A Cooke's Tour of

Photography

How to make the most of your digital images

Professor Robin A. Cooke

Telepathology is one of the uses to which digital images can be put.

In the routine practice of pathology digital images are used for many purposes –

recording results, presenting cases at clinical meetings, writing scientific articles, preparing material for lectures for teaching, making poster presentations, sending fixed images via email for consultation.

Even though digital cameras have become very advanced technically, many medical images are still quite inferior.

My hypothesis is that the standard of images being presented by pathologists at clinical meetings
by authors of many current medical textbooks and journal articles
is of very poor quality and

we need to improve this.

Two pages from a current popular textbook

FIGURE 17–45 Colonic adenomas. **A**, Pedunculated adenoma (endoscopic view). **B**, Adenoma with a velvety surface. **C**, Low-magnification photomicrograph of a pedunculated tubular adenoma.

categories, however, have little clinical significance in isolation. Tubular adenomas tend to be small, pedunculated polyps composed of small rounded, or tubular, glands (Fig. 17–46A). In contrast, villous adenomas, which are often larger and sessile, are covered by slender villi (Fig. 17–46B). Tubulovillous adenomas have a mixture of tubular and villous elements. Although villous adenomas contain foci of invasion more frequently than tubular adenomas, villous architecture alone does not increase cancer risk when polyp size is considered.

Sessile serrated adenomas overlap histologically with hyperplastic polyps, but are more commonly found in the right colon.[110] Despite their malignant potential, sessile serrated adenomas lack typical cytologic features of dysplasia that are present in other adenomas (Fig. 17–46C). Histologic criteria include serrated architecture throughout the full length of the glands, including the crypt base, associated with lateral growth and crypt dilation (Fig. 17–46D). In contrast, serrated architecture

Although most colorectal adenomas are benign lesions, a small proportion may harbor invasive cancer at the time of detection. *Size is the most important characteristic that correlates with risk of malignancy.* For example, while cancer is extremely rare in adenomas less than 1 cm in diameter, some studies suggest that nearly 40% of lesions larger than 4 cm in diameter contain foci of cancer. In addition to size, high-grade dysplasia is a risk factor for cancer in an individual polyp (but not other polyps in the same patient).

Familial Syndromes

Several syndromes characterized by the presence of colonic polyps and increased rates of colon cancer have been described. The genetic basis of these disorders has been established and has greatly enhanced our understanding of sporadic colon cancer (Table 17–10).

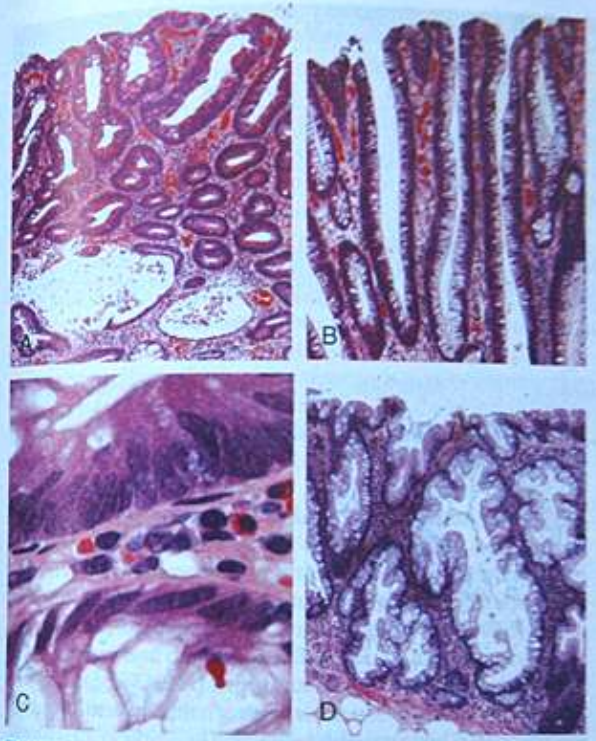
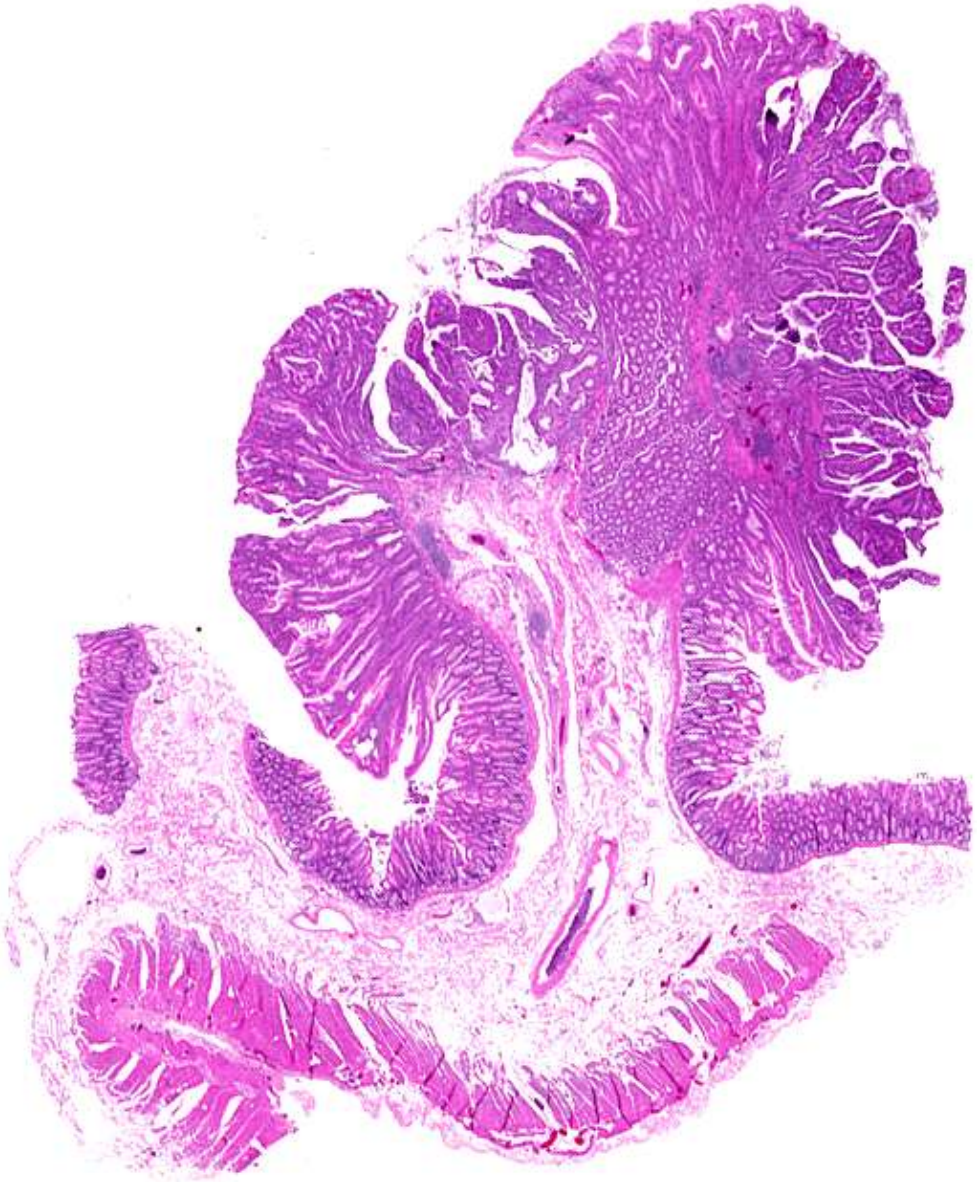
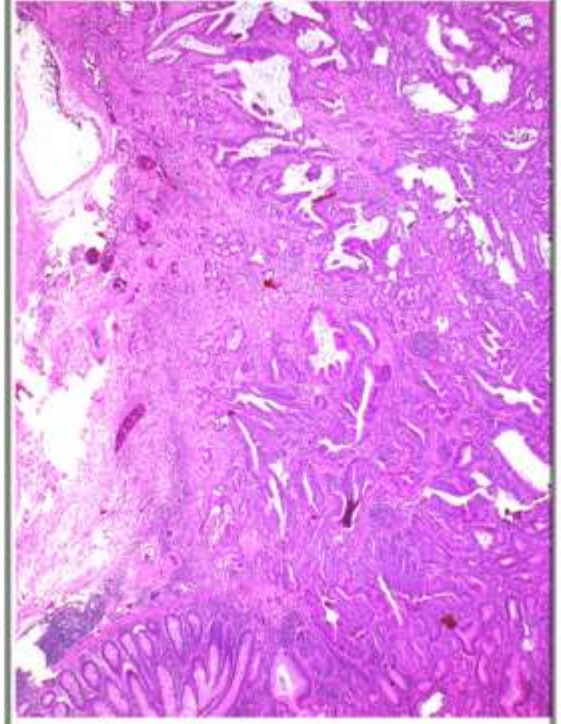
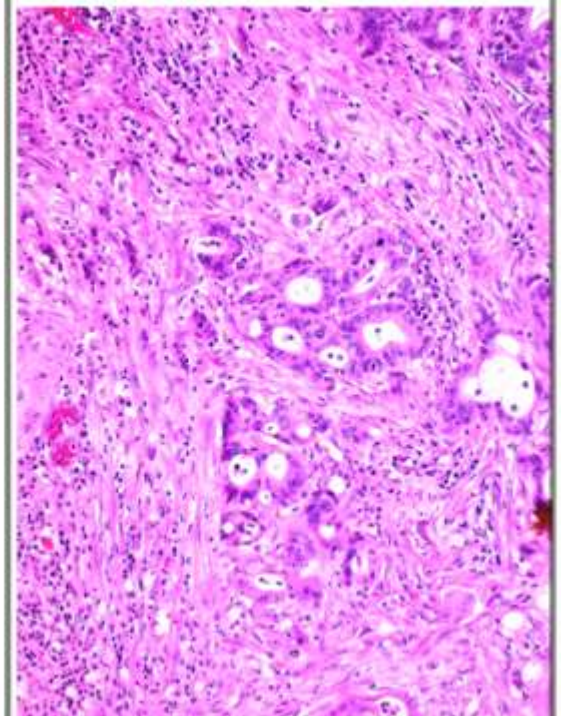


FIGURE 17–46 Histologic appearance of colonic adenomas. **A**, Tubular adenoma with a smooth surface and rounded glands. Active inflammation is occasionally present in adenomas, in this case, crypt dilation and rupture can be seen at the bottom of the field. **B**, Villous adenoma with long, slender projections that are reminiscent of small intestinal villi. **C**, Dysplastic epithelial cells *(top)* with an increased nuclear-to-cytoplasmic ratio, hyperchromatic and elongated nuclei, and nuclear pseudostratification. Compare to the nondysplastic epithelium below. **D**, Sessile serrated adenoma lined by goblet cells without typical cytologic features of dysplasia. This lesion is distinguished from a hyperplastic polyp by extension of the neoplastic process to the crypts, resulting in lateral growth. Compare to the hyperplastic polyp in Figure 17–44A.







In 2008 one of the young specialists at Princess Alexandra Hospital where I go every Wednesday said that they could

not use the photographs of gross specimens that the trainees were taking in the grossing room.

Could I please do something about it?

I used the gear they already had in the grossing room and instructed the trainees

and especially the scientific staff
on how to use it.

