



FROM LIGHT CARRIER TO FLUORESCENCE ENDOSCOPY

Petr Štorek
Petr Šumbera

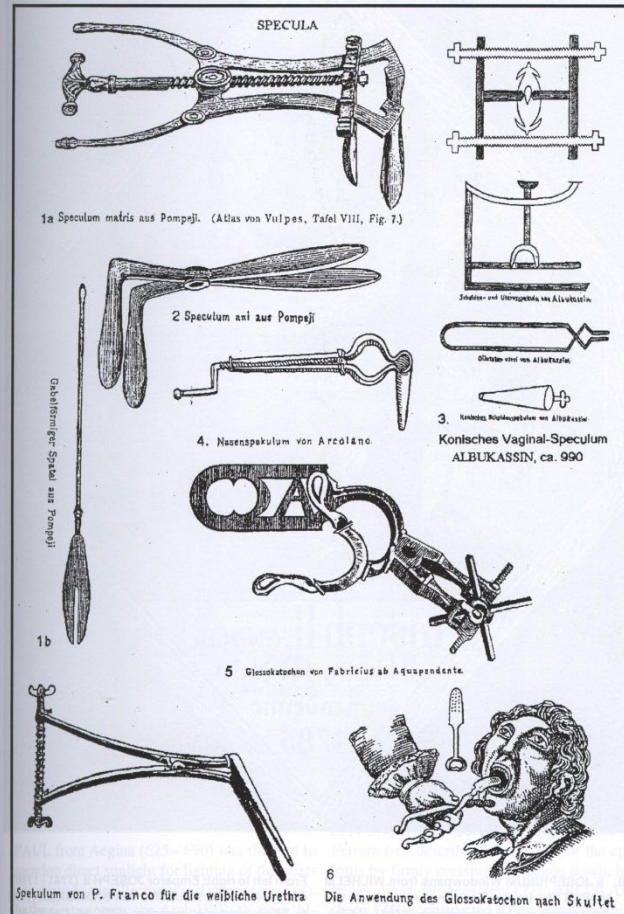
KARL STORZ SE & Co. KG

INFORMATION OFFICE CZ&SK



ANTIQUITY FIRST SPECULA

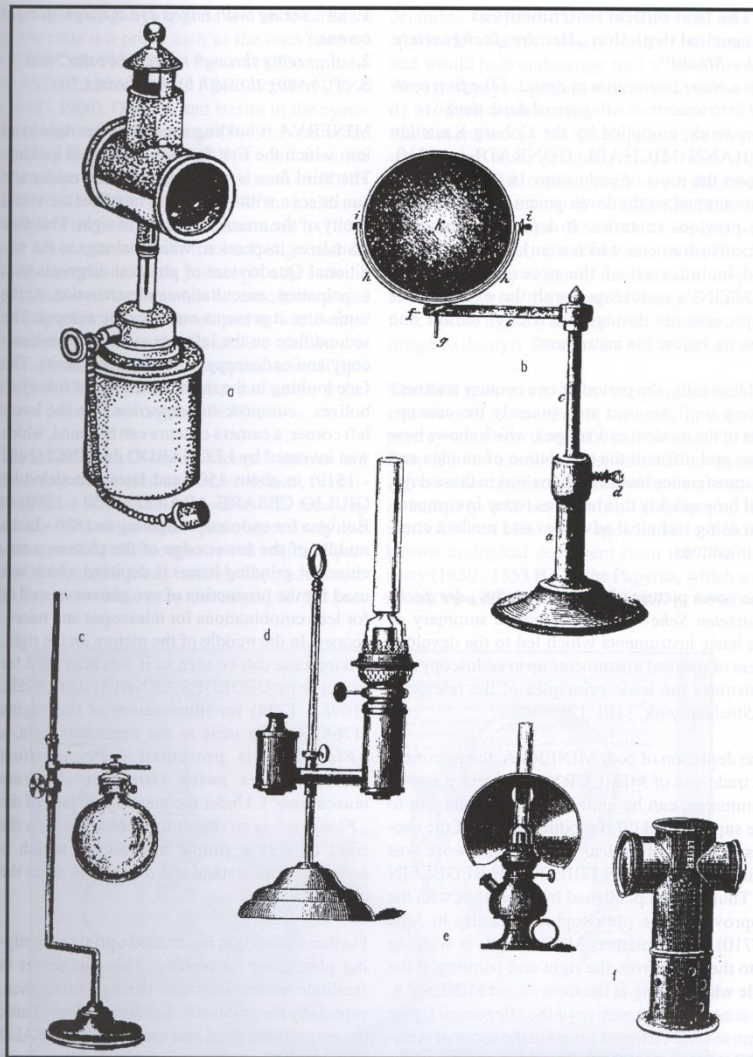
PLATE 1. ANTIQUE SPECULA





Light sources:

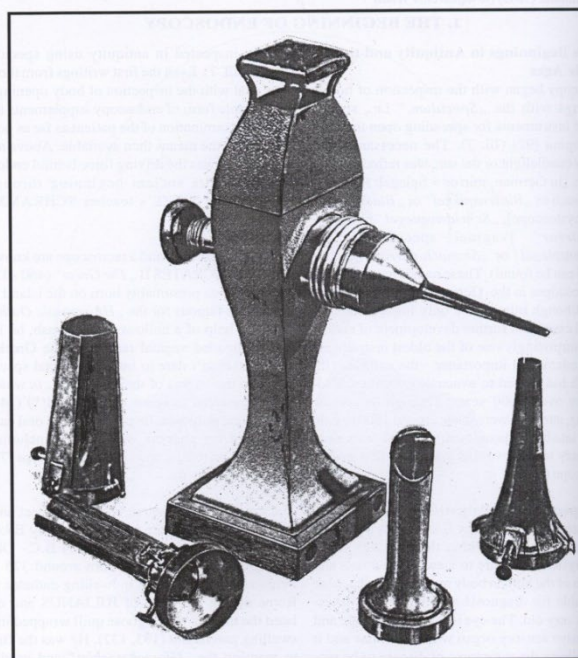
focus by mirror



III. 10 Endoscopic lamps. a) Modification in the 19th century by GEORGES ARNAUD de RON- (1879). c) LUDWIG TÜRCK spherical glass bottle, filled with water, Vienna (1869). d) Petroleum lamp

