

ARTERIAL HYPERTENSION

- is a pathologic condition, characterized by stable high arterial tension ($>139/89$).
- It may be primary or secondary.

Hypertensive disease

- Hypertensive disease is a chronic disease (primary arterial hypertension), which is characterized by stable high arterial tension.

risk factors

- 1) hereditary predisposition
- 2) emotional stress,
- 3) cigarette smoking,
- 4) obesity, inactivity,
- 5) alcoholism,
- 6) endocrine disorders,
- 7) inactivity,
- 8) heavy consumption of salt.

- About 90 to 95 % of hypertension is idiopathic and apparently primary (essential hypertension). Of the remaining 5 to 10 %, most is secondary to renal disease or, less often, to narrowing of the renal artery, usually by an atheromatous plaque (renovascular hypertension). Both the essential and secondary hypertension may be either benign or malignant, according to the clinical course.

Stages of Hypertensive disease

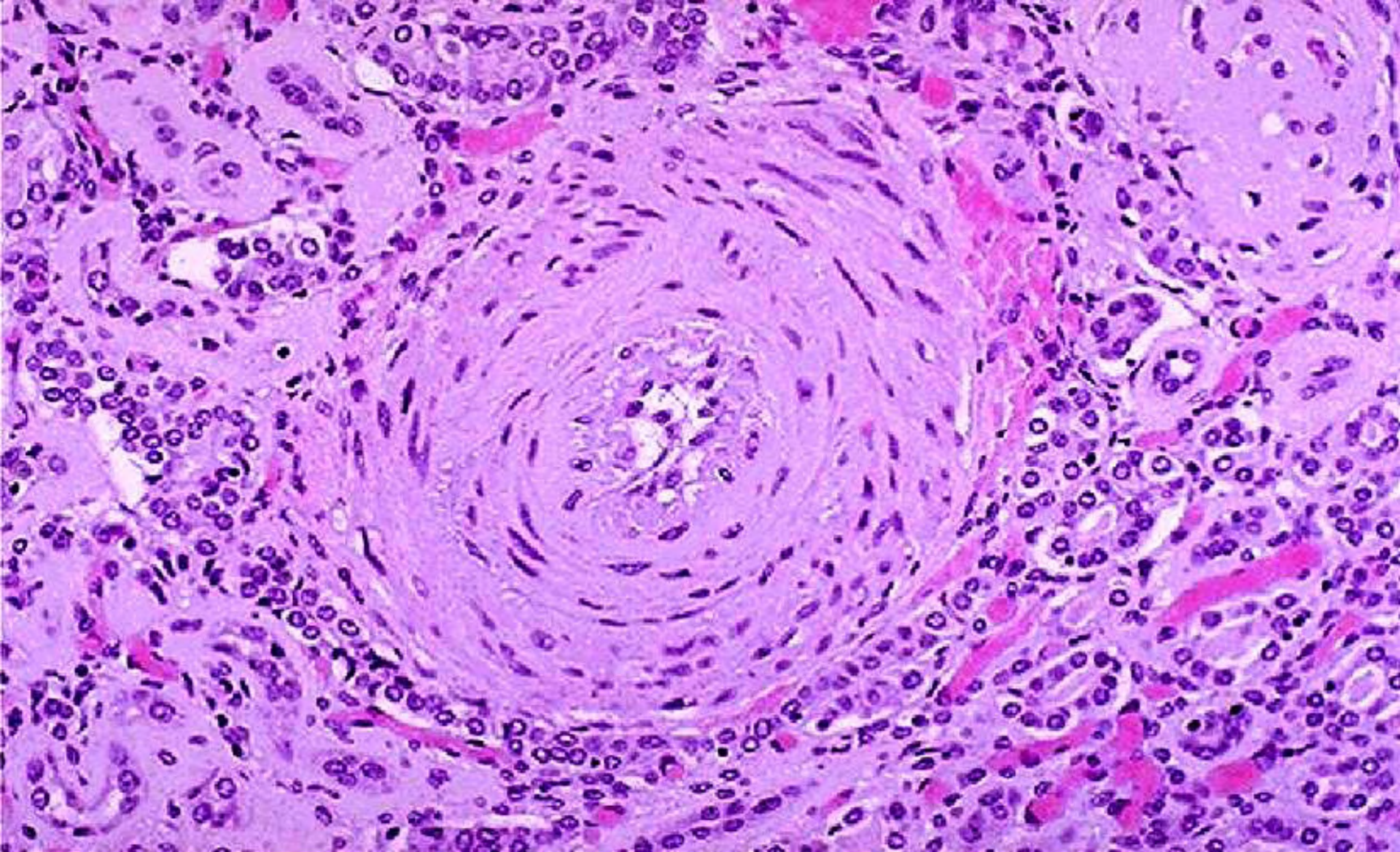
- Functional stage
- Stage of morphological changes in arteries
- Stage of secondary morphological changes in organs

