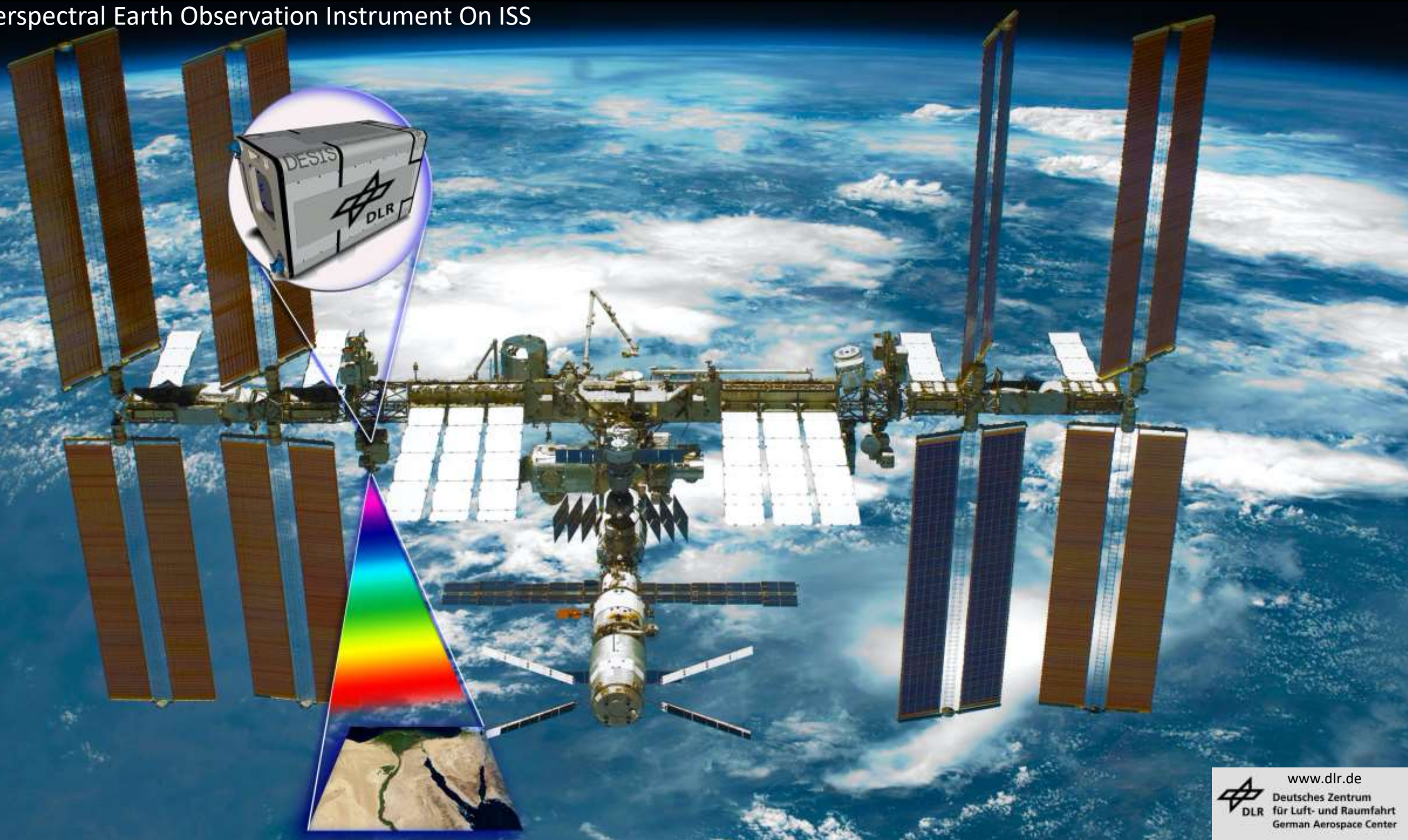
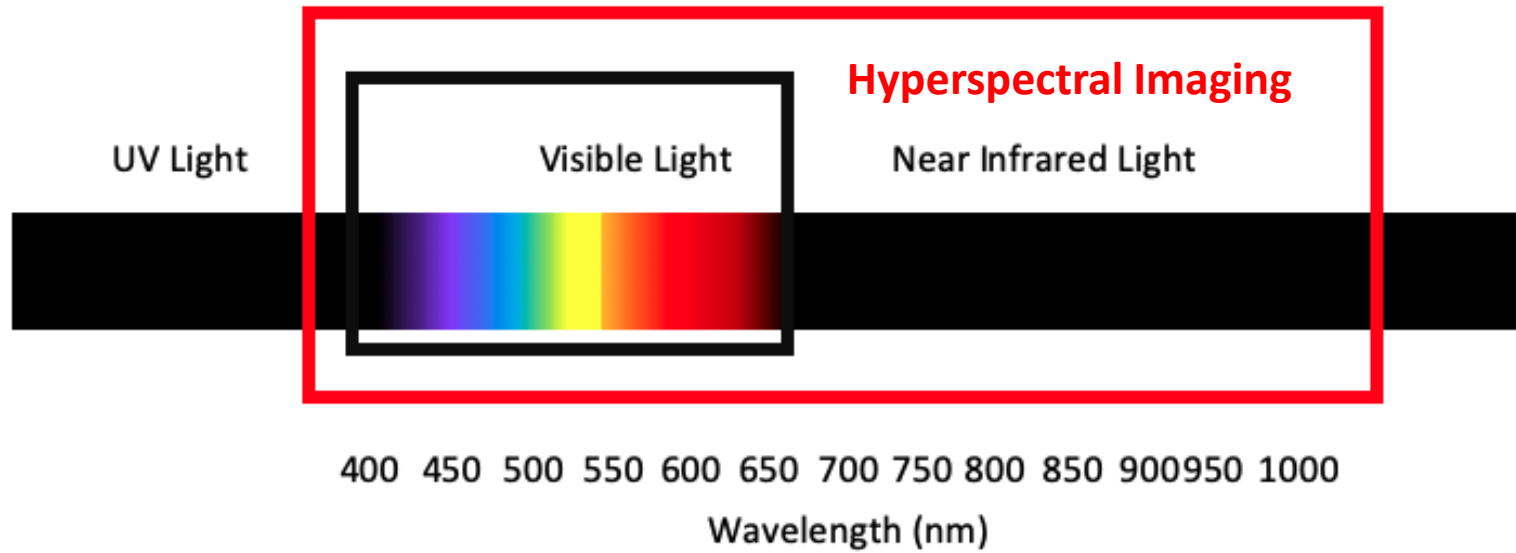


# Hyperspectral Earth Observation Instrument On ISS



# Electromagnetic Spectrum





TIVITA<sup>®</sup> Diaspective Vision  
Hyperspectral Camera Device



RGB and false color images for  
StO<sub>2</sub>, NIR, OHI and TWI

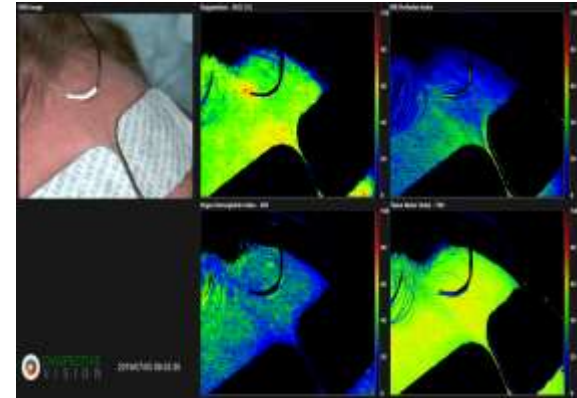
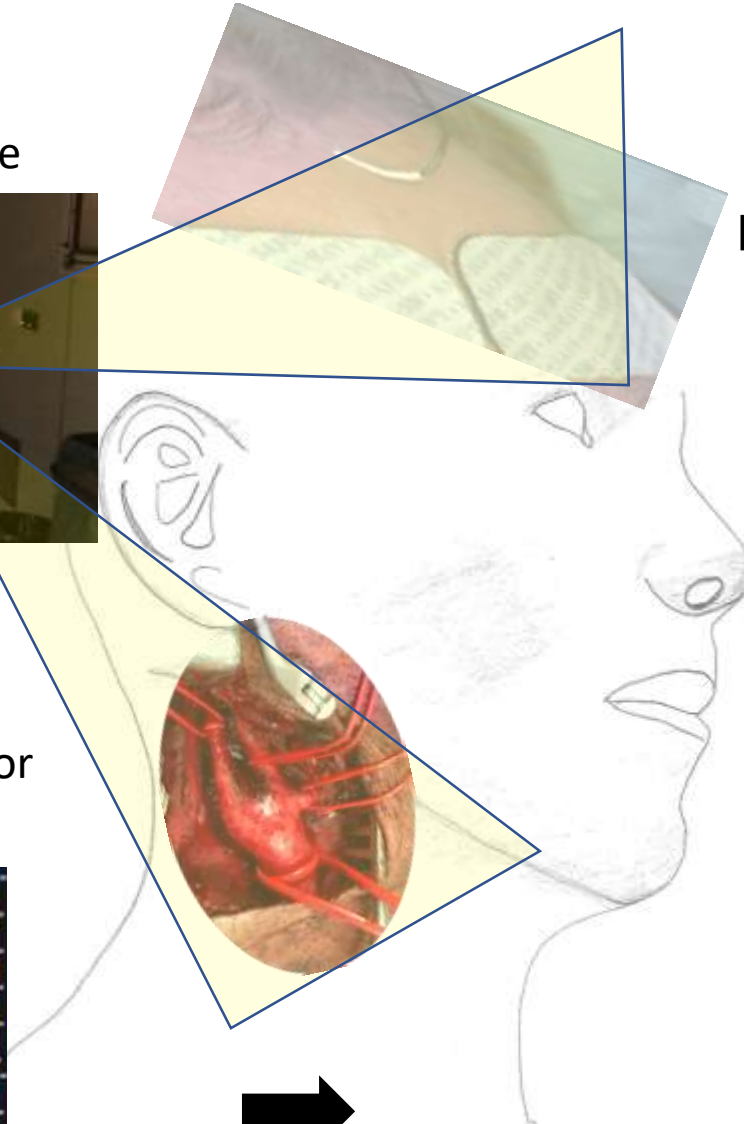
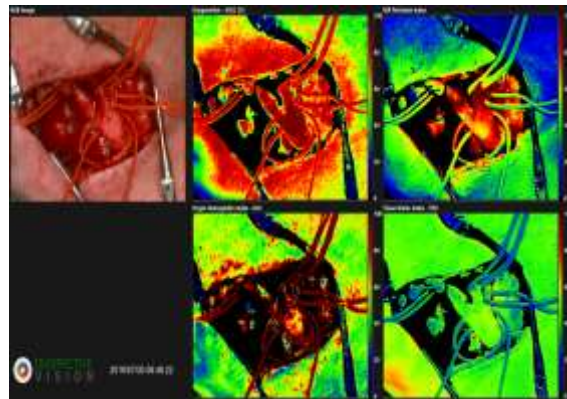
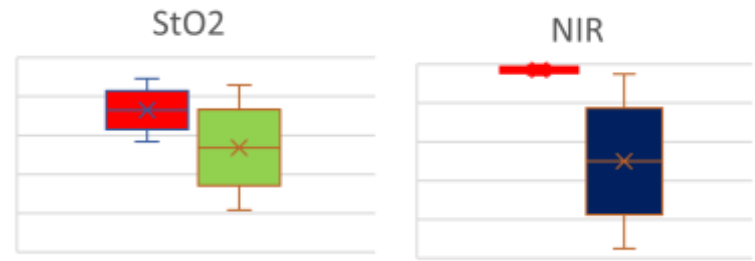


Image Analysis  
TIVITA Suite Tissue

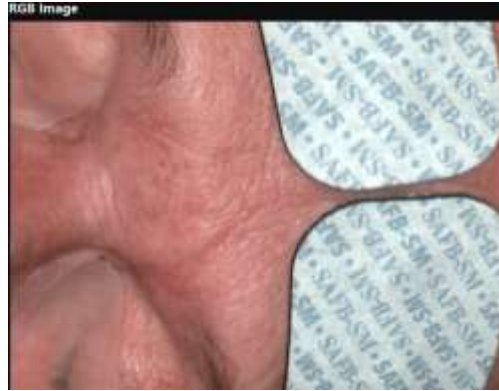
Quantitative Data on:  
StO<sub>2</sub>, NIR, OHI and TWI



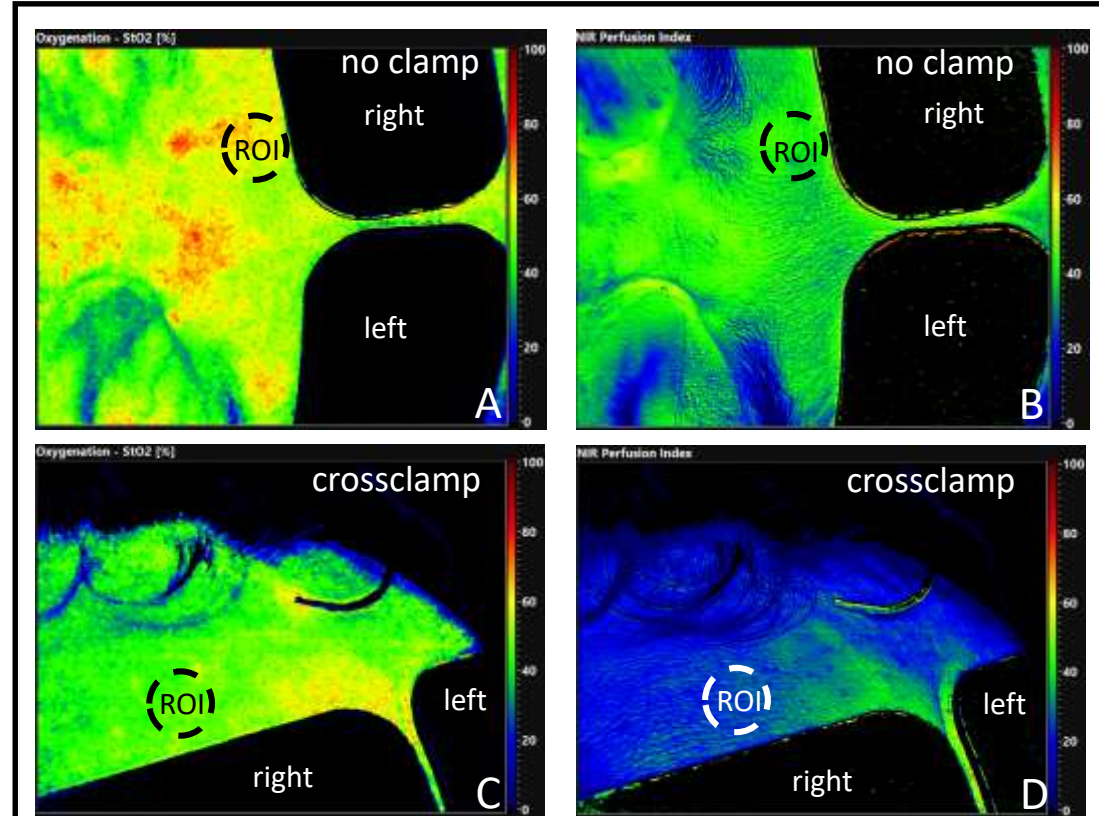
# Hyperspectral Images were Acquired Before, and During Crossclamping Round Markers Indicate Regions of Interest (ROI) for Subsequent Analysis

CEA Performed on Right Side

RGB Image before clamping

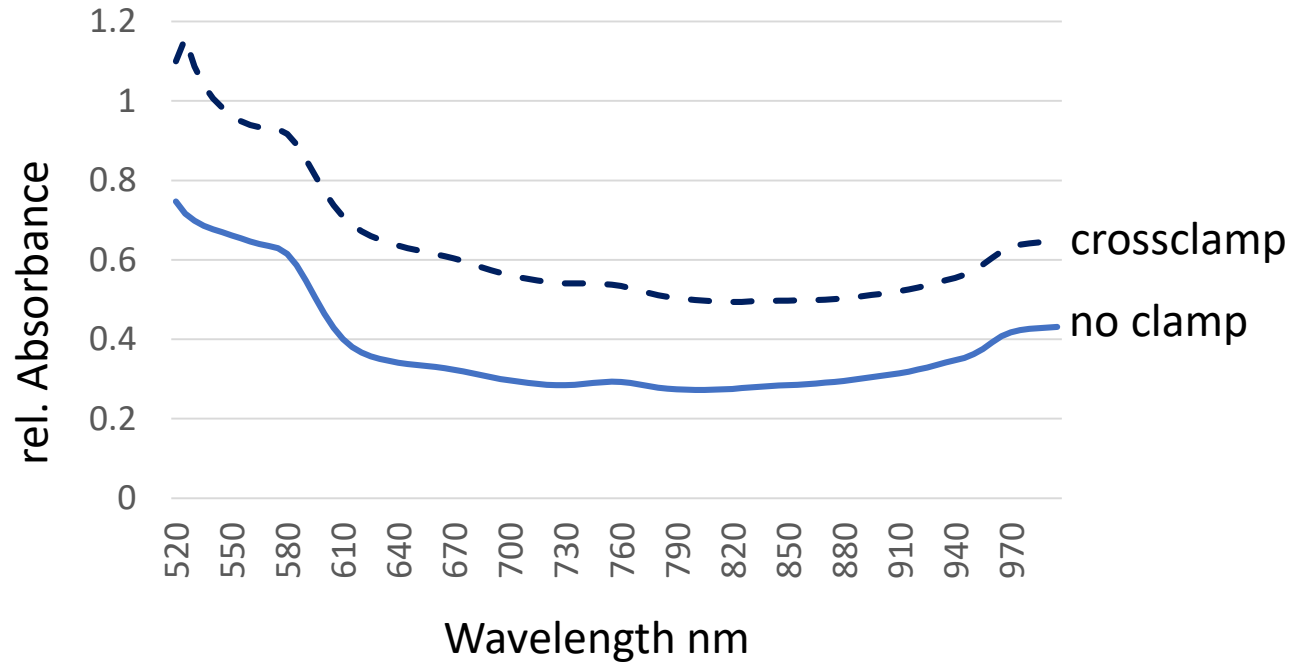


RGB Image during crossclamping

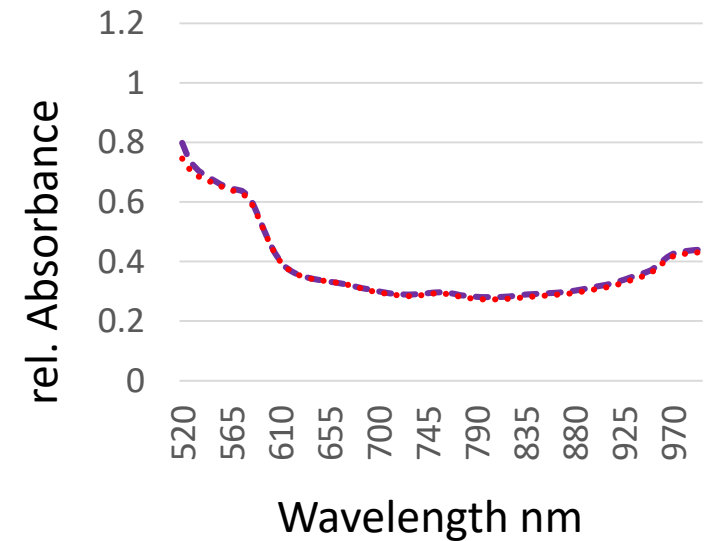


Patient with right CEA. False color hyperspectral images (HSI) for StO<sub>2</sub> (A) and NIR (B) before clamping and during crossclamping (C,D), respectively. Round markers represent the region of interest (ROI) for subsequent computational analysis of StO<sub>2</sub> and NIR. Images were acquired by TIVITA.