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1806 Phillip Bozzini Light carrier



III. 5 BOZZINI's Lichtleiter in Chicago (1806) (Photo I. BUSH)

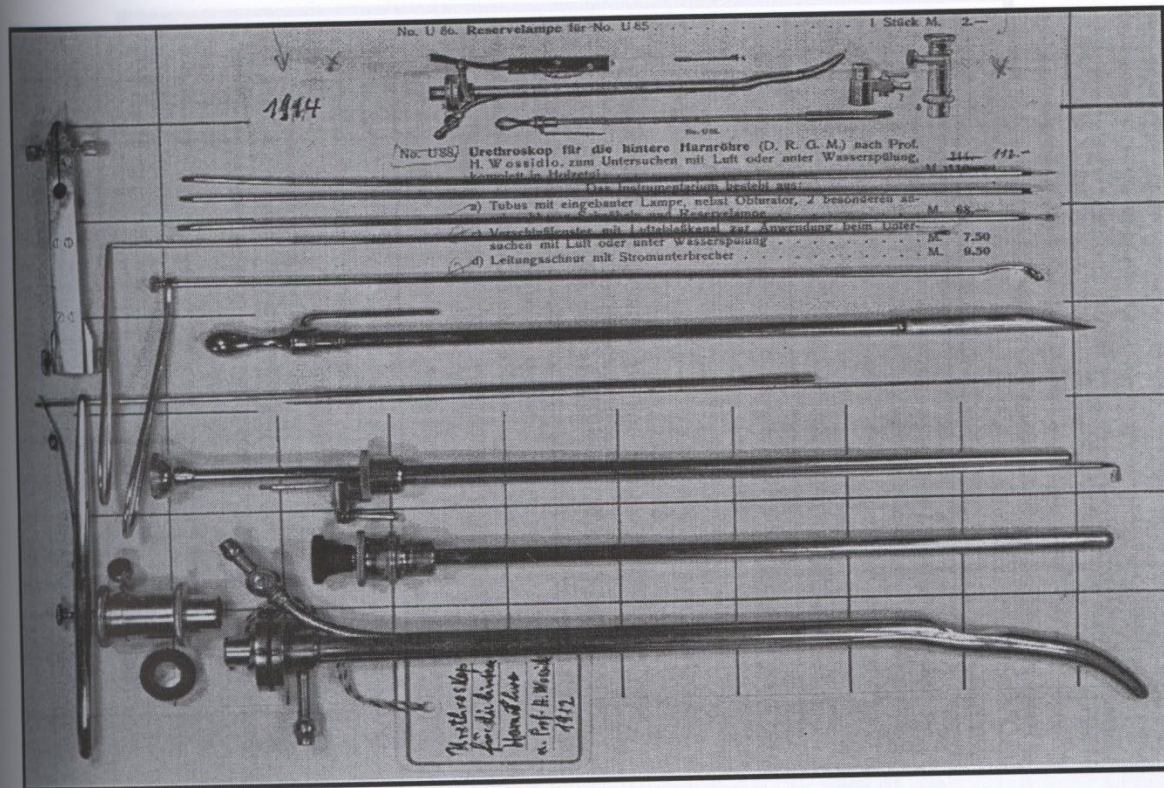
PLATE 1. ANTIQUE SPECULA (77)

- Fig. 1a Speculum matris from Pompeii, 21 cm long, branches 9.5 cm long.
Fig. 1b Forked mouth spatula from HIPPOCRATES for operations on nasal polyps. It served as a „Hypomochlion“ for the traction spring of the rhinospunge.
Fig. 2 Speculum ani from Pompeii, model for the nasal speculum (200).
Fig. 3 Vaginal specula from ALBUCASIS (912 - 1013).
Fig. 4 Nasal speculum from ARCOLAND (died 1460).

- Fig. 5 „Glossokatochon“ from FABRICIUS of AQUAPENDENTE (1537 - 1619).
Fig. 6 Use of the „Glossokatochon“ according to SKULTET (1621 - 1686).
Fig. 7 Urethral speculum for women by P. FRANCO (1500 - 1561).



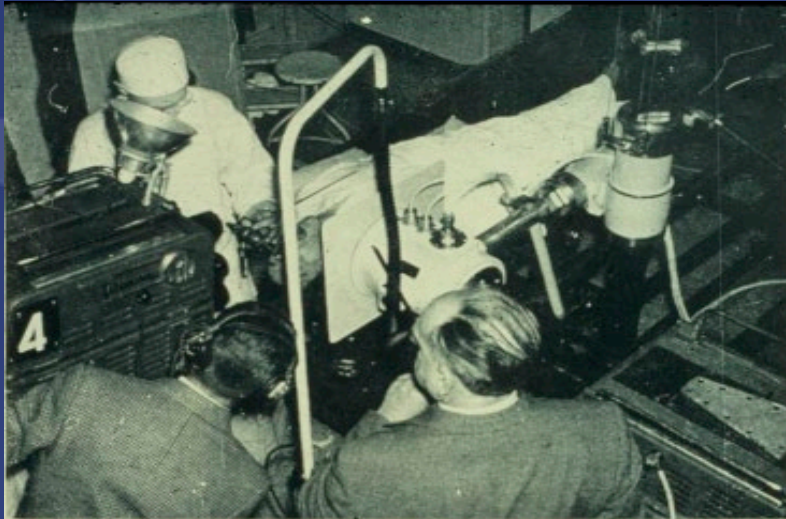
UROLOGY — rapid development of endoscopic equipment





History of Video in Surgery

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**Dr. Soulas
In a TV-Studio
(1956, France)**



**Bronchoscopy
with 150 lbs
Orthicon Camera**

Figure 1: General arrangement. The patient and the equipment are in place.