Some examples of photographs of gross specimens in 2007 compared with those in early 2010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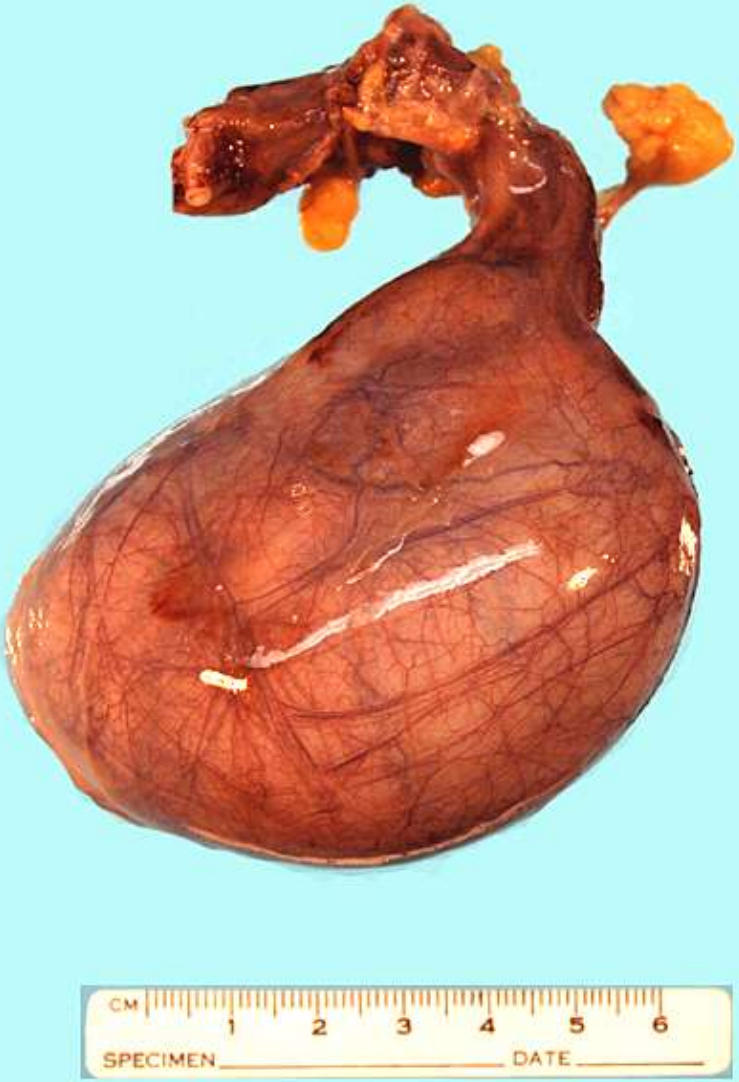
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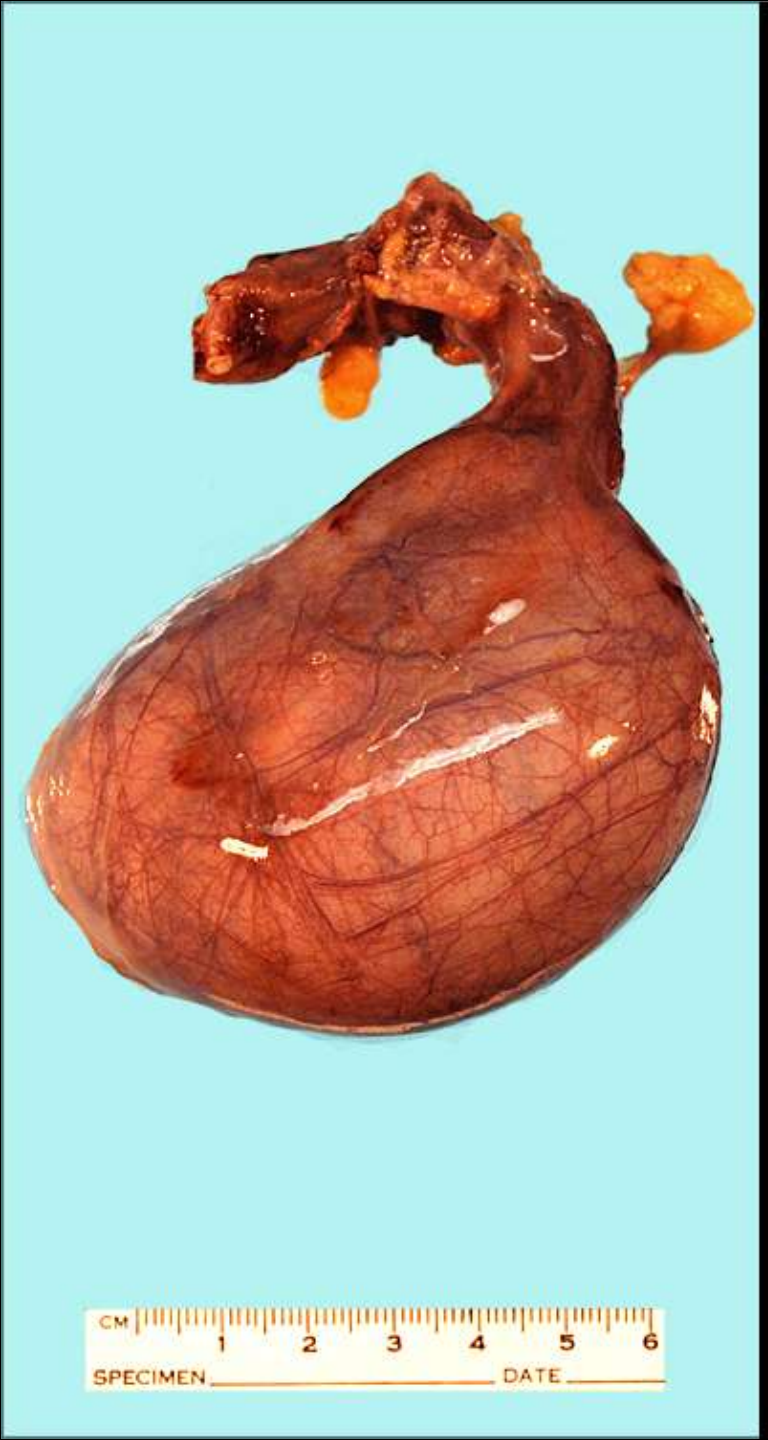
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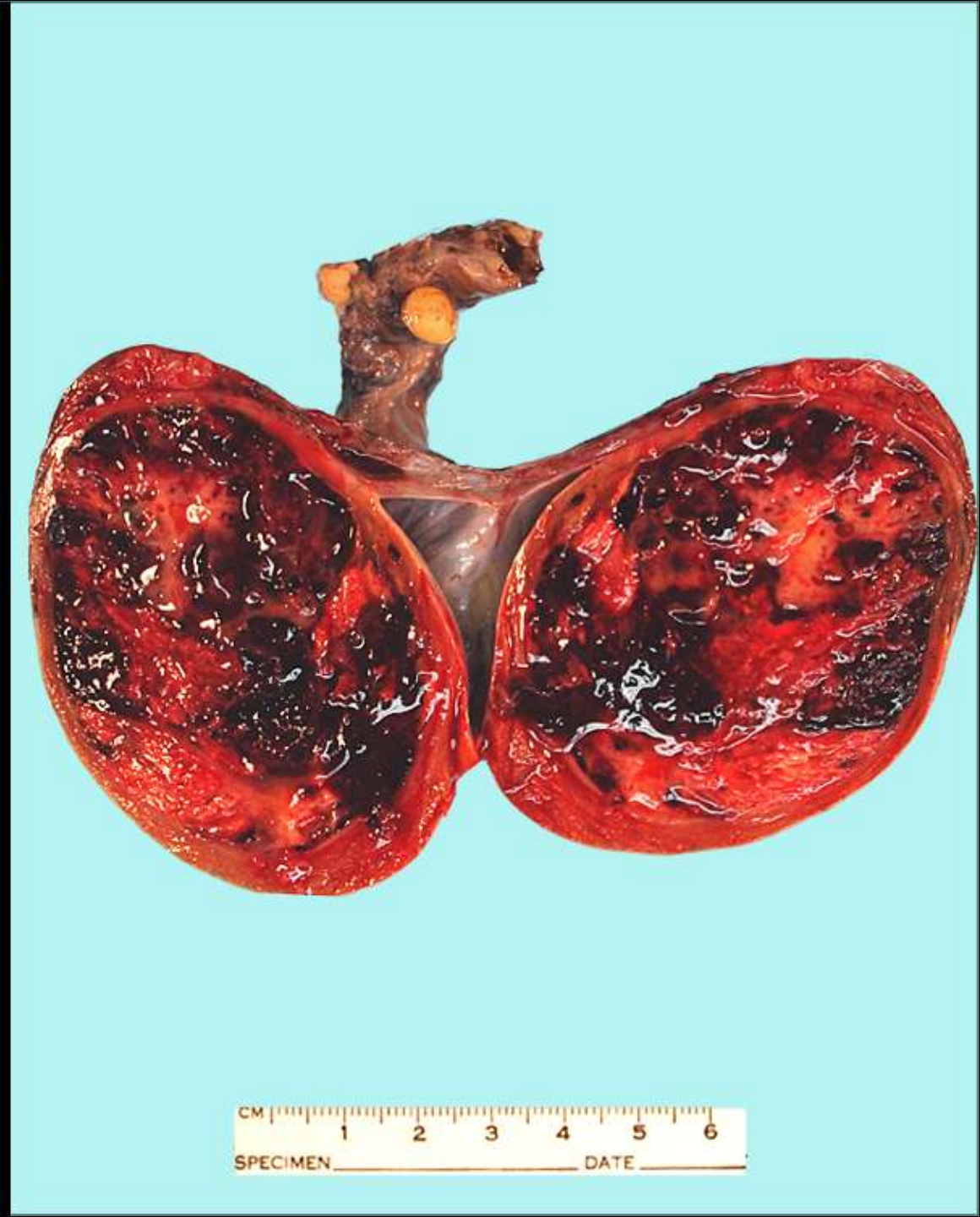
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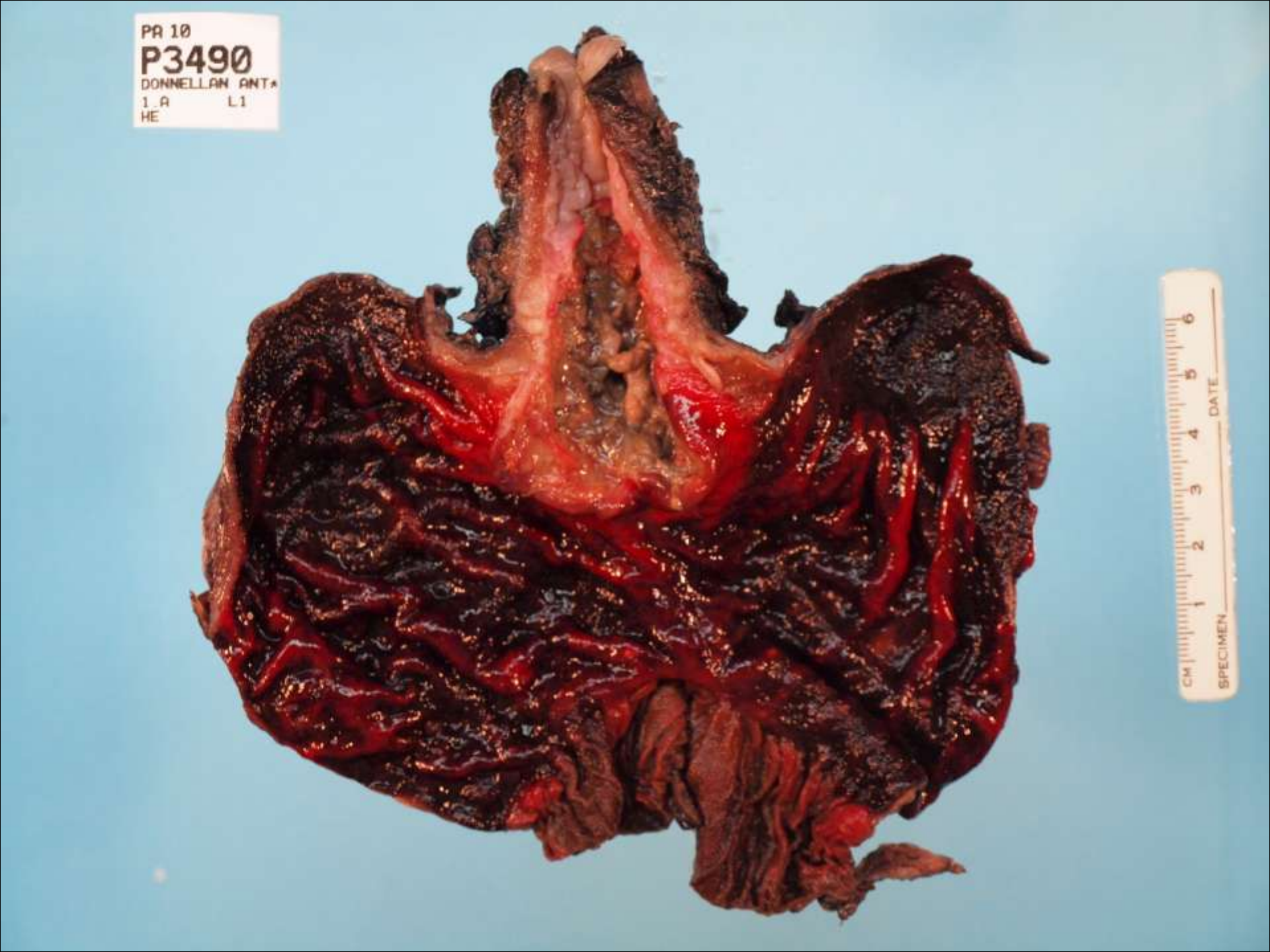
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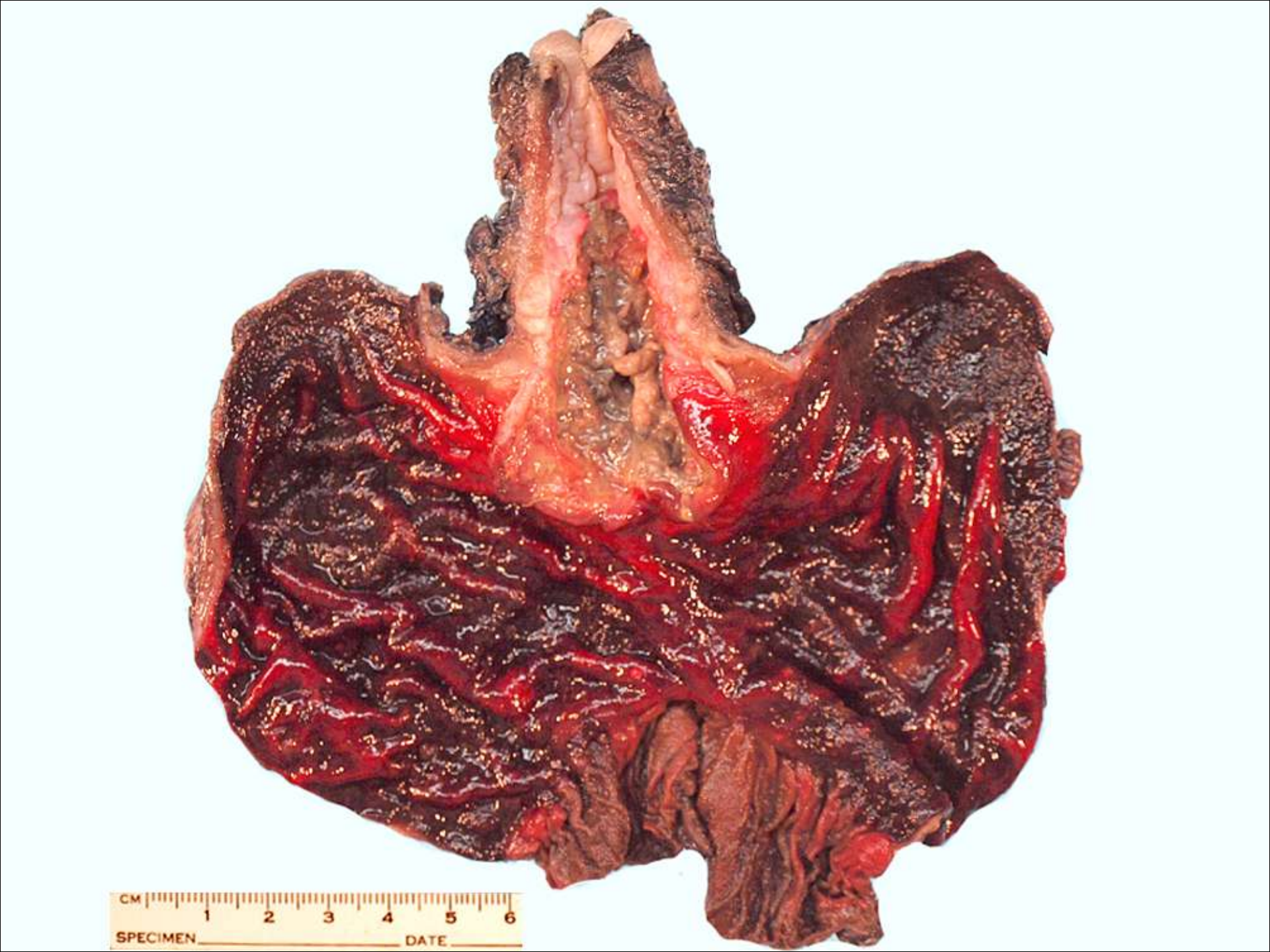
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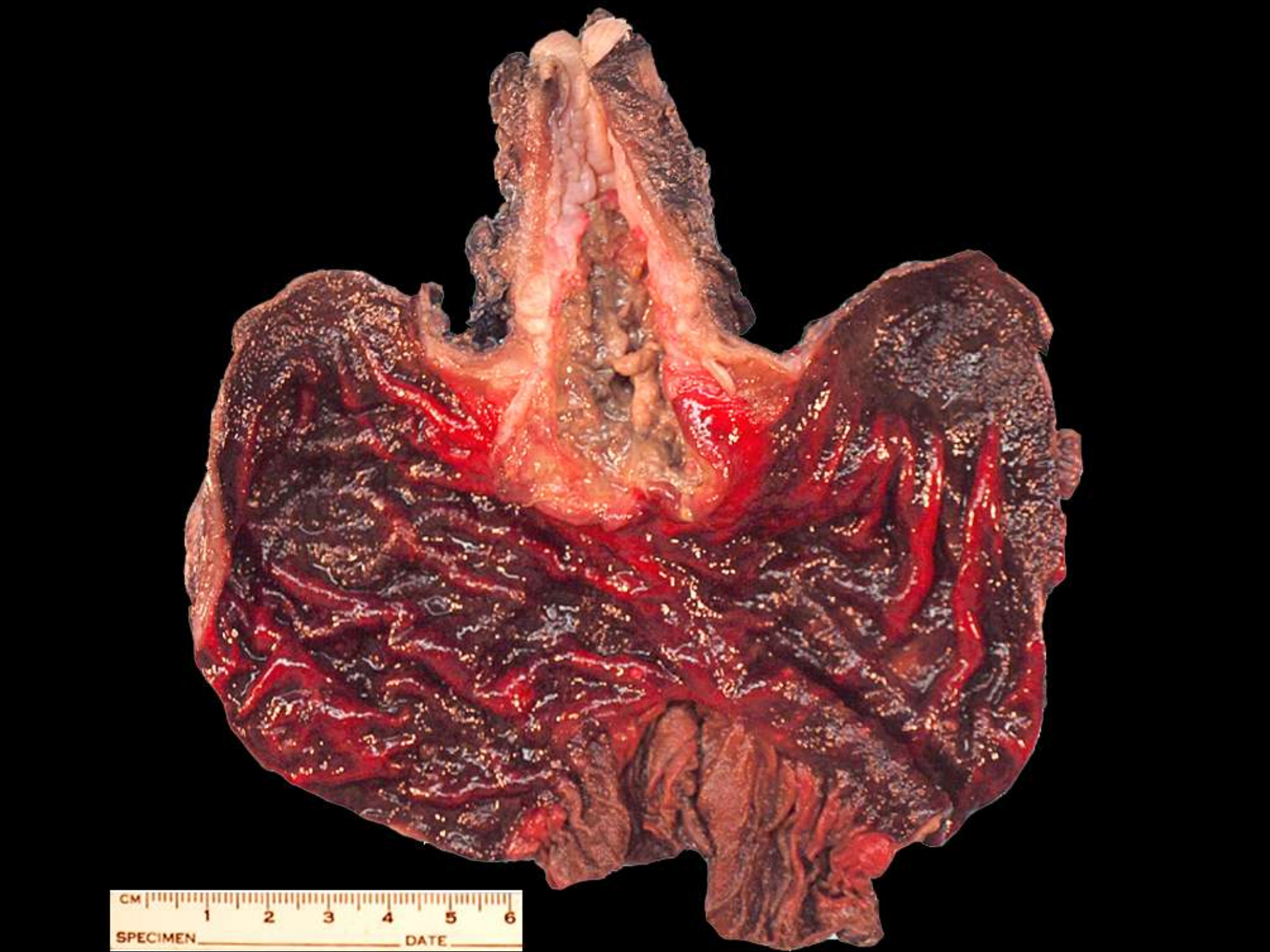
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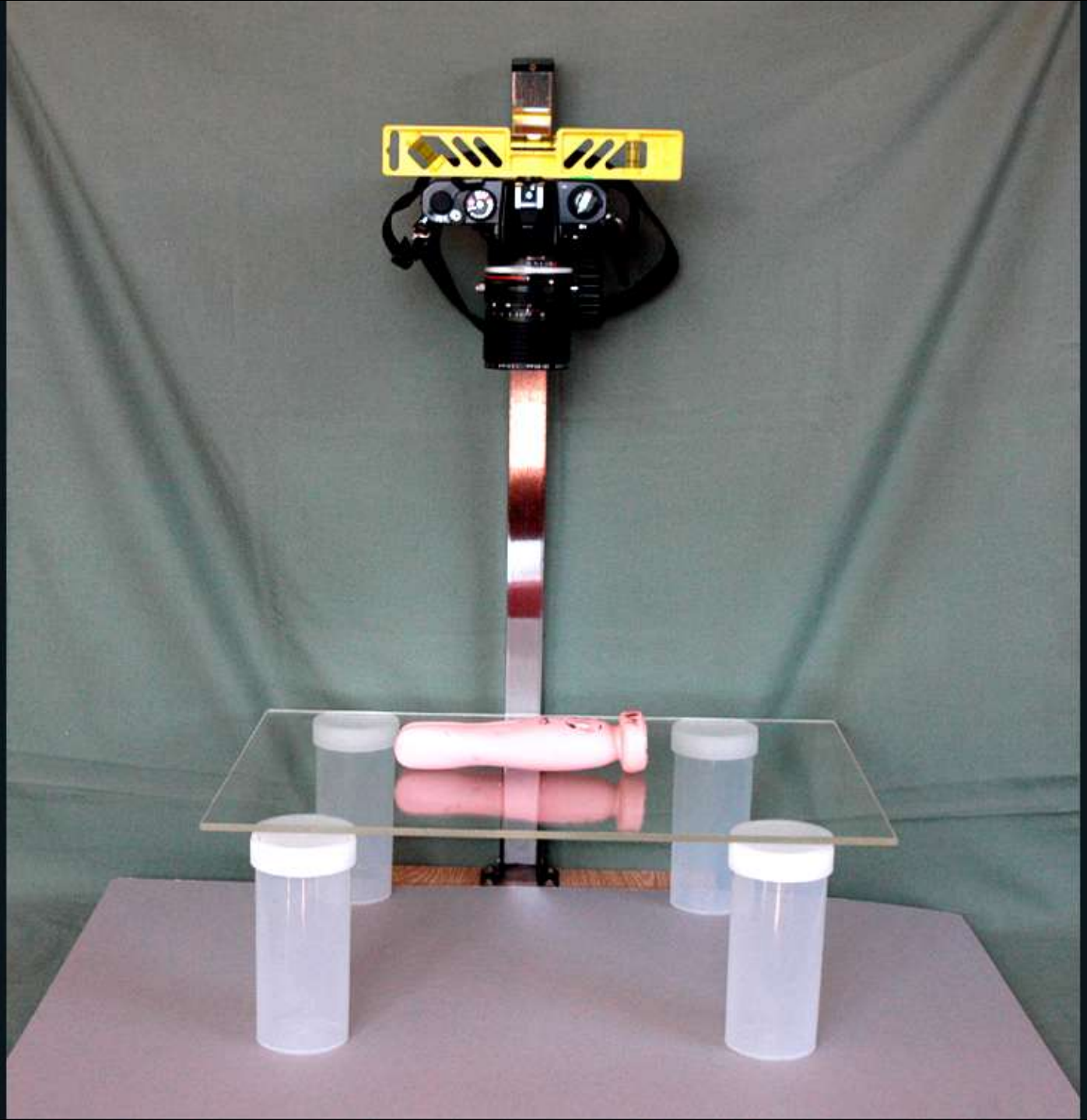
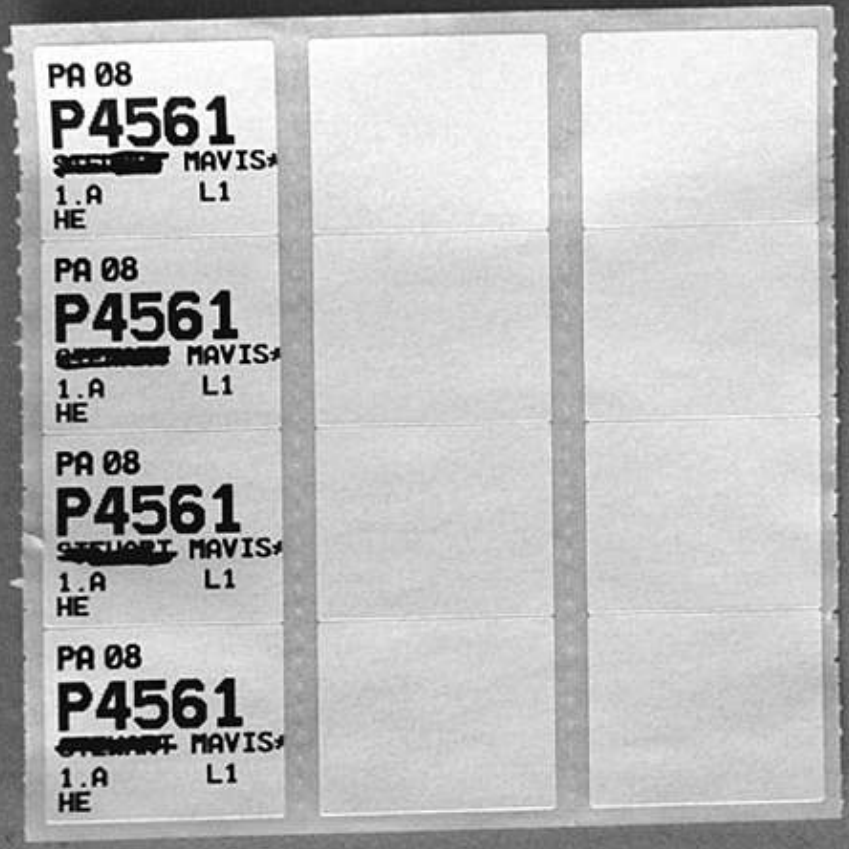
Photographic gear and how to use it

Photographing gross specimens

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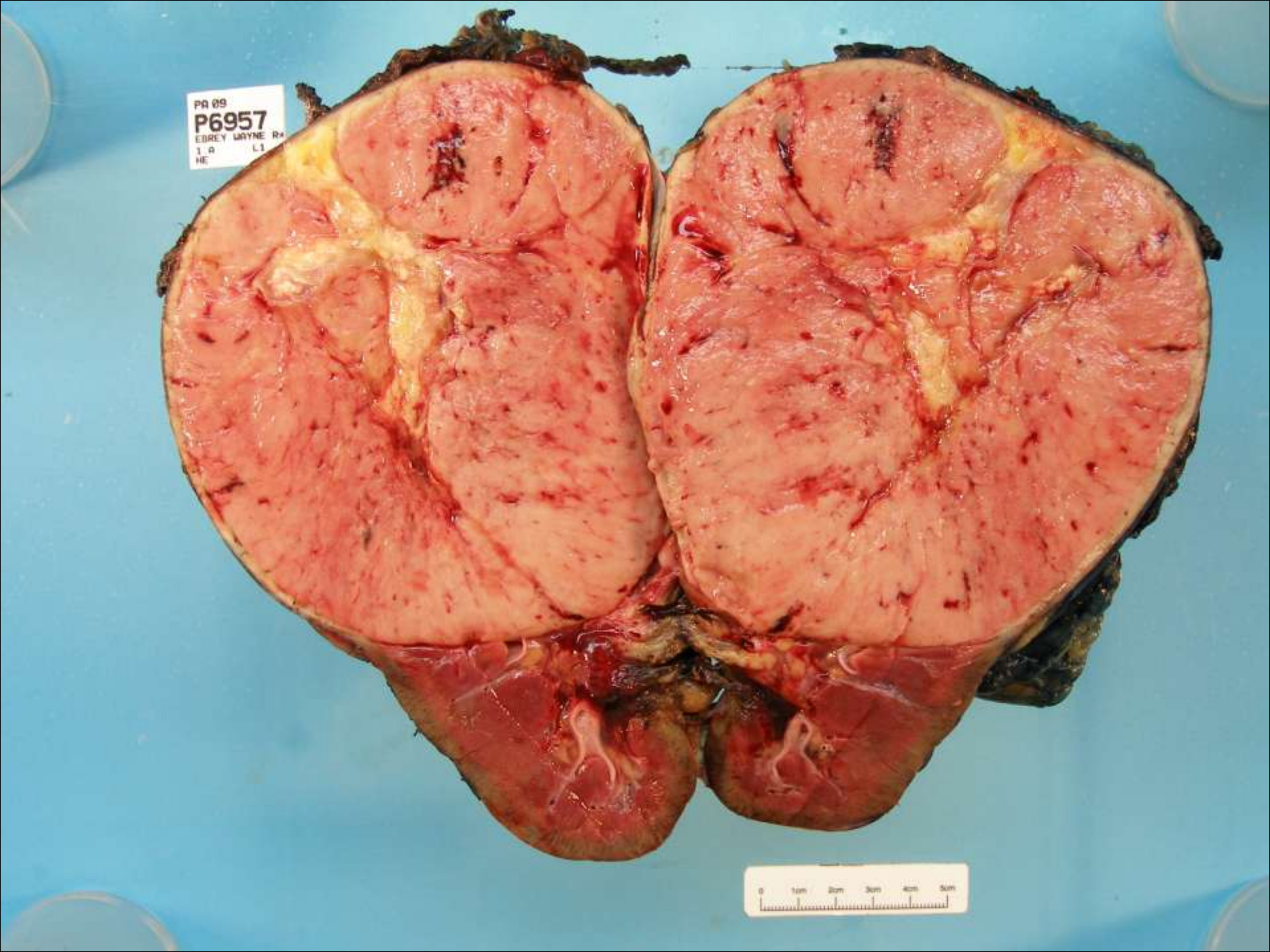
A simple gross specimen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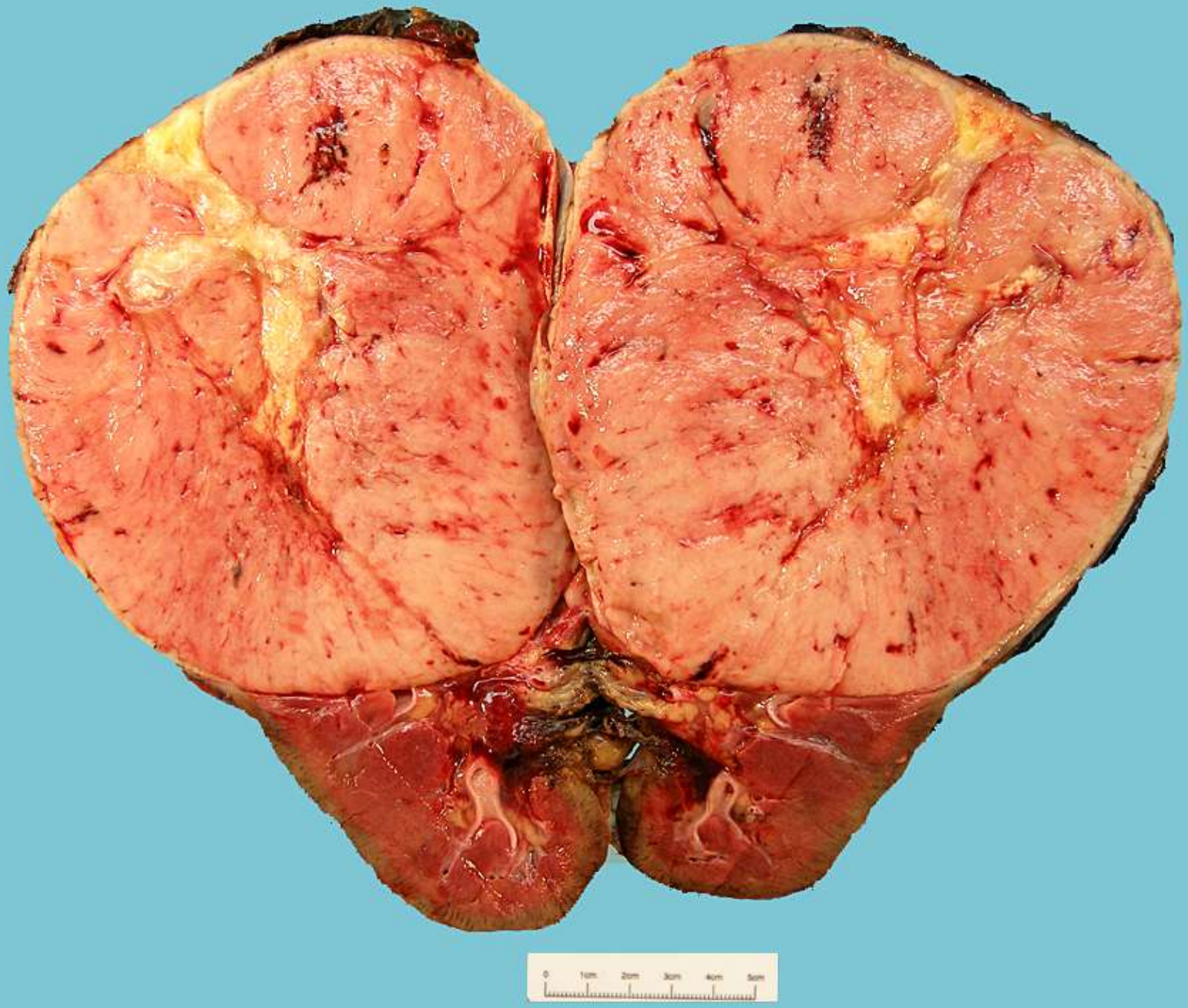
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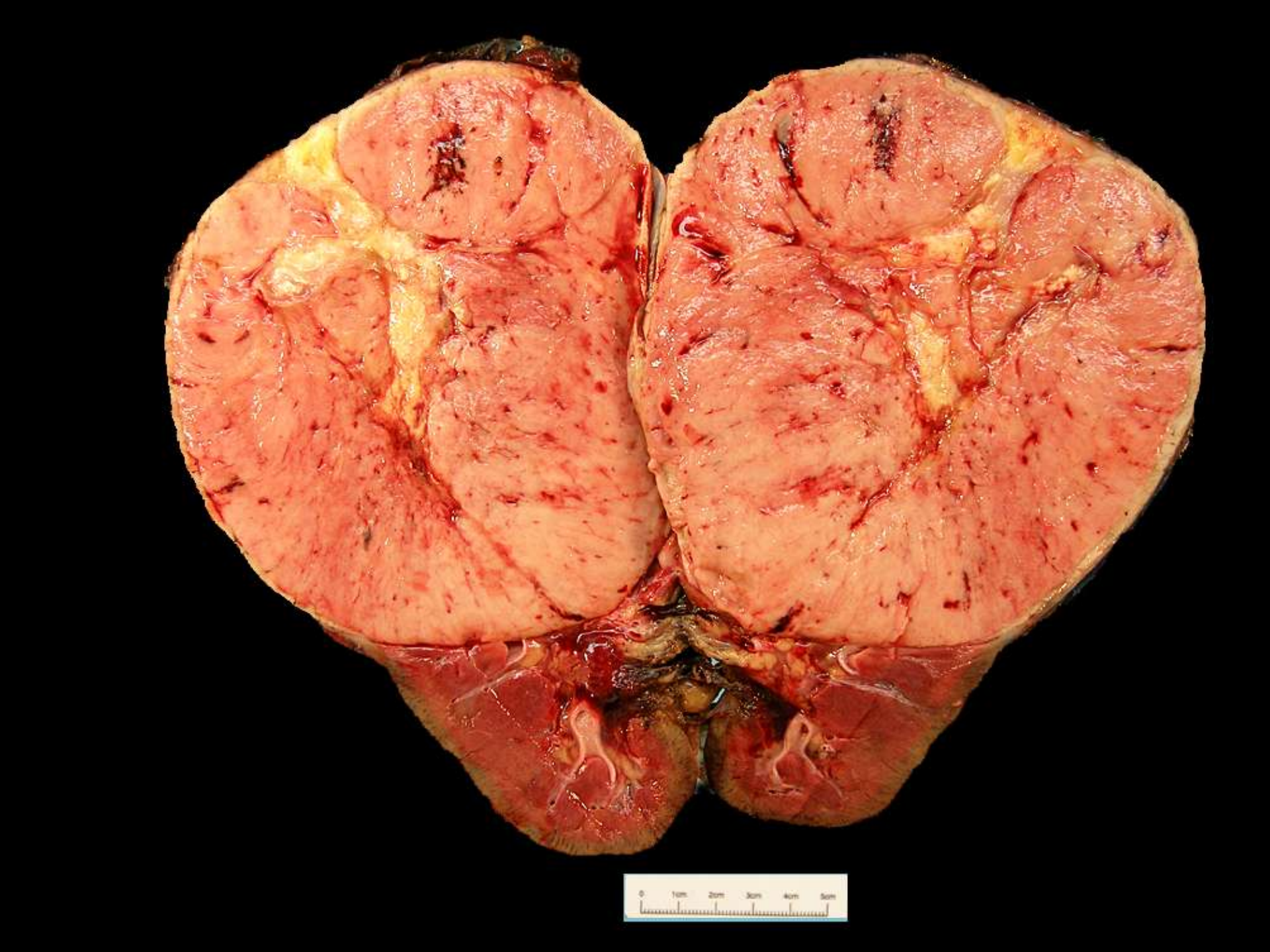
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Photographing microscopic sections