Functional stage

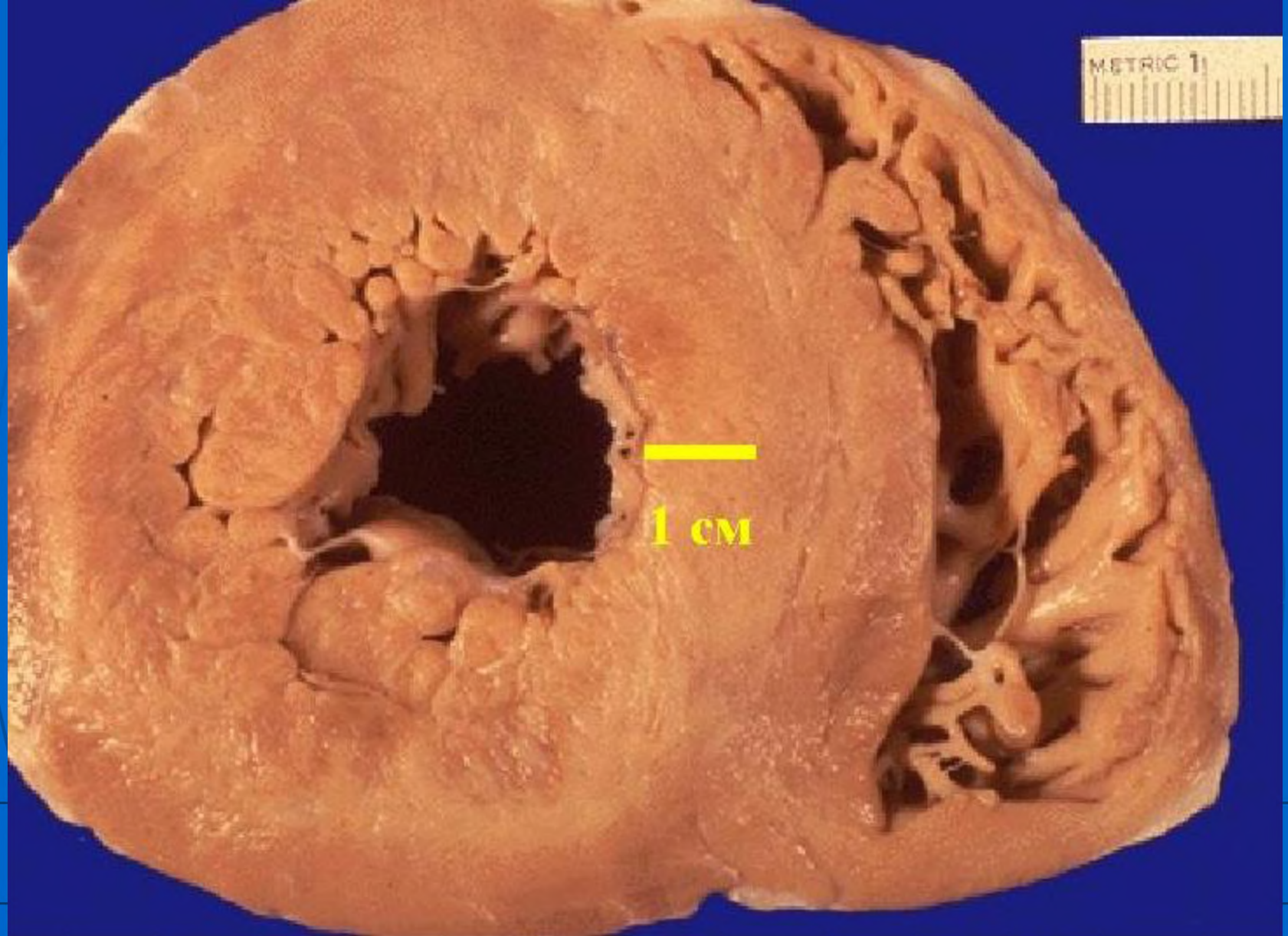
- Functional (preclinical) stage.
- Spasm of arteries
- Hypertrophy of smooth muscle

Stage of morphological changes in arteries

- Hyaline arteriolosclerosis
- Hyperplastic arteriolosclerosis
- Glomerulosclerosis
- Destruction of elastic membranes
- Hypertrophy of myocardium



