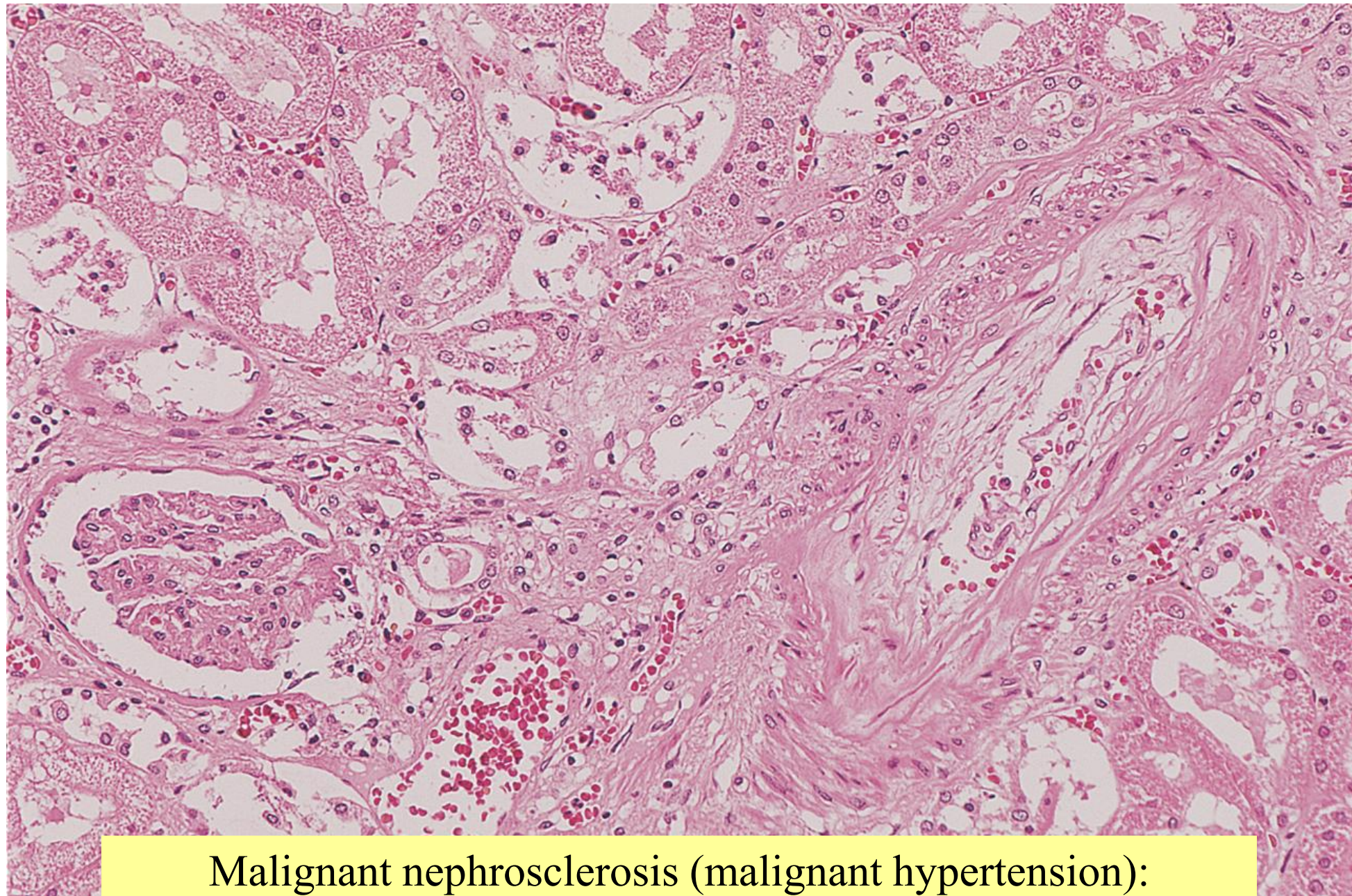
- 1) Heart diseases (angina pectoris, myocardial infarction, heart failure, cardiomegaly and atrial fibrillation)
- 2) Kidney diseases (chronic kidney disease, benign nephrosclerosis and essential hypertension)
- 3) Diabetes mellitus
- 4) Hypertensive cerebral hemorrhage
- 5) Malignant hypertension (or malignant nephrosclerosis)
blood pressure: $>220/130$ mmHg
(hypertensive encephalopathy, brain hemorrhage, acute renal failure, acute left ventricular failure and hemorrhage in the eyeground)



