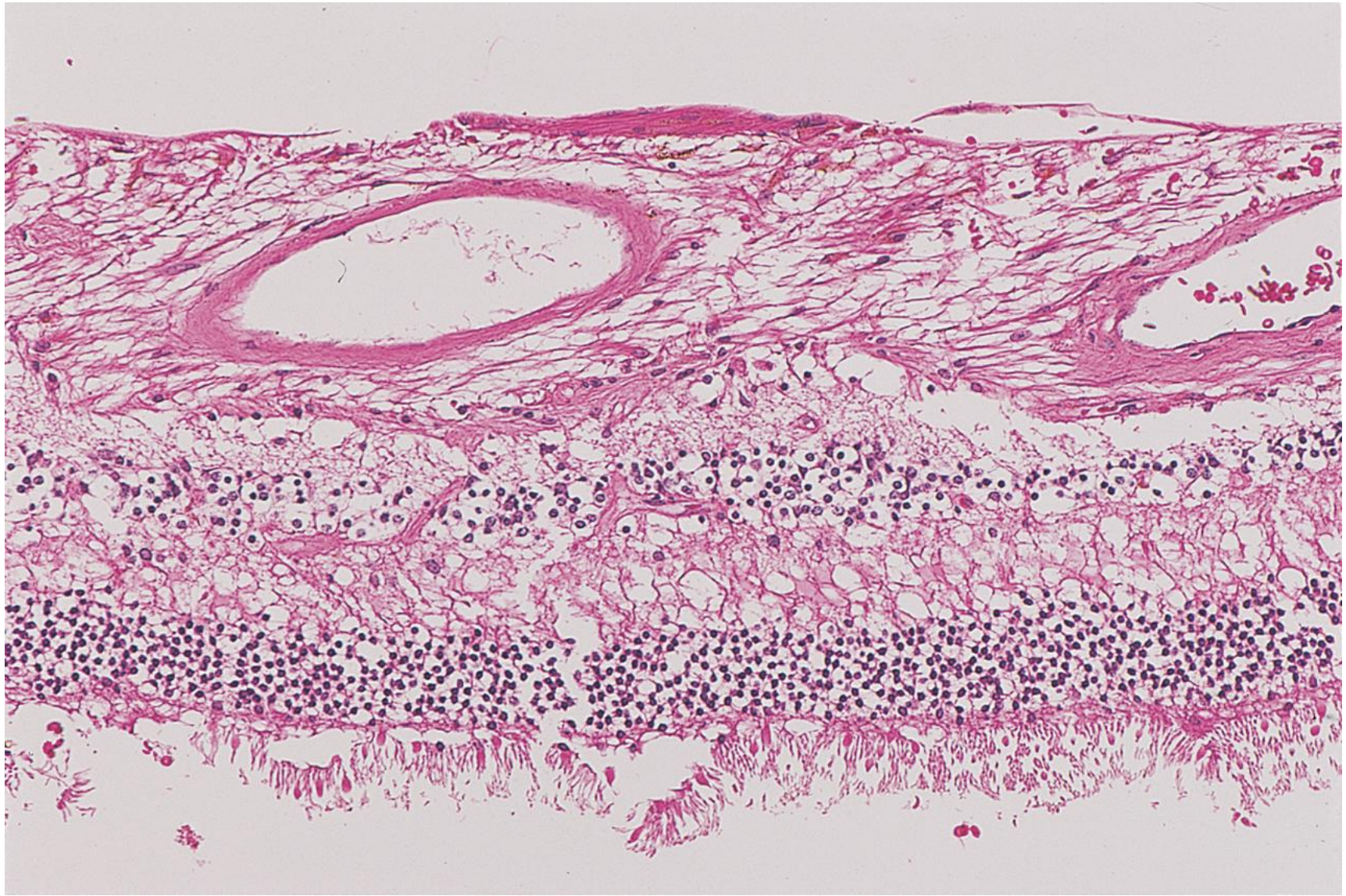
Nervous system lesions in diabetes mellitus