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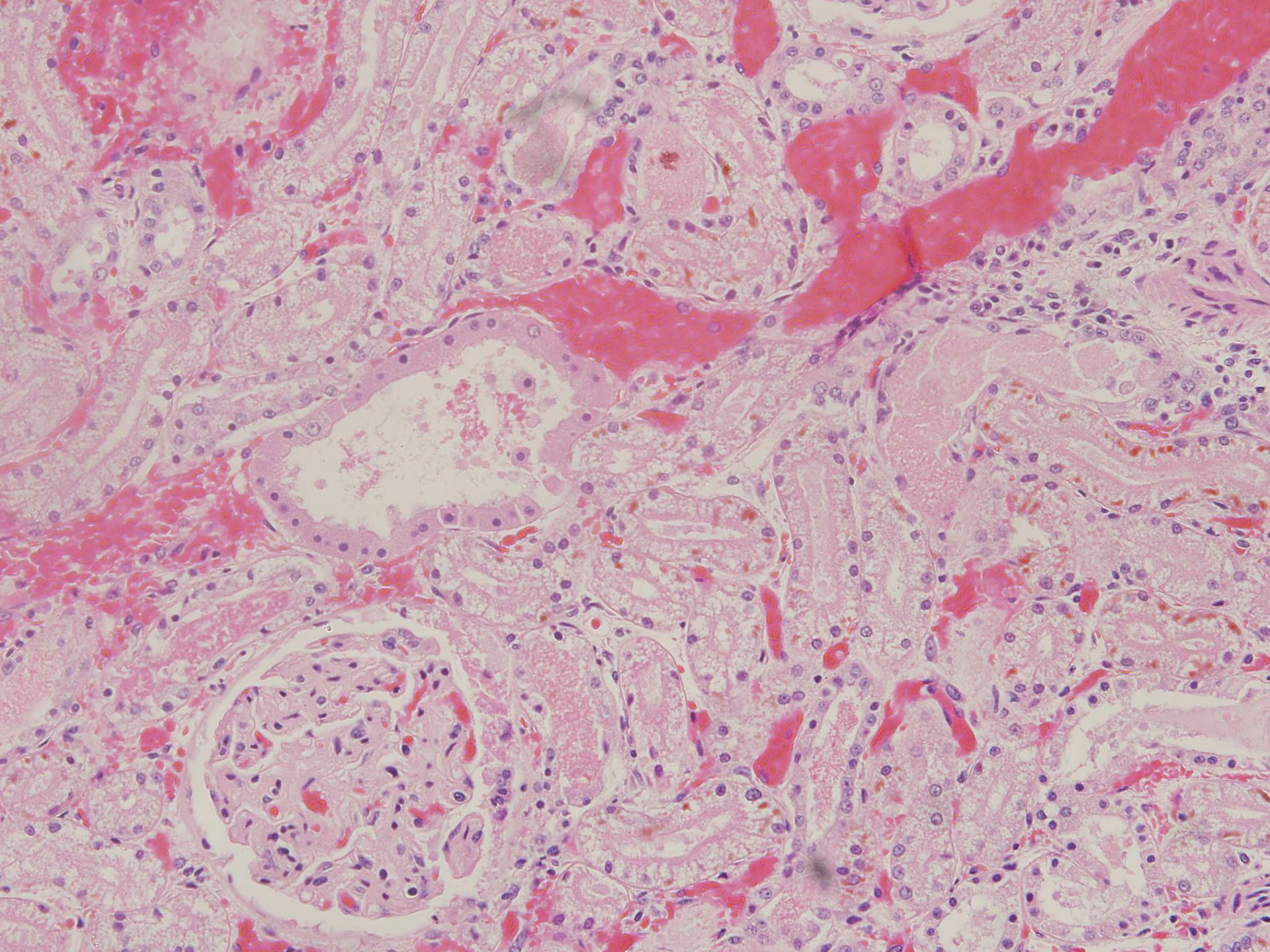
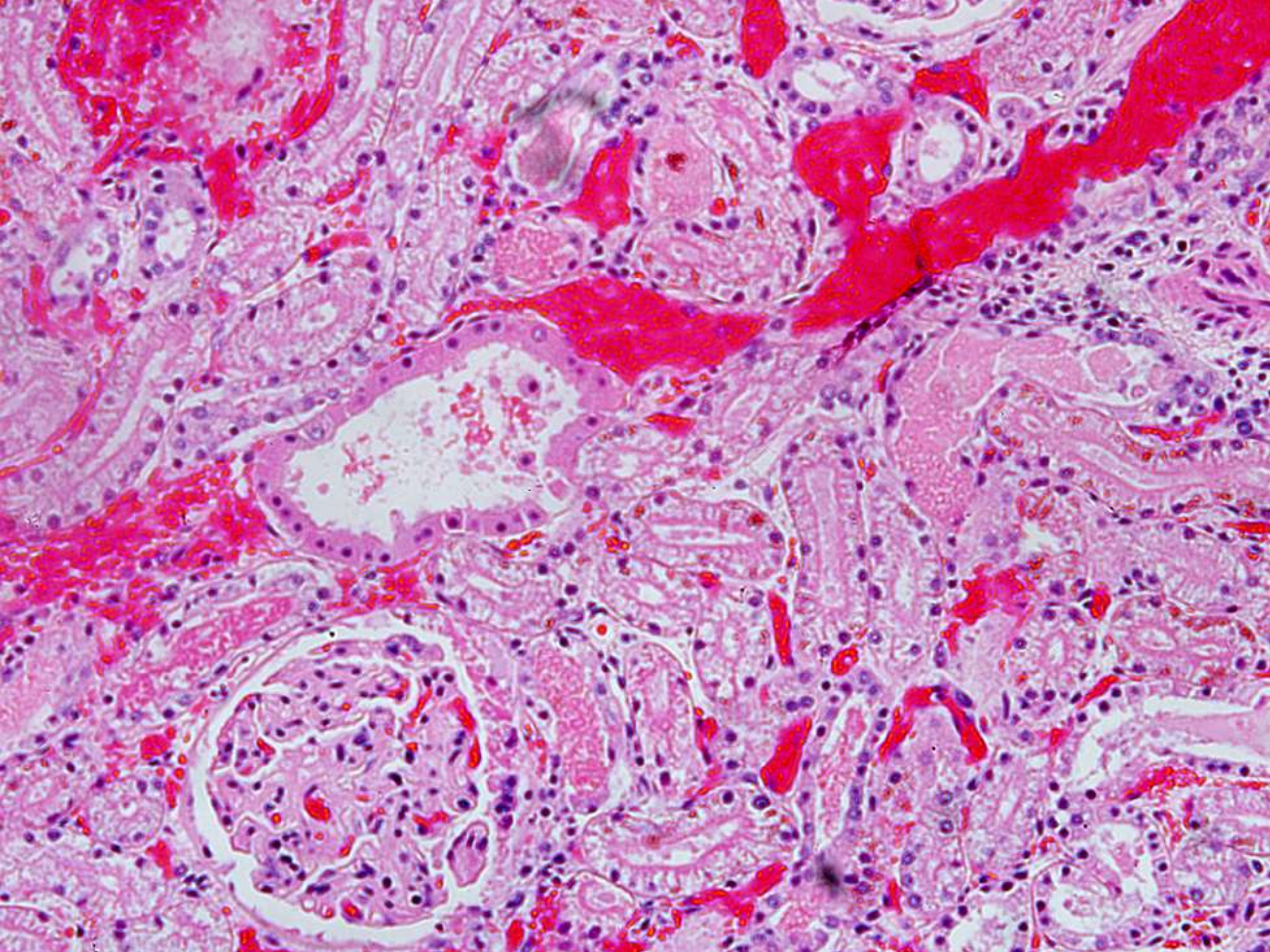
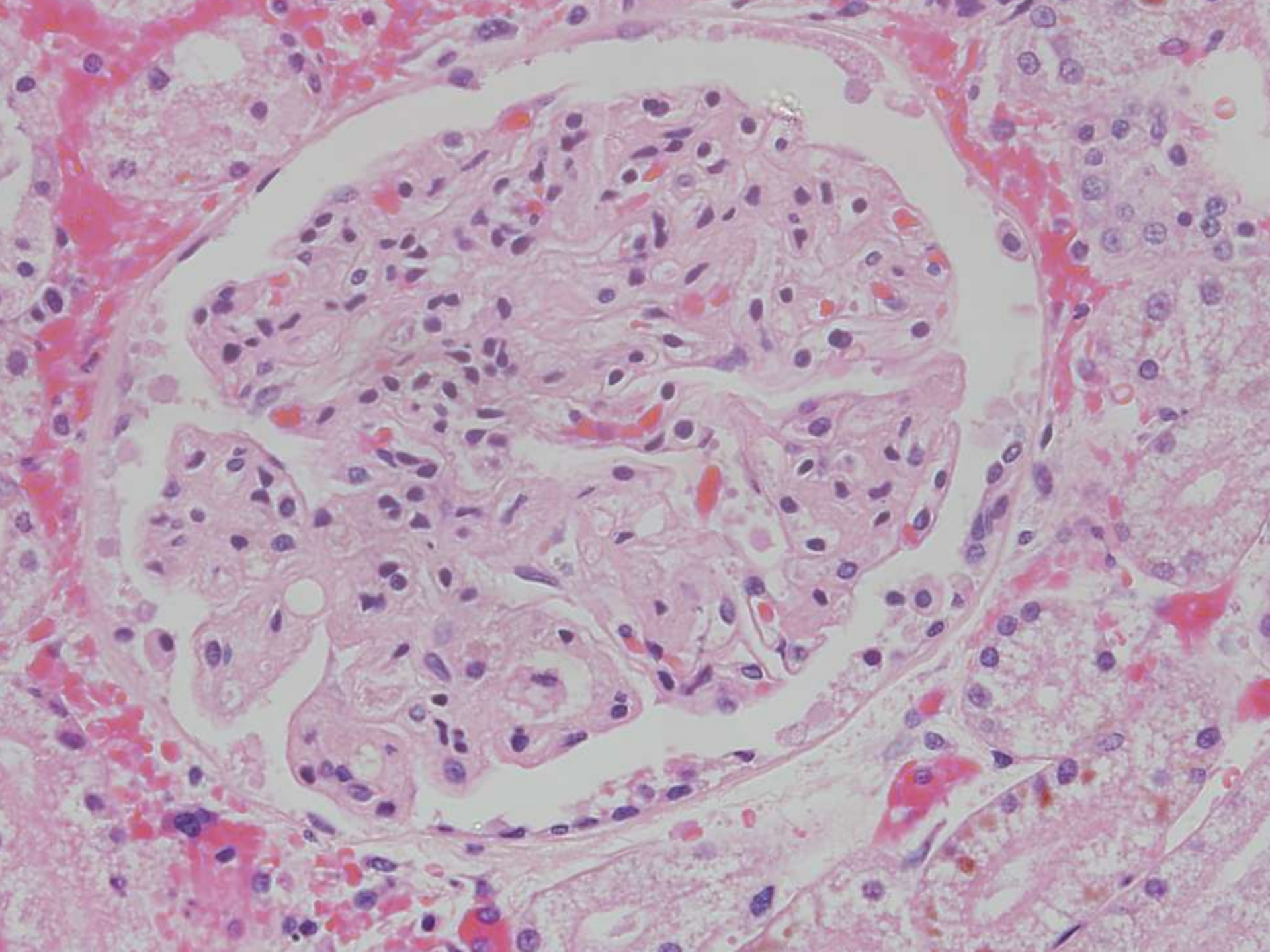
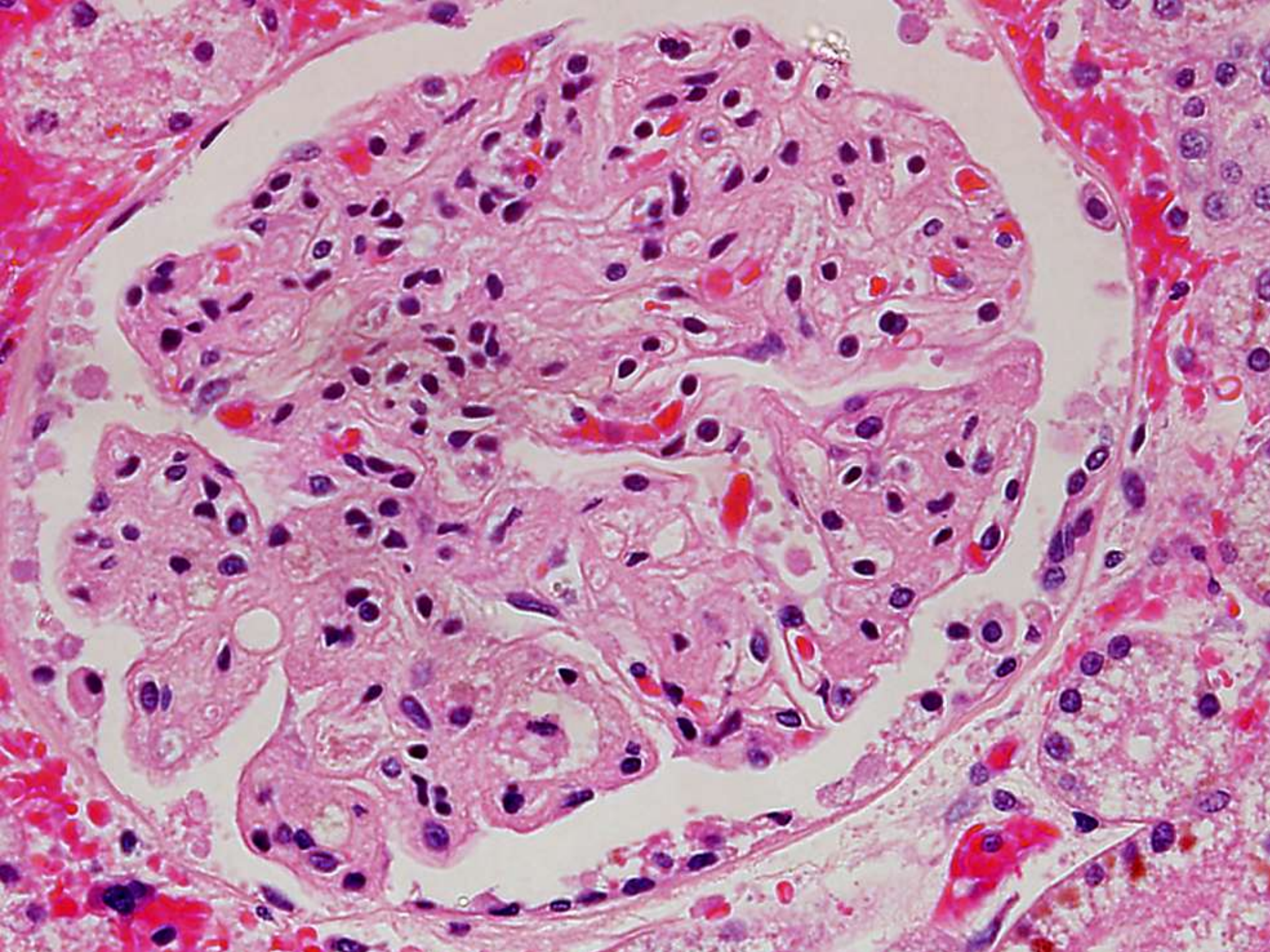
OLYMPUS

Even microscopic images taken with the most modern digital camera do need some sharpening and enhancing.









How to present material at a surgical case discussion

Simple x1 images of the whole slide ‘sub-gross pathology’ are very useful.

This gives a non microscopist, for example a surgeon, an opportunity to relate to something that he/she has seen and handled.