Hypertensive kidney = benign nephrosclerosis
(arteriolosclerotic nephrosclerosis)



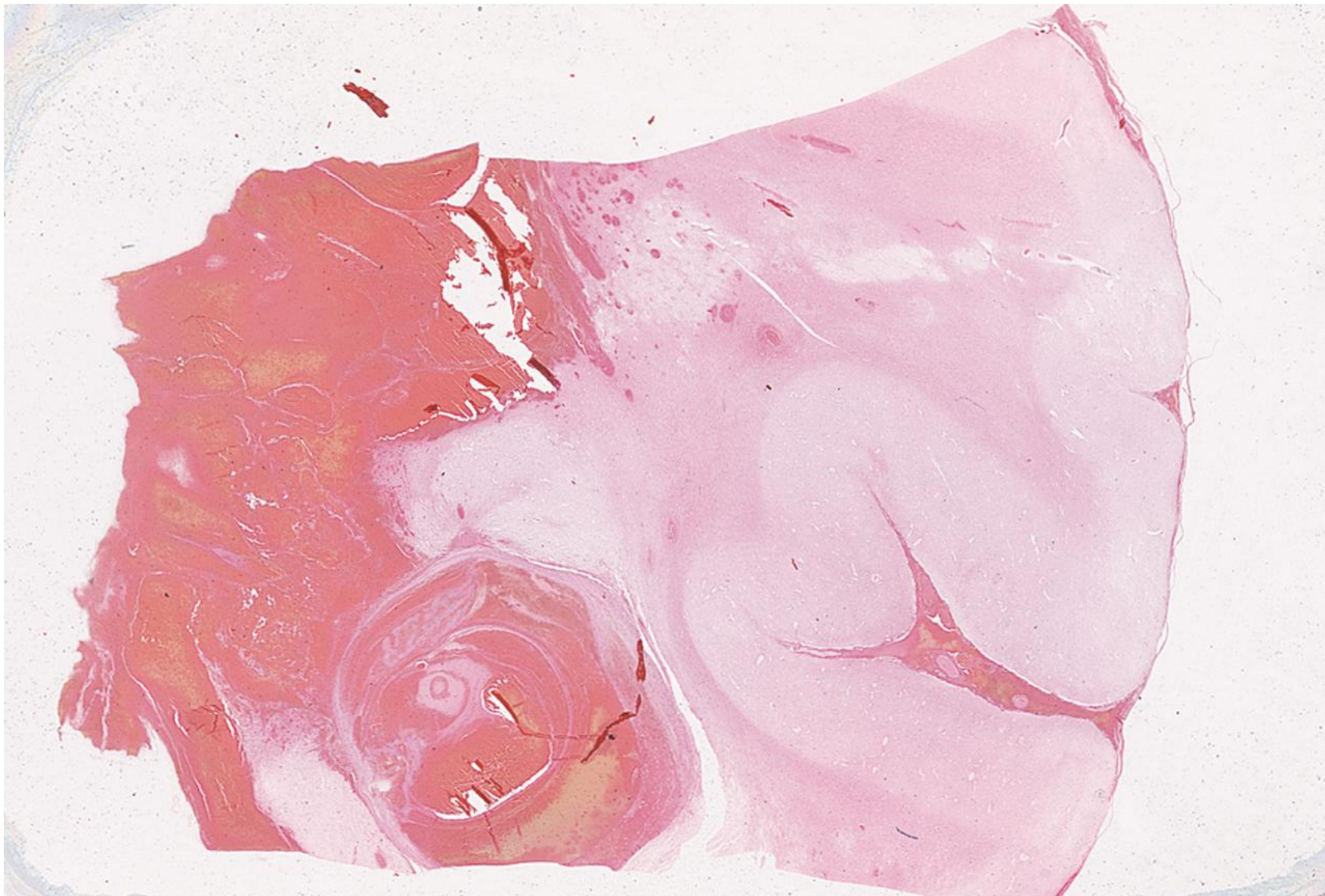
Lipohyaline-type arteriosclerosis of the adrenal gland (H&E)