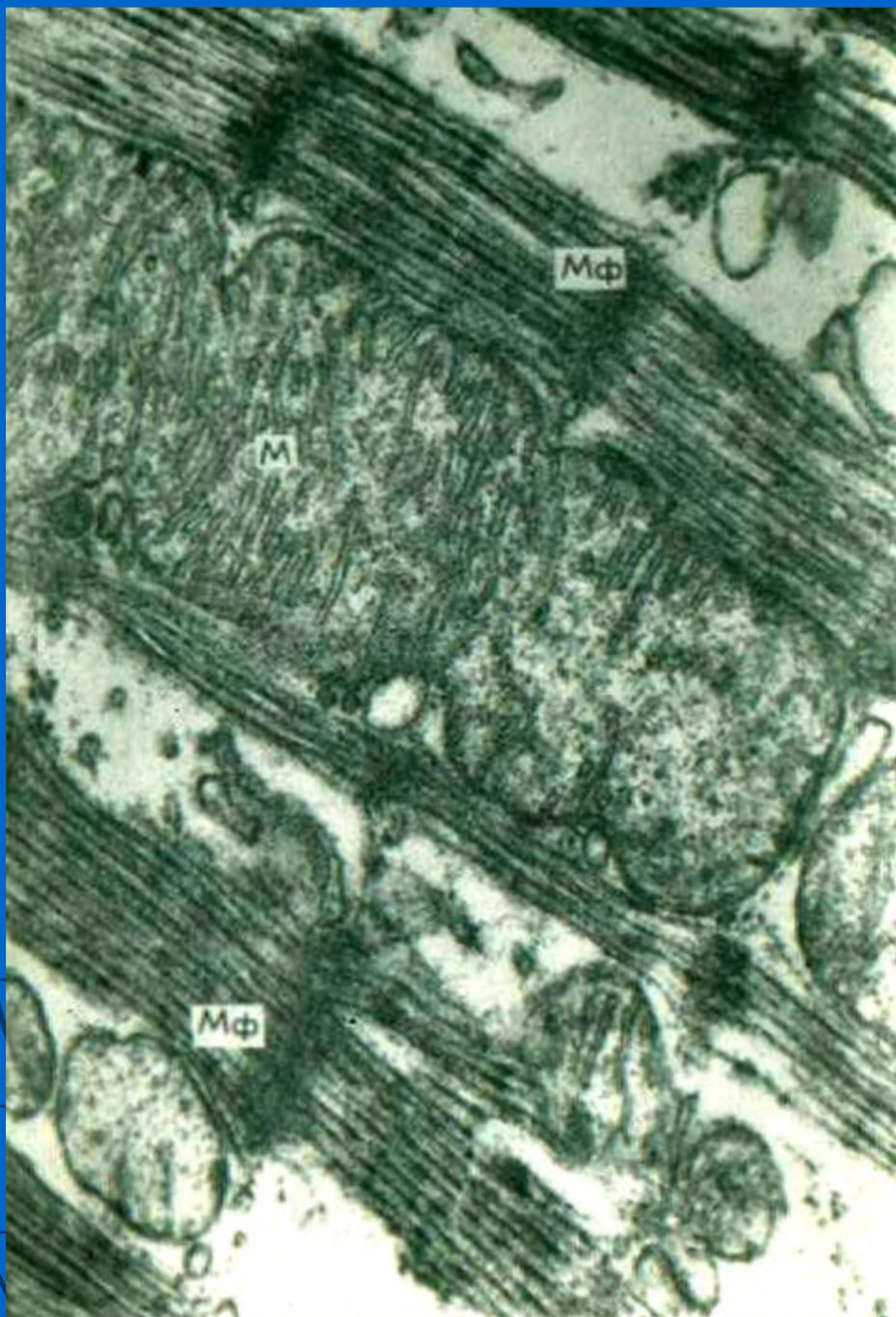
Kidney. AH, st. 2.
H&E



Hypertrophy of left ventricle.

Hypertrophy
of left
ventricle.





Electron micrograph
of myocardium,
stage II AH:
hypertrophy of
mitochondria (M)
and myofibrils (MΦ)
hypertrophy of
myocardium,
× 7500.

Stage of secondary morphological changes in organs

- Hypertension has been identified as one of the most important risk factors in both coronary heart disease and cerebrovascular accidents; it may also lead to hypertensive heart disease, aortic dissection and renal failure.

Clinical & morphological types of Hypertensive disease

- Cardiac
- Cerebral
- Renal

Risk factors of Hypertensive disease:

- *genetic factors, which include violations inherited excretion of sodium by kidney, damage of sodium-potassium transport in arteriolar myocytes, changes of genes of the renin-angiotensin system;*
- *excessive salt intake, often combined with a genetic predisposition to hypertension. Moreover, increasing the sodium ion concentration in the body leads to an imbalance of ions K^+ , Ca^{++} , Mg^{++} , etc.;*
- *psycho-emotional stress.*

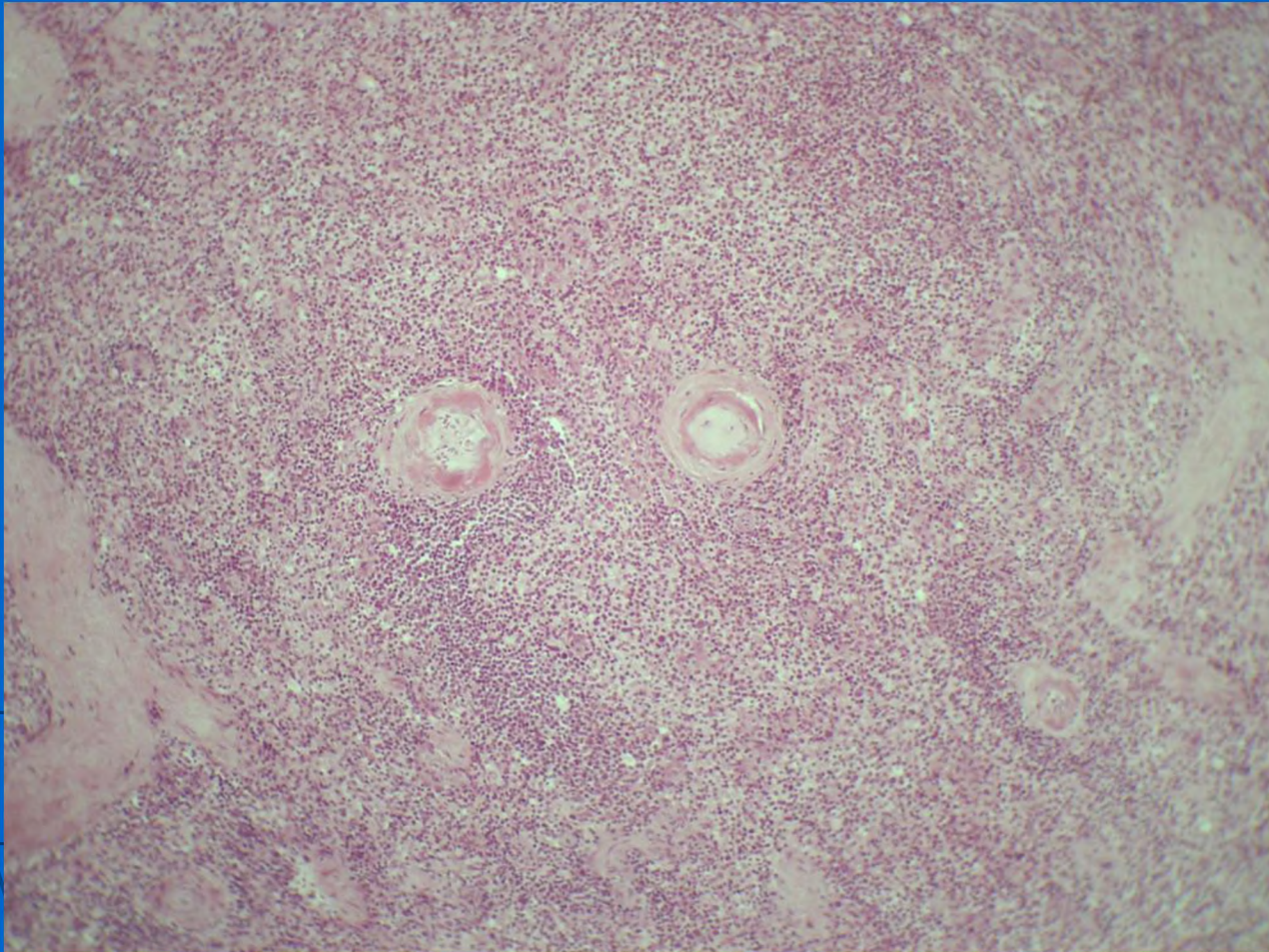
Transient (pre-clinical, functional) stage