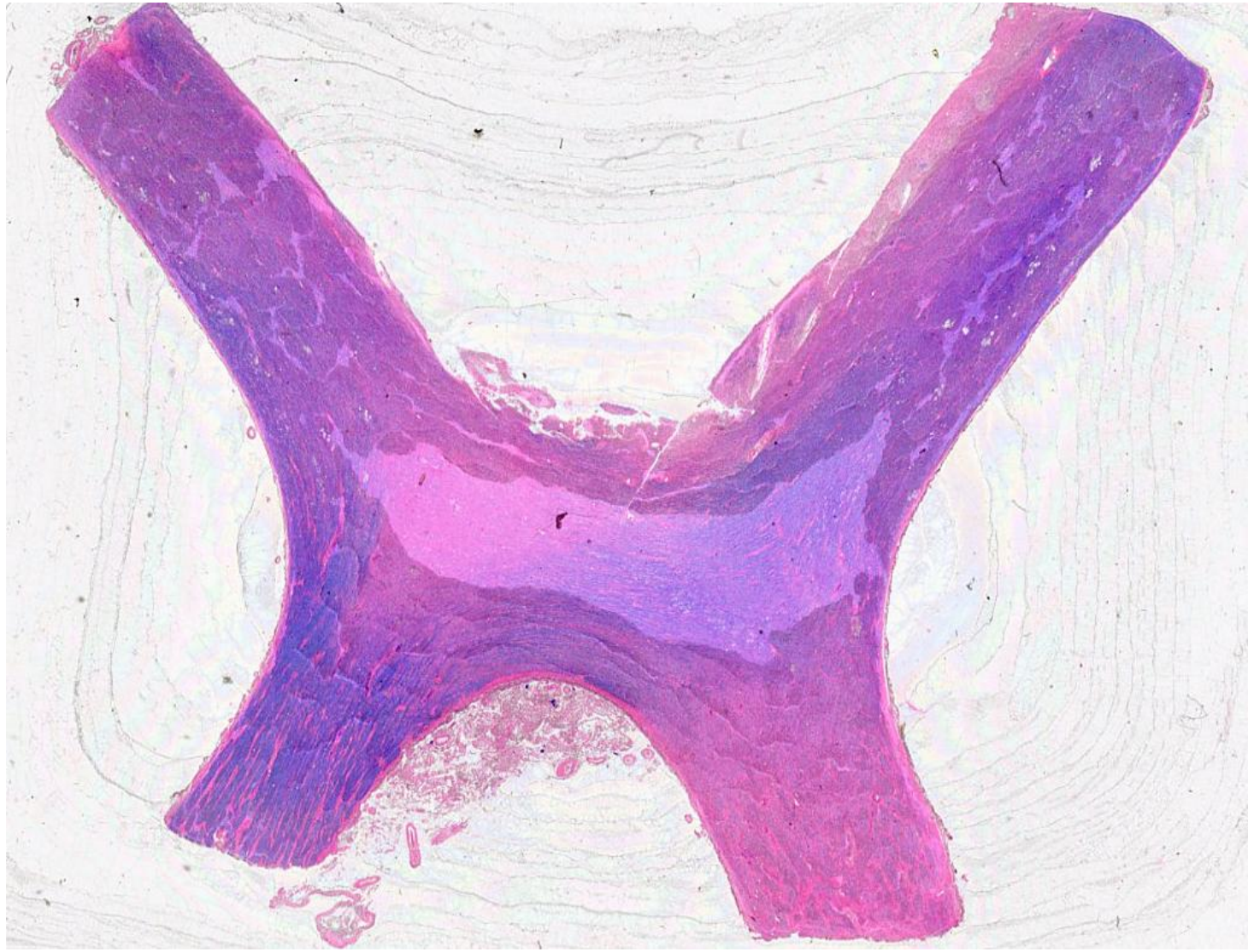
The triad of diabetic complications (diabetic triopathy) includes neuropathy, retinopathy and nephropathy. It has been reported that neurodegeneration plays a major role very early in diabetic retinopathy, and occurs prior to microvascular disease. Anti-VEGF therapy has been used to treat the retinopathy. Gliosis is seen in the lateral geniculate body, the relay nucleus of visual signals from the retina. Diabetic neuropathy, distal symmetric polyneuropathy, causes a loss of sensory function beginning distally in the lower extremities. Autonomic nerved are also frequently involved. Glucose control effectively halts the progression of diabetic triopathy. Refer to neuro-17-brain.

Ref.-1: Stewart MW. The diabetic retina: anatomy and pathophysiology. In: Diabetic Retinopathy, 2017. Adis, Singapore. doi: 10.1007/978-981-10-3509-8_2