It is desirable to be able to demonstrate the gross specimen to the surgeon when doing clinical case discussions, but it must be a good image.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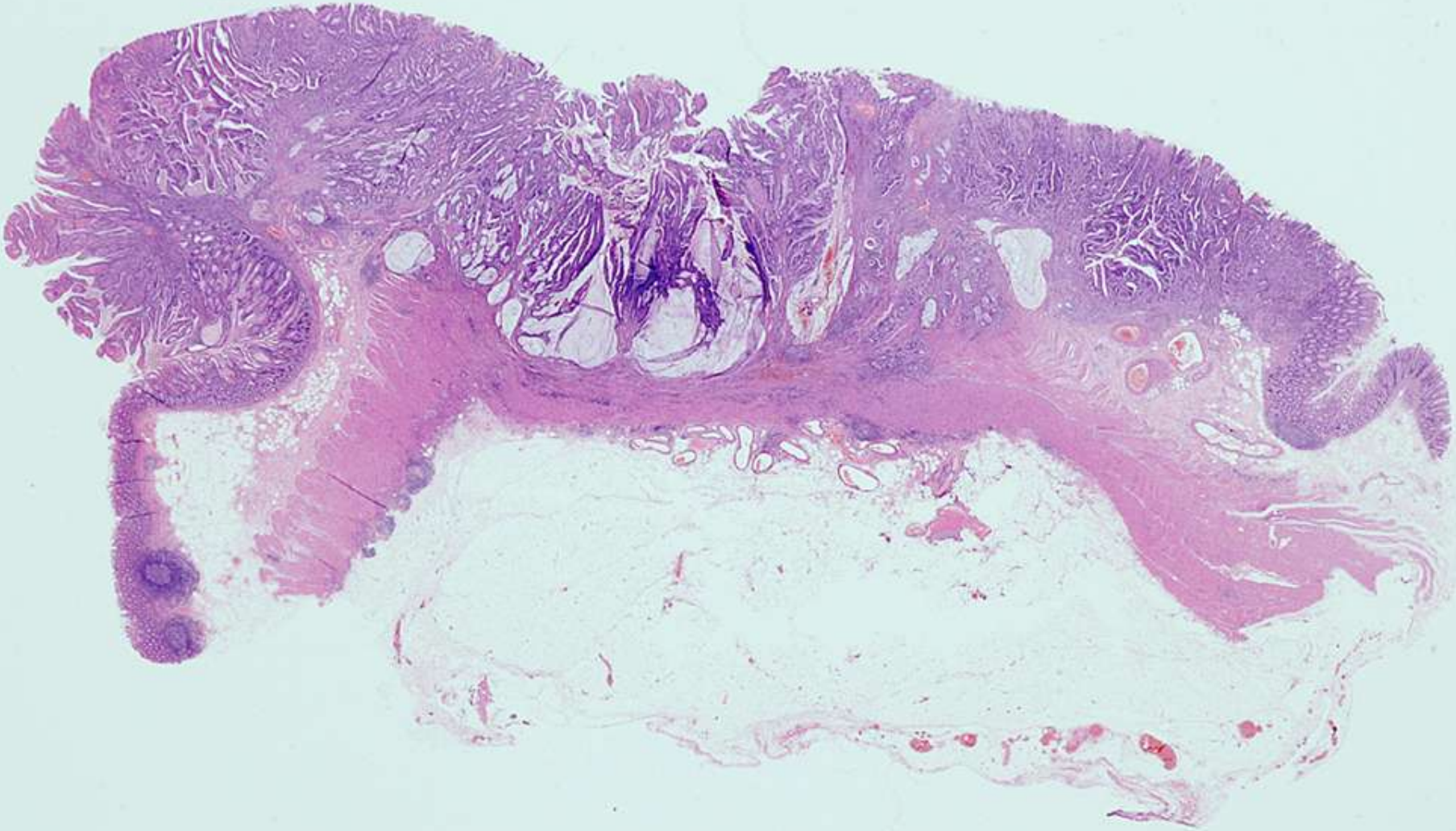
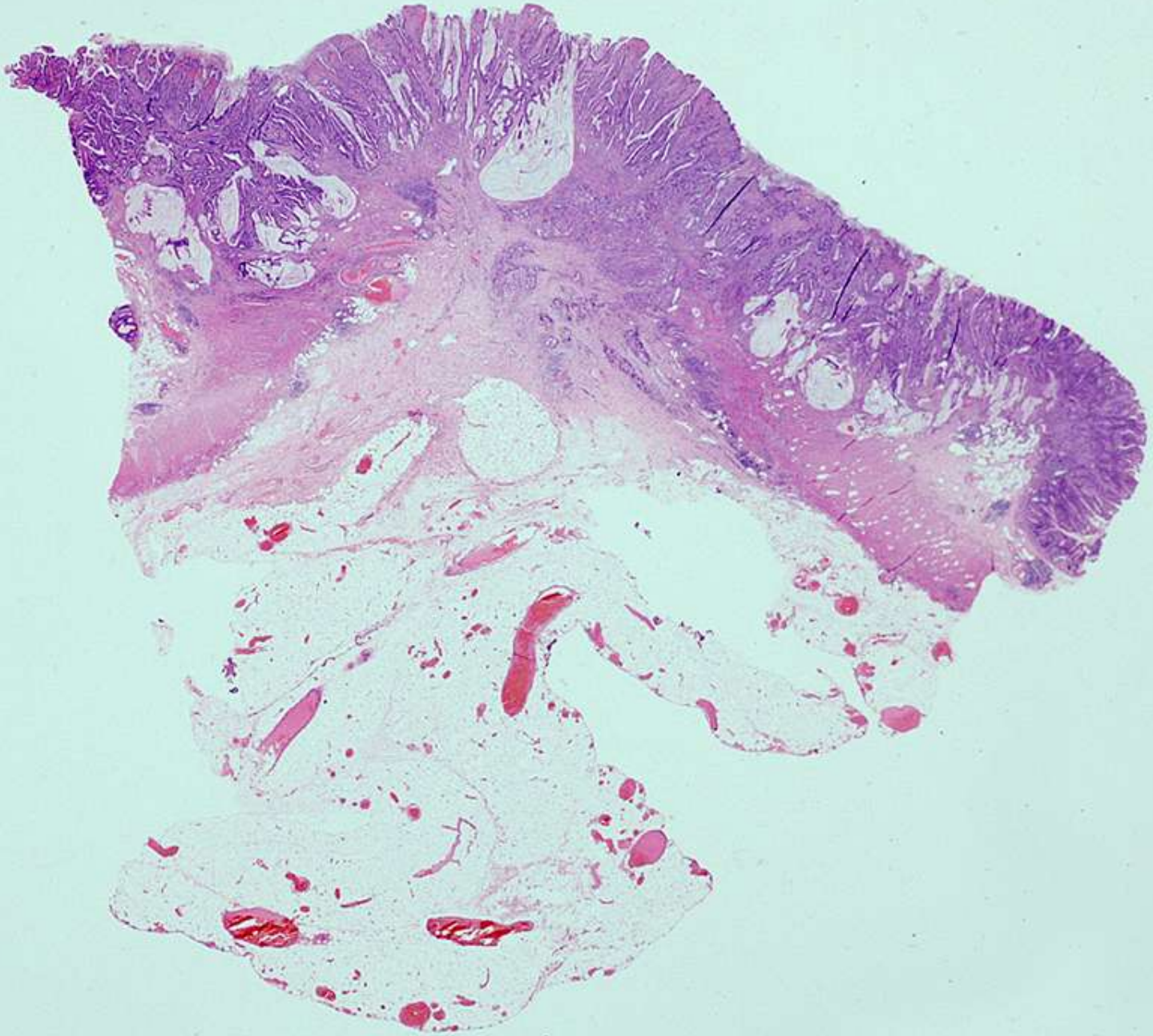
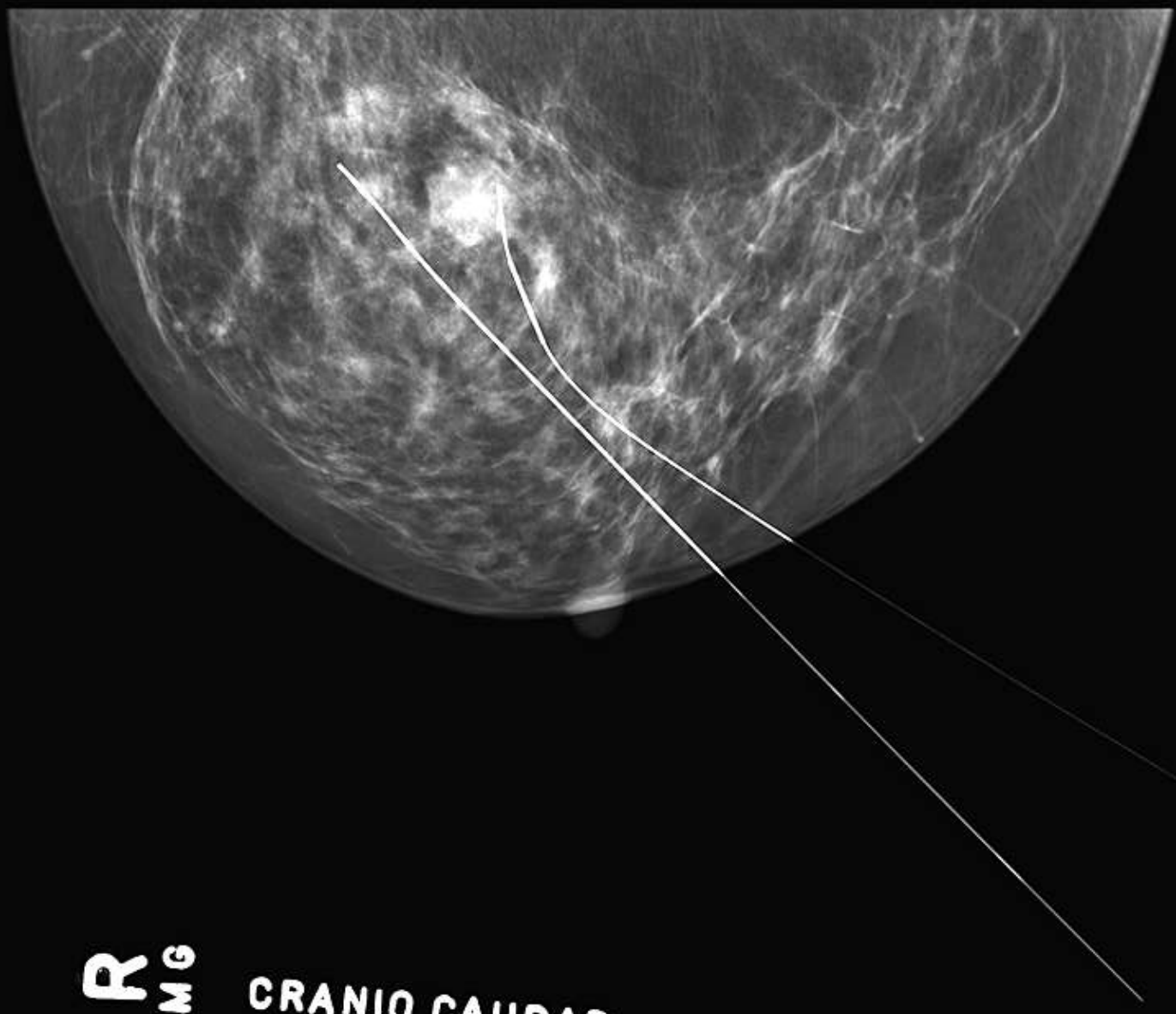
Margins of excision and depth of tumour invasion are most easily demonstrated using a x1 view of the whole section.





Some examples of standard surgical pathology cases

Pathology of a screening detected lesion of the breast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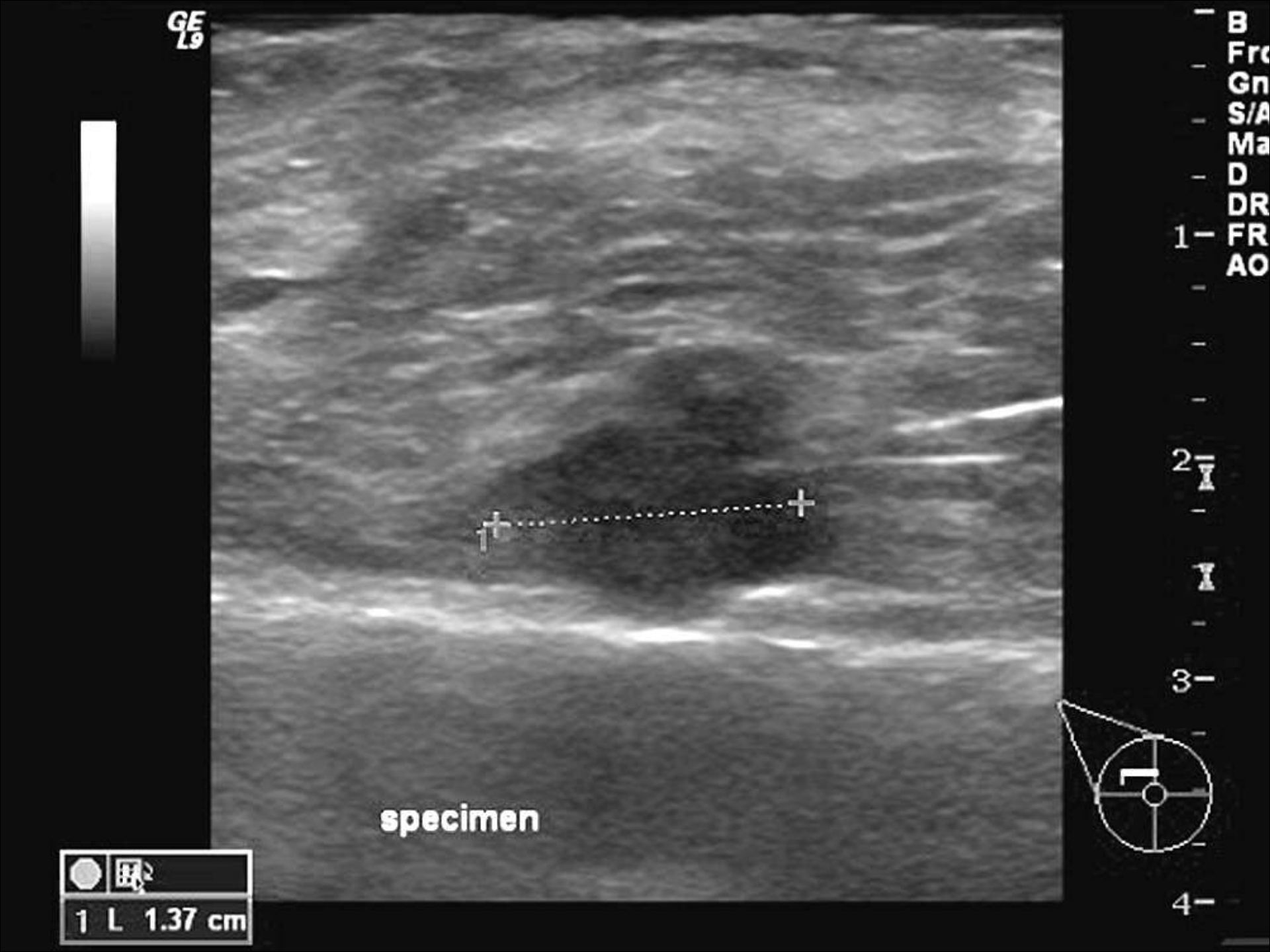
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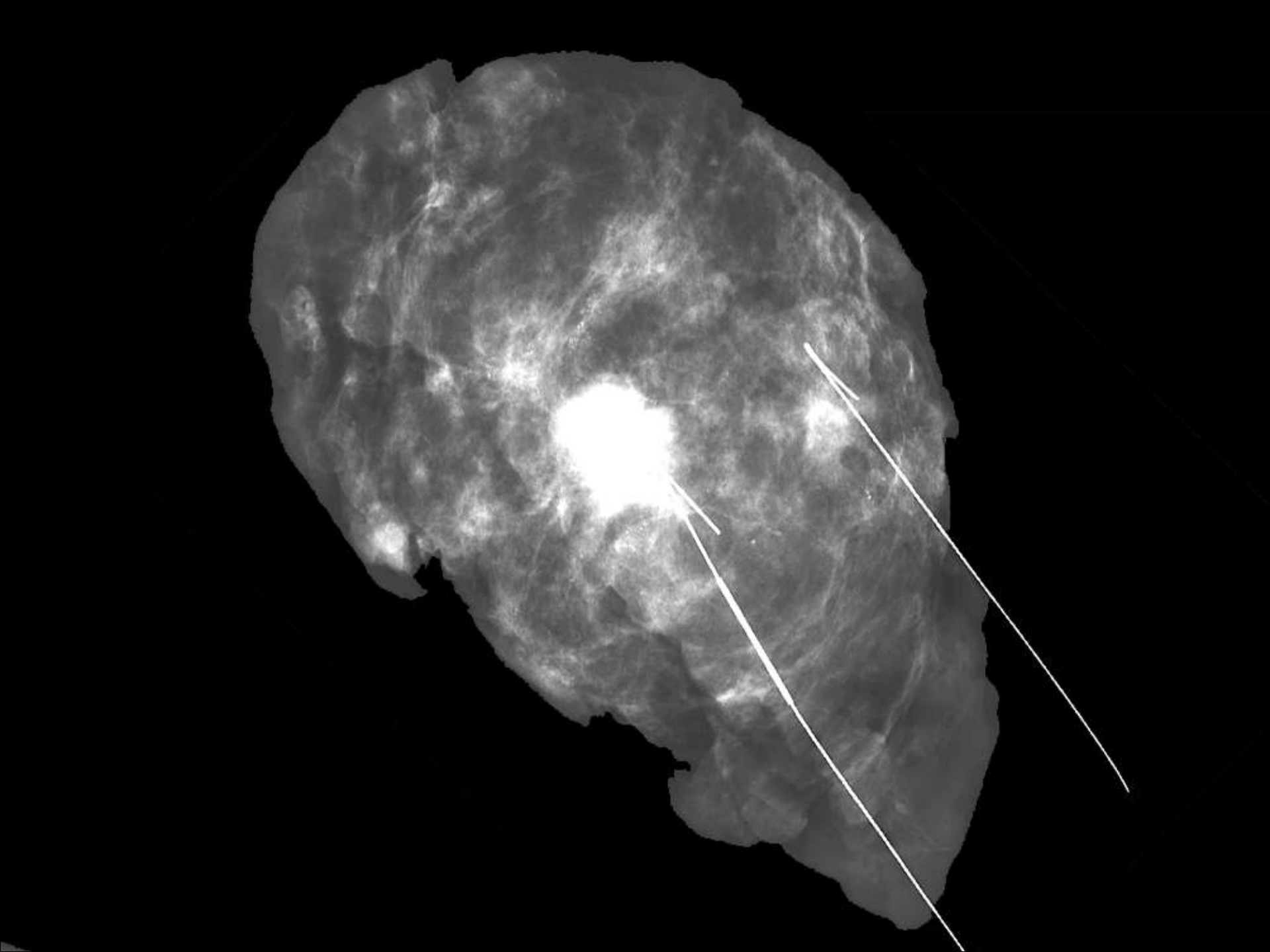
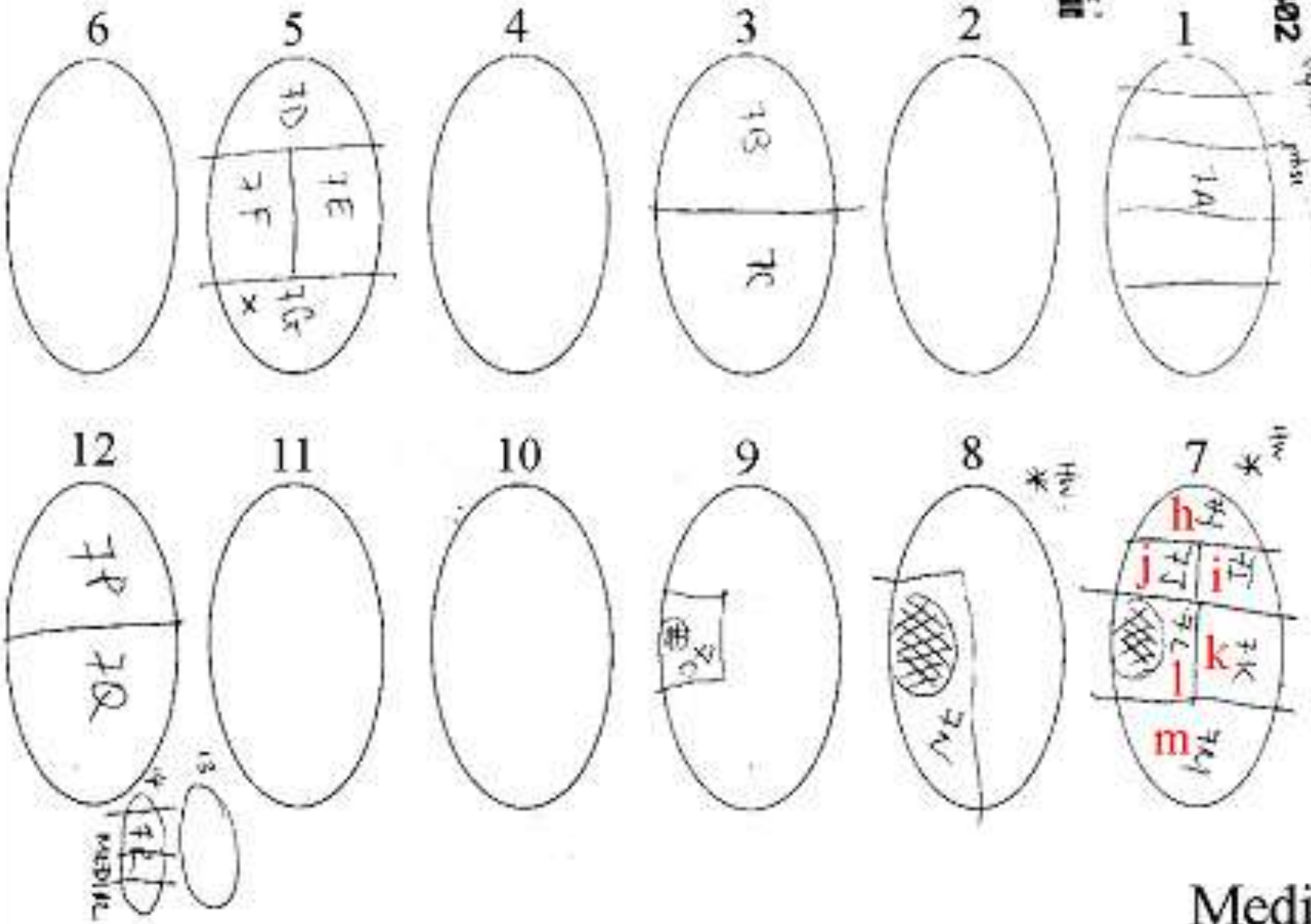
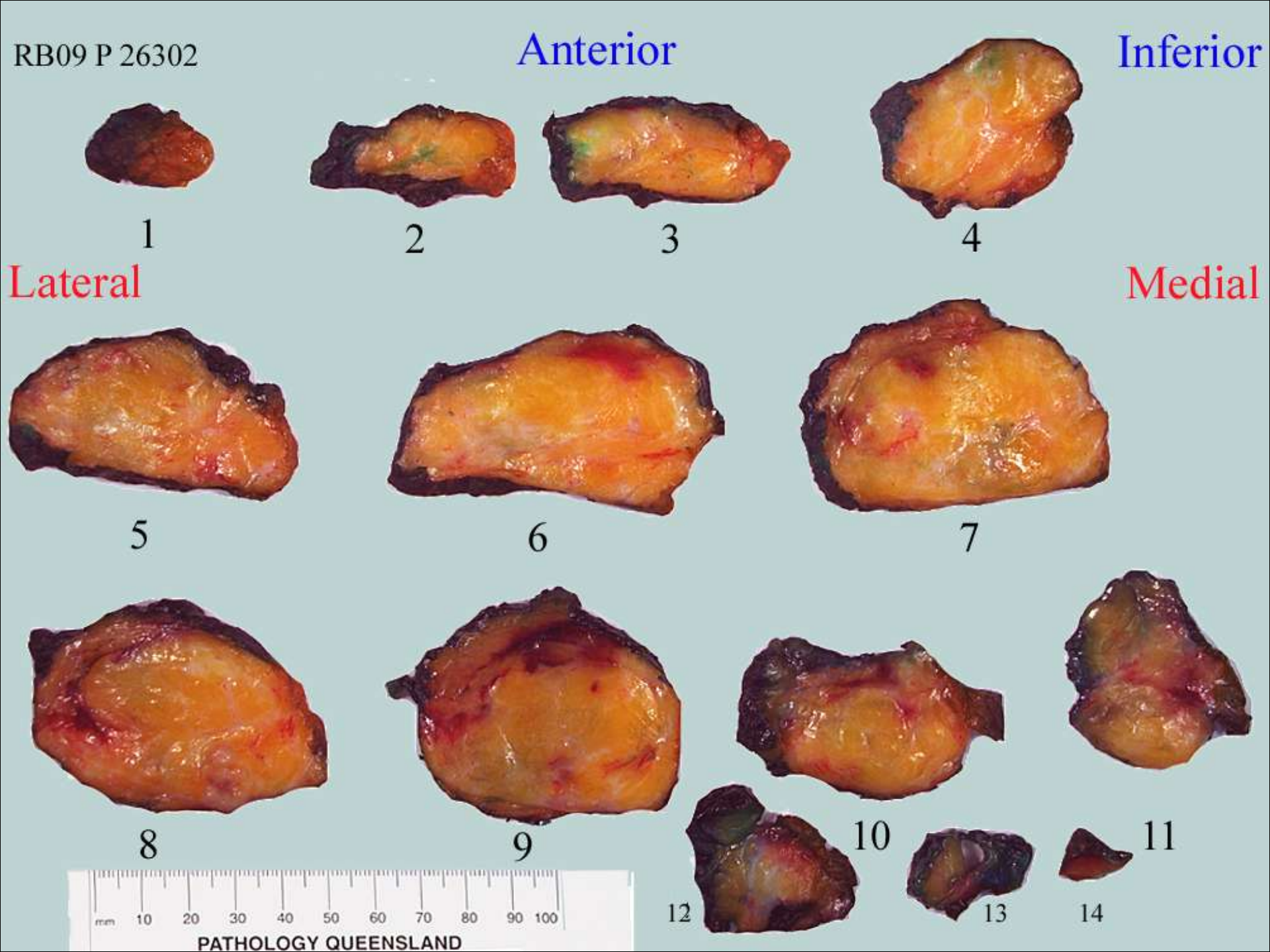


Lateral



Medial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PATHOLOGY QUEENSLAND

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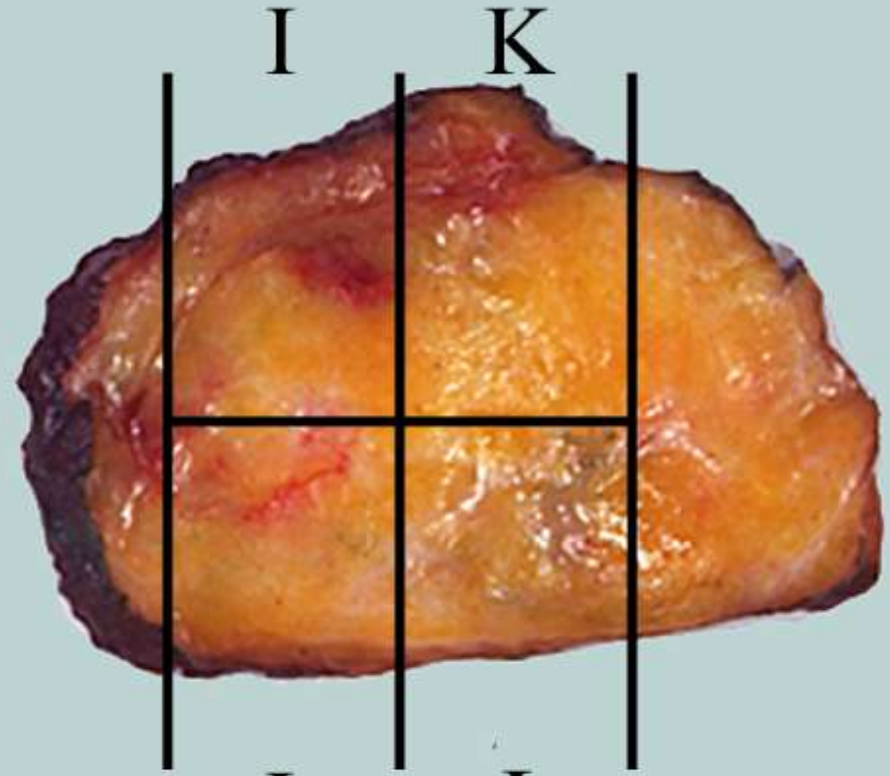

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Female 51 right breast

Wide local excision

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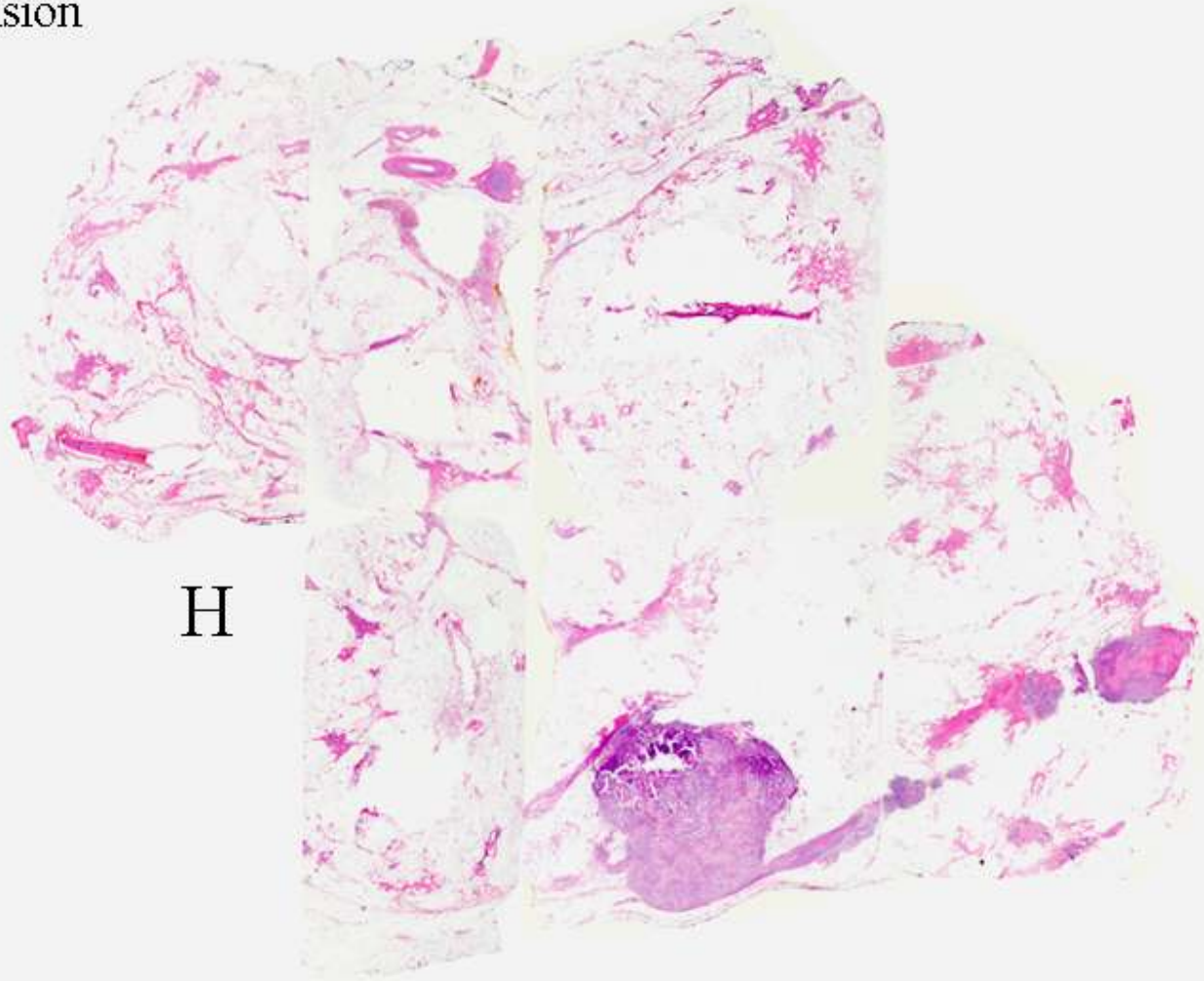

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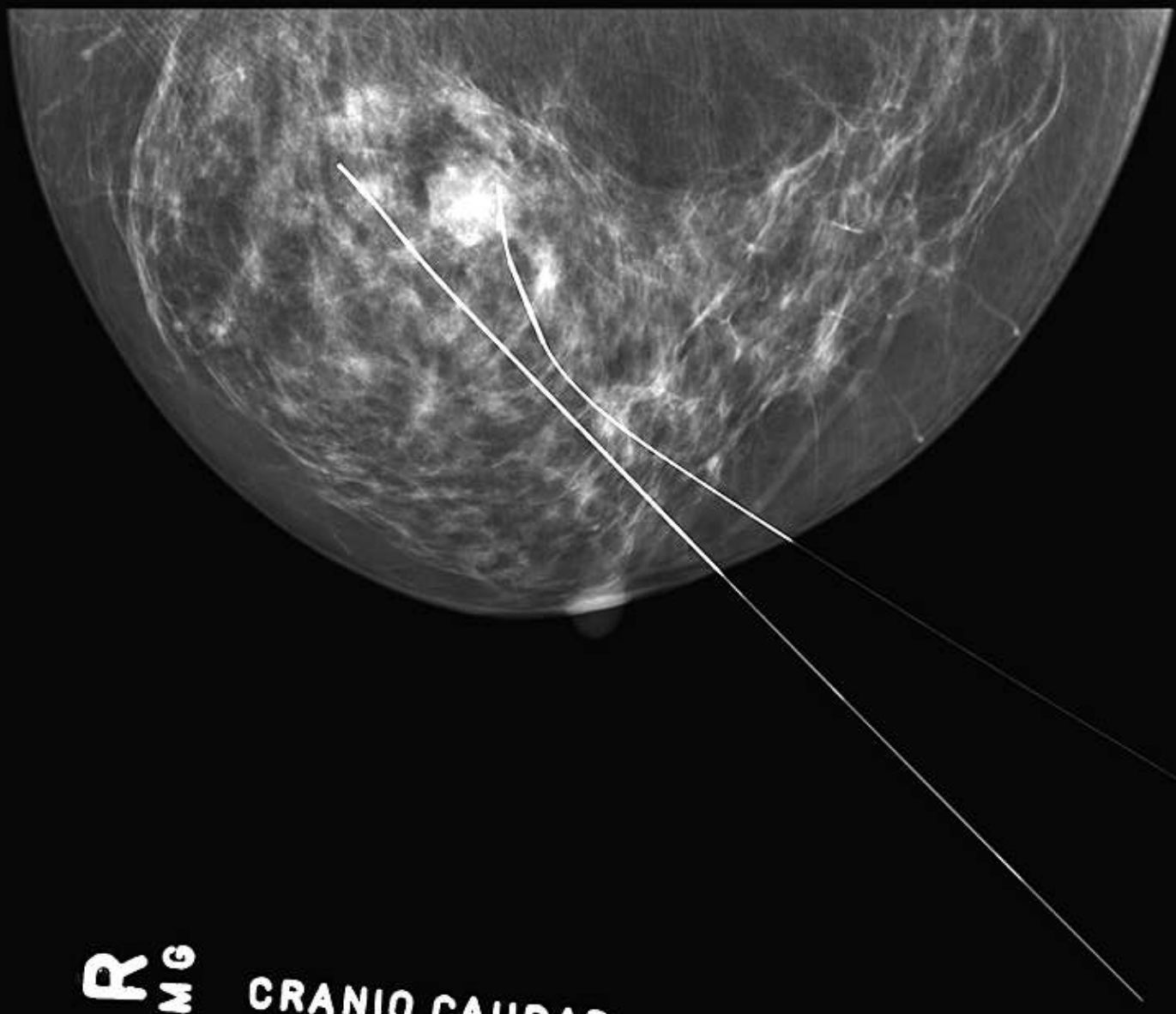
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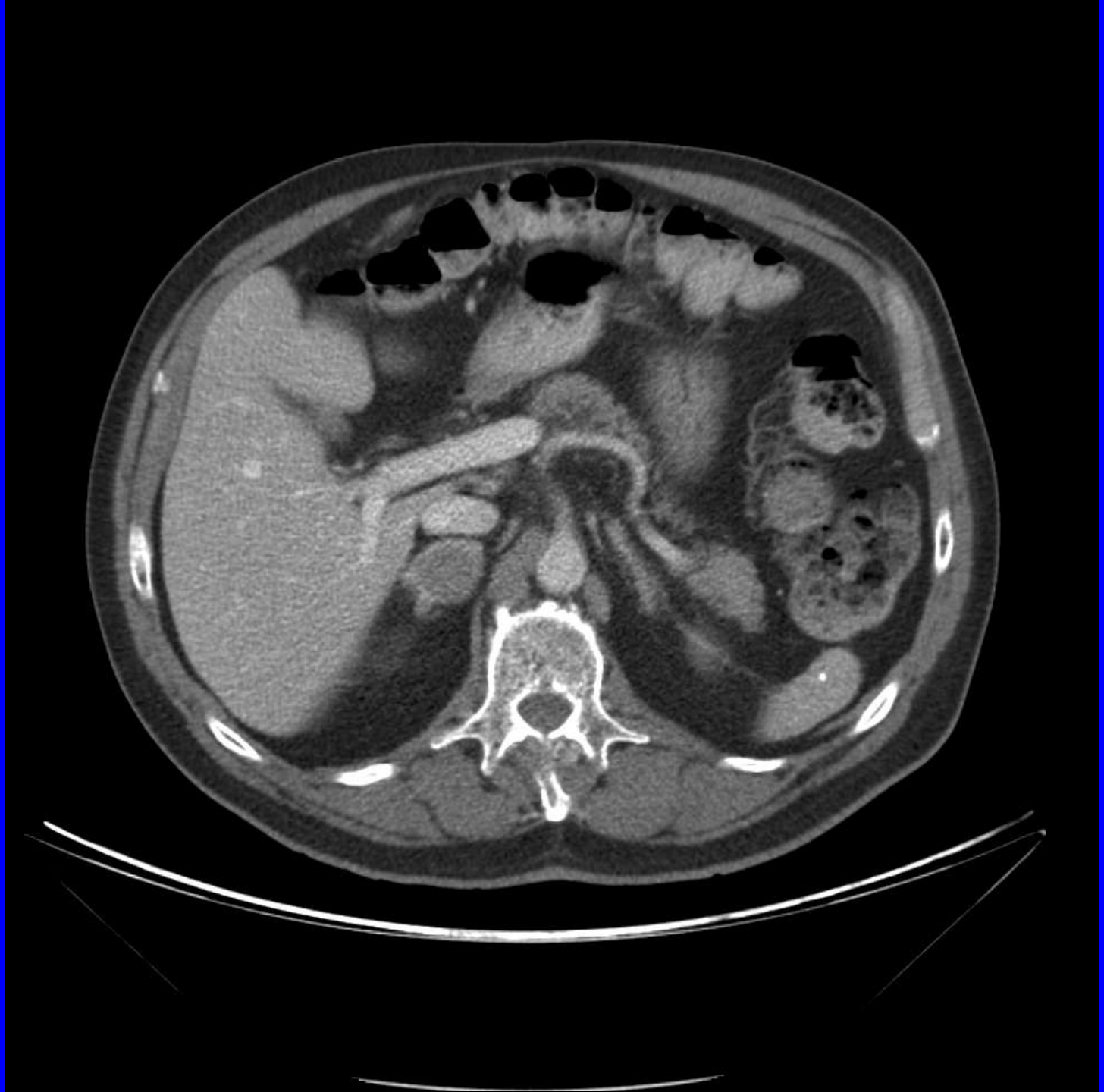
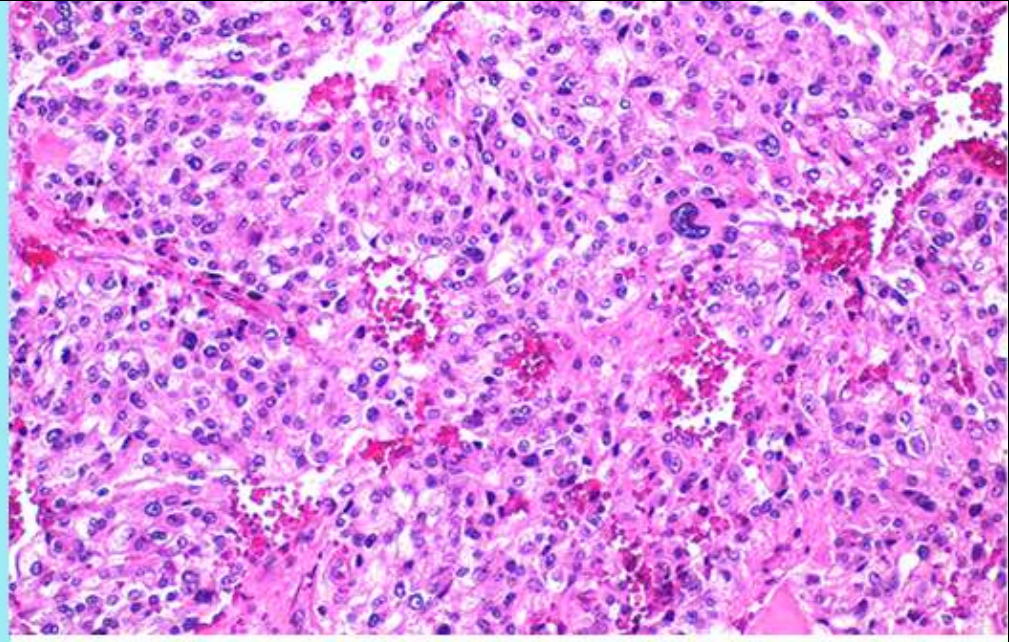
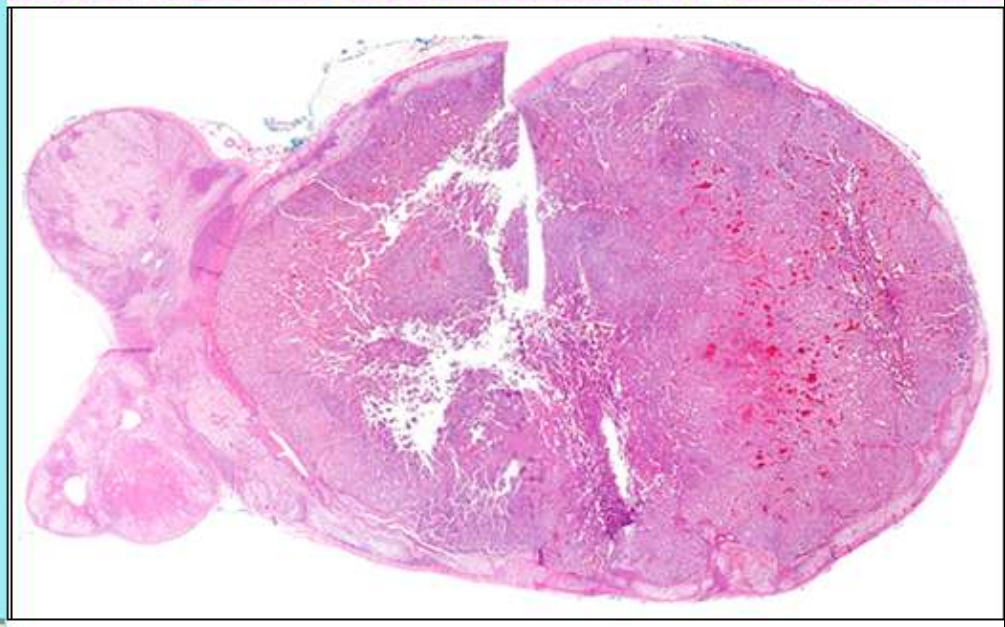
Phaeochromocytoma
in the right adrenal



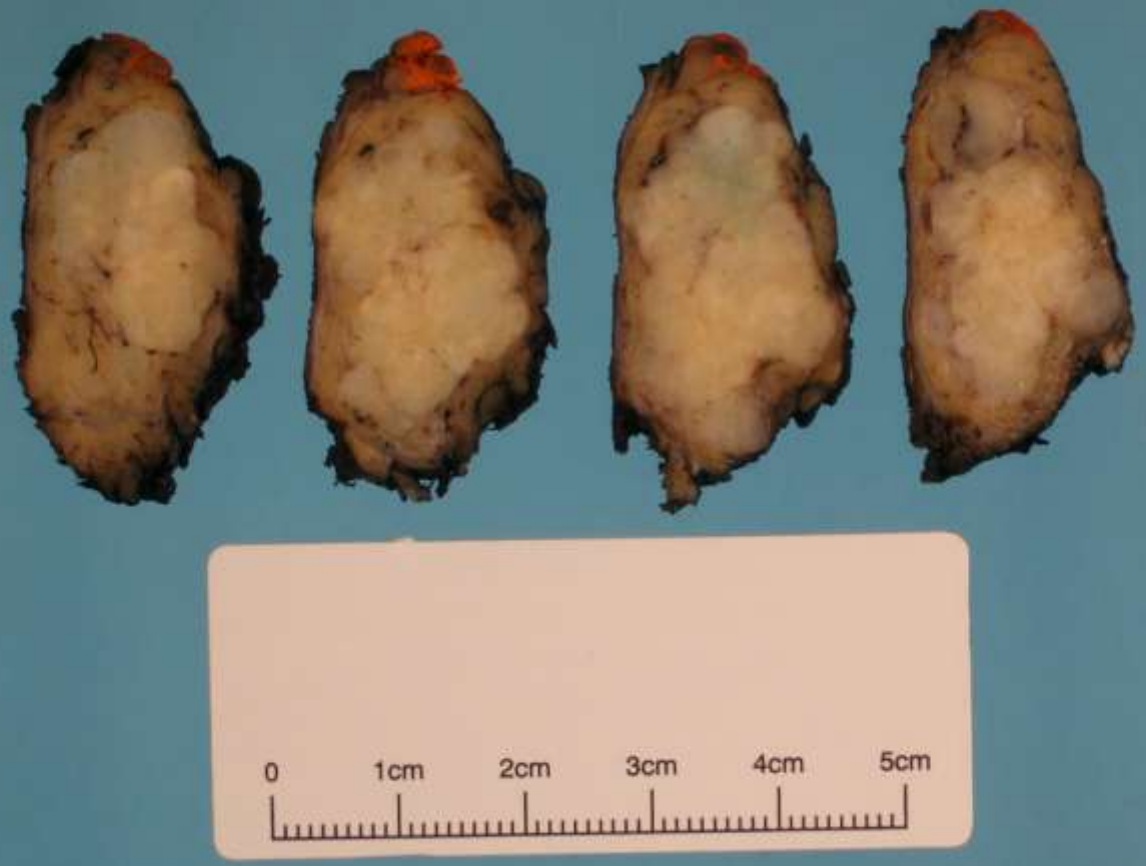




Phaeochromocytoma

How to enhance gross and microscopic images

A parotid tumour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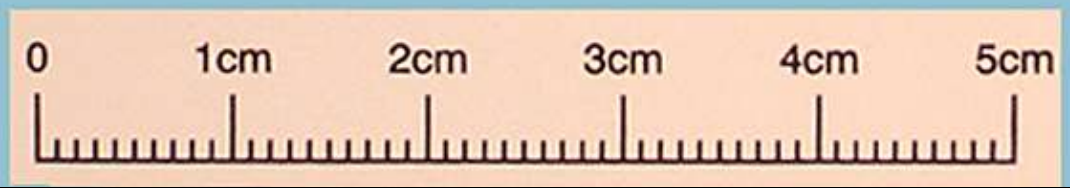
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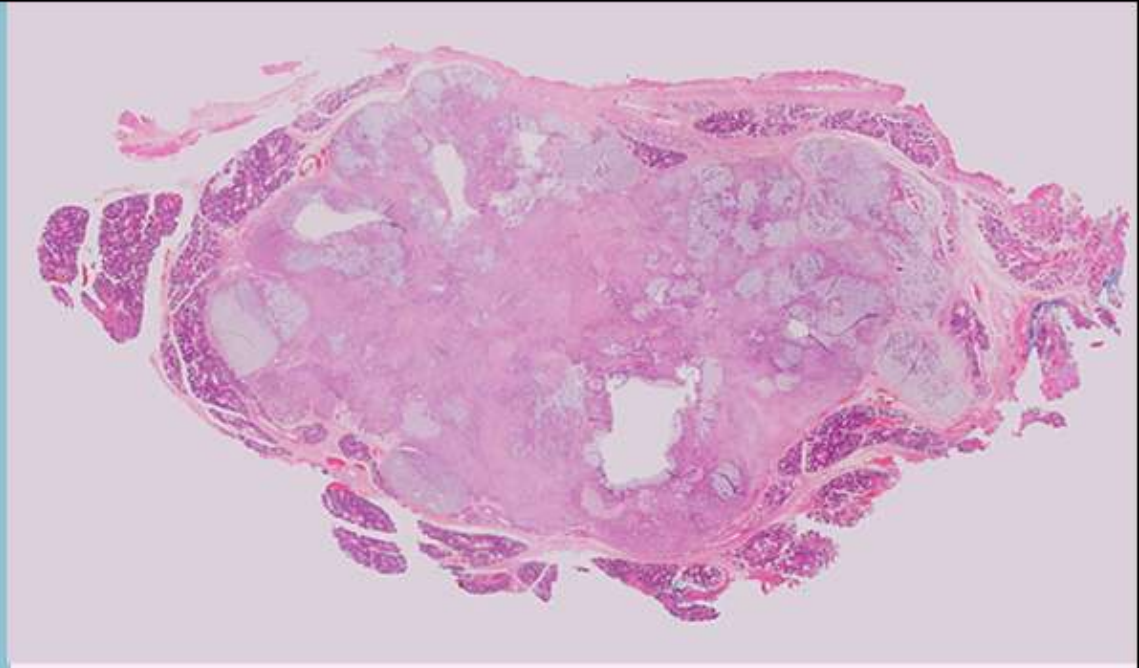
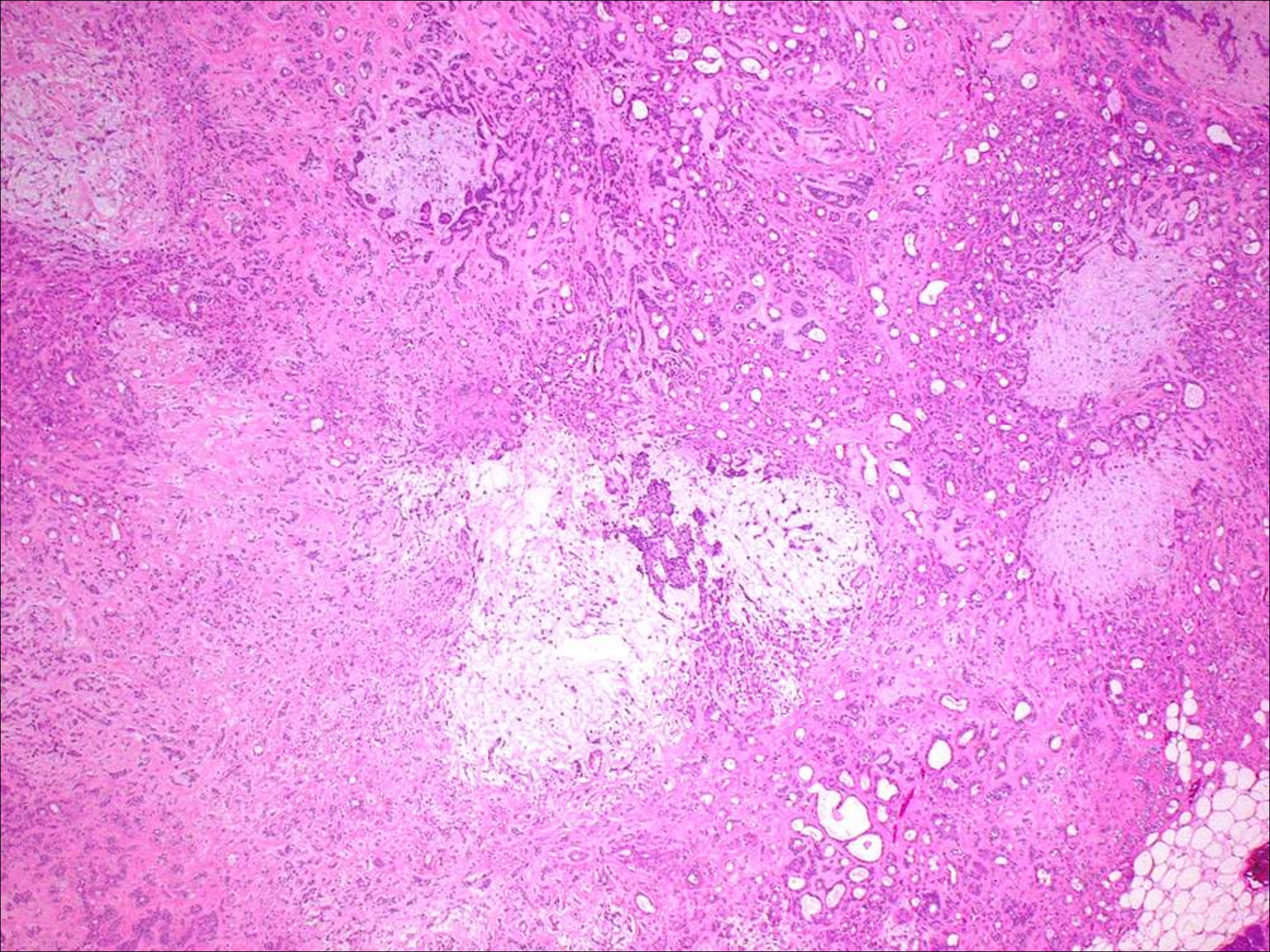
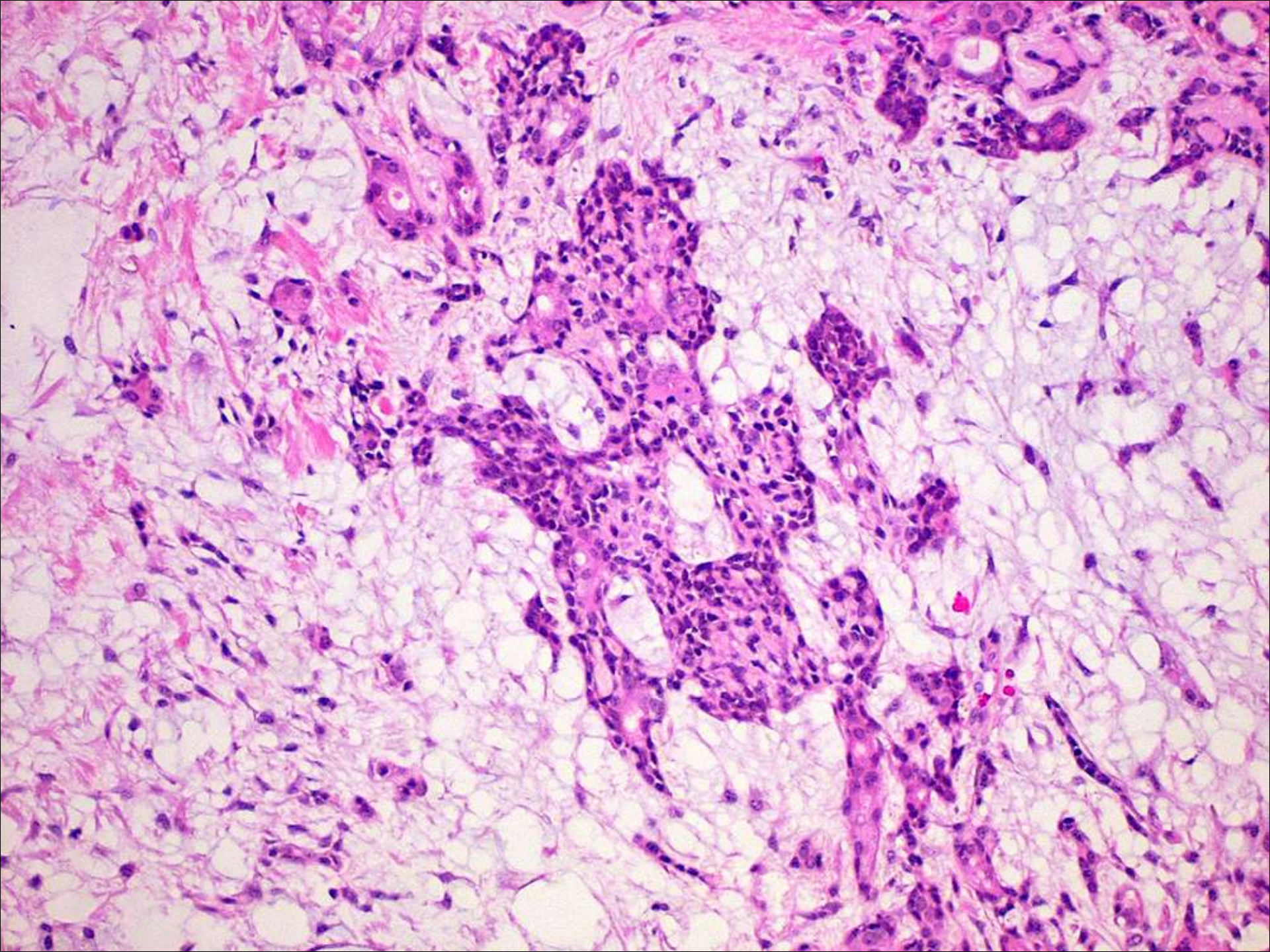
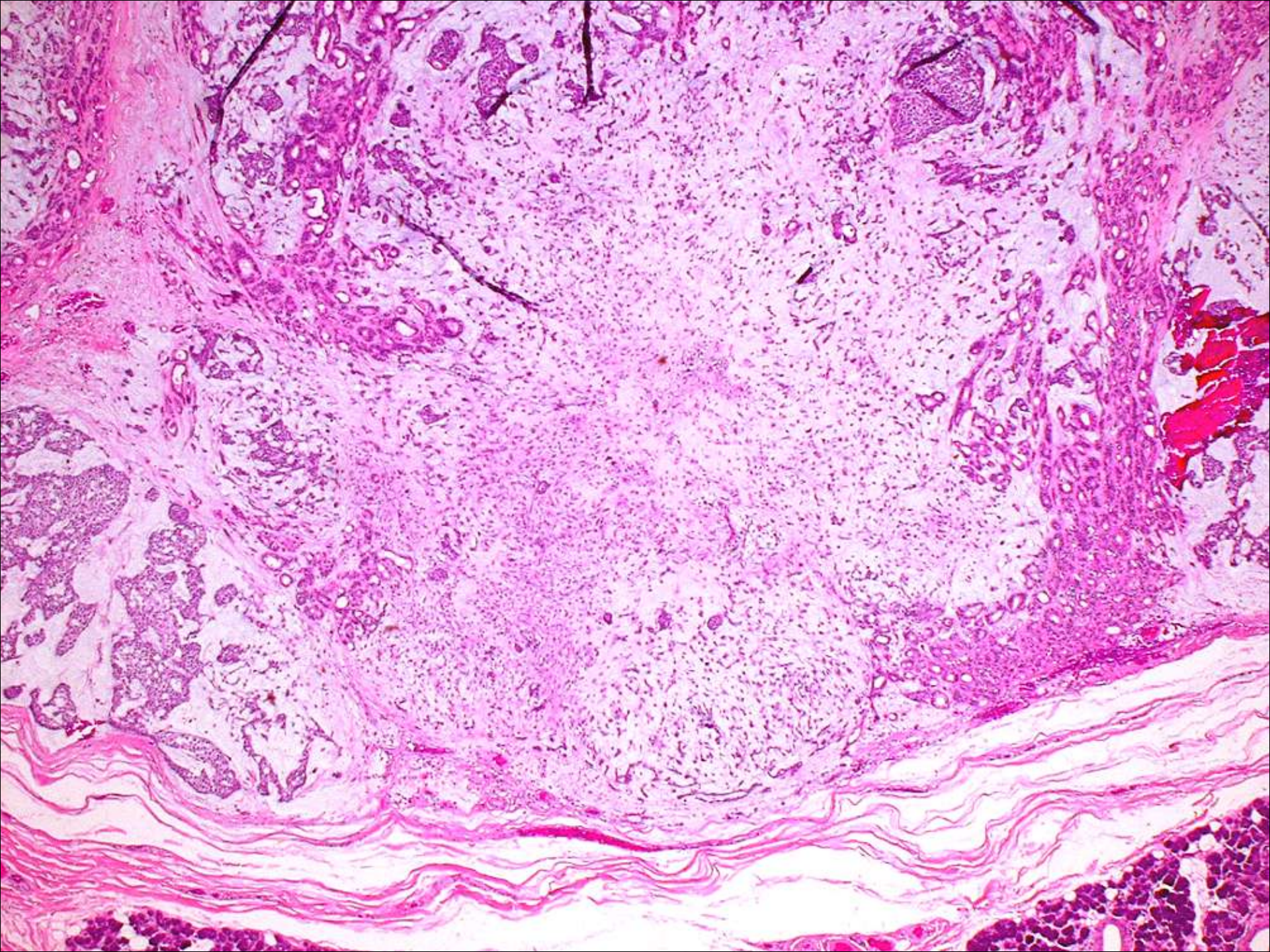
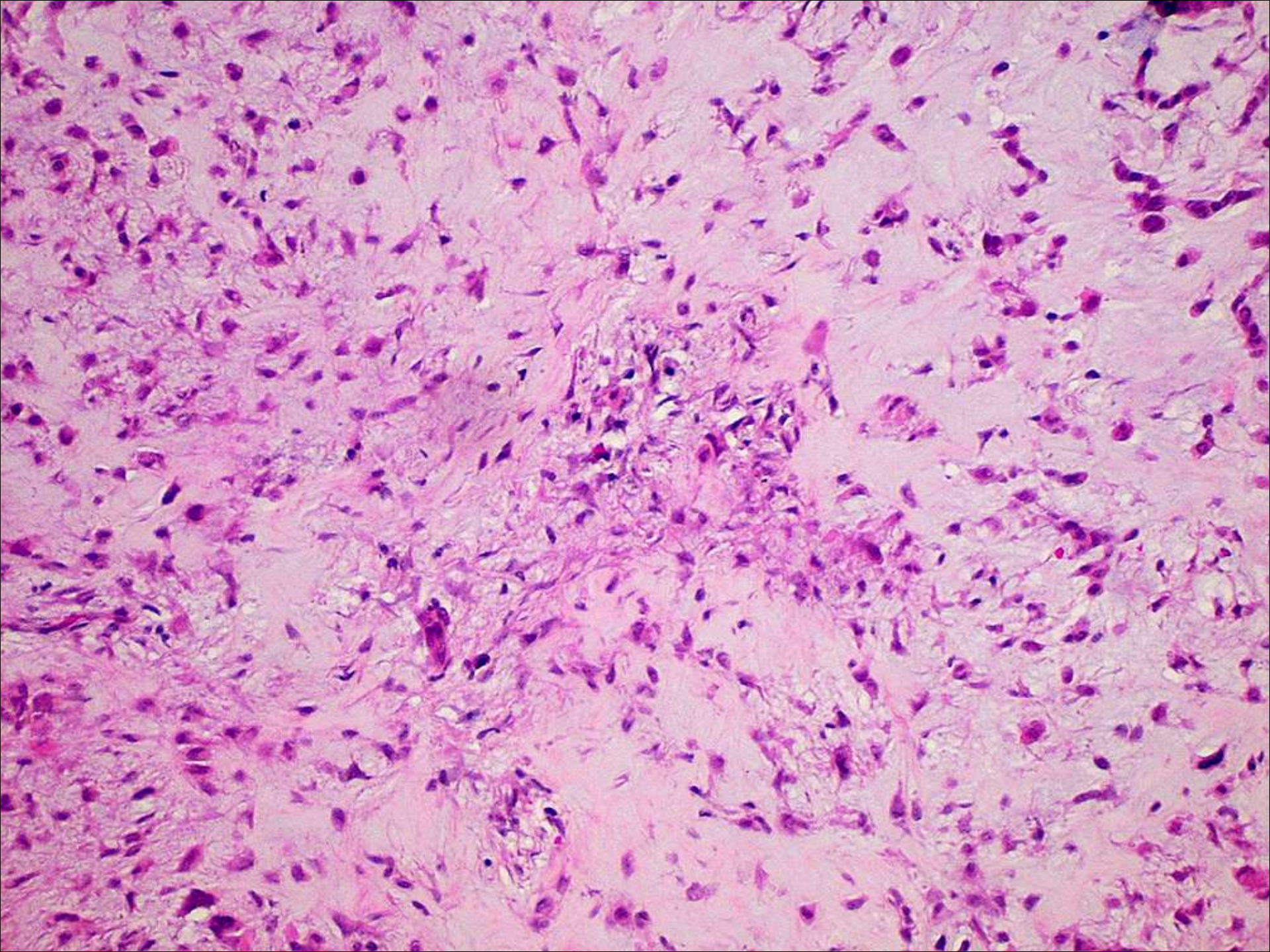
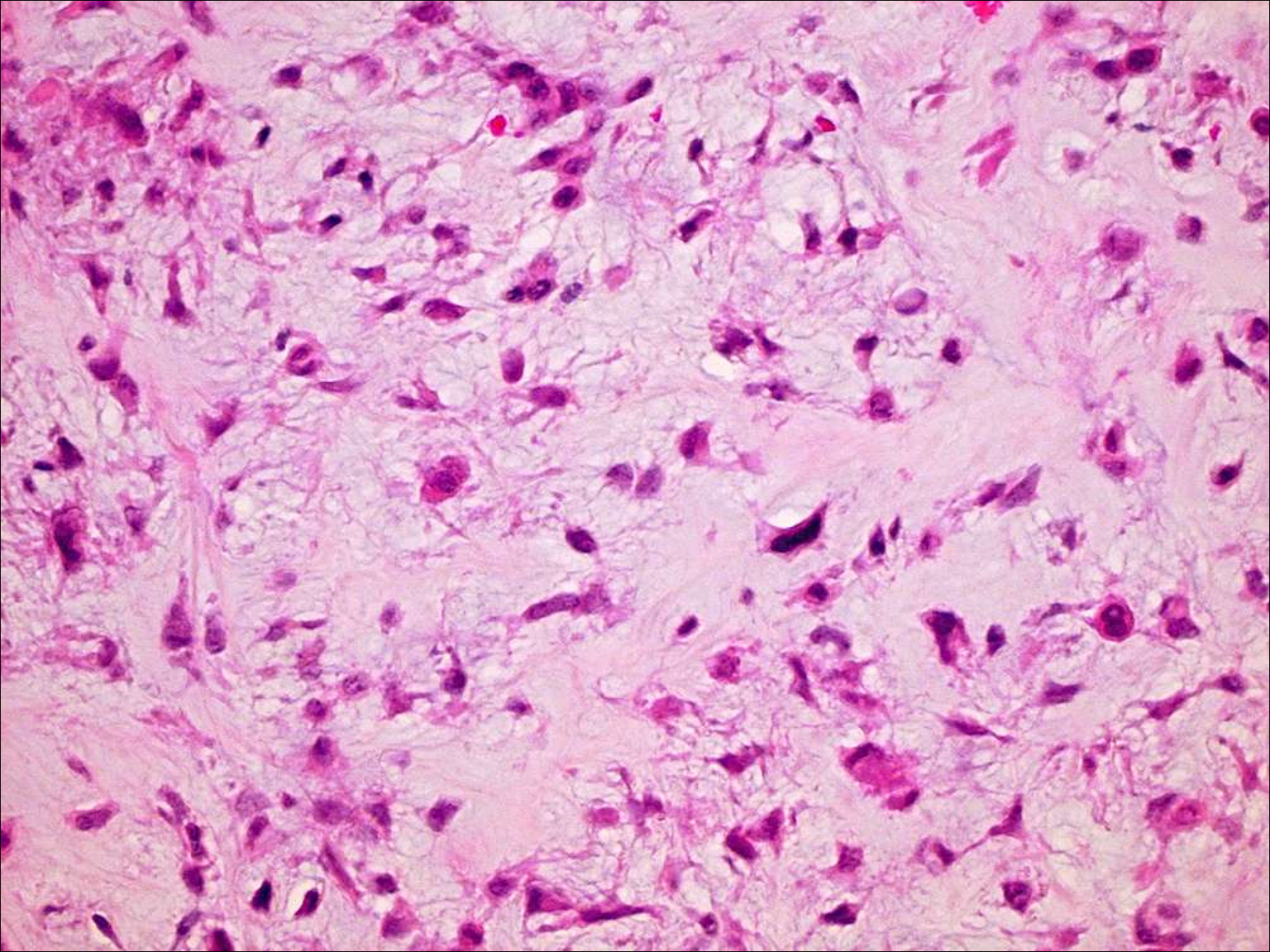




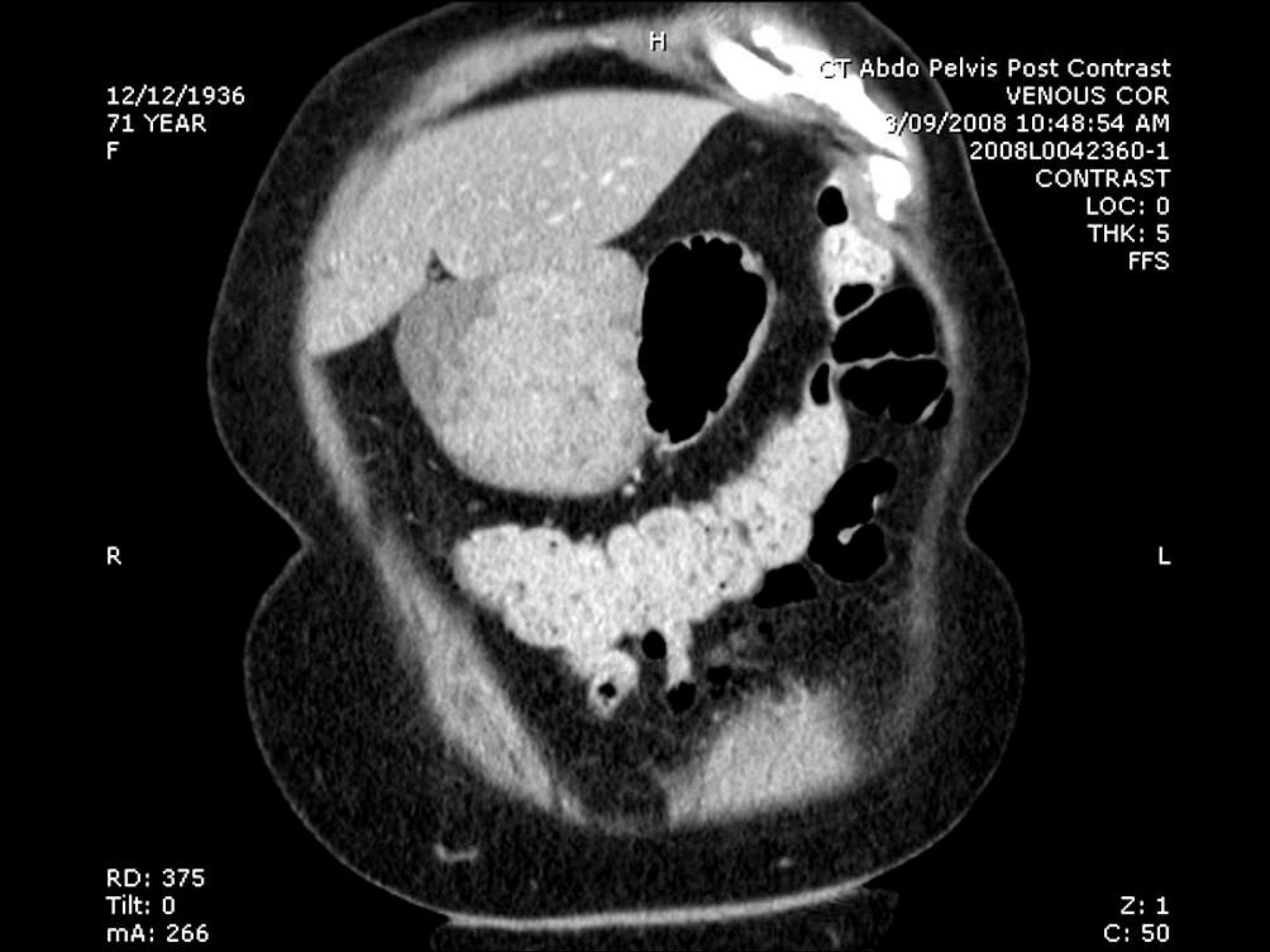








Stomach GIST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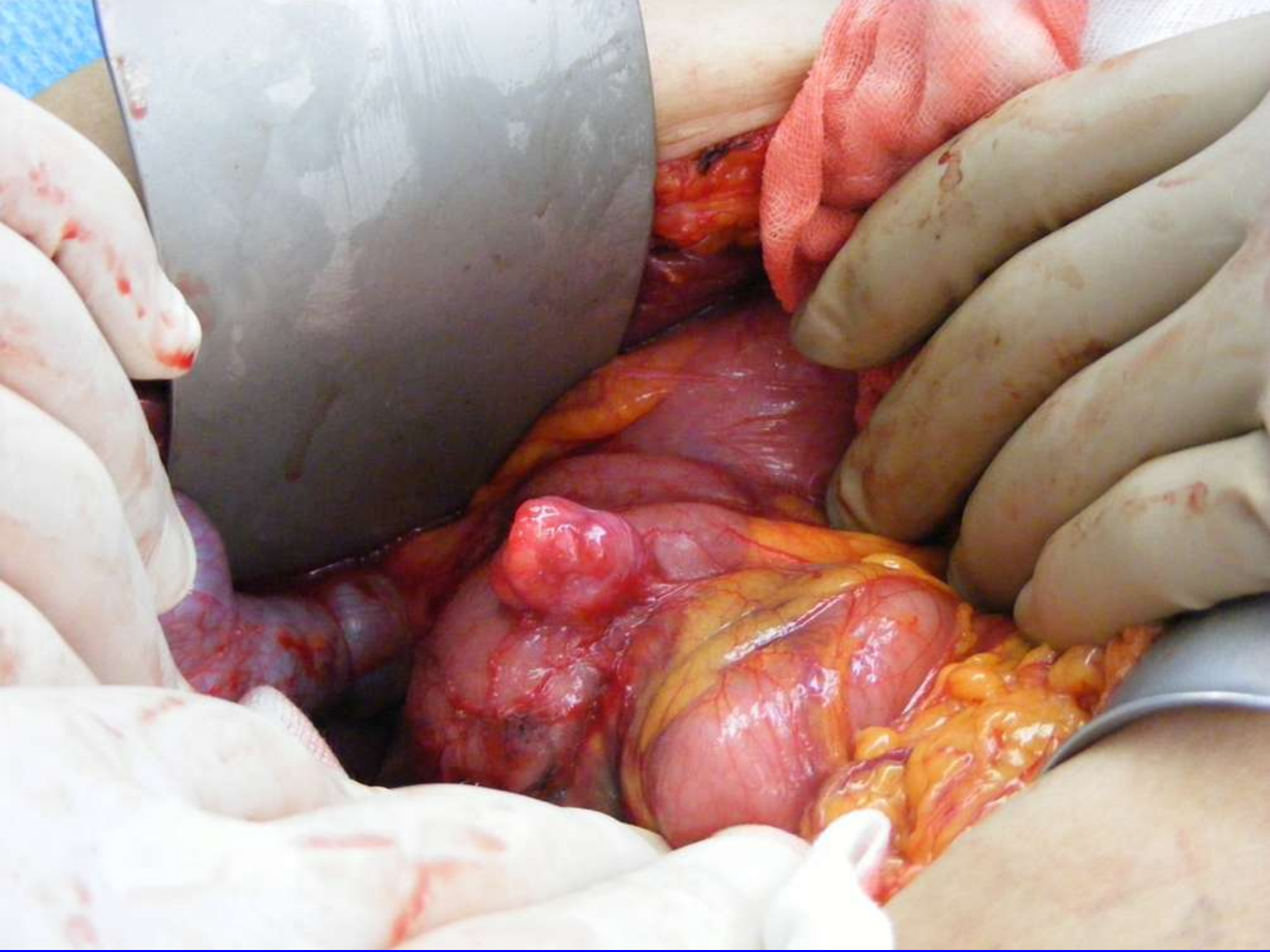

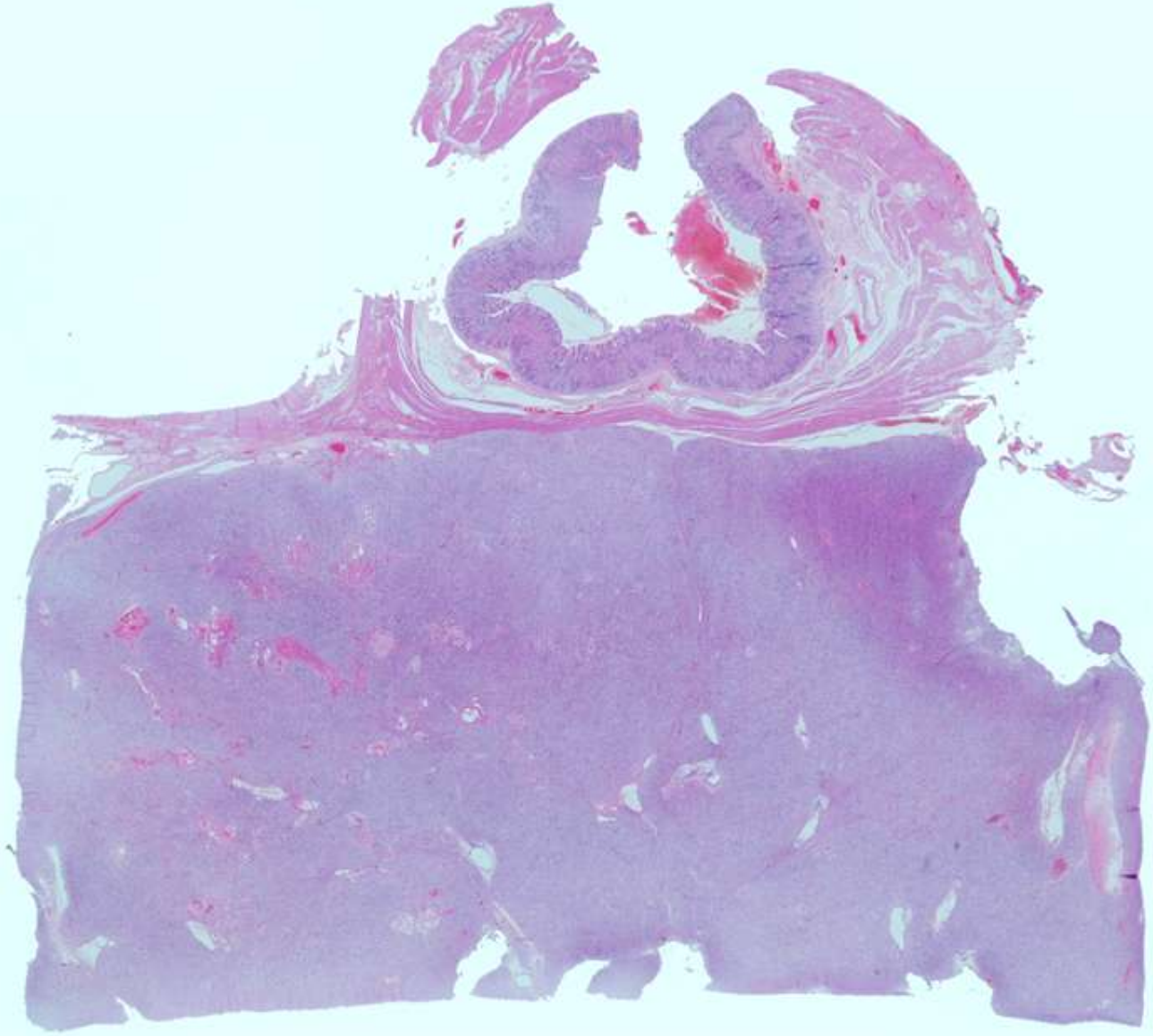

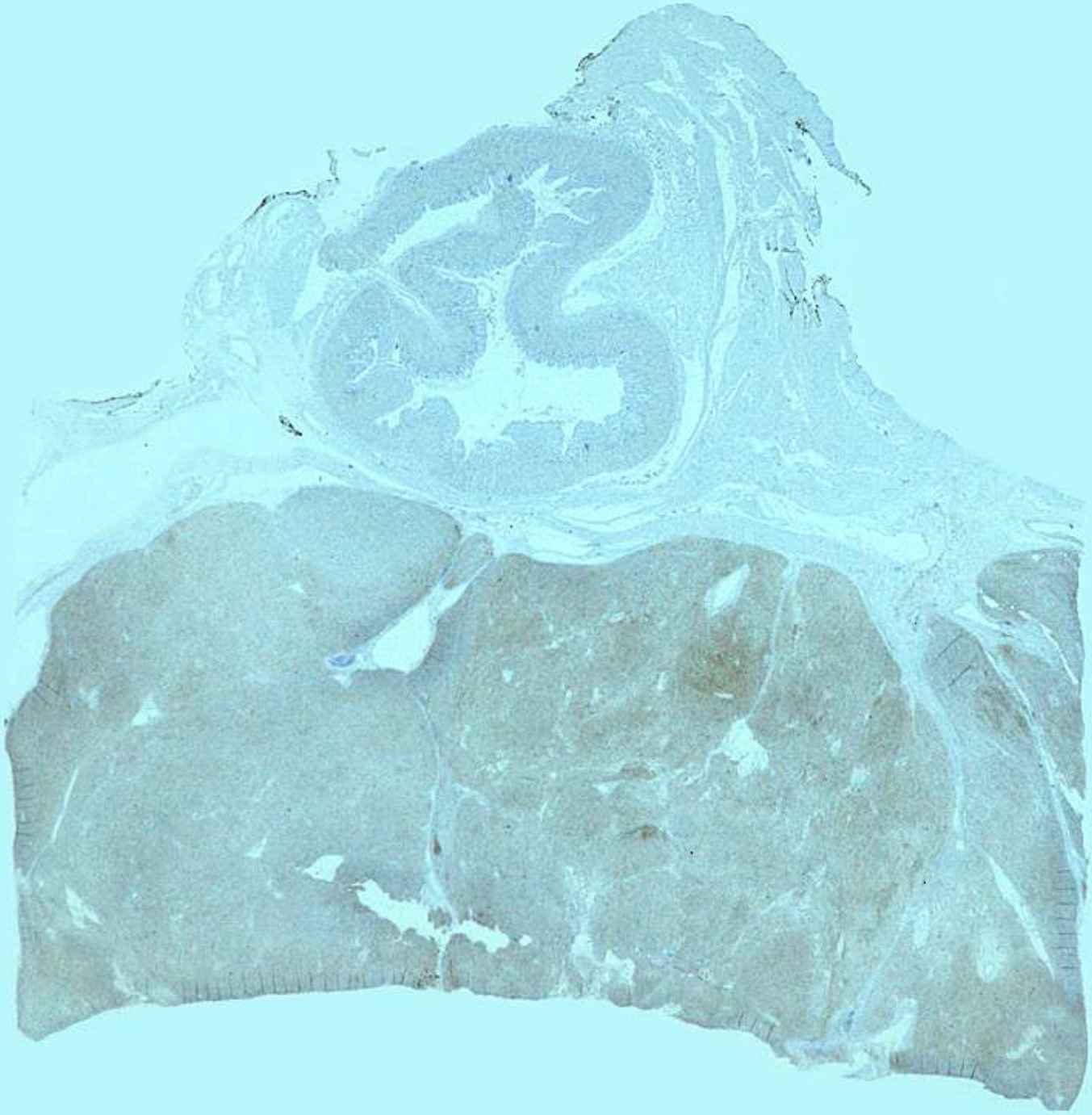

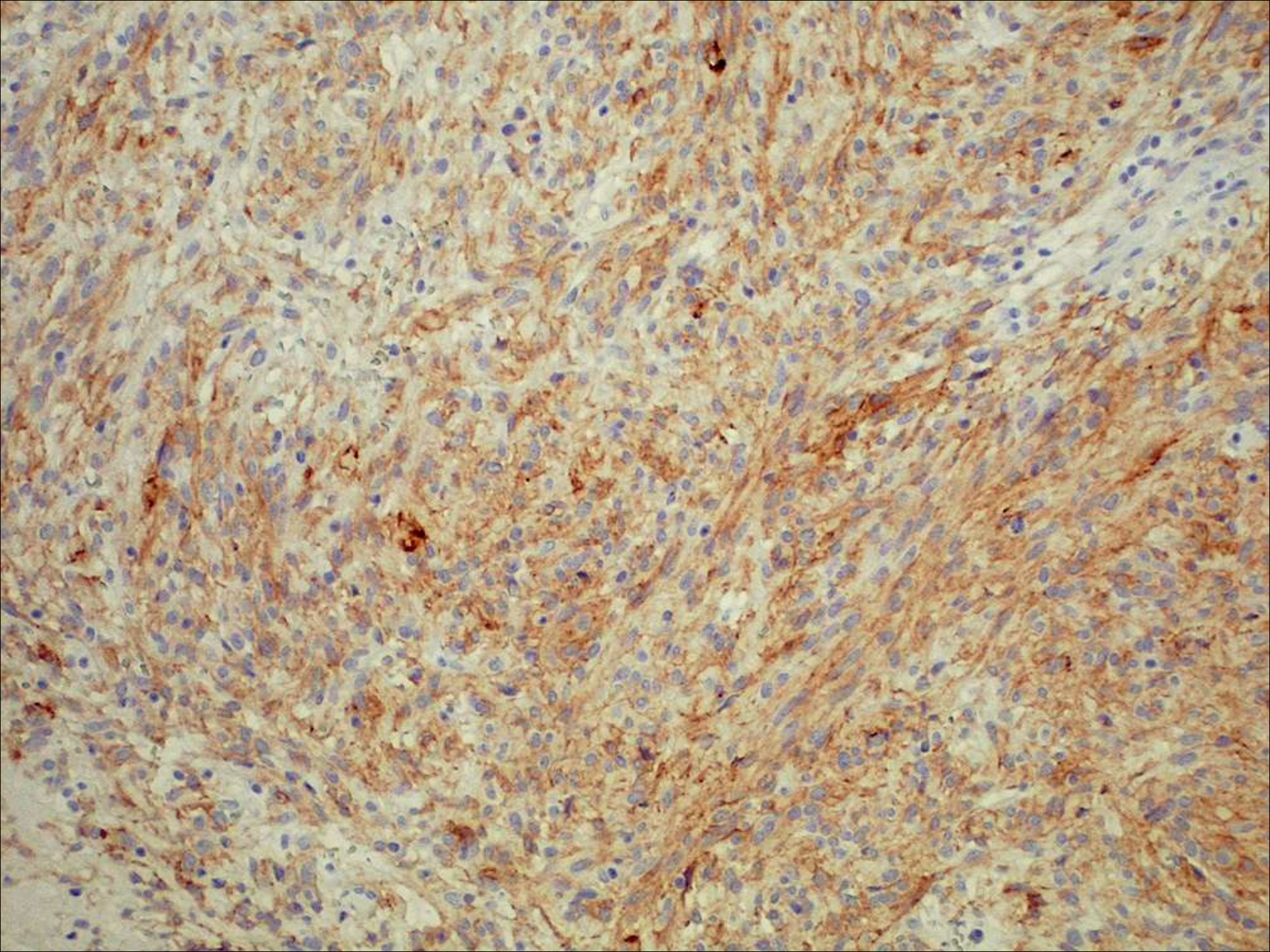


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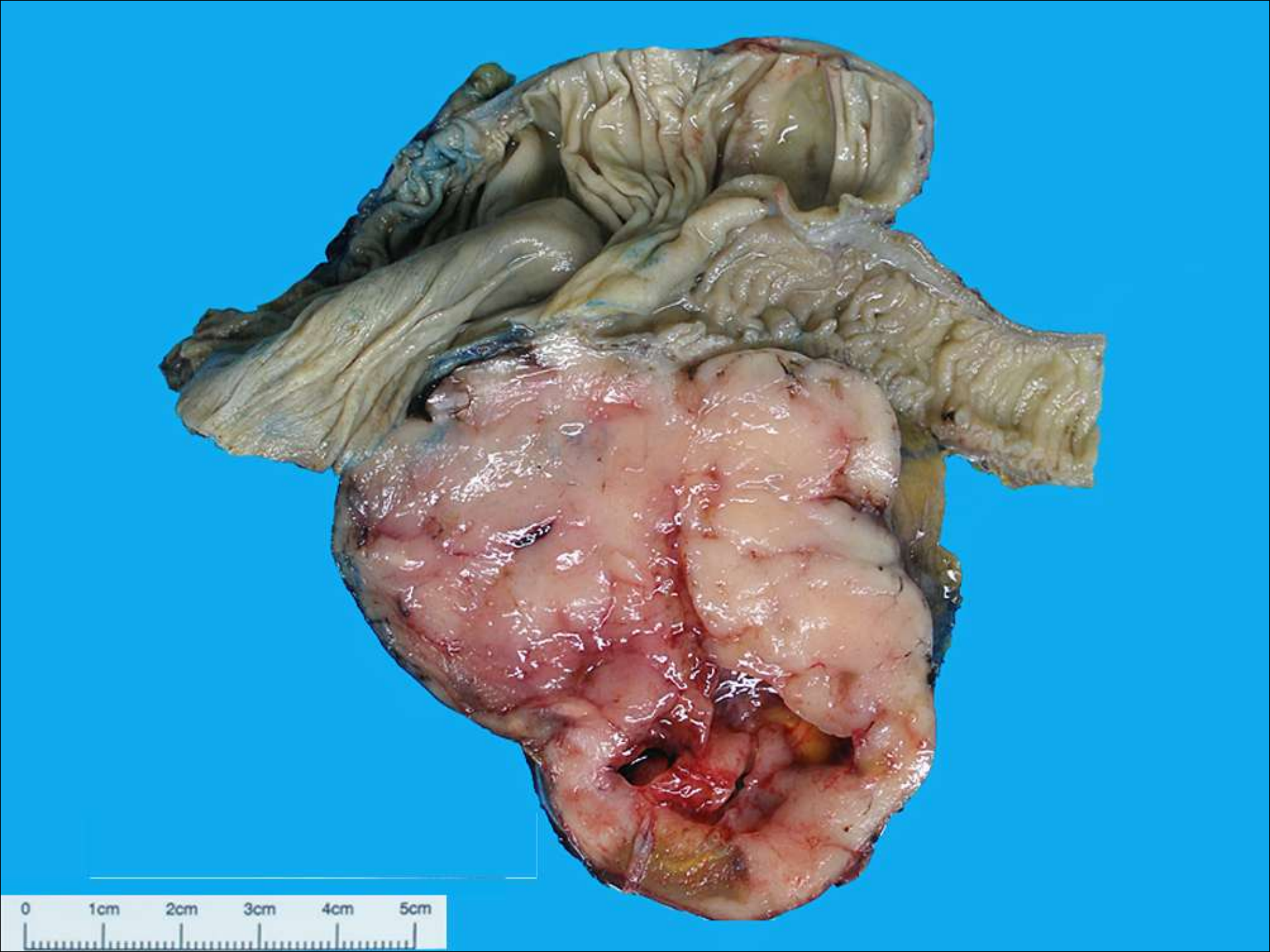
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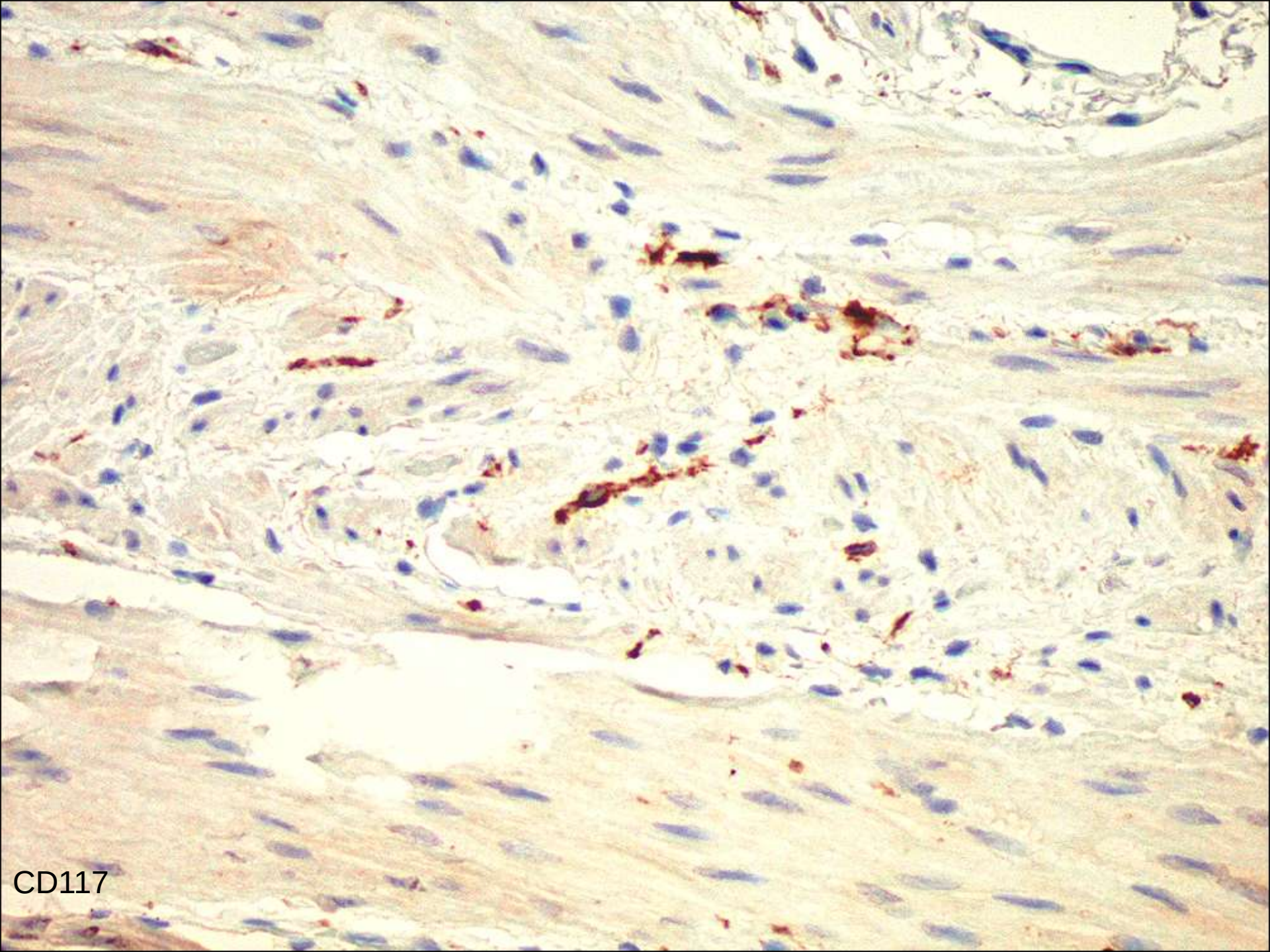
The tumours are believed to arise from interstitial cells of Cajal which are pace maker cells for the autonomic system in stimulating peristalsis

In this function they are equivalent to the myocardial cells of the conducting system of the heart

The interstitial cells of Cajal can be seen in normal stomach muscle stained with CD117

They are small cells with long dendritic processes that ‘meander’ through the muscle cells of the stomach wall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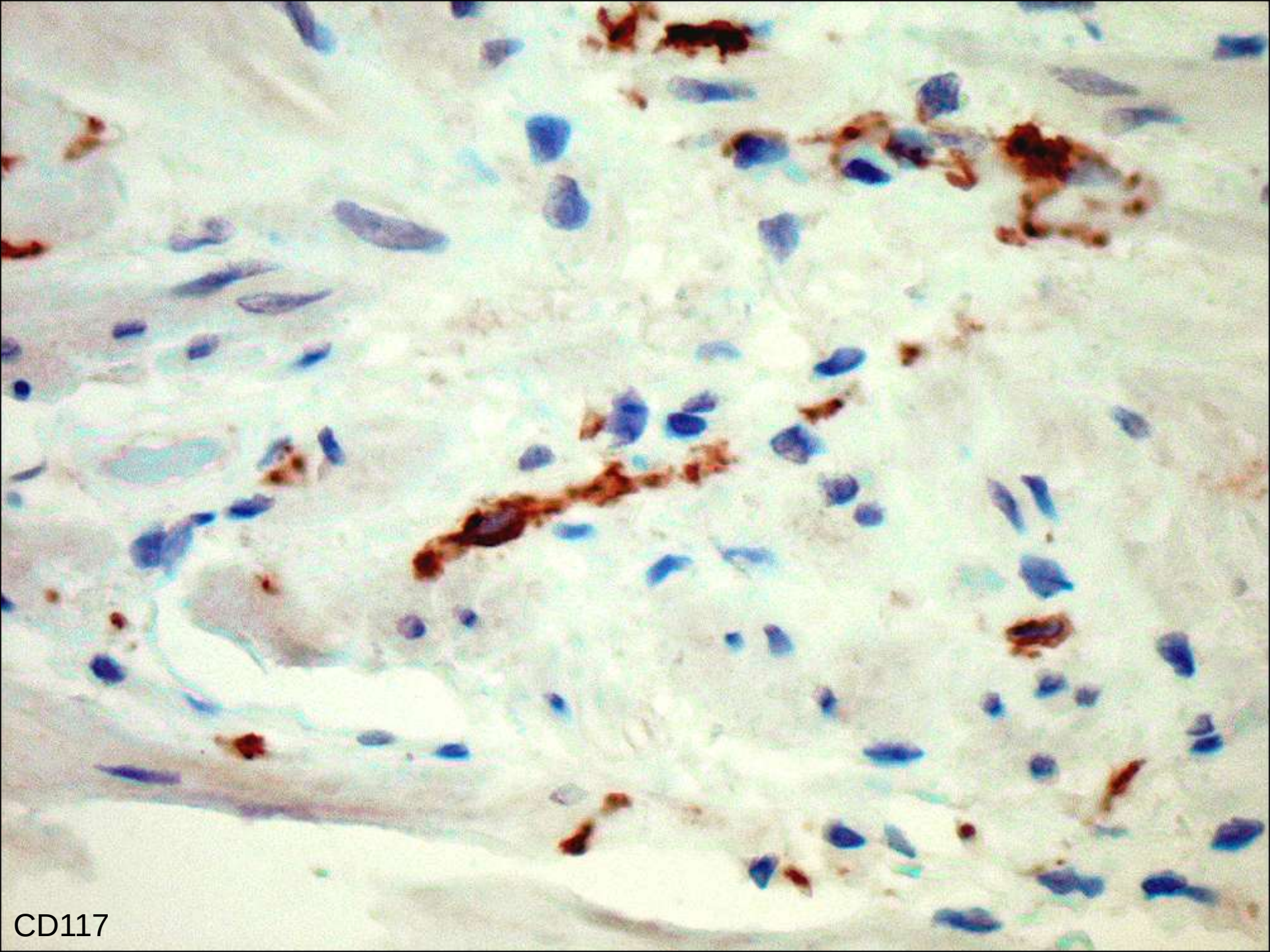
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HISTOLOGY

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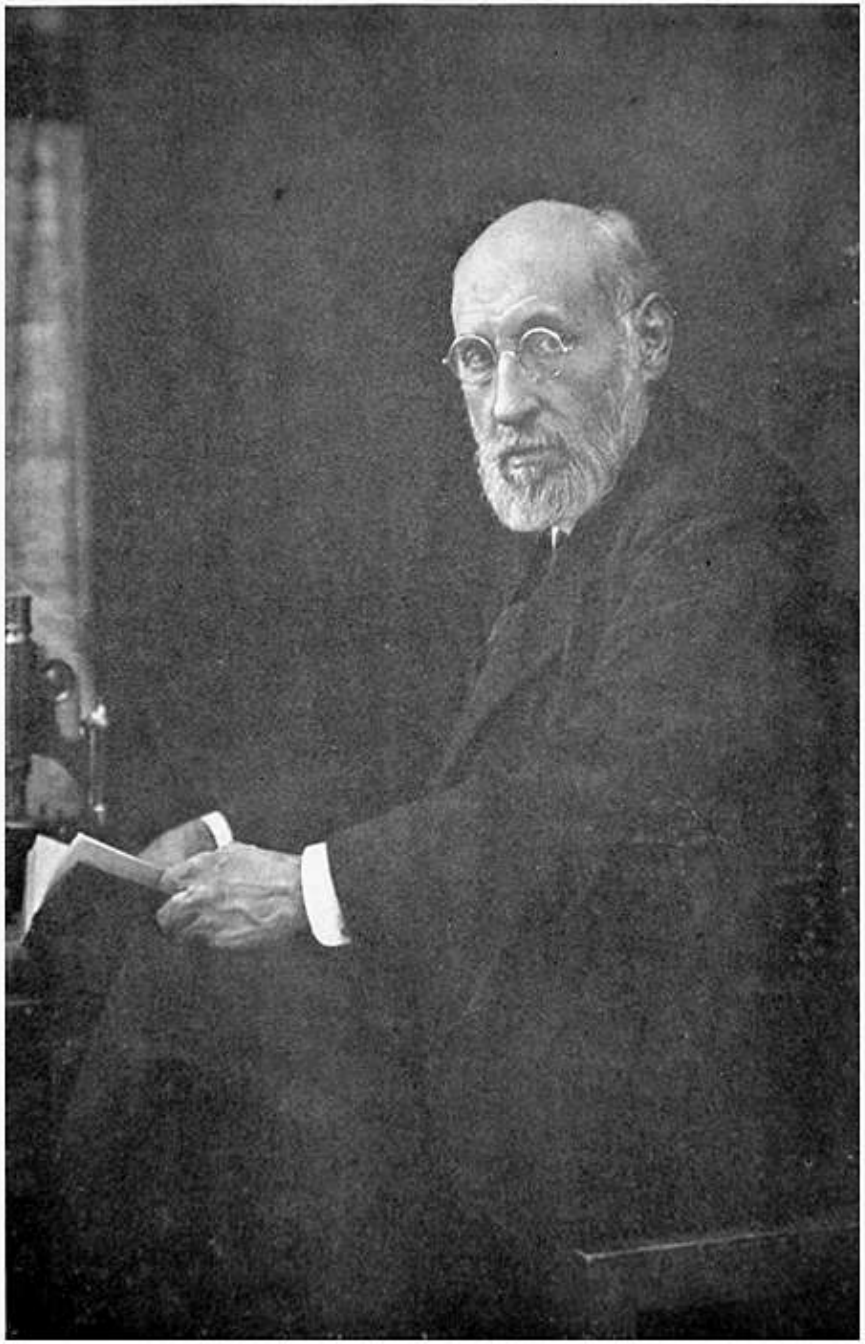

Santiago Ramón-Cajal, M.D.

ganglion to the other and giving off collateral and terminal nerve branches around the cells. (4) Large giant cells probably arising from the spinal cord, which divide and subdivide in the ganglia, giving off pericellular ramifications for a large part of the plexus of Auerbach.[2]

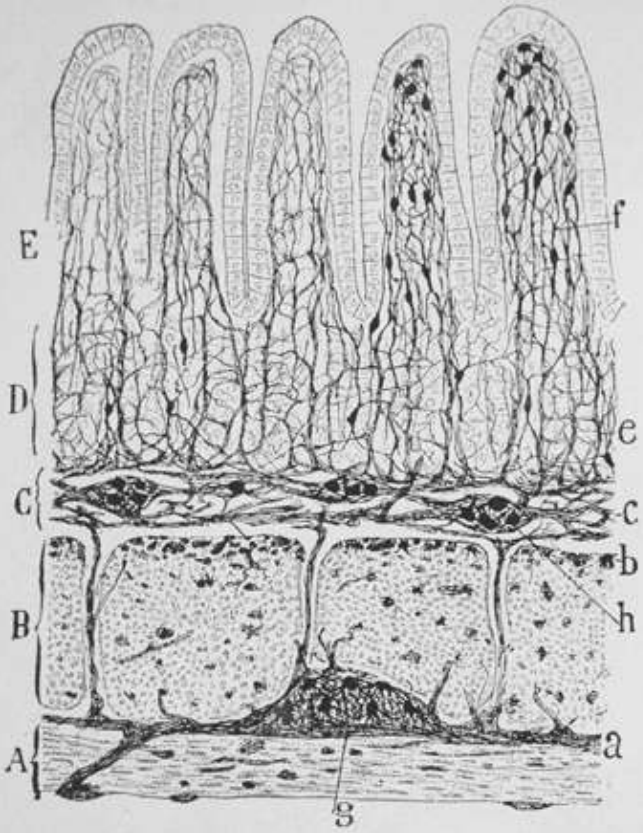

FIG. 453. Diagram of the nervous system of the small intestine. *A*, layer of longitudinal muscular fibers; *B*, transverse muscular fibers; *a*, *g*, Auerbach's plexus; *C*, connective tissue of the submucosa showing the plexus of Meissner; *D*, layer of Lieberkühn's glands; *E*, villi.

Around the ganglia at the level of the meshes of the plexus are seen also a large number of triangular stellate cells, whose very ramified varicose expansions penetrate among the bundles of smooth muscle fibrocells and perhaps terminate in them. The expansions of such cells, called Cajal'sche Zellen by Dogiel, who confirmed them in the guinea pig, seem all of the same nature; often anastomosing with each other they engender a secondary plexus of longitudinal meshes.

[2] For more details see the work of La Villa: "Las células y fibras nerviosas del intestino," *Rev. trim. micr.*, iii, Madrid, 1897.

Between the circular muscular fibers and the submucous connective tissue under the deep glandular plane, is found another plexus, less rich than the anterior, called the *plexus of Meissner* (Fig. 453, *C*). In its nodal points reside also accumulations of ganglion cells, and from its nerve bundles proceed the fibers destined to the glands and villi of the

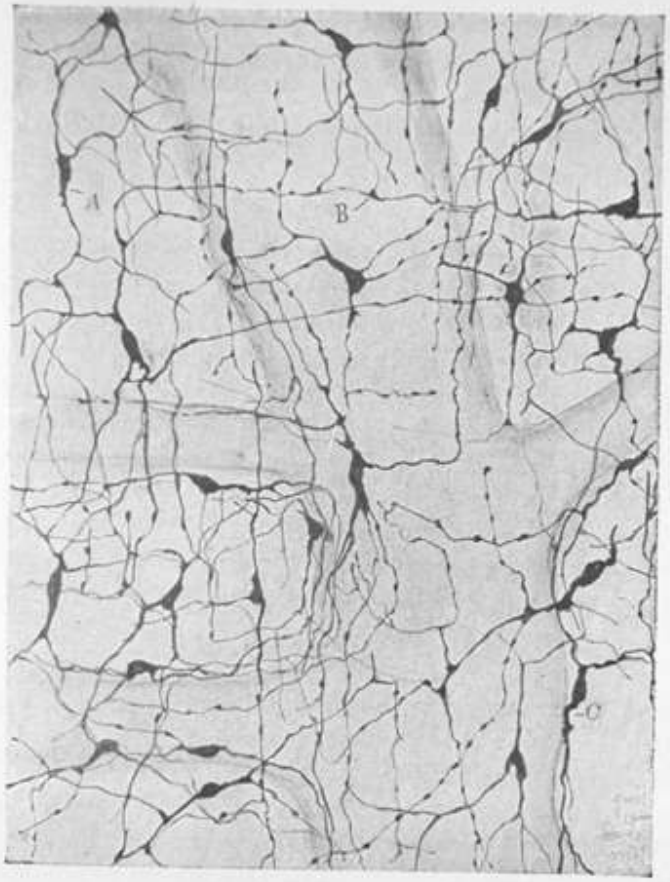

FIG. 454. Small stellate periganglionic and interstitial cells of the intestine of the rabbit. *A*, stellate cells; *B*, anastomosing branch appearing between the two cells; *C*, periganglionic marginal cell.

intestines. The nerve cells seem to be all of that variety whose prolongations lack differentiation into nervous and protoplasmic. Such expansions go from one ganglion to another, it being impossible to determine their stopping place neither with the method of Golgi nor with that of

Digitising old specimens and photographs

Gross specimens
A museum collection from 1960-64

Old 35mm photographs
of specimens and of patients


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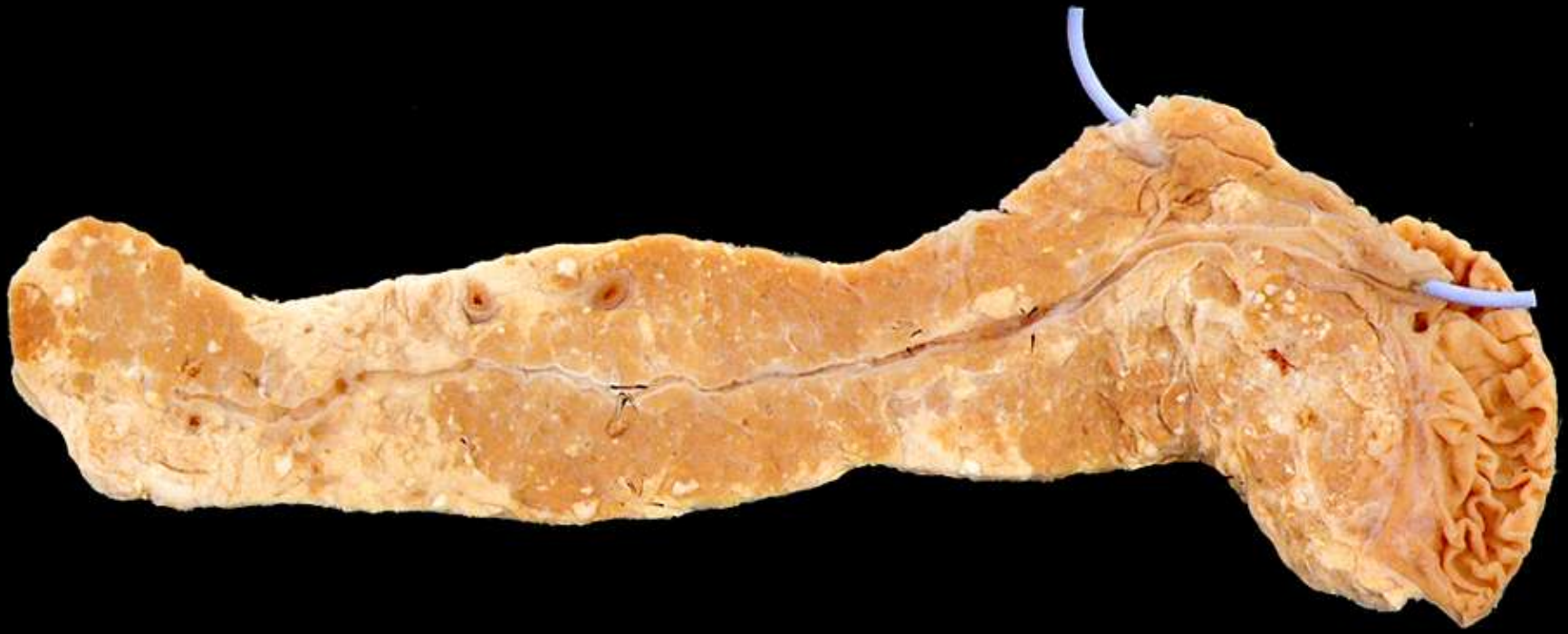


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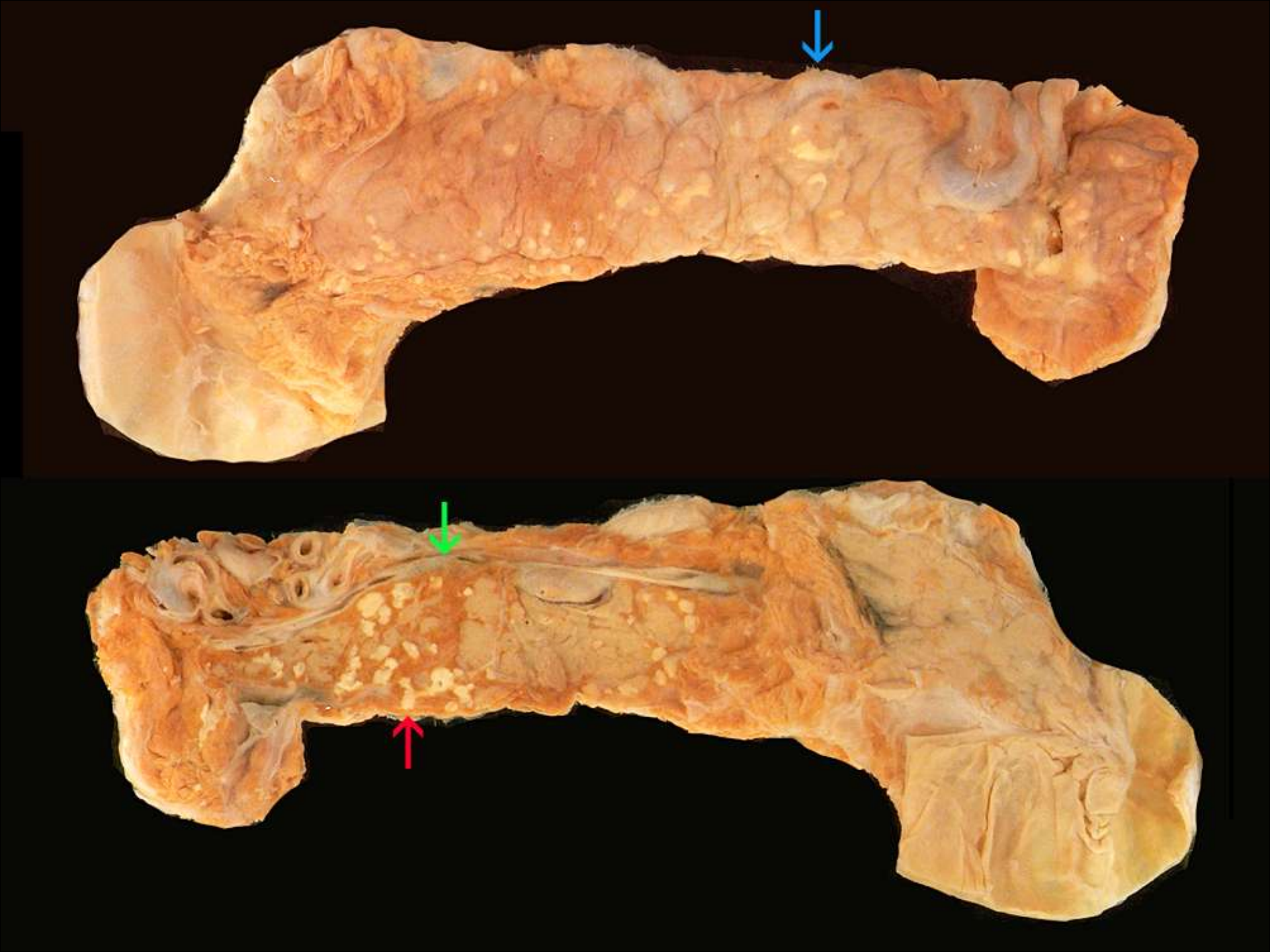

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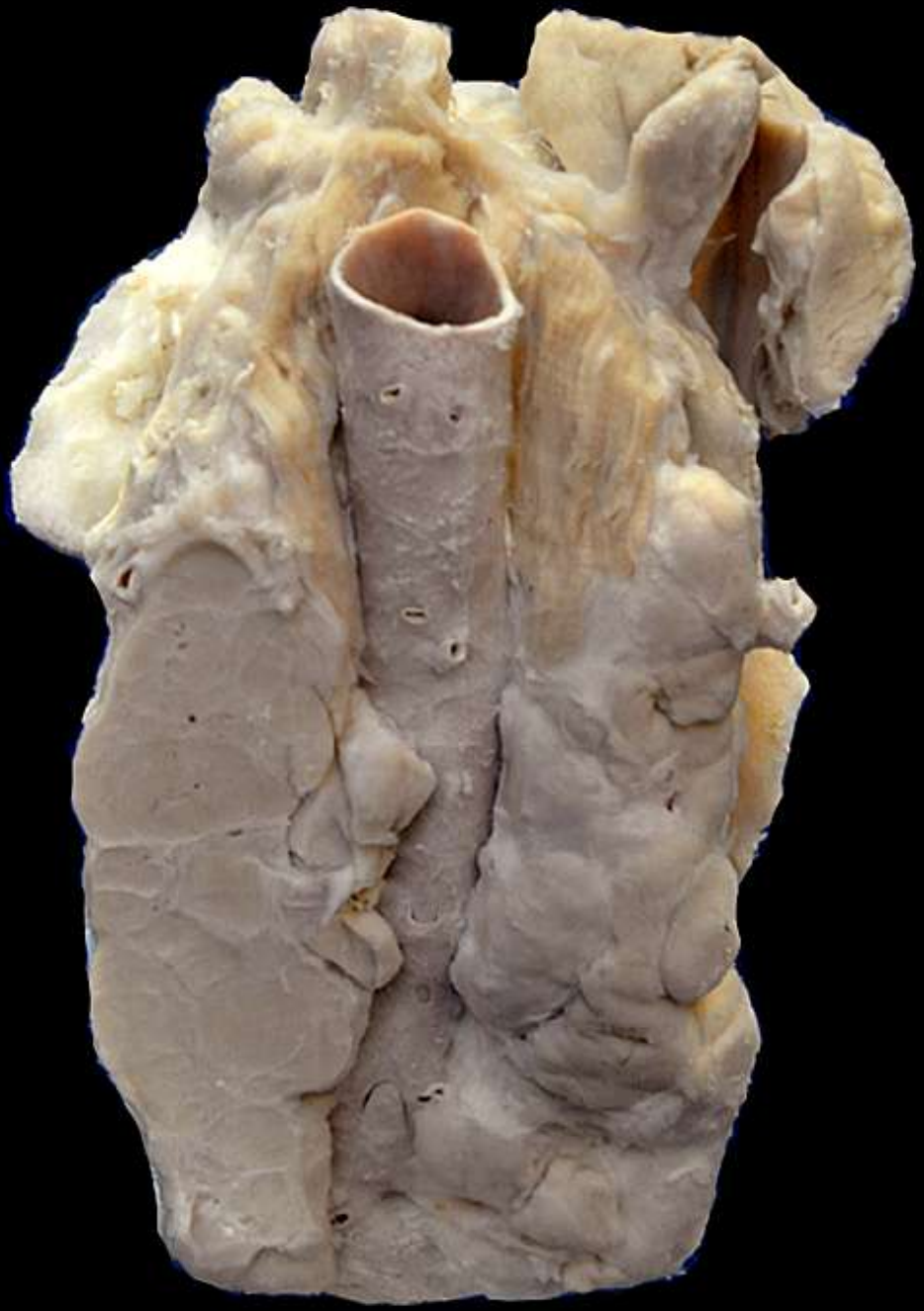

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