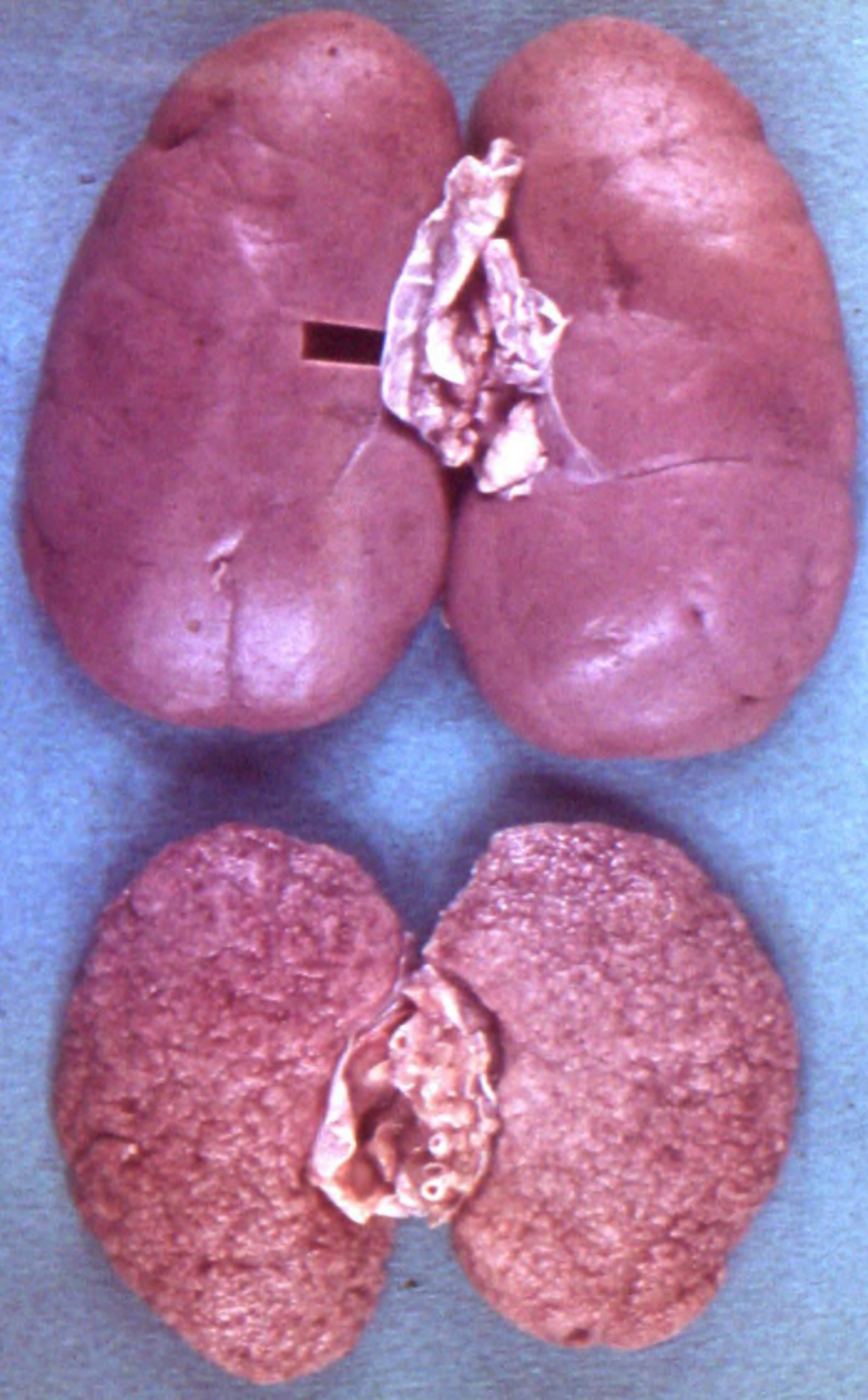
- characterized by occasional slight rise in blood pressure, manifested by spasm, plasmatic impregnation, hypertrophy of smooth muscle cells and elastic structures in arterioles. At the electron microscopic study notes narrowing of arterioles, tight closure of endothelial cells, shirring and the splitting of the basement membrane of the intima, loosening of the vascular wall due to plasmatic impregnation. At the same time developing of compensatory hypertrophy of the cardiac left ventricular wall occurs. Histological examination of myocardium notes an increase of cardiomyocyte size with hyperchromatic nuclei, stromal overgrowth.