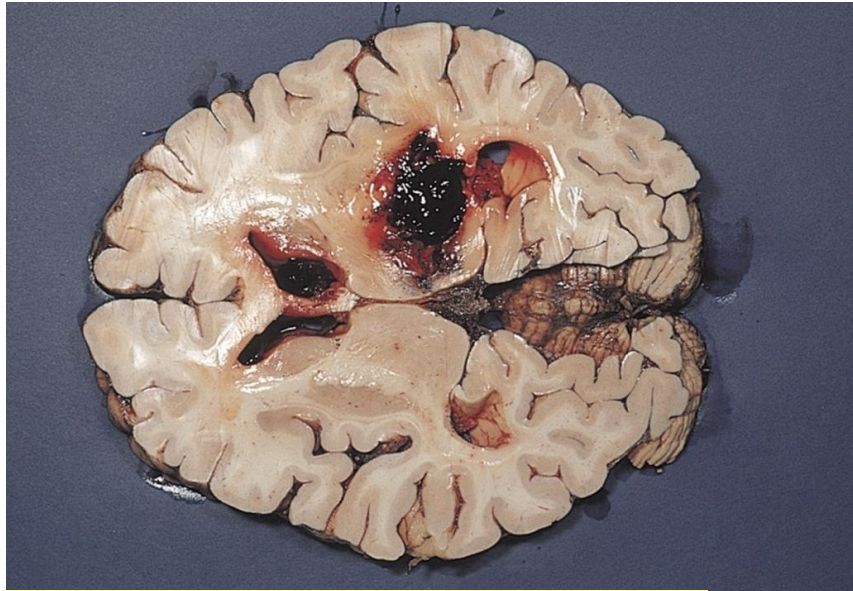
Malignant nephrosclerosis (malignant hypertension):
Intimal myxoid thickening of renal small arteries (H&E)



Hypertensive cerebral hemorrhage, lateral type
(putaminal hemorrhage with ventricular rupture)



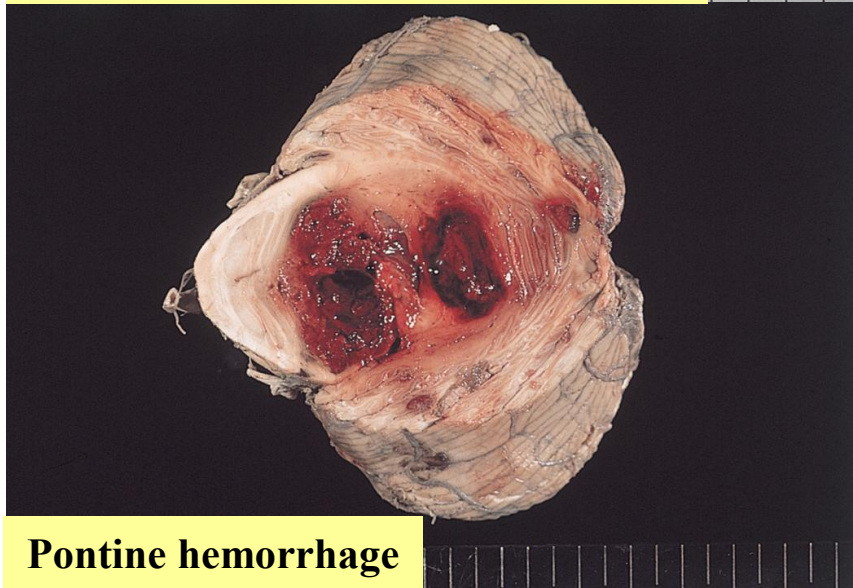
Hypertensive cerebral hemorrhage, lateral type
(microaneurysm formation by angioneurosis, H&E)



Thalamic hemorrhage (medial type)



Cerebellar hemorrhage



Pontine hemorrhage



Brain stem hemorrhage secondary to brain edema

Varied forms of hypertensive cerebral hemorrhage (cut surfaces after formalin fixation)