ingen / Germany



slim 1 inch Video camera



C- Mos Camera



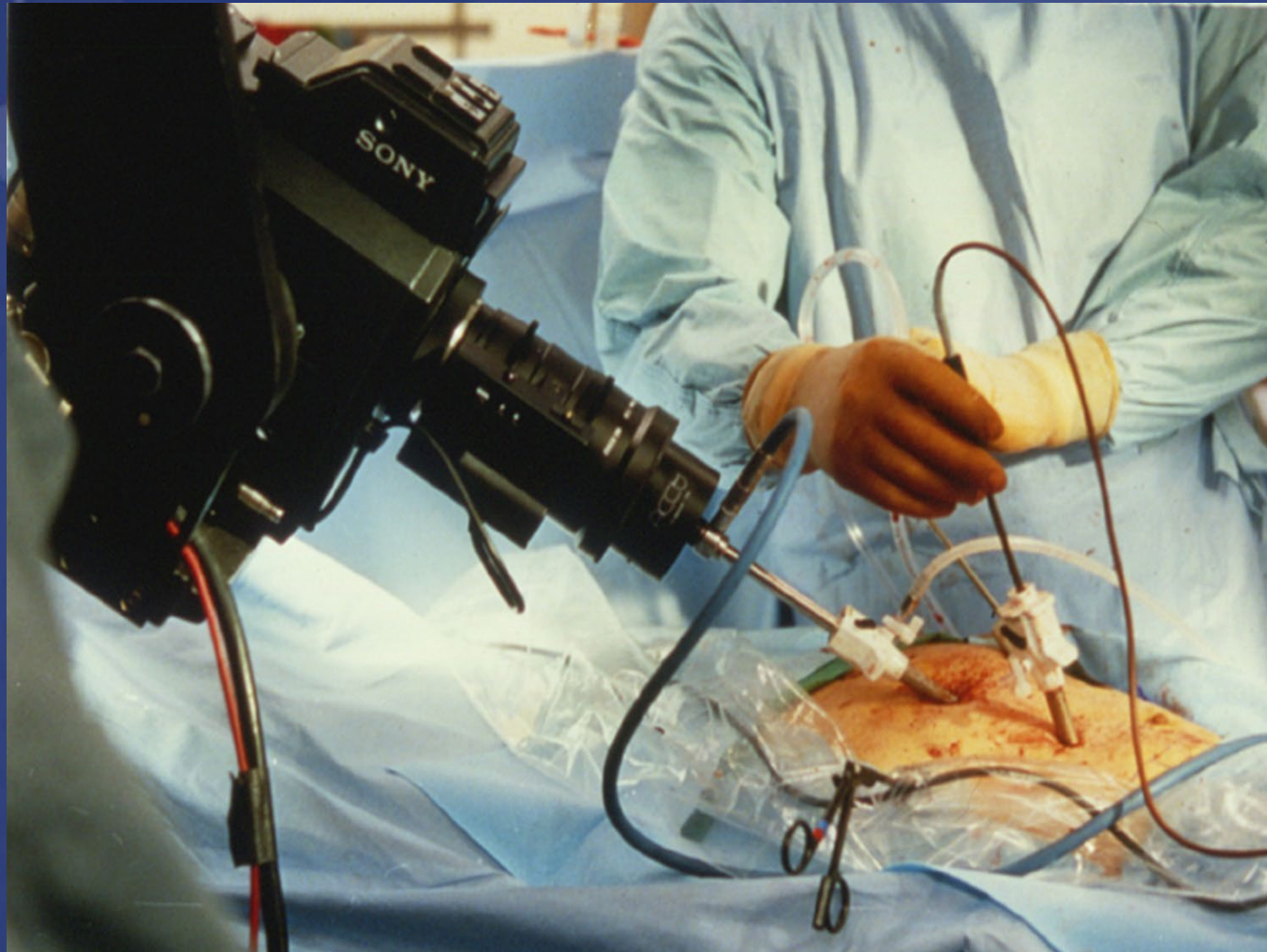
CCD Camera





HD – Year 2000

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2008
IMAGE 1 KARL STORZ
1. Full HD kamera

Resolution : 1920 x 1080p
Ratio : 16:9





2014 – modular system

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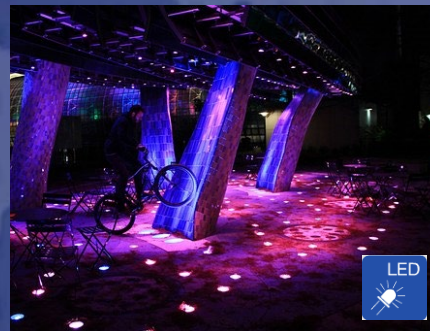
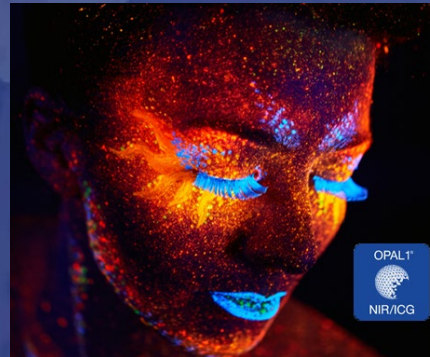
IMAGE 1 S PLATFORM





Main Imaging Technologies

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4K Resolution

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~8 mio. pixels → 4 x more
~1 bio. colors → 64 x more

➔ More sharpness, more color, more detail,
more Depth-of-Field



3D Technology

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~8% quicker → compared to 2D
~11% quicker → if suturing is involved
~14% quicker → on solid organs
~50% less complications → if suturing is involved

→ More speed, accuracy, safety

Source: EAES 2018, London: Consensus meeting on 3D



NIR/ICG Fluorescence

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~ 6- 20% leakages₁ → colon/oesophagus
~ 175k Cholecystectomies₂ → 90% laparoscopic₃
→ 0.3-0.7% incidence of injuries_{3,4} → 97% vision₄
~ 95,5% → SNL detection rate₅
➔ Seeing below the surface, highlighting important structures, decreasing morbidity and mortality

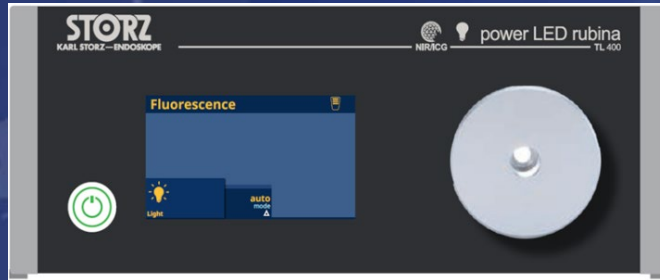
Sources:

1 Burden of Gastrointestinal Anastomotic Leaks: an Evaluation of Clinical and Economic Outcomes,
DESTATA, 3 Fluorescence cholangiography: The advent of a new era of improved visualisation and safety,
4 Causes and Prevention of Laparoscopic Bile Duct Injuries Analysis of 252 Cases From a Human Factors
and Cognitive Psychology Perspective, 5 Imboden et al.