Stage of widespread vascular changes

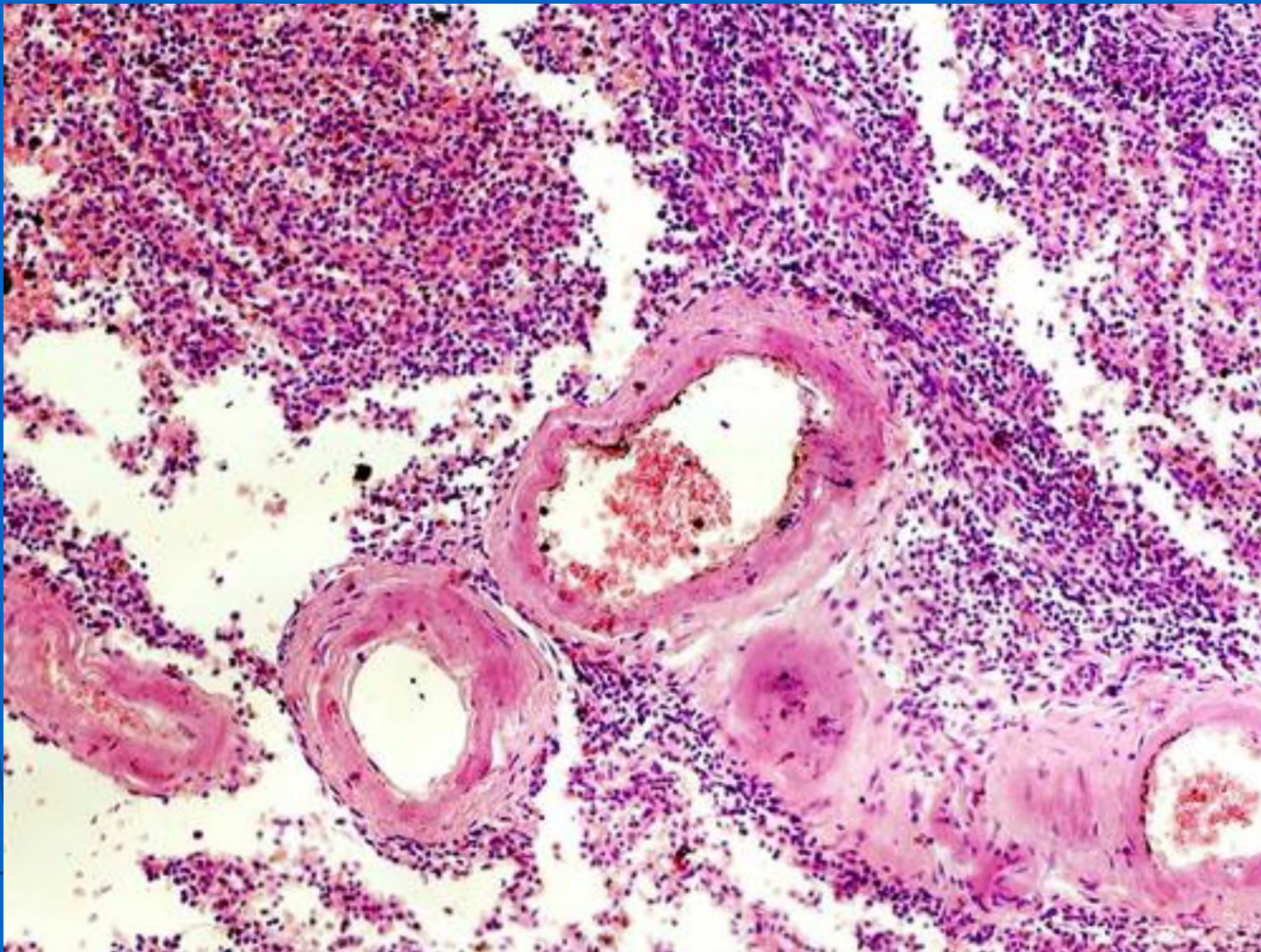
- *Stage of widespread vascular changes characterized by persistent arterial hypertension. In this case, as a result of a long plasmatic impregnation hyaline arteriolosclerosis in all organs develops.*

