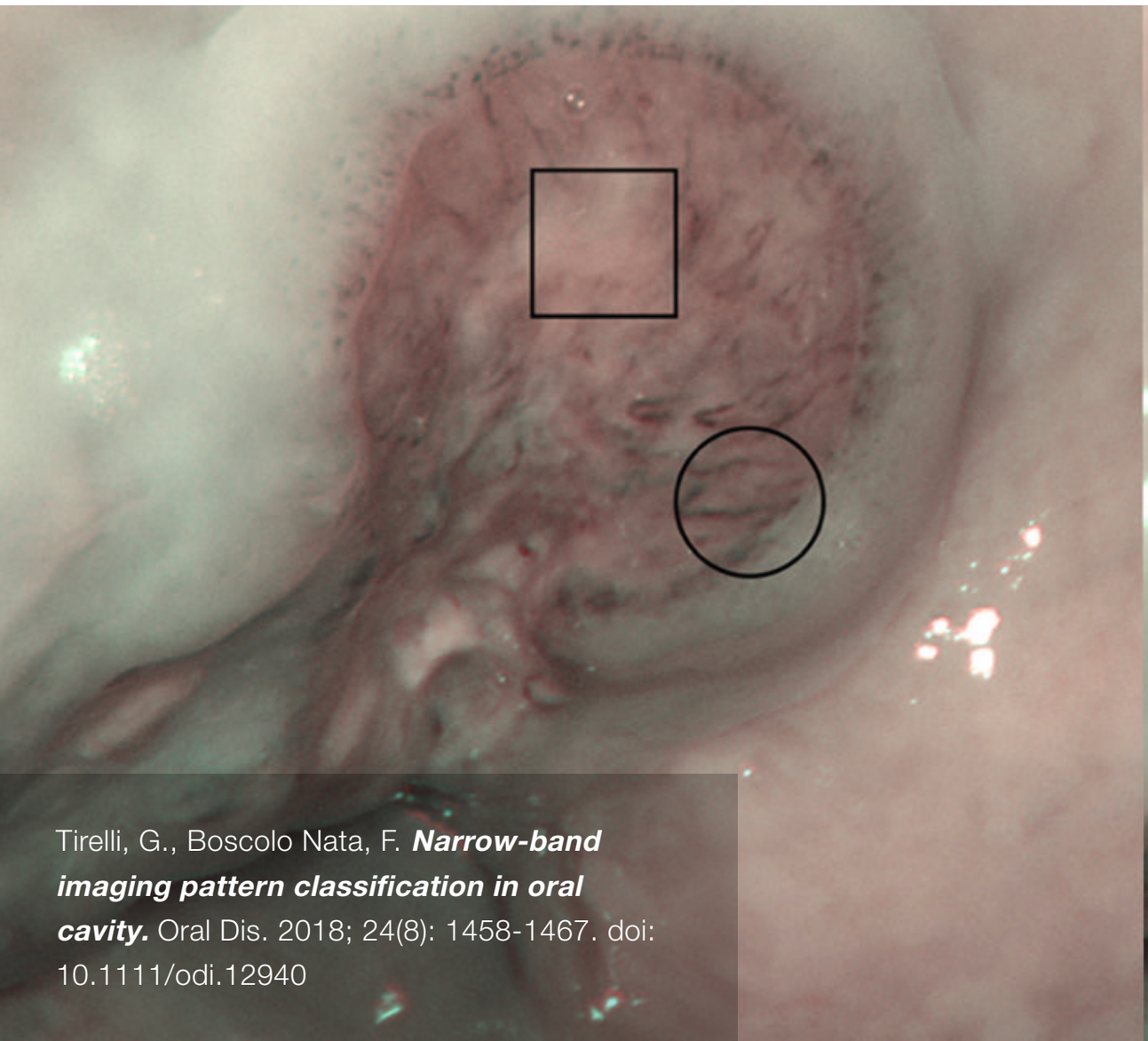
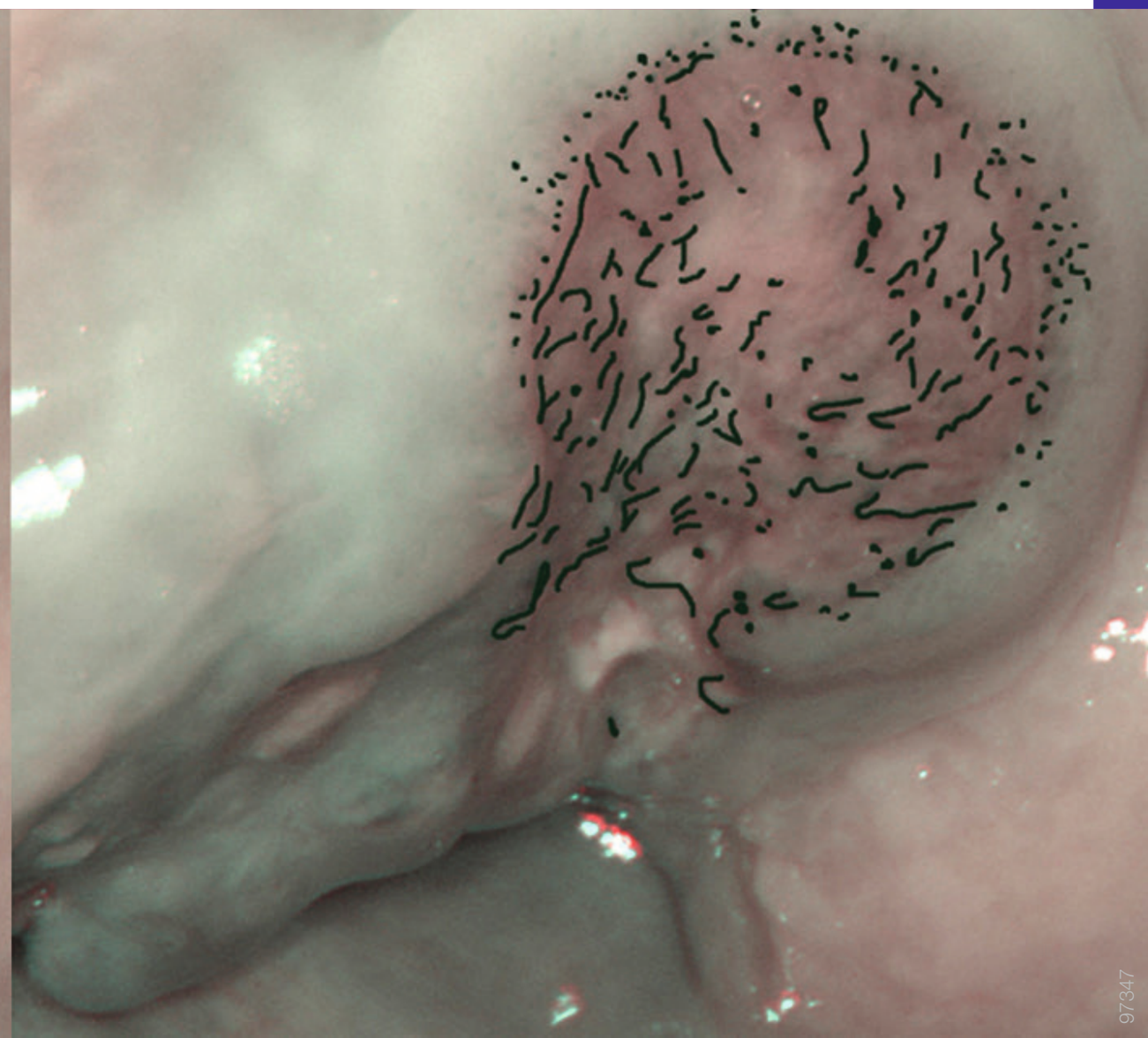
OLYMPUS