New AGE technology- 4K Image Chain

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Pure **LED** Light Source

1x white light LED

1x near infrared LED

Designed for **NIR/ ICG** with two dedicated sensors



Distortion correction for better 3D effect

Autorotation

ICG in 3D and 2D



No refocusing and sharp
Overlay





VITOM EAGLE EXOSCOPE

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IMAGE 1 S TECHNOLOGIES

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CLARA – ENHANCED ILLUMINATION

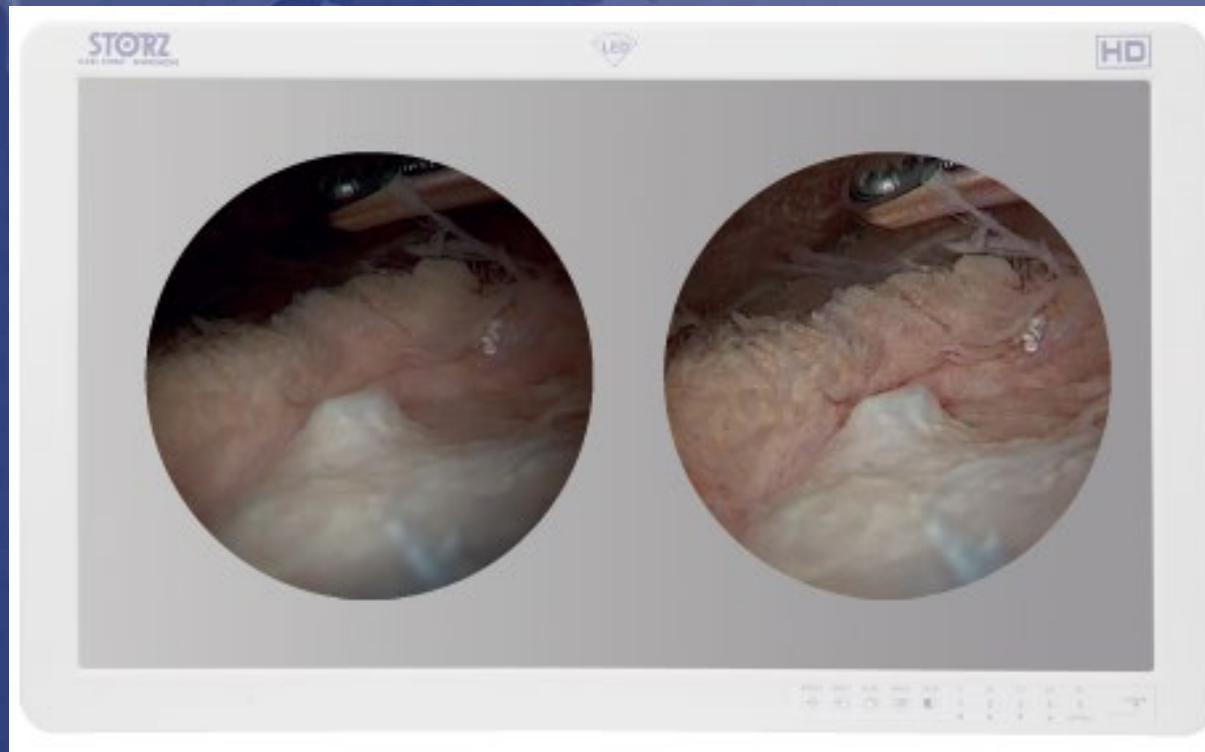




IMAGE 1 S TECHNOLOGIES

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CROMA - enhances the image improving visualisation of vessels and **differentiation of tissue**