Hyalinosis of central arteries of spleen

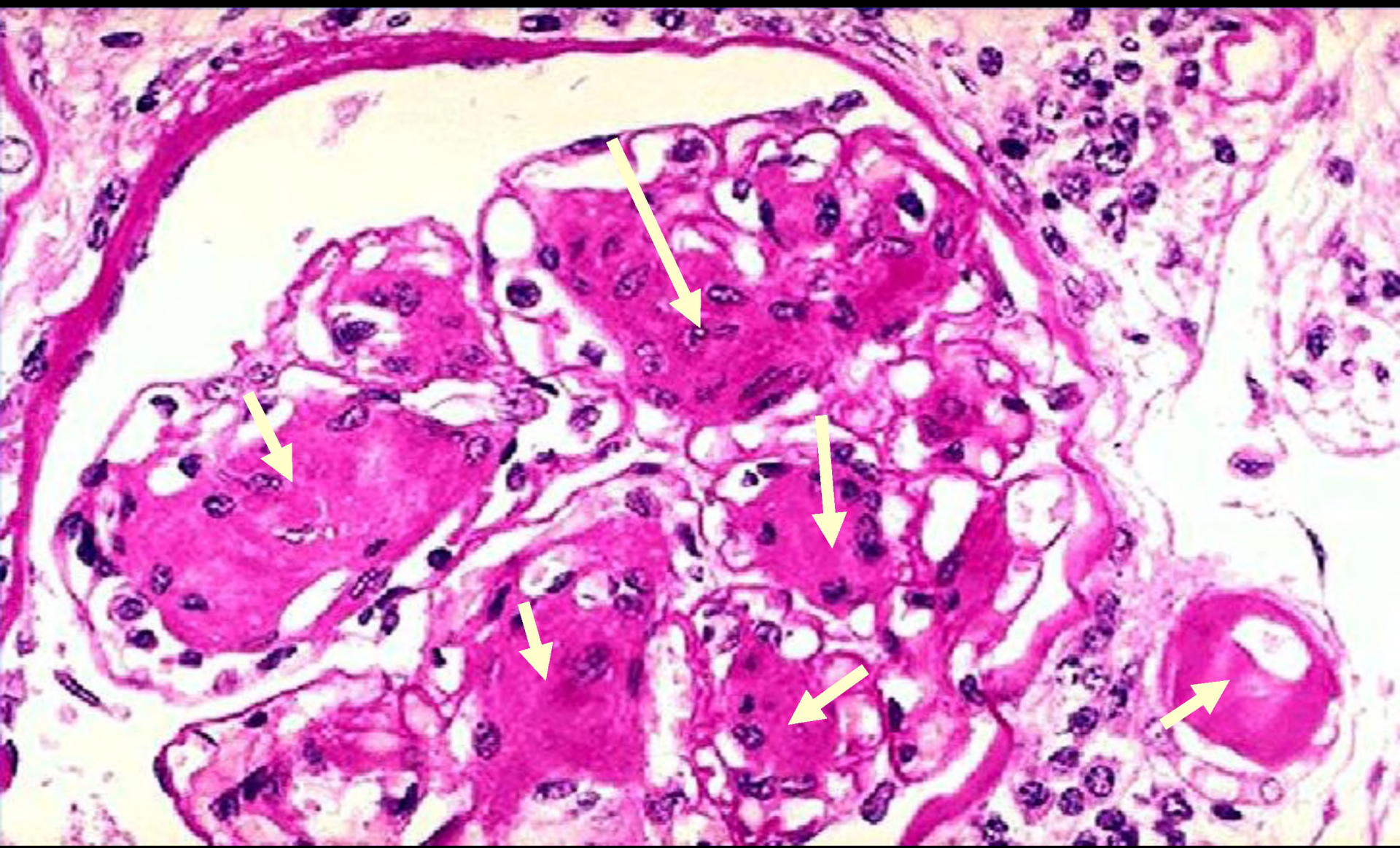




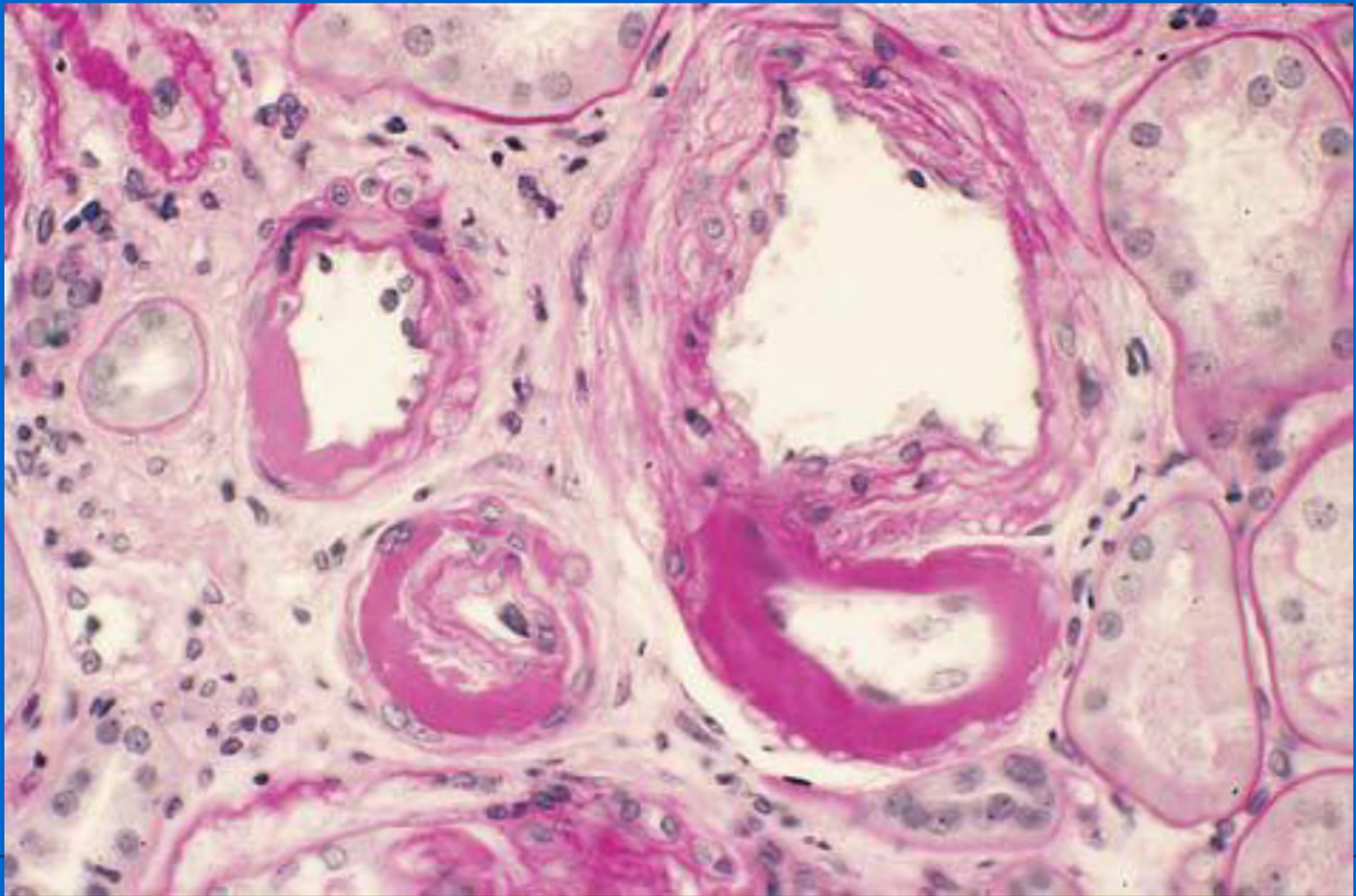
Normal kidneys (above) and kidneys of dead patient with arterial hypertension (below). When AH kidneys are reduced in size, their surface is fine-grained. Invaginations or small retractile scars associated with atrophy of nephrons with hyalinized glomeruli, elevations - with hyperplasia of the remaining cells.