Inspect Oral Cavity Patterns

With Narrow Band Imaging (NBI)





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Disclaimer

NBI is crucial in the early diagnosis of oral cavity cancer. A deep knowledge of NBI patterns in the different oral subsites could help in differentiating normal epithelium from dysplastic and neoplastic lesions.

Francesca Boscolo Nata, MD
ENT Clinic, Head and Neck Department
University of Trieste, Italy

Giancarlo Tirelli, MD
ENT Clinic, Head and Neck Department
University of Trieste, Italy

The following pictures highlight the main characteristics of oral cavity NBI patterns in the different epithelial types.

· **Normal pattern** is different in each epithelial type.
· **Dysplastic pattern** is similar in epithelial types 1 and 2a, and different in type 2b.
· **Neoplastic pattern** is similar in all the epithelial types. Vessels are visible in vegetating areas of the lesion, while they are absent in ulcerated areas because of the presence of necrotic tissue.

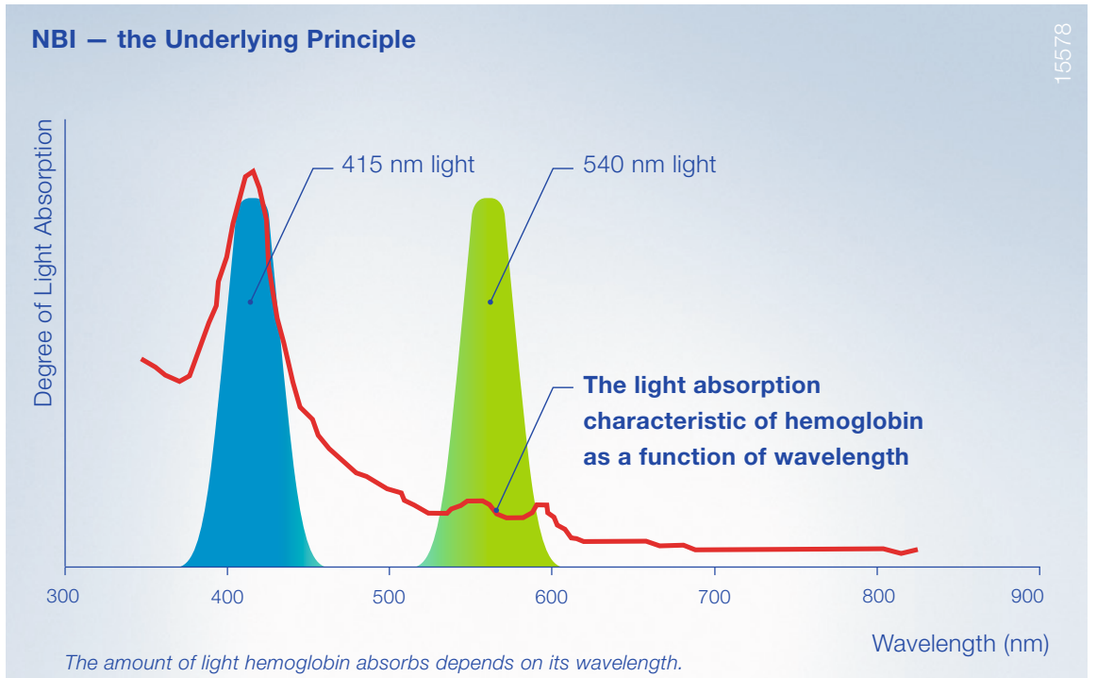
How NBI Works

The Underlying Principle

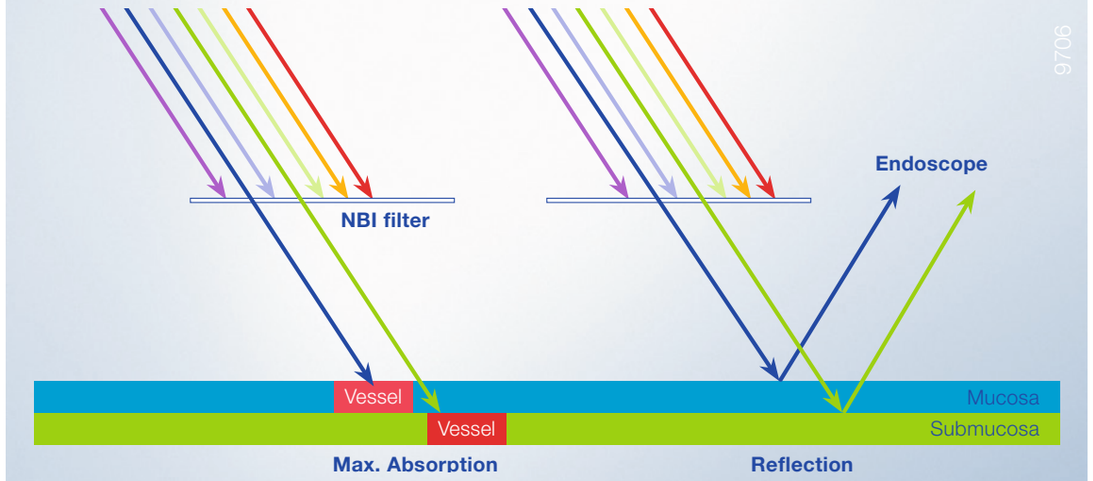
Normal white light (WL) contains all colors. When WL hits the surface of a tissue, all colors are absorbed. Thus the image remains with lack of contrast. With NBI this is different.

NBI uses only blue and green light. When blue and green light hit the surface of the tissue, it is highly absorbed by hemoglobin in the blood vessels. While the blue light is absorbed by the capillaries in the mucosa, the green light reaches deeper to the submucosal area, where it is reflected by the blood vessels. This is why NBI creates a significantly higher contrast between blood vessels and the surrounding tissue than WL. The NBI images therefore show more contrast than WL images. Since small tumors are often surrounded by many blood vessels, NBI helps to detect these tumors at an early stage and to analyze these areas accordingly. Thus, NBI supports the early and precise optical diagnosis of oral, pharyngeal and laryngeal cancer lesions, which as a result allows better treatment and more accurate follow-ups.

Numerous studies highlight the clinical value of NBI, especially with regard to the characterization of suspicious mucosal areas and the detection of cancerous lesions.



The amount of light hemoglobin absorbs depends on its wavelength.



NBI light is absorbed by capillaries on the mucosal surface (blue) and veins in the submucosa (green).

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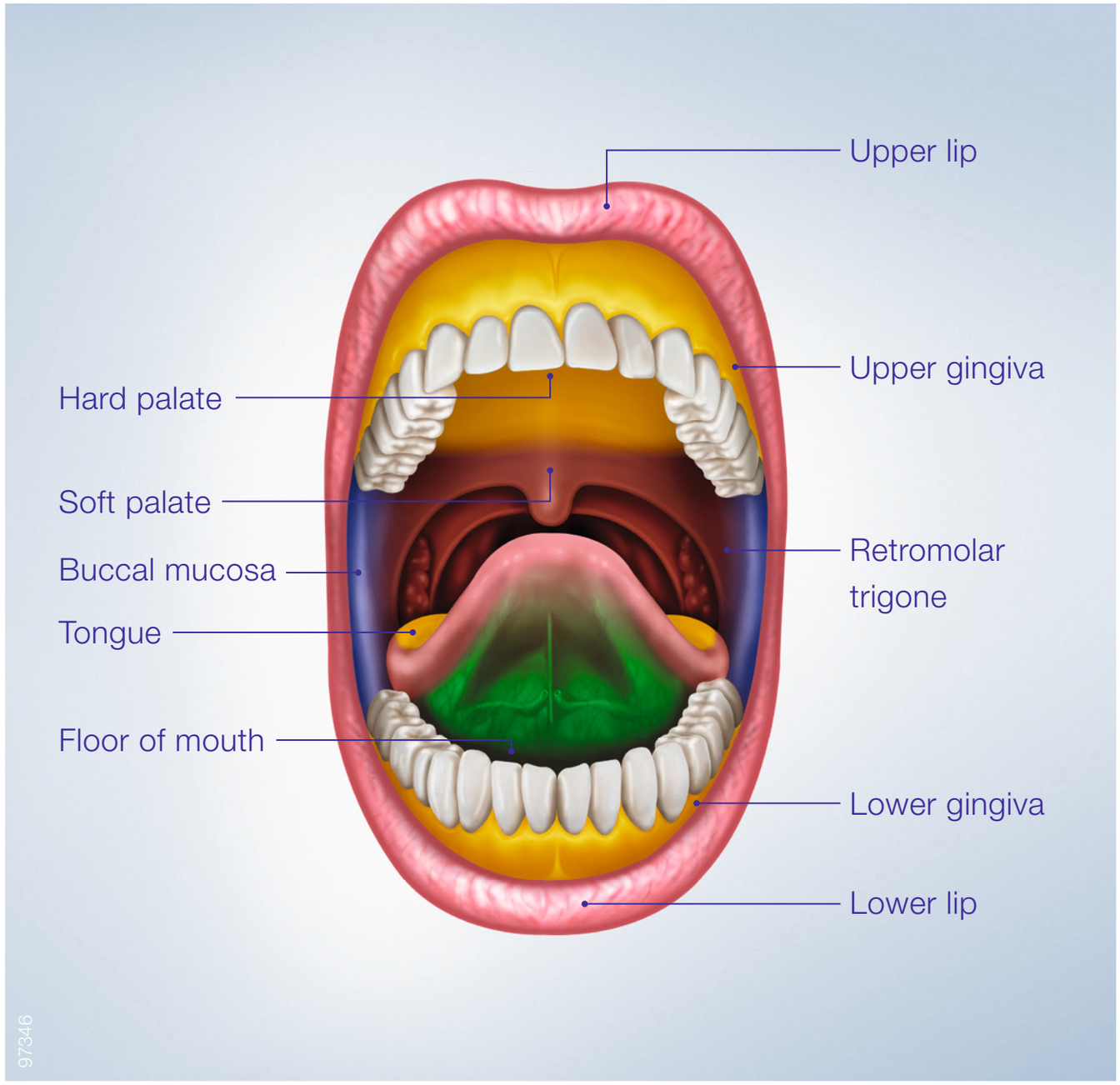
Anatomy and Mucosal Structure in Oral Cavity



We can identify three different mucosal structures in oral cavity (Lin et al., 2012):

Type 1 (yellow)
Keratinized thick stratified squamous epithelium in gingiva, hard palate and dorsal surface of the tongue.

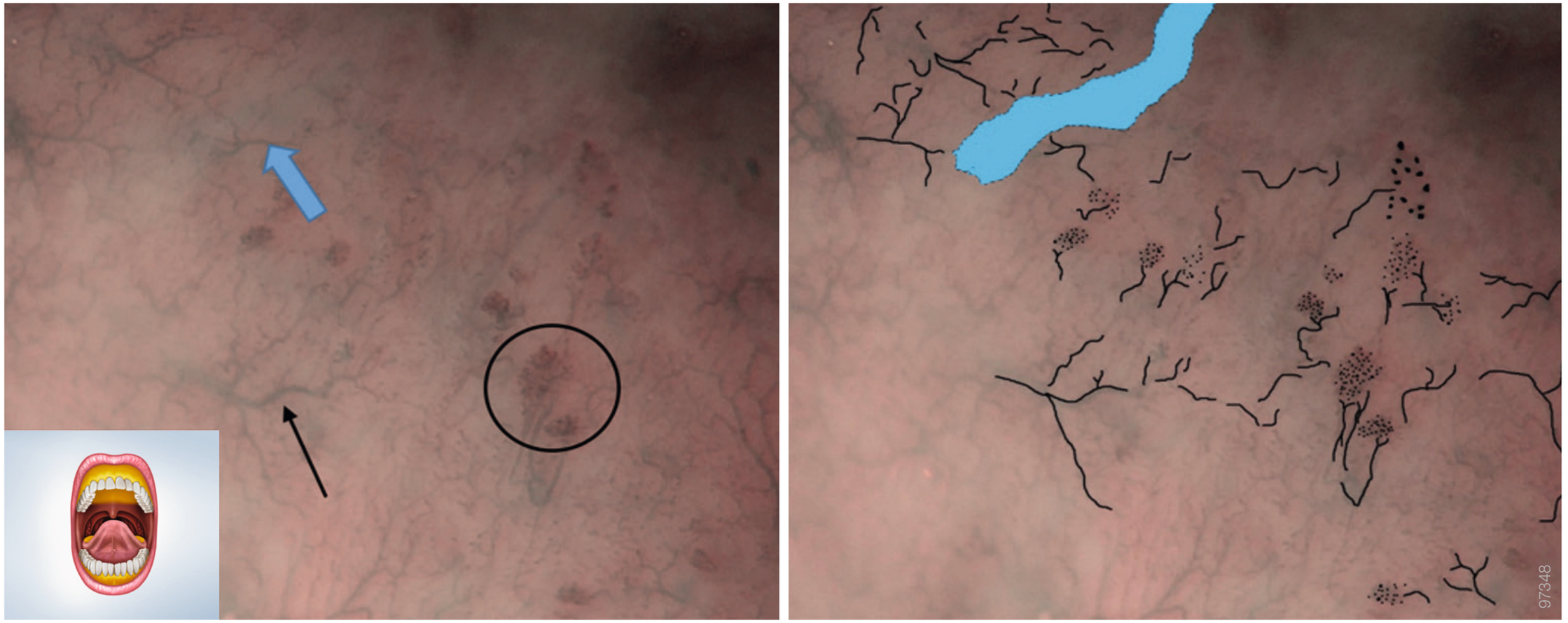
Type 2a (green)
Nonkeratinized thin stratified squamous epithelium in the floor of the mouth and ventral tongue.

Type 2b (blue)
Nonkeratinized very thick stratified squamous epithelium in the retromolar trigone, labial and buccal mucosa.

Type 1 Epithelium

Normal Pattern

Gingiva, hard palate and dorsal surface of the tongue, normal pattern.

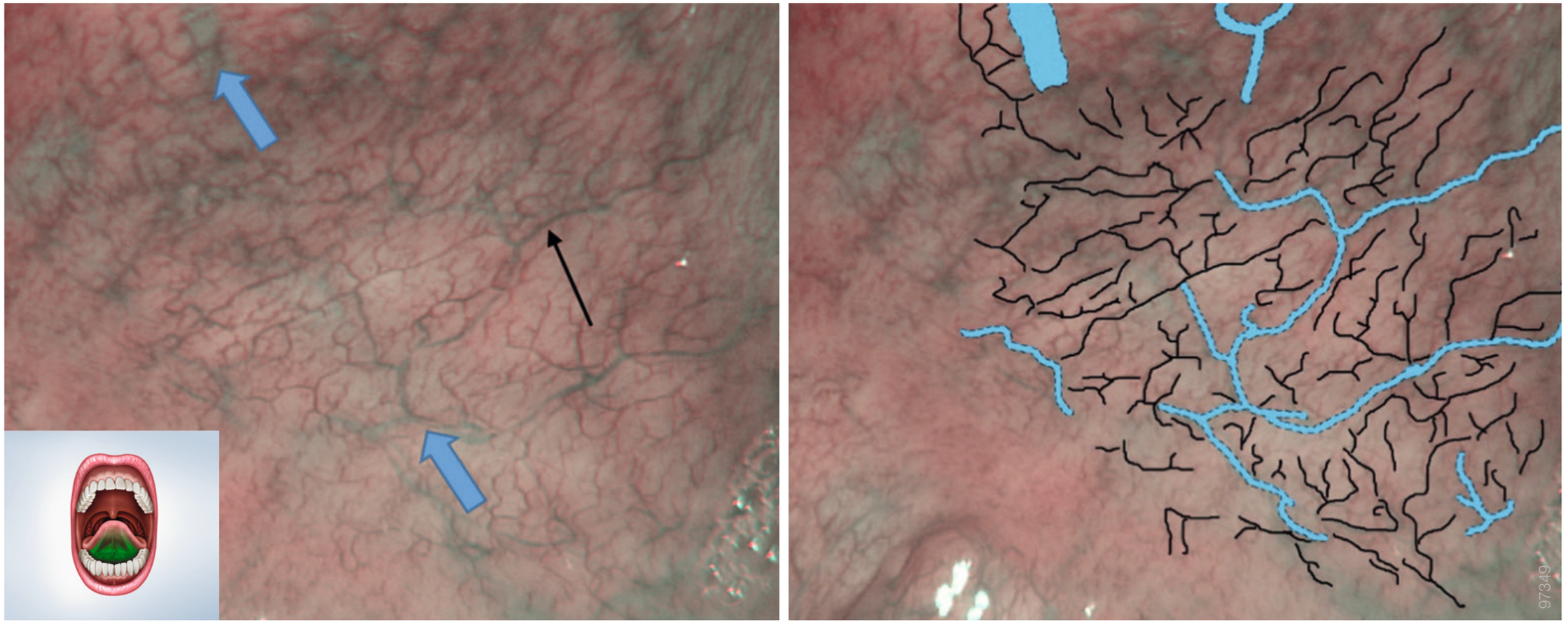


Posterior hard palate. Superficial mucosal capillaries appear as thin dark-green/brown vessels with small branches arising at an acute angle (thin black arrow). We can notice some “flower-like” configuration with a thin vessel acting as a “stem” and some points all around as the “petals” (○), attributable to minor salivary glands. Some large light-blue vessels representing the submucosal veins can be glimpsed (thick light-blue arrow).

Type 2a Epithelium

Normal Pattern

Floor of the mouth and ventral tongue, normal pattern.

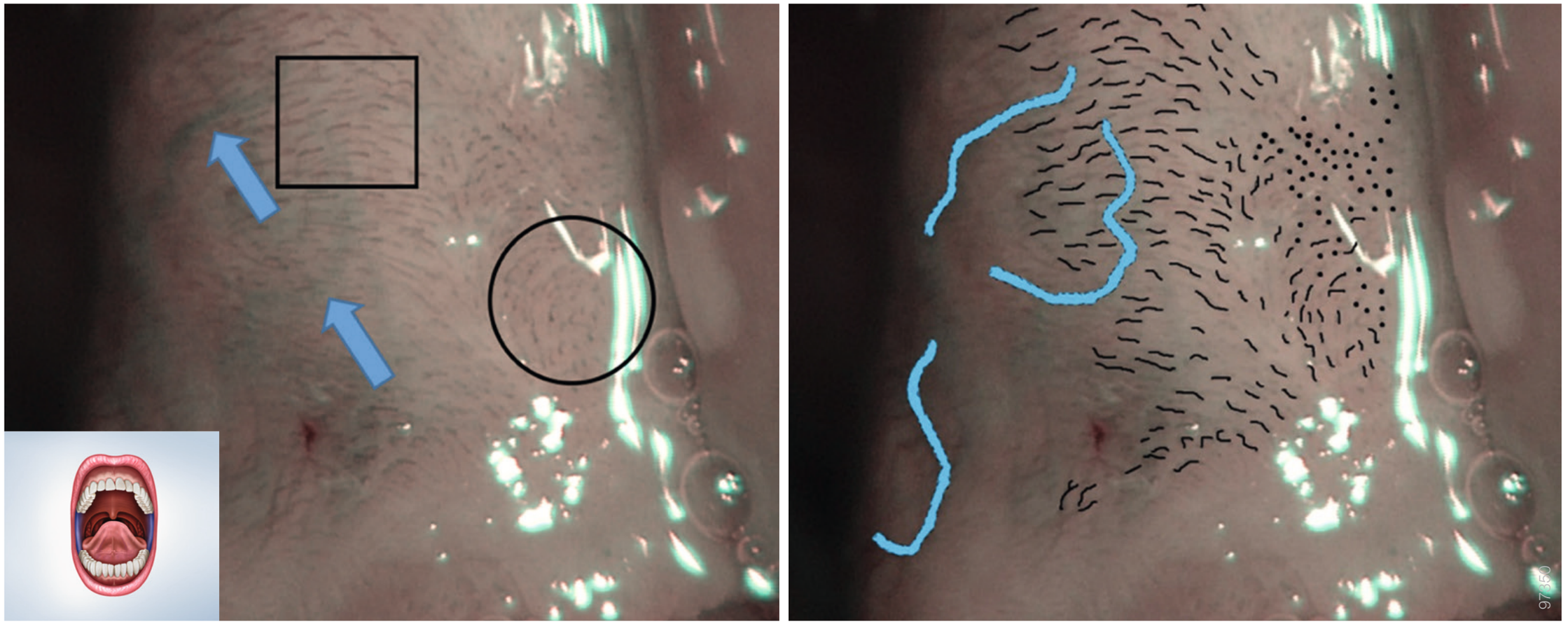


Floor of the mouth. Superficial mucosal capillaries appear as thin dark-green/brown vessels with small branches arising at an acute angle (black thin arrow). Submucosal veins are clearly visible as larger light-blue vessels (thick light-blue arrows).

Type 2b Epithelium

Normal Pattern

Retromolar trigone, labial and buccal mucosa, normal pattern.

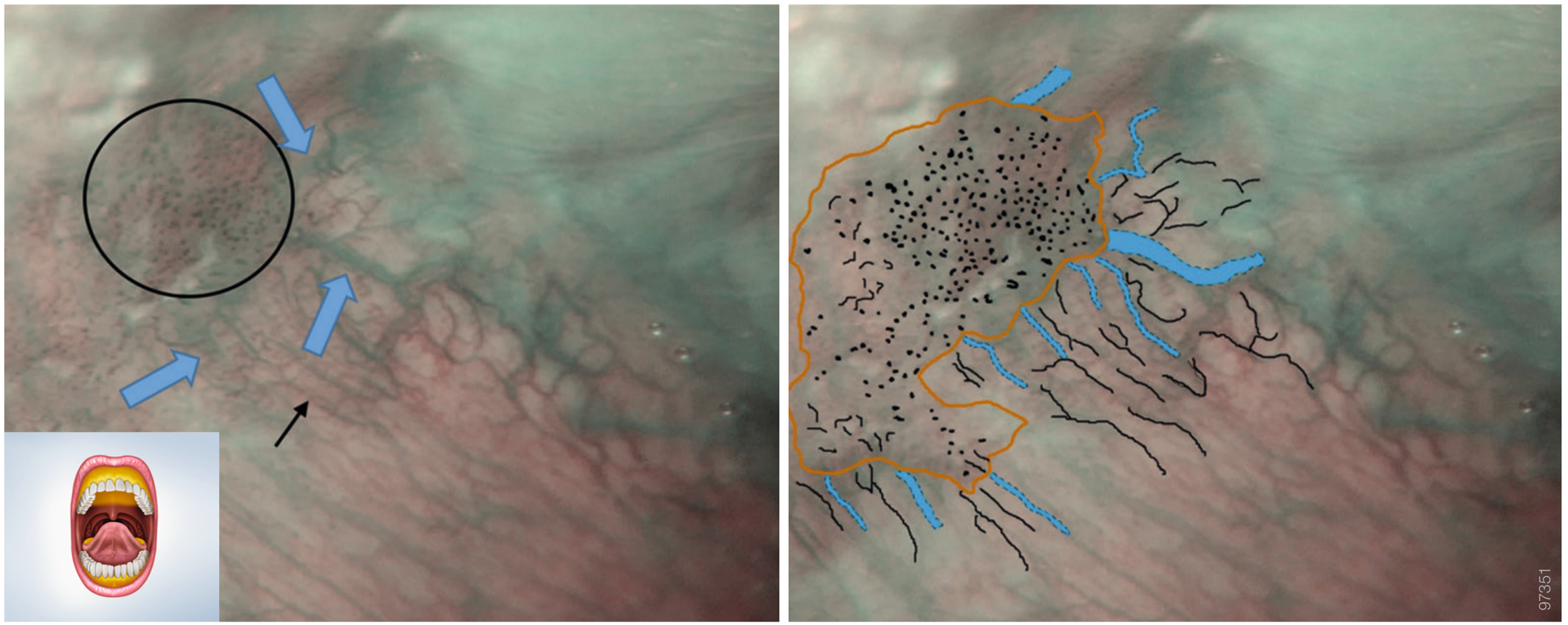


Left inferior trigone. Superficial mucosal capillaries appear as regular and equidistant dark-green/brown small punctuations (○) if the vessels are visualized perpendicularly, or as short dashes (□) if they are longitudinal to the mucosa. Submucosal veins can be glimpsed as some large light-blue vessels (thick light-blue arrows).

Type 1 Epithelium

Dysplastic Pattern

Gingiva, hard palate and dorsal surface of the tongue, dysplastic pattern.

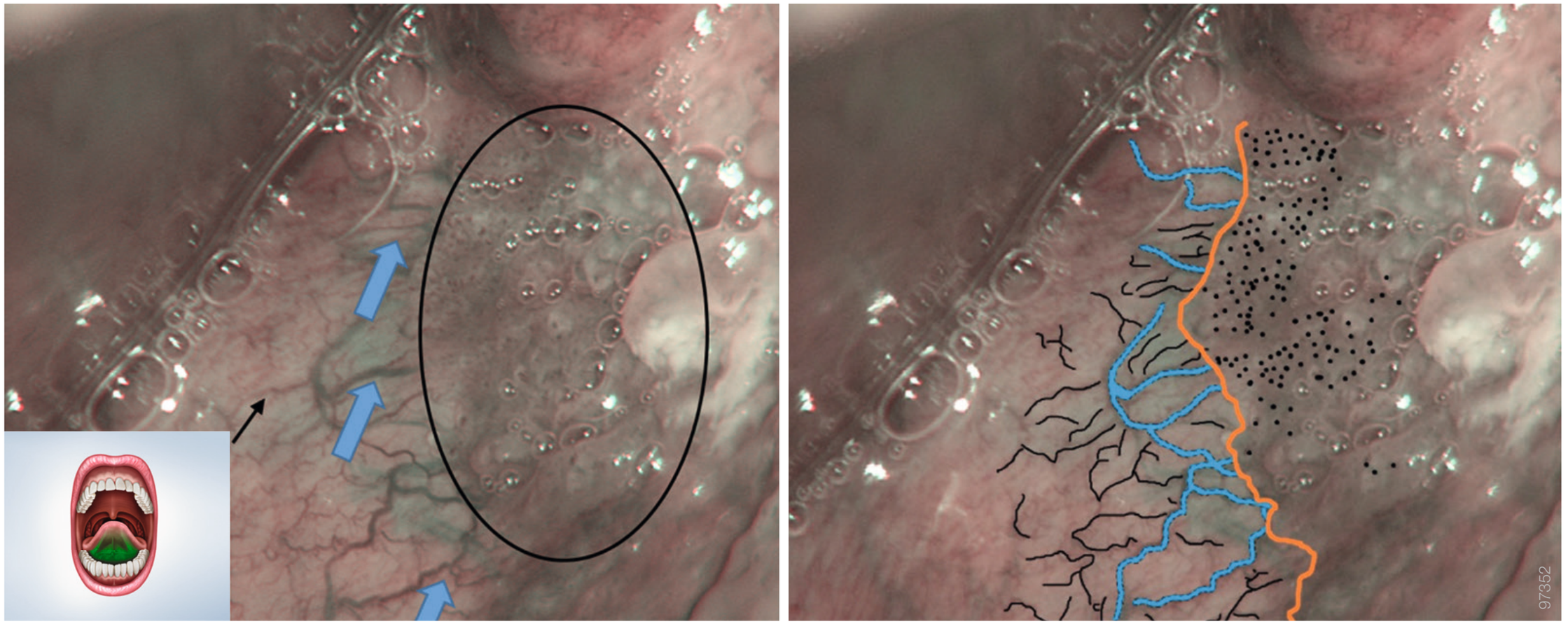


Posterior hard palate. The area with high-grade dysplasia is visible as a well-demarcated area with thick dark spots (○); dilated light-blue vessels (thick light-blue arrows) reach this area perpendicularly. In the dysplastic area the submucosal large light-blue vessels are no longer visible. Superficial mucosal capillaries are still visible outside the dysplastic area as thin dark-green/brown vessels with small branches arising at an acute angle (black thin arrow).

Type 2a Epithelium

Dysplastic Pattern

Floor of the mouth and ventral tongue, dysplastic pattern.

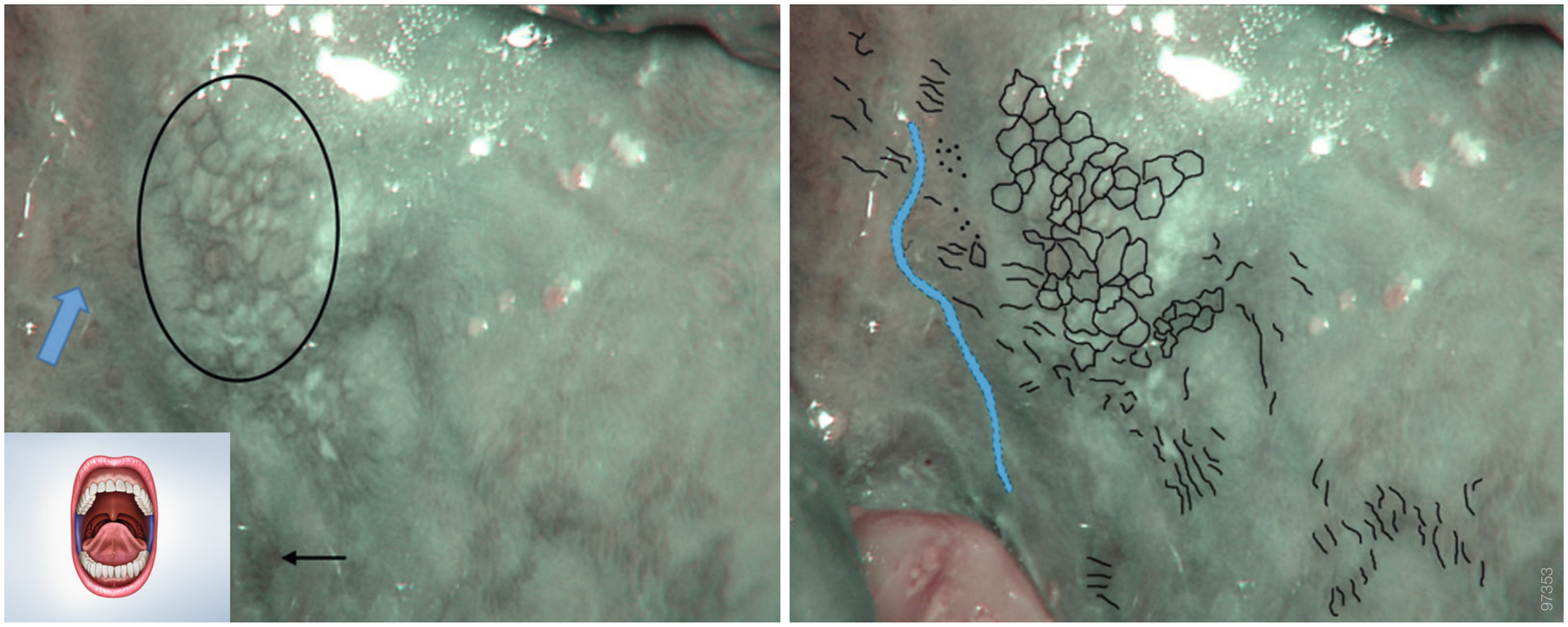


Floor of the mouth. The area with high-grade dysplasia is visible as a well-demarcated area with thick dark spots (○); dilated light-blue vessels (thick light-blue arrows) reach this area perpendicularly. In the dysplastic area the submucosal large light-blue vessels are no longer visible. Superficial mucosal capillaries are still visible outside the dysplastic area as thin dark-green/brown vessels with small branches arising at an acute angle (black thin arrow).

Type 2b Epithelium

Dysplastic Pattern

Retromolar trigone labial and buccal mucosa, dysplastic pattern.

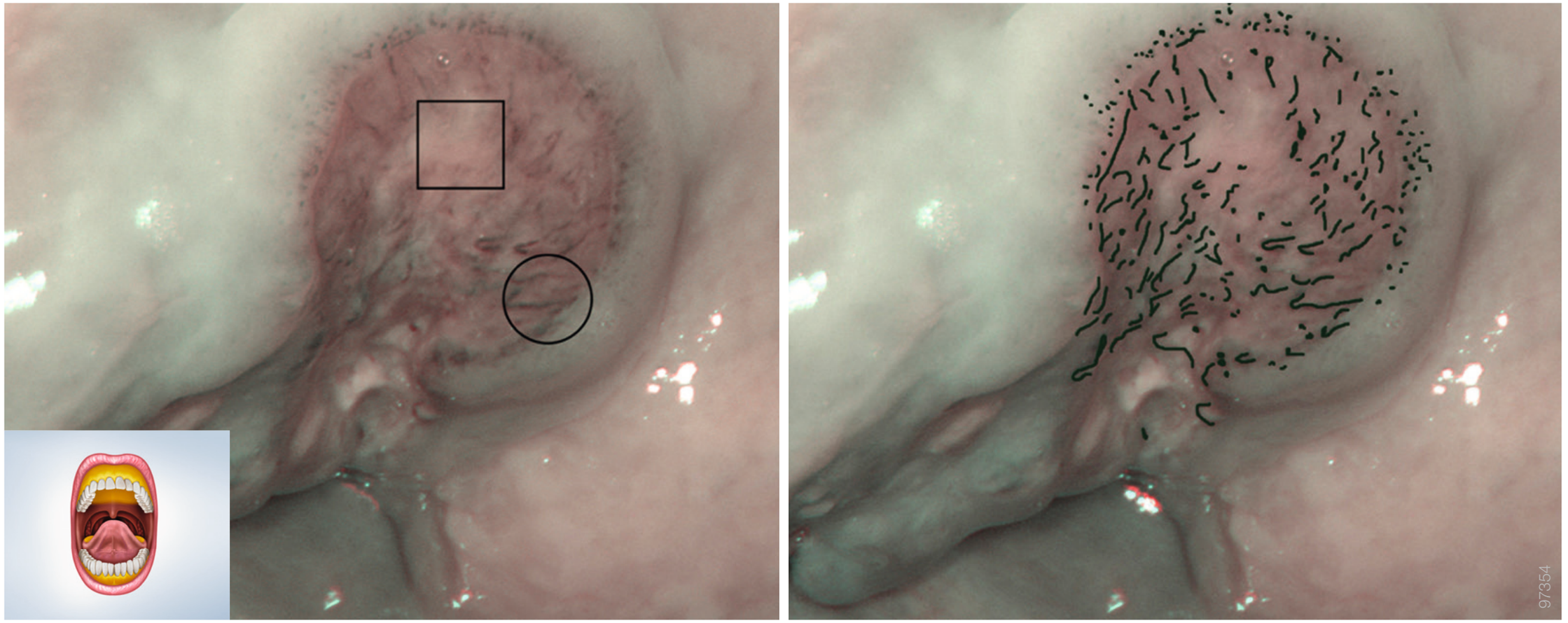


Posterior left buccal mucosa. The area with high-grade dysplasia is visible as an image resembling a honeycomb mesh made of multiple polygonal areas (○). In the dysplastic area the submucosal large light-blue vessels are no longer visible, but can be glimpsed in the surrounding areas (thick light-blue arrow). Superficial mucosal capillaries are still visible as short dashes (black thin arrow) outside the dysplastic area.

Type 1 Epithelium

Neoplastic Pattern

Gingiva, hard palate and dorsal surface of the tongue, neoplastic pattern.

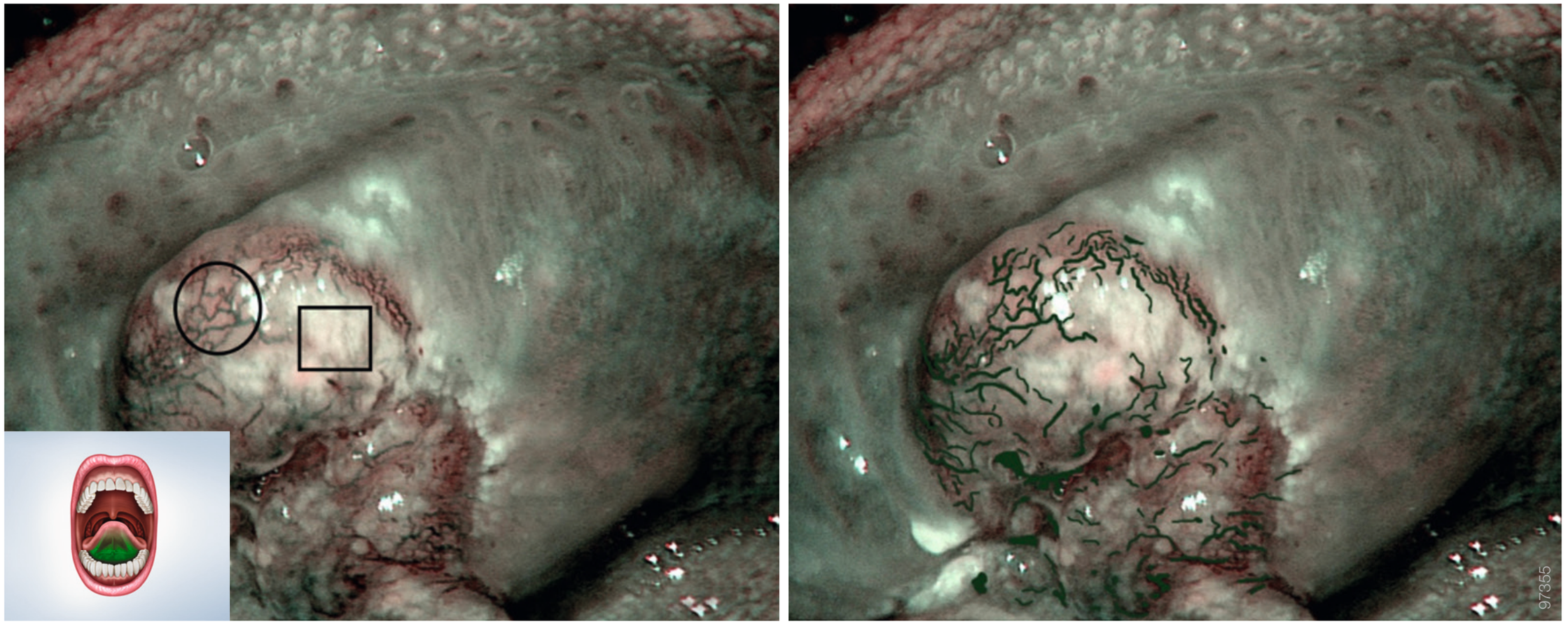


Right hard palate. Neoplastic vessels have a completely altered structure; they appear as dark-green dilated winding vessels at the tumor limits (○); conversely they are not visible in necrotic areas (□).

Type 2a Epithelium

Neoplastic Pattern

Floor of the mouth and ventral tongue, neoplastic pattern.

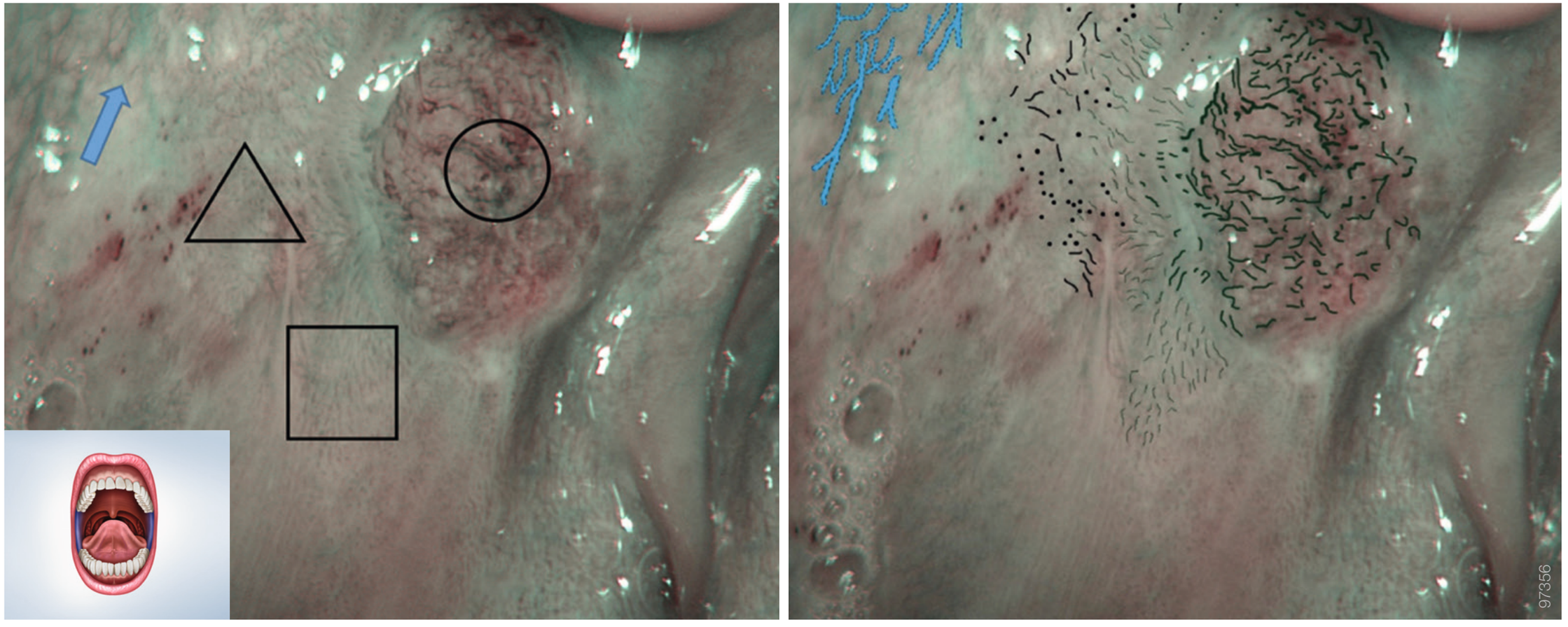


Left tongue margin. Neoplastic vessels have a completely altered structure; they appear as dark-green dilated winding vessels (○); conversely they are not visible in necrotic areas (□).

Type 2b Epithelium

Neoplastic Pattern

Retromolar trigone, labial and buccal mucosa, neoplastic pattern.



Right posterior buccal mucosa. Neoplastic vessels have a completely altered structure; they appear as dark-green dilated winding vessels (○). Normal pattern is visible outside the vegetating lesion, with superficial mucosal capillaries as regular and equidistant dark-green/brown small punctuations (△) or as short dashes (□), and submucosal veins as large light-blue vessels (thick light-blue arrow).

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