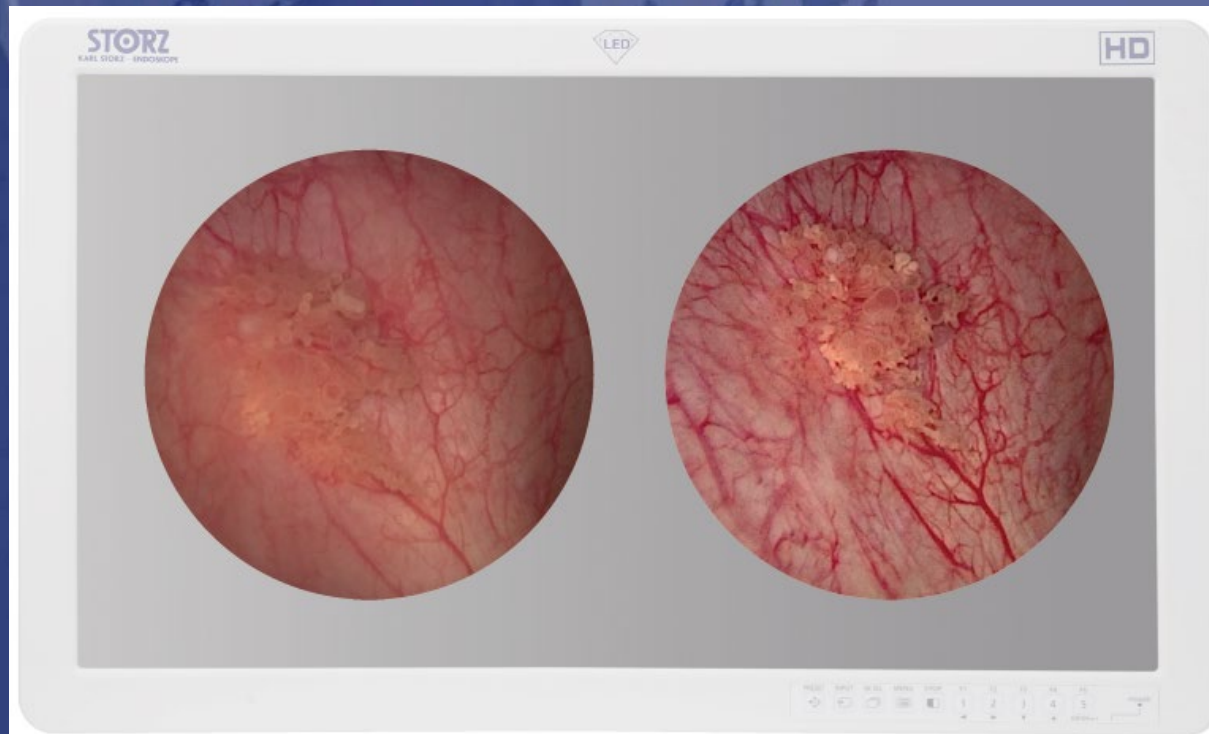




IMAGE 1 S TECHNOLOGIES

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CLARA + CROMA - enhanced light and contrast

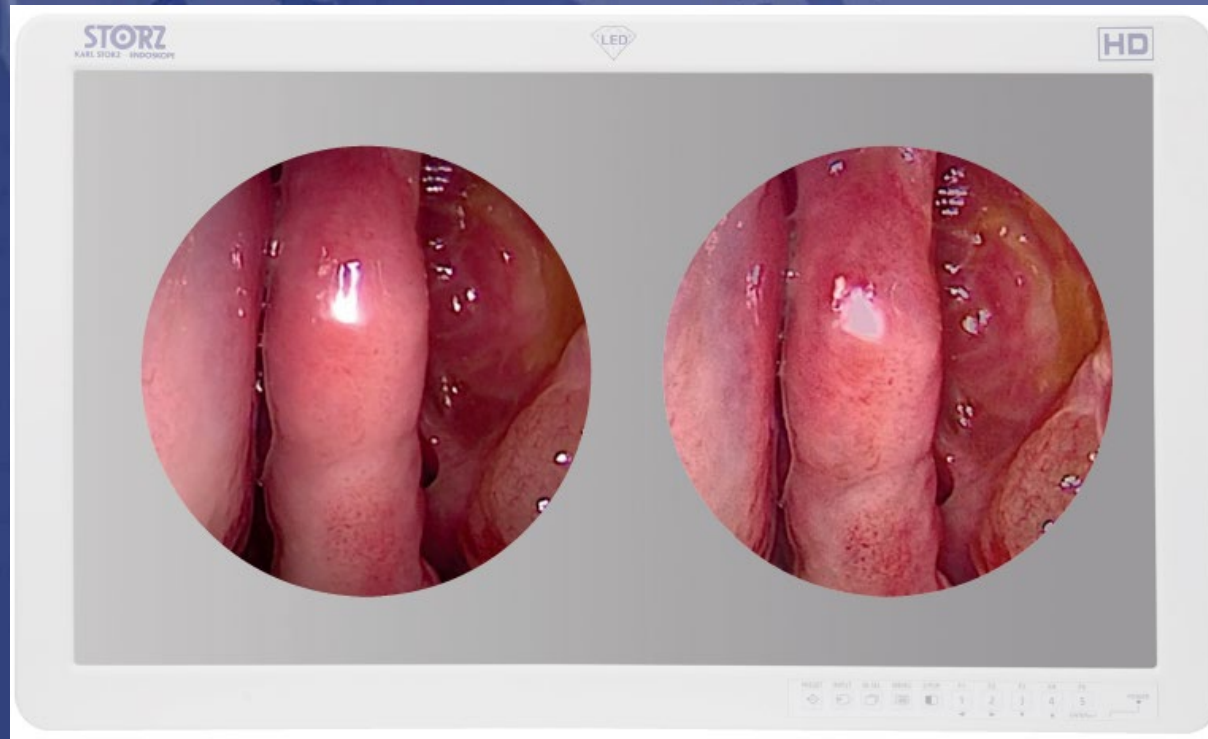




IMAGE 1 S TECHNOLOGIES

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SPECTRA A - reduces the red and intensifies the green and blue component, the background appears greenish so the **blood vessels and capillaries** are highlighted

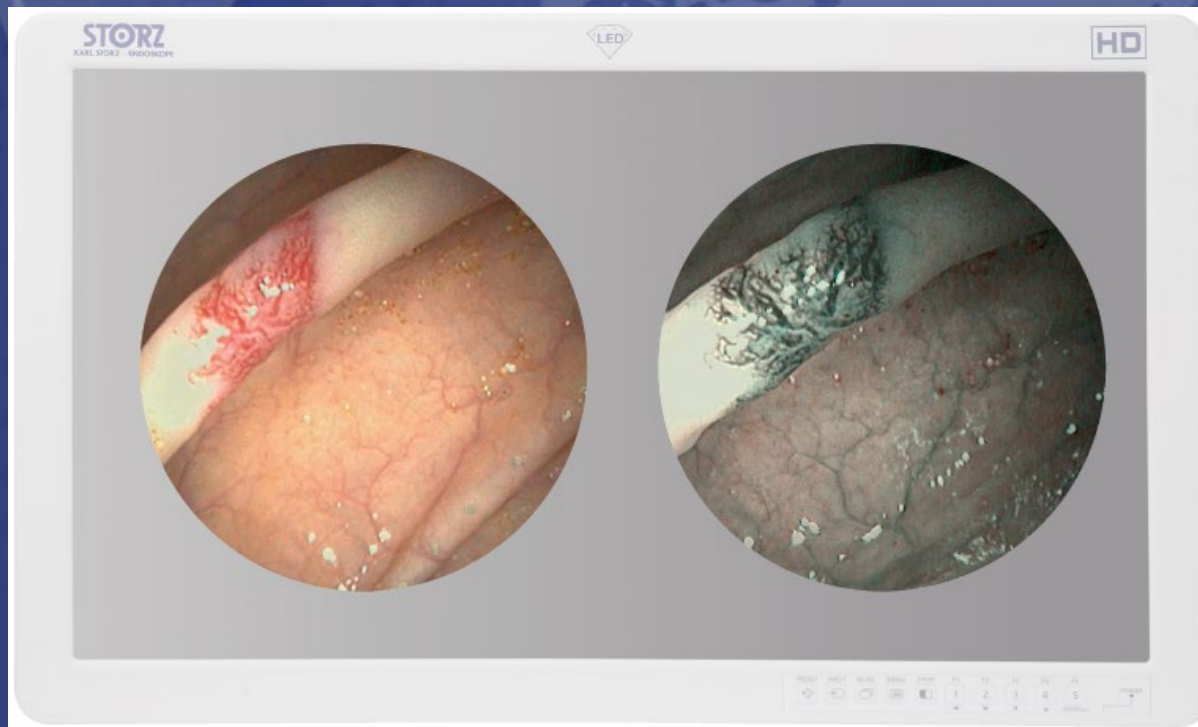




IMAGE 1 S TECHNOLOGIES

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SPECTRA B - spectral filtering of the red hue
resulting in structures, such as **blood vessels in
mucosa**





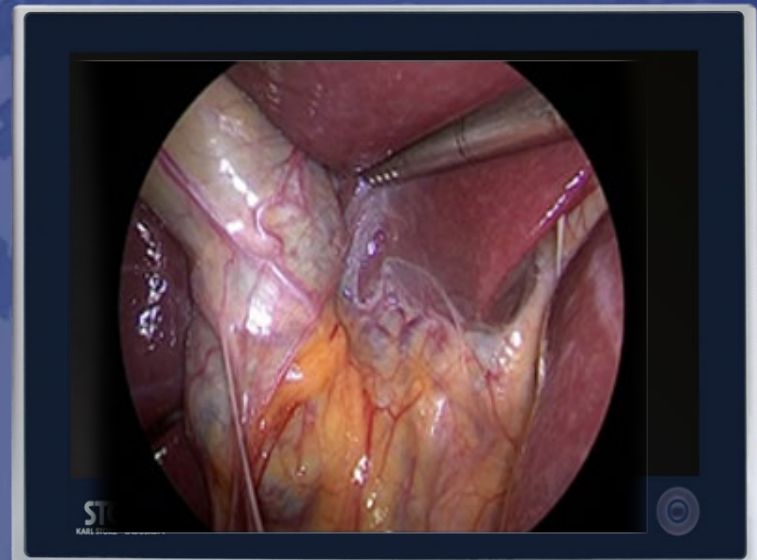
FLORESCENCE IMAGING

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Filter 1

Filter 2



FLORESCENCE

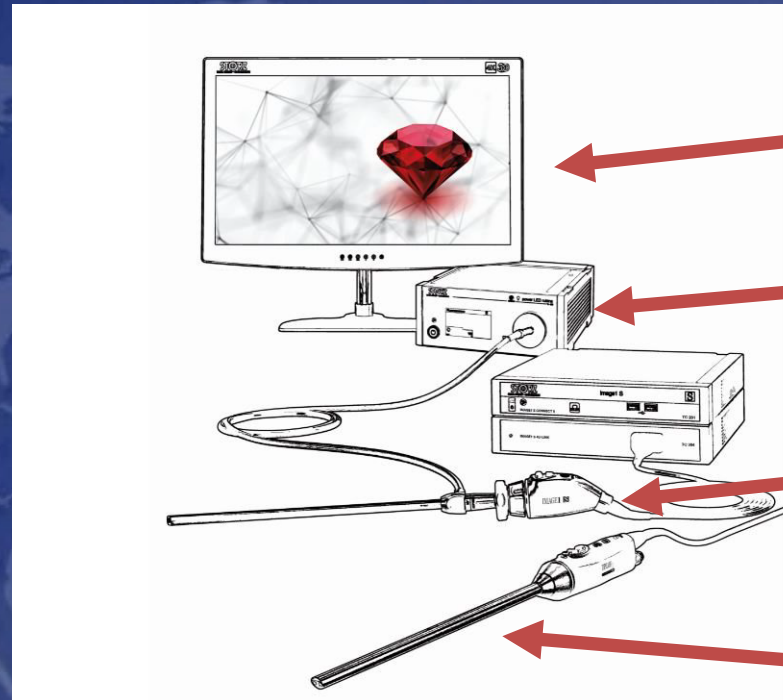
TISSUE



KARL STORZ ICG- 4K SYSTEM

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IMAGE1 S
camera system



4K 3D monitor

LED ICG
light source

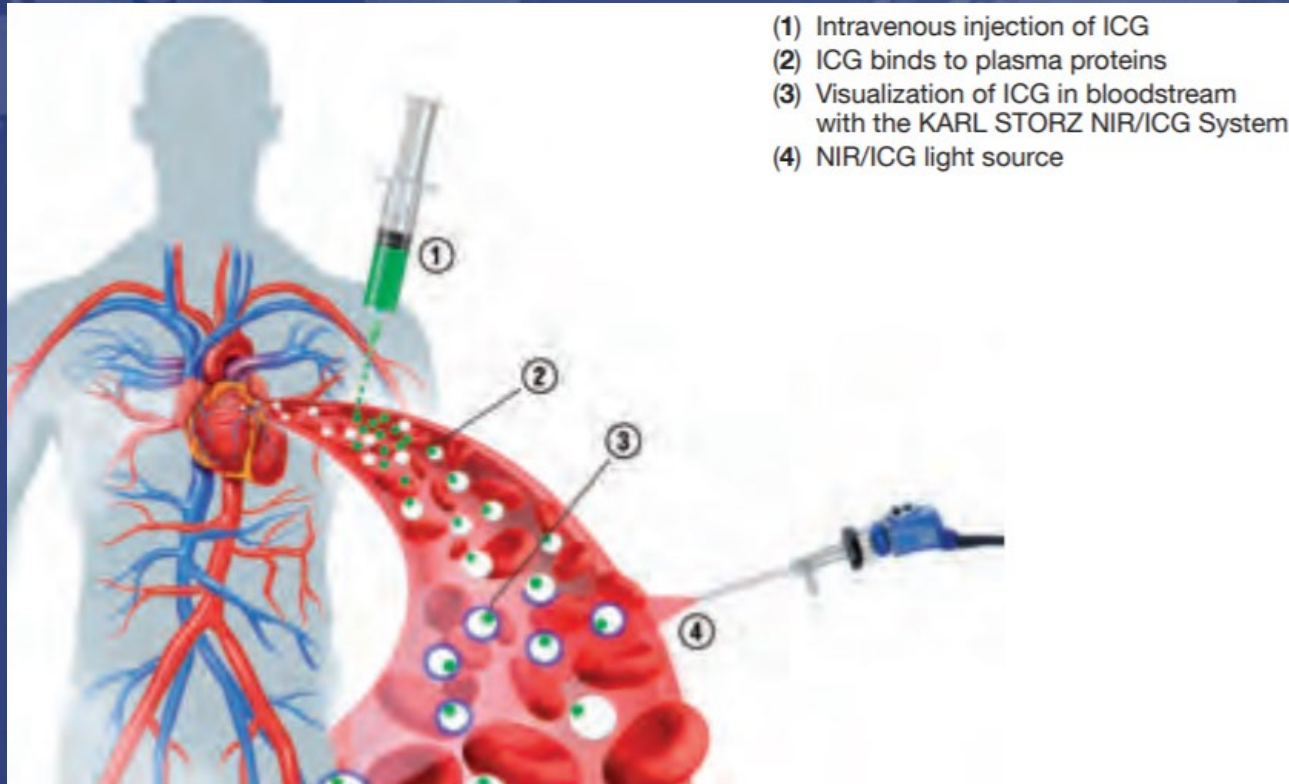
ICG-telescope
& camera head

4K 3D ICG
camera head



Schematic drawing showing intravenous administration of ICG

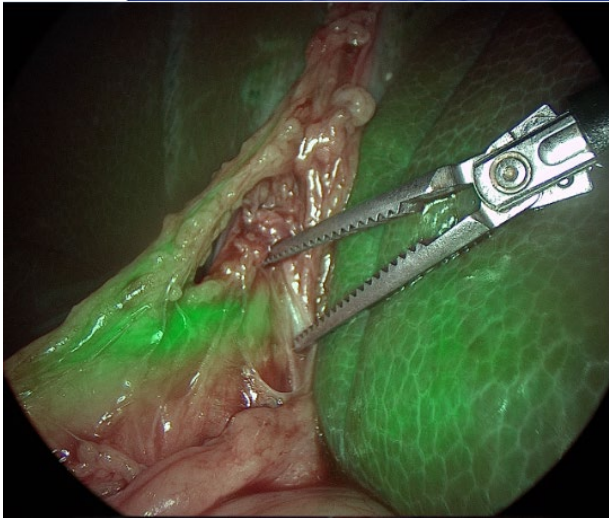
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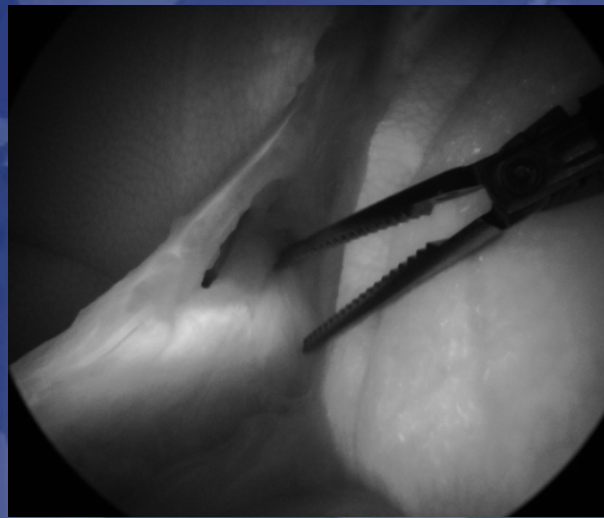


Main Features Imaging Modes

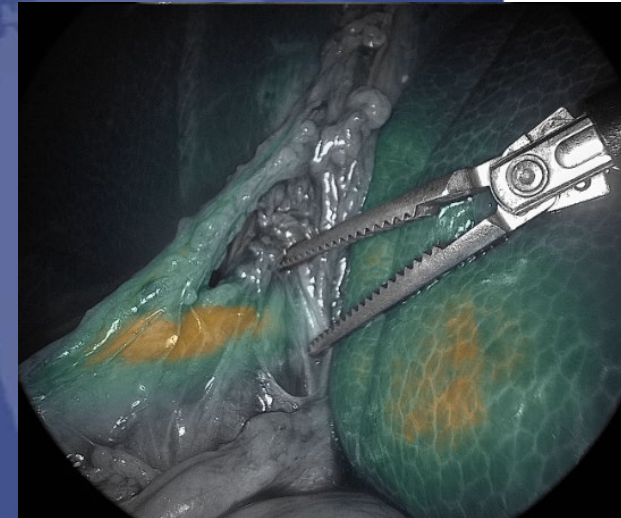
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Overlay



Monochromatic
Image

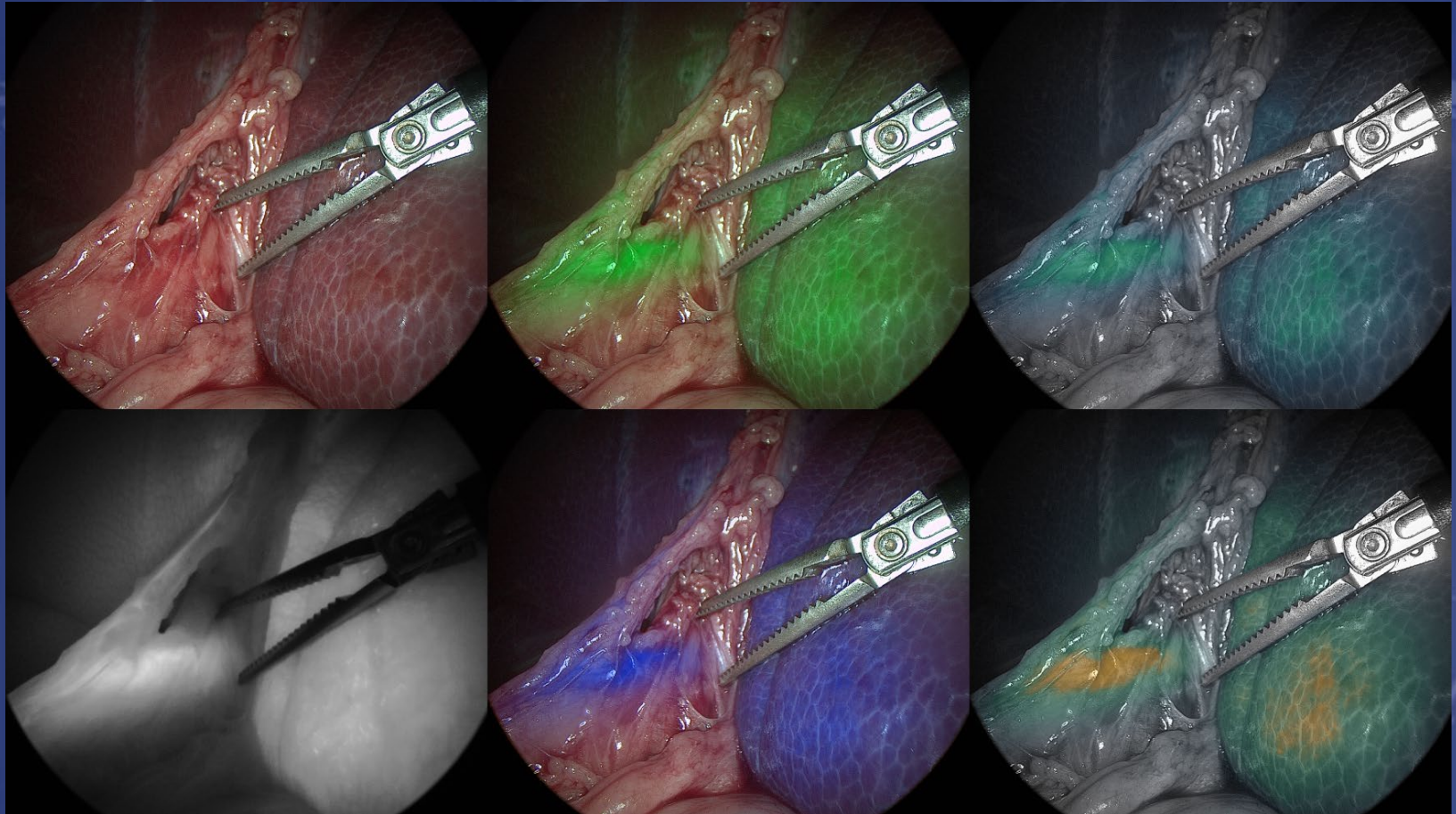


Intensity Map



Results

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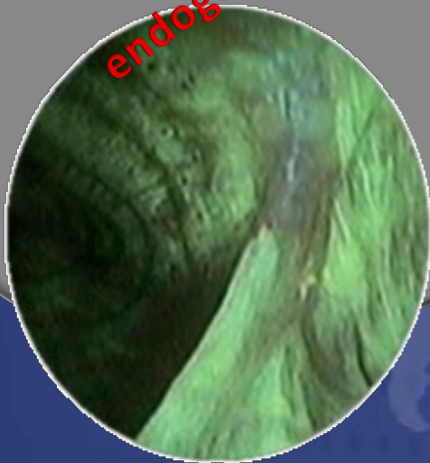


OUR BRANCHES

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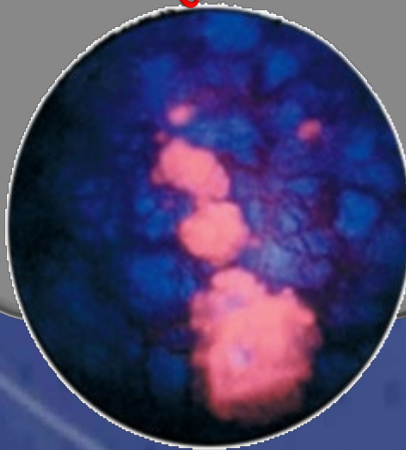
AF

endogenous



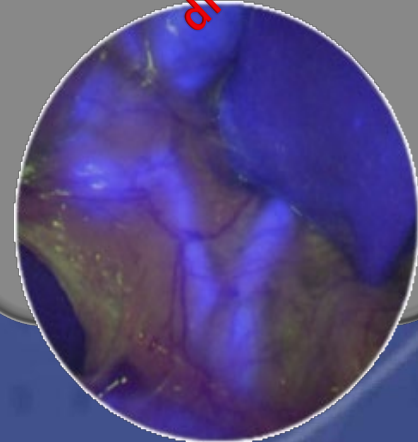
PDD

drug



**NIR
(ICG)**

drug





Innersight3D

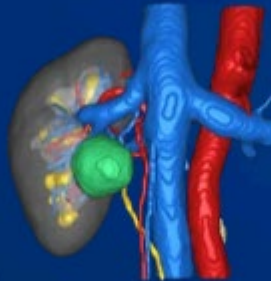
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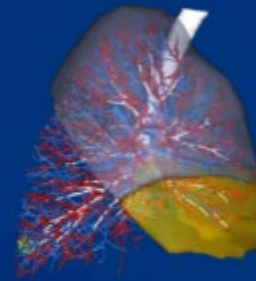
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Innersight3D Portfolio



Kidney



Lung



Colon



Liver



Prostate



THANK YOU FOR YOUR ATTENTION