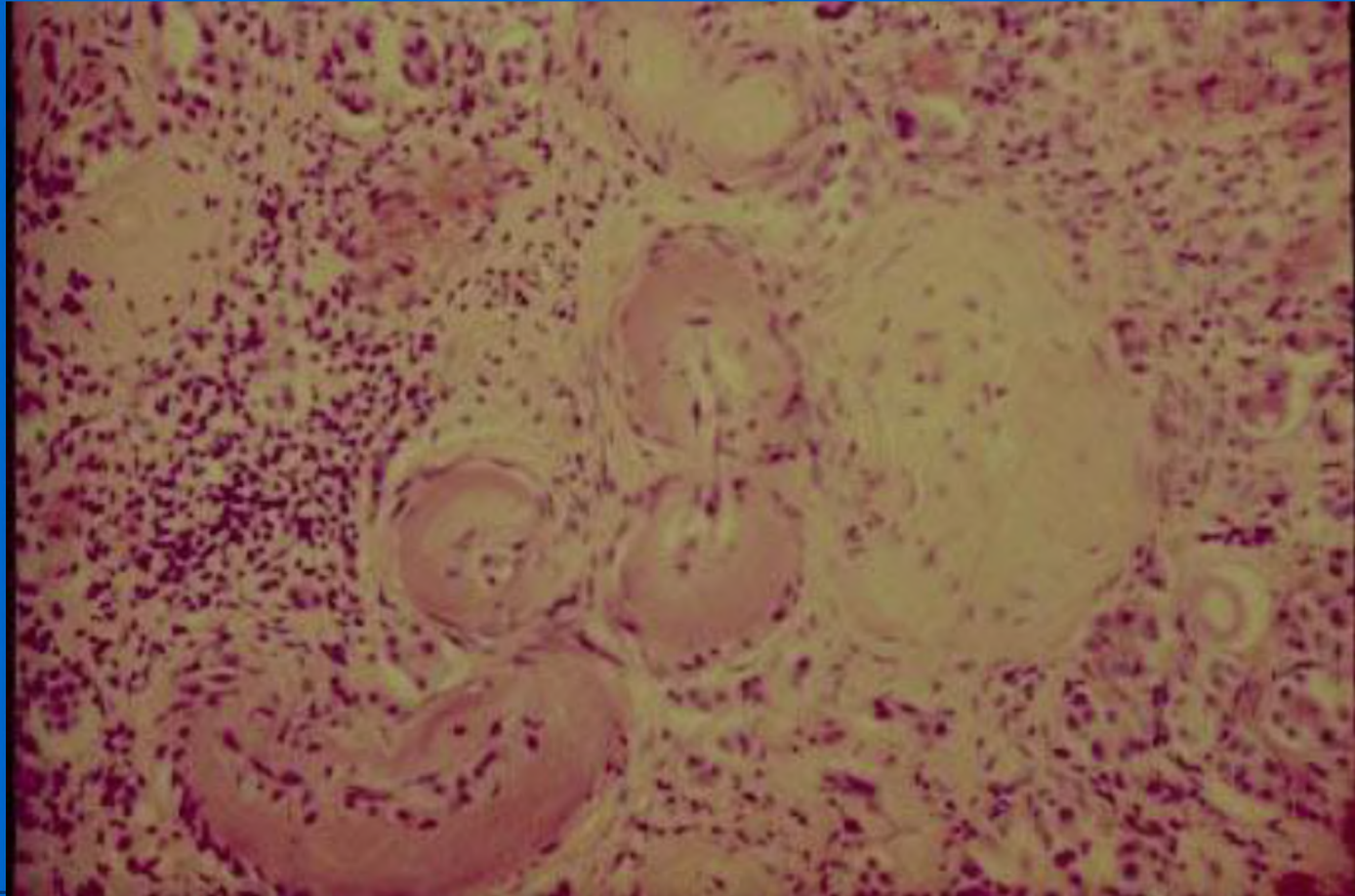
- **Hypertonic disease. Hyalinosis of arteries and arteriole. Stained with hematoxylin and eosin (x100)**



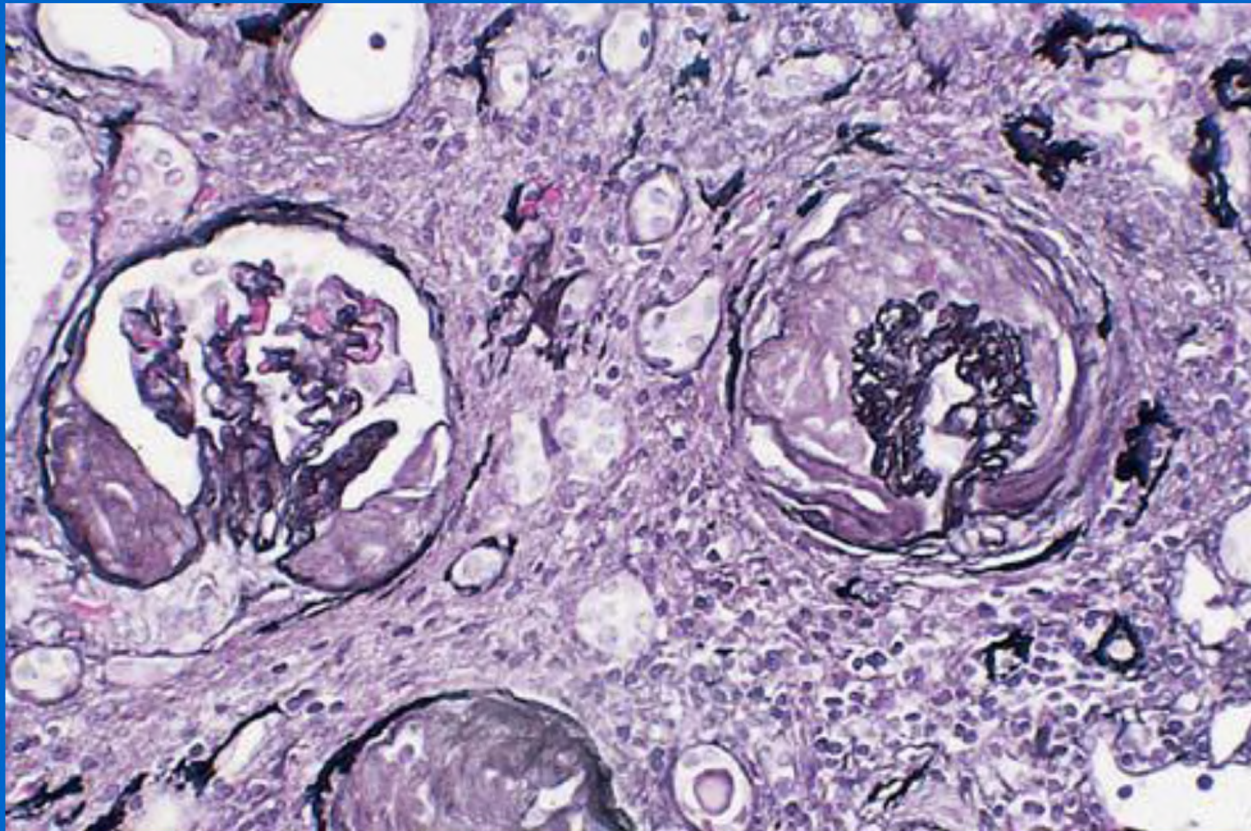
Kidney. AH, st. 2.
PAS-reaction.