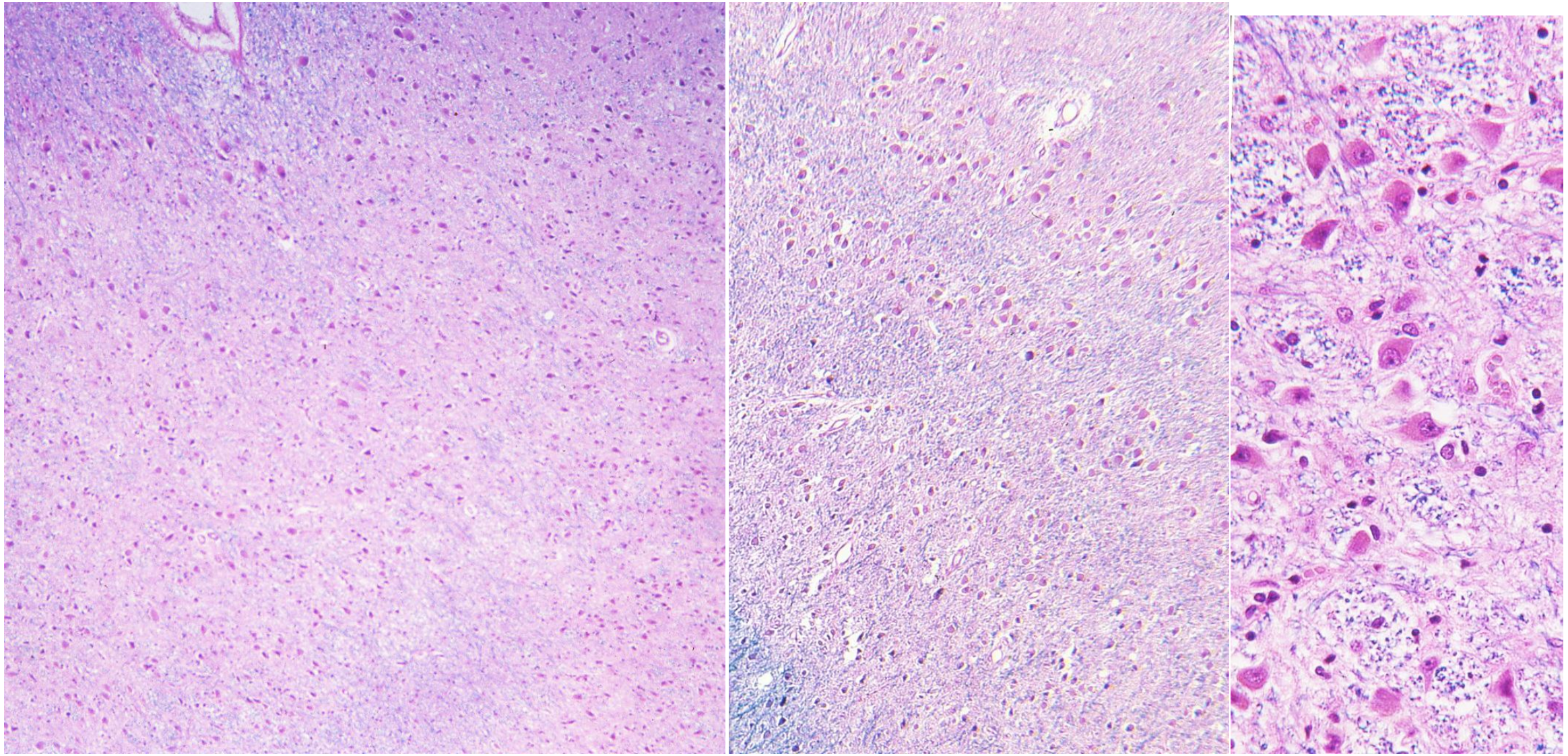
Ref.-2: Feldma EL, et al. Diabetic neuropathy. Nat Rev Dis Primers 2019; 5: 41. doi: 10.1038/s41572-019-0092-1



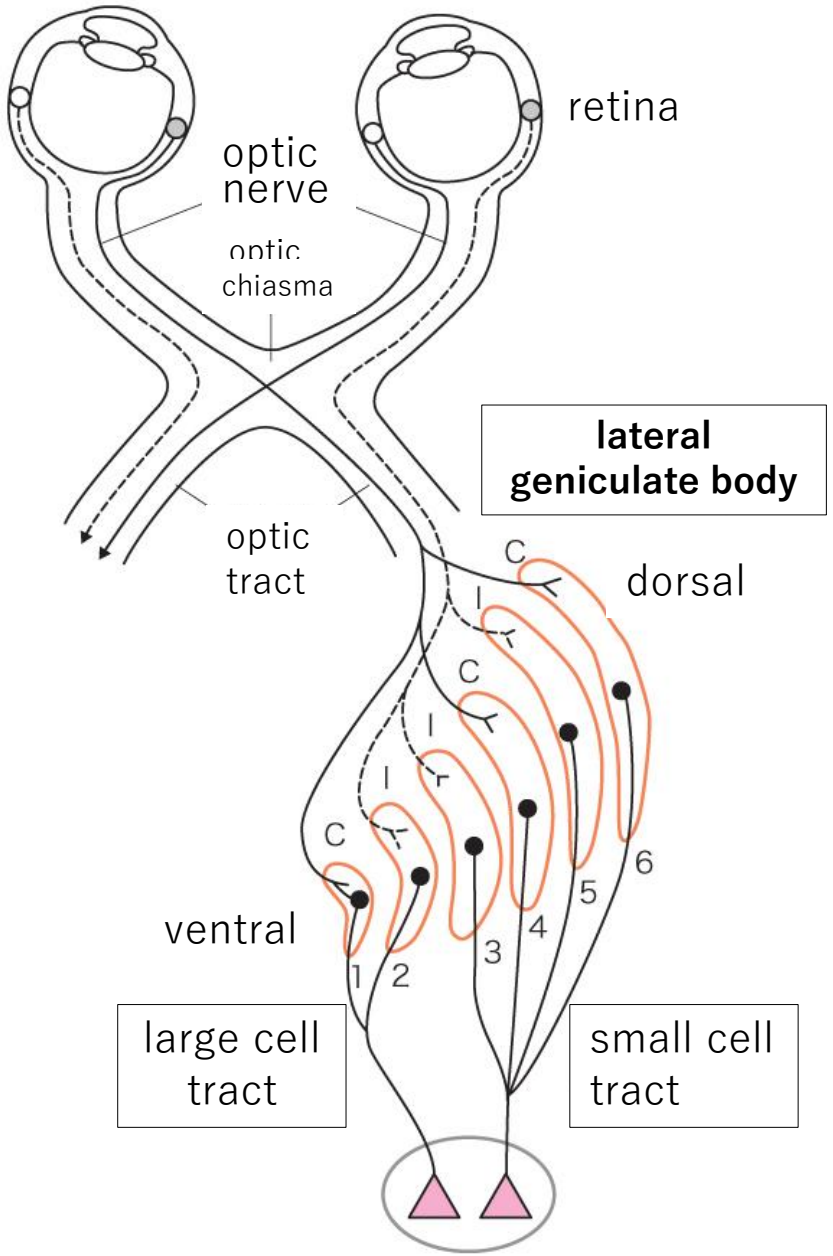
Diabetic retinopathy in a 59 y-o male autopsy case (H&E). Arterioles are increased in the thickened inner layer (nerve fiber layer). Mild gliosis is associated in the inner layer. The inner and outer granular cell layers, as well as the visual cell layer, are observed.



Optic chiasma in severe diabetic retinopathy in a 59 y-o male autopsy case (LFB-HE). Decrease of the myelinated fibers is evident. Sorry for the artificial bubble inclusions on the central part of the section.

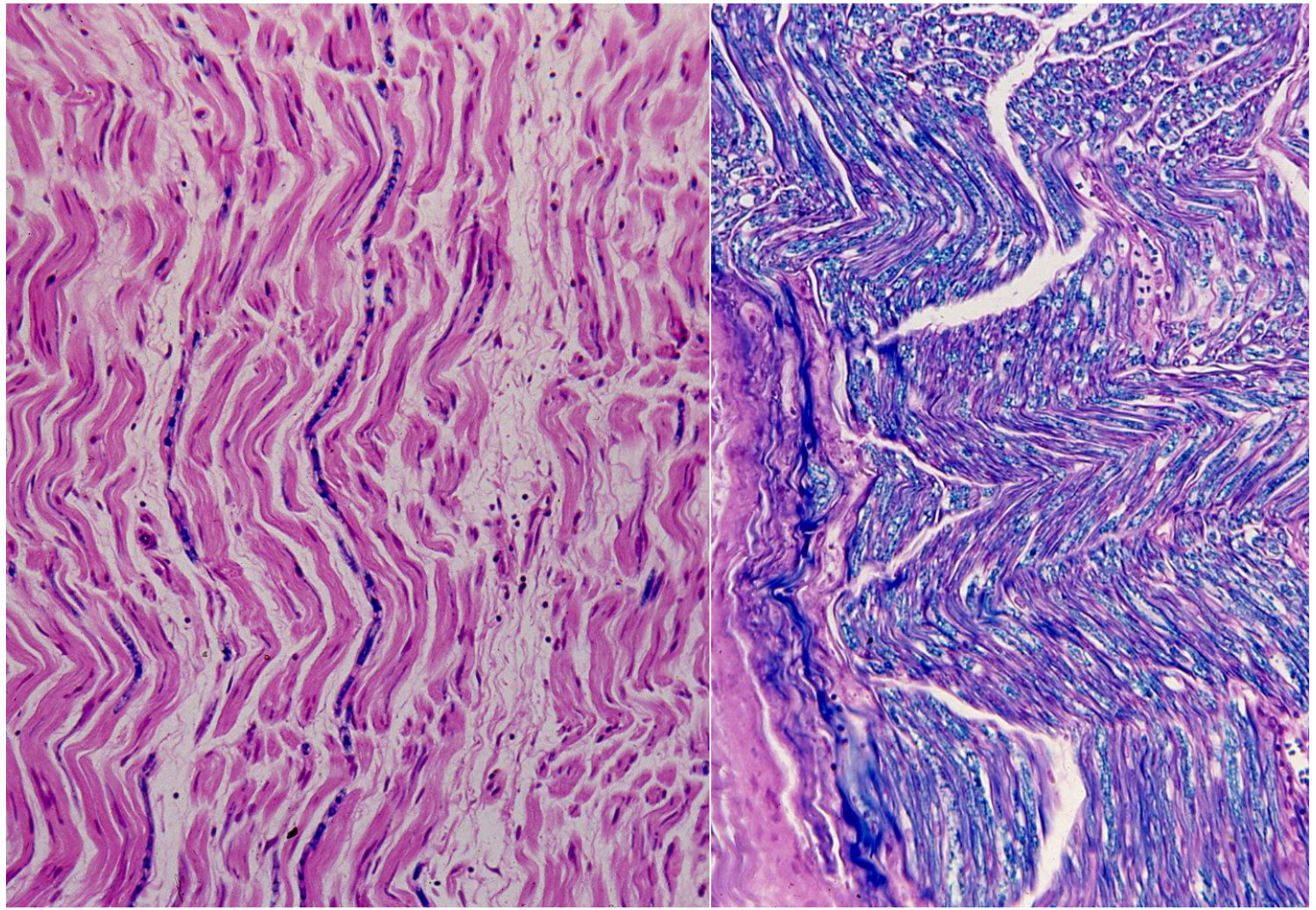


Lateral geniculate body in severe diabetic retinopathy in a male autopsy case aged 50's (left). Right two panels show a non-diabetic control case (LFB-HE). Gliosis and mild decrease of neurons are observed in the diabetic case.

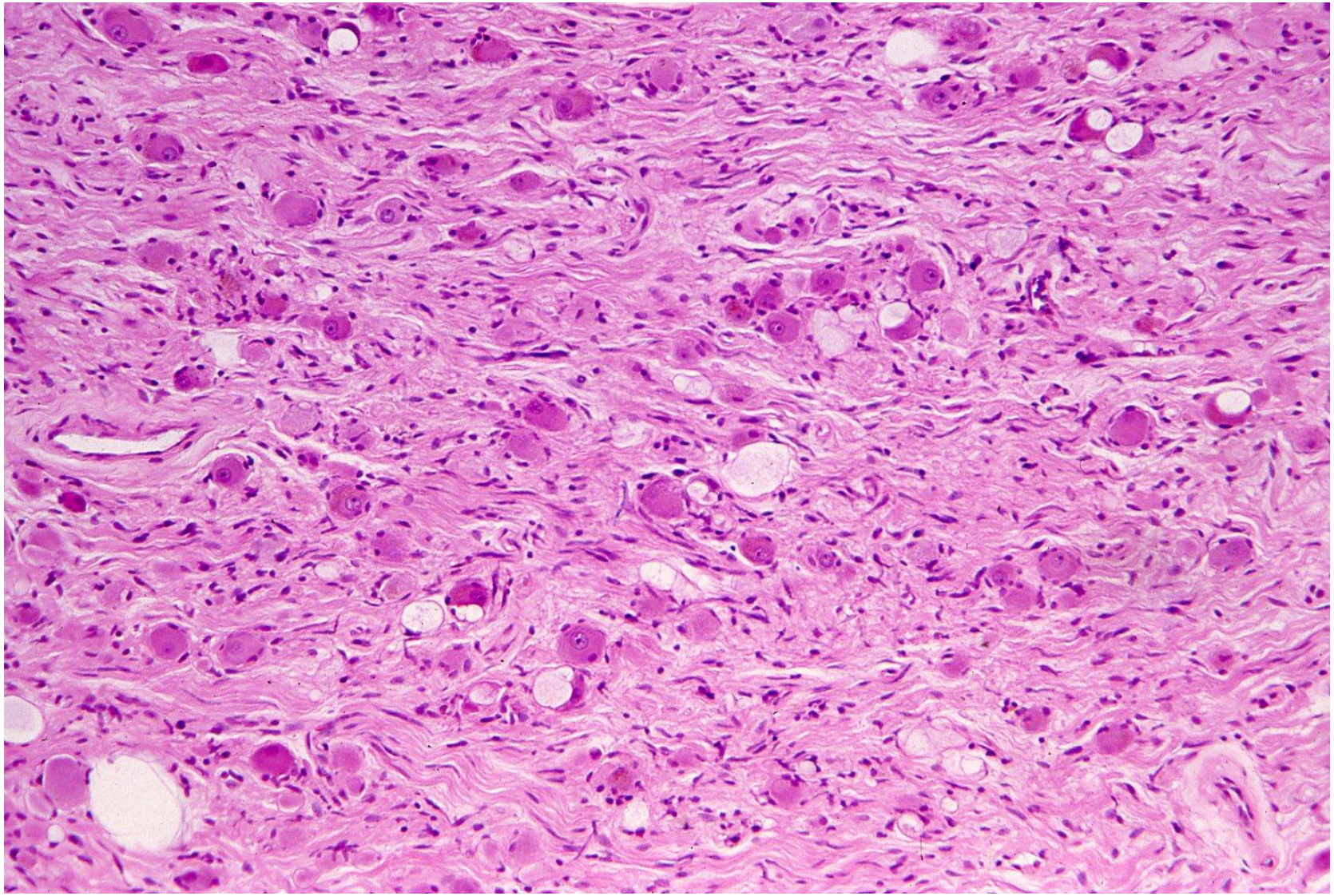


The roles of lateral geniculate body:

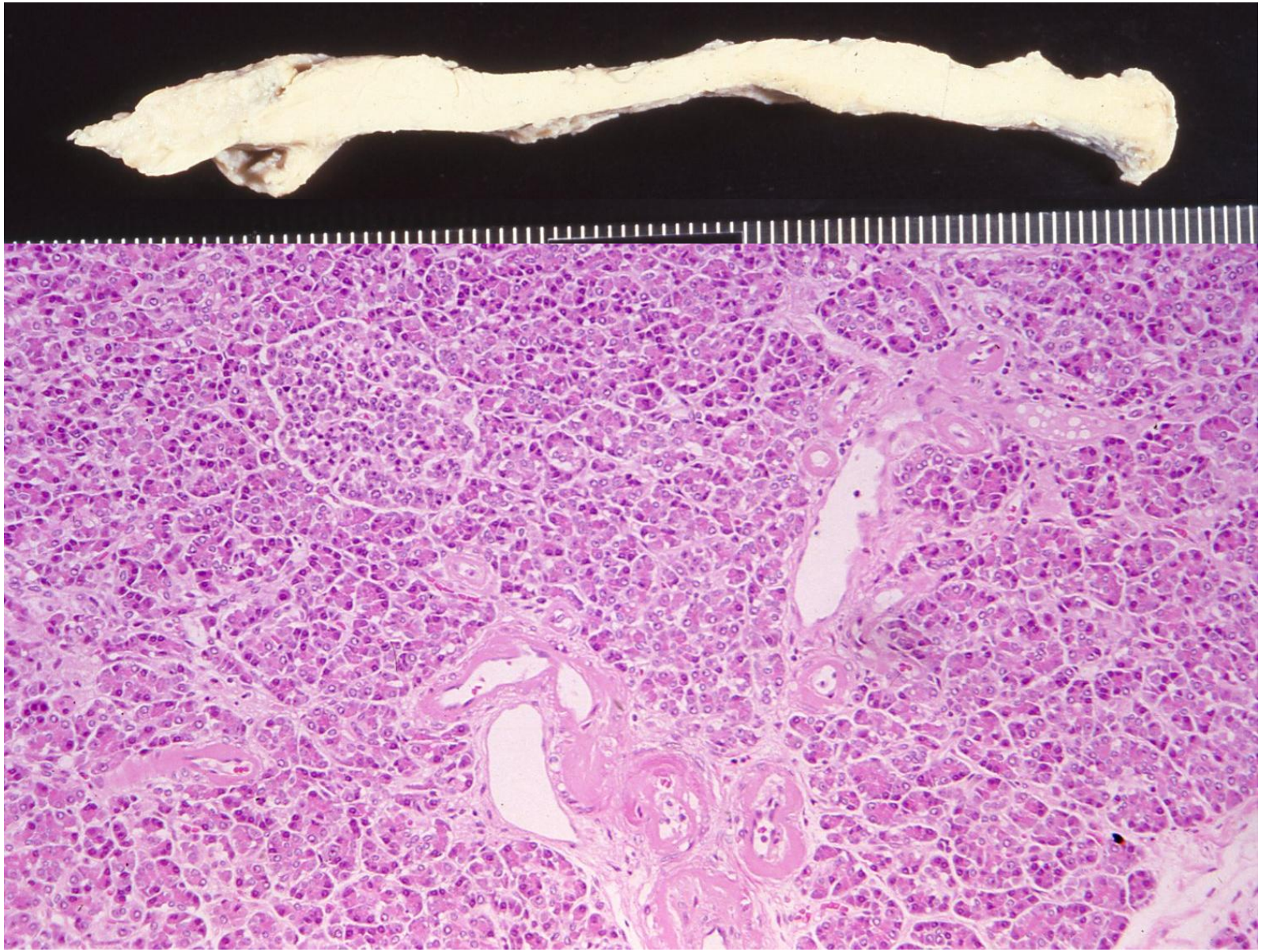
The lateral geniculate body is a key component of the mammalian visual pathway. It is a small, ovoid or fan-shaped, 1 cm-sized ventral projection of the thalamus, connecting with the optic nerve. The left half visual image projected onto the right half of the retina of each eye is sent to the right lateral geniculate body. Fibers from the large ganglion cells in the retina carry the motile and stereovision, and synapse to the 1st and 2nd layers of the lateral geniculate body. The fibers from the small ganglion cells in the retina carry color image, texture and shape signals, and connect to the 3rd to 6th layers of the lateral geniculate body.



Vagal nerve in diabetic neuropathy in a male autopsy case aged 50’s (left). Right panel shows age-adjusted control (LFB-HE). Marked decrease of myelinated fibers are observed in the vagal nerve (a representative of the peripheral nerve).

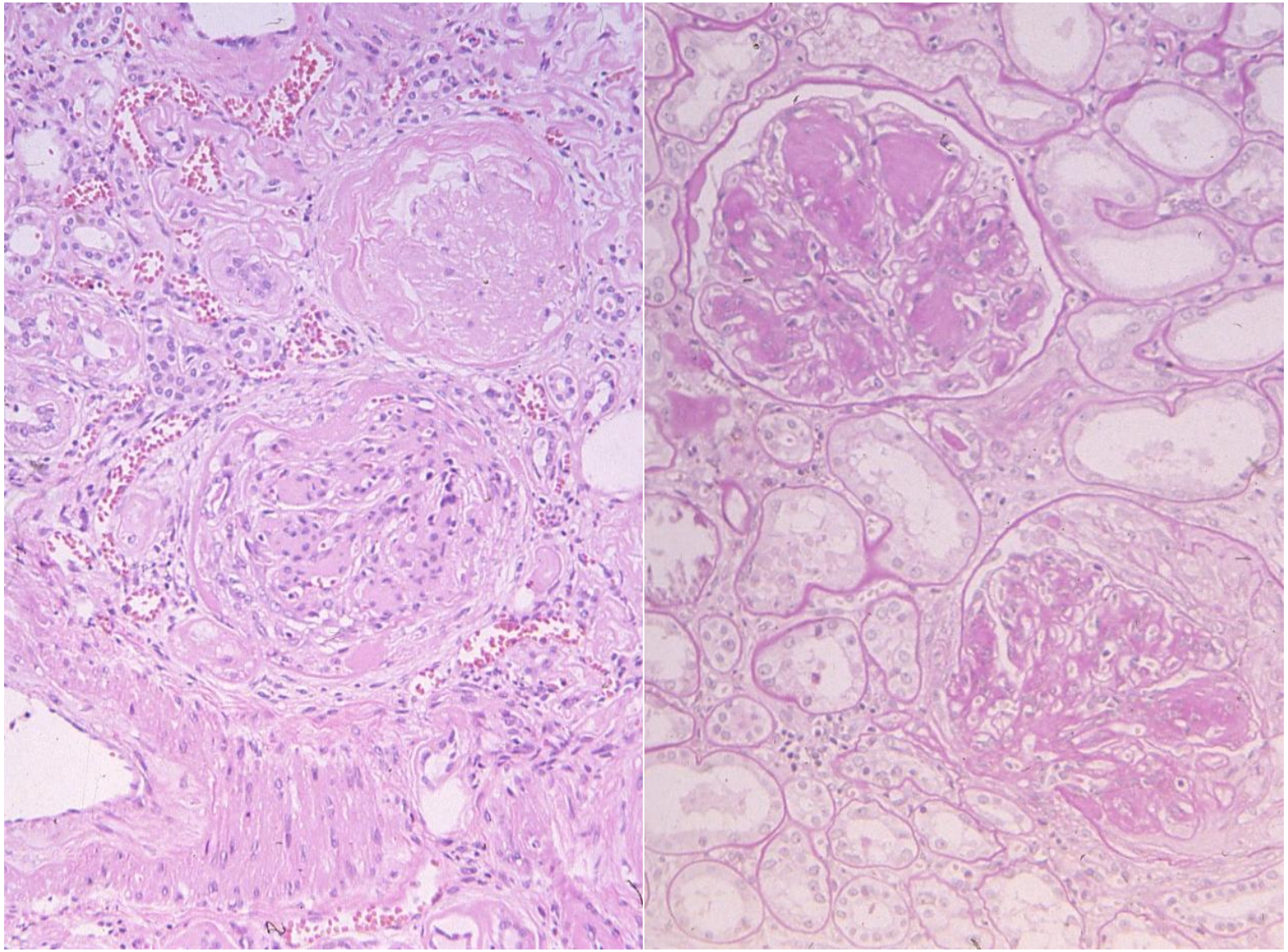


Vacuolar change in neurons of the dorsal root ganglion of the spinal cord in a male autopsy case aged 50’s (H&E). The vacuoles may represent severe sensory disturbance caused by diabetic peripheral neuropathy.

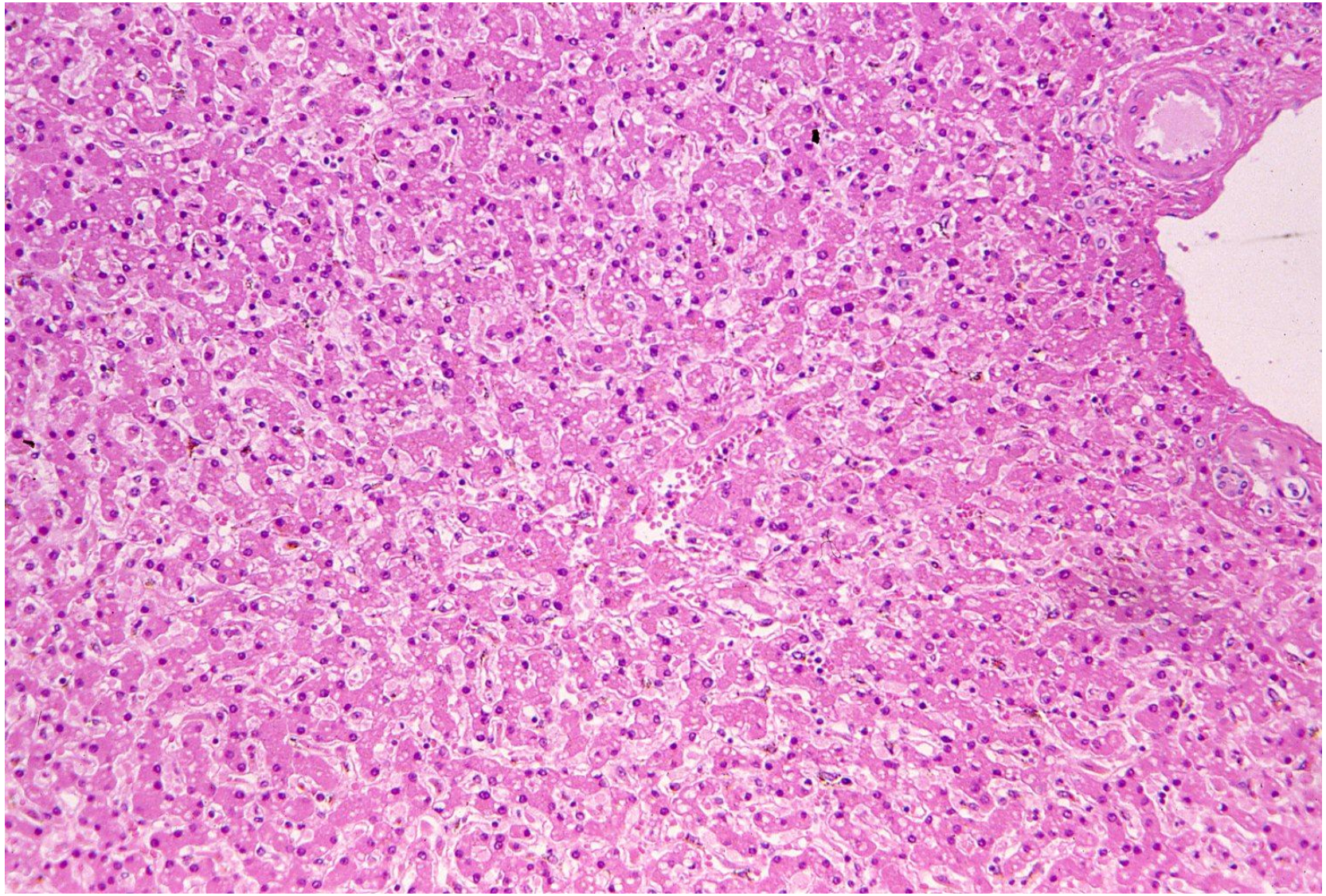


Diabetic triopathy in a male autopsy case aged 50's. The pancreas is grossly atrophic (43 g), and microscopically shows a decrease of Langerhans islets but without amyloid deposition (H&E). Arteriolosclerosis is associated.

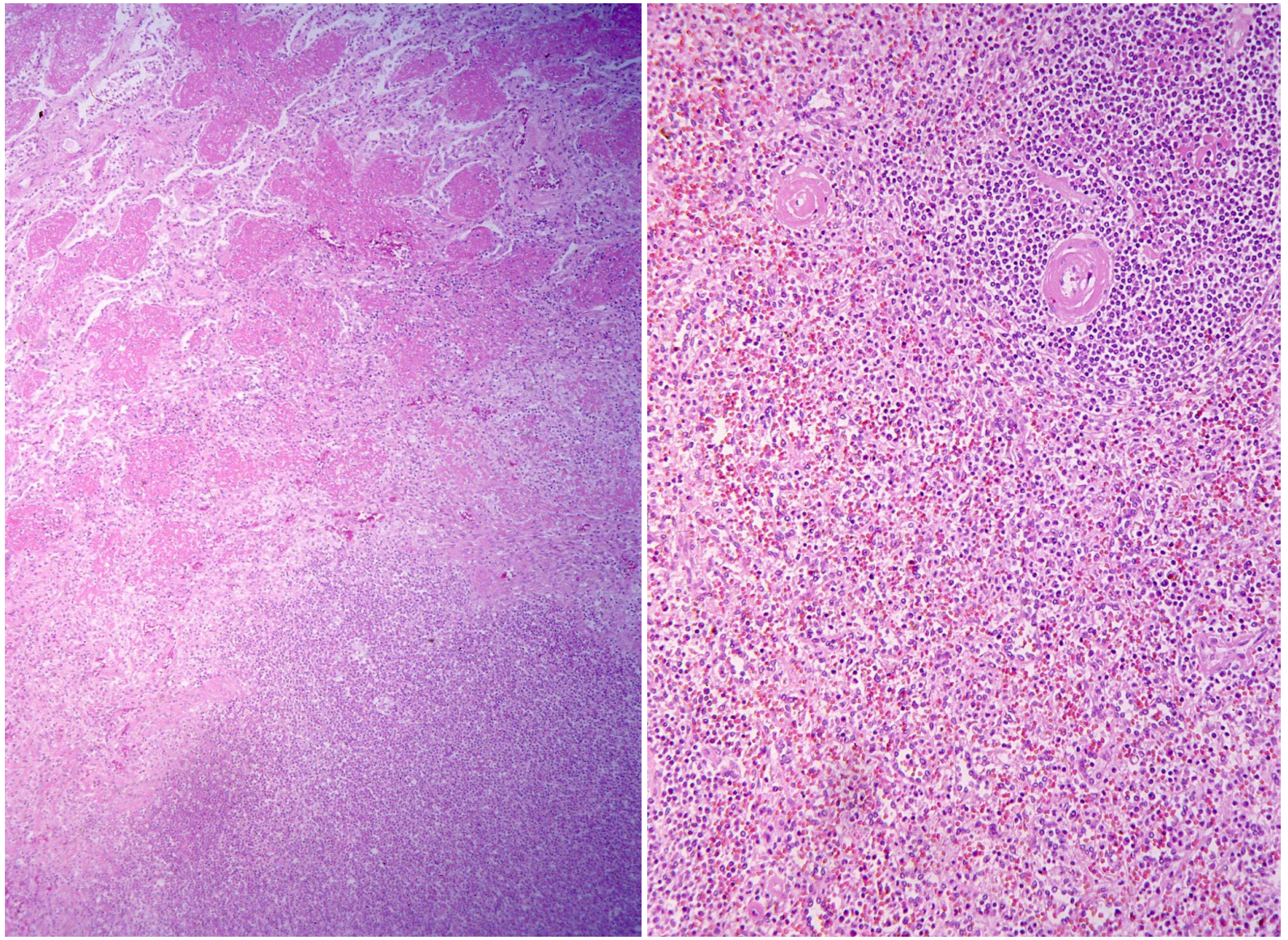
Diabetic nephropathy in a male autopsy case aged 50’s (gross features after formalin fixation). Granularity is grossly observed on the kidney surface.



Diabetic nephropathy in a 59 y-o male autopsy case (left: H&E, right: PAS). Nodular lesions are formed in the glomeruli.



Diabetic triopathy in a 59 y-o male autopsy case. The liver shows mild fatty change in the hepatocytes (H&E).



Diabetic triopathy in a 59 y-o male autopsy case (H&E). Lung abscess (left) with septicemia caused the patient's death. Acute splenitis is observed in the spleen (right). The liver shows mild fatty change in the hepatocytes.