Kidney of dead patient with arterial hypertension: hyalinosis of arteriole walls. PAS reaction.



- **Arteriosclerotic nephrosclerosis. Hyalinosis of the walls of the afferent arterioles and glomeruli, sclerosis and lymphocytic stromal infiltration, atrophy of the tubular epithelium. Stained with hematoxylin and eosin (x120).**

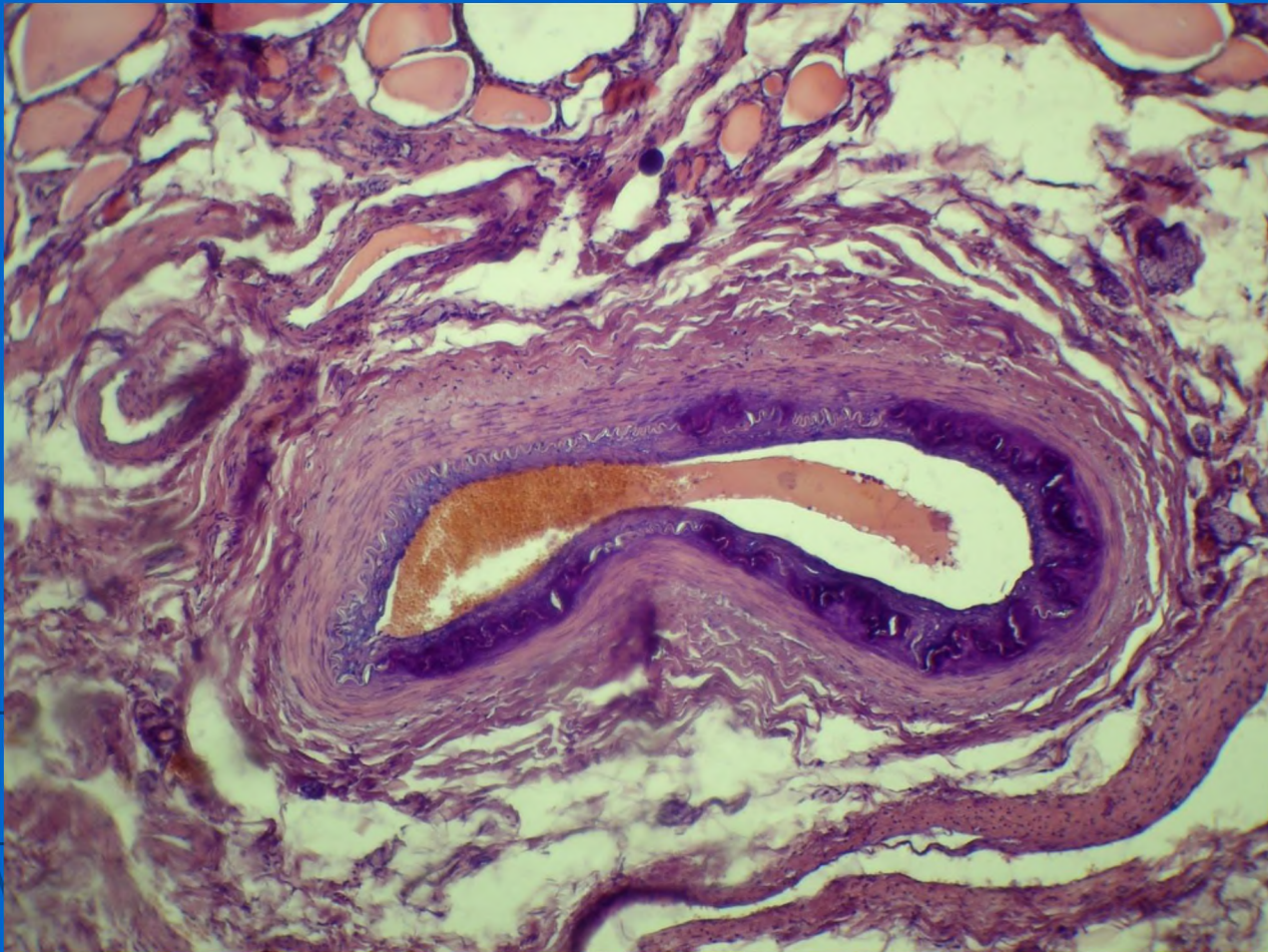


- **Arteriosclerotic nephrosclerosis. Global and segmental sclerosis of the glomeruli, sclerosis and lymphocytic infiltration of the stroma, atrophy of the tubular epithelium. Impregnation with silver nitrate (x120).**

Stage of secondary organ damage

- Stage of secondary organ damage differs gross violations in the affected organs, caused by significant changes in the arterioles and arteries. In most cases, this process develops gradually and is manifested by progressive atrophy of the parenchyma and sclerosis of organs.

Arteriosclerosis with calcification of intraorgan artery of thyroid gland.



- For **malignant type of hypertension** fibrinoid necrosis and thrombosis arterioles various organs are characteristic, and lead to multiple infarcts and hemorrhages.

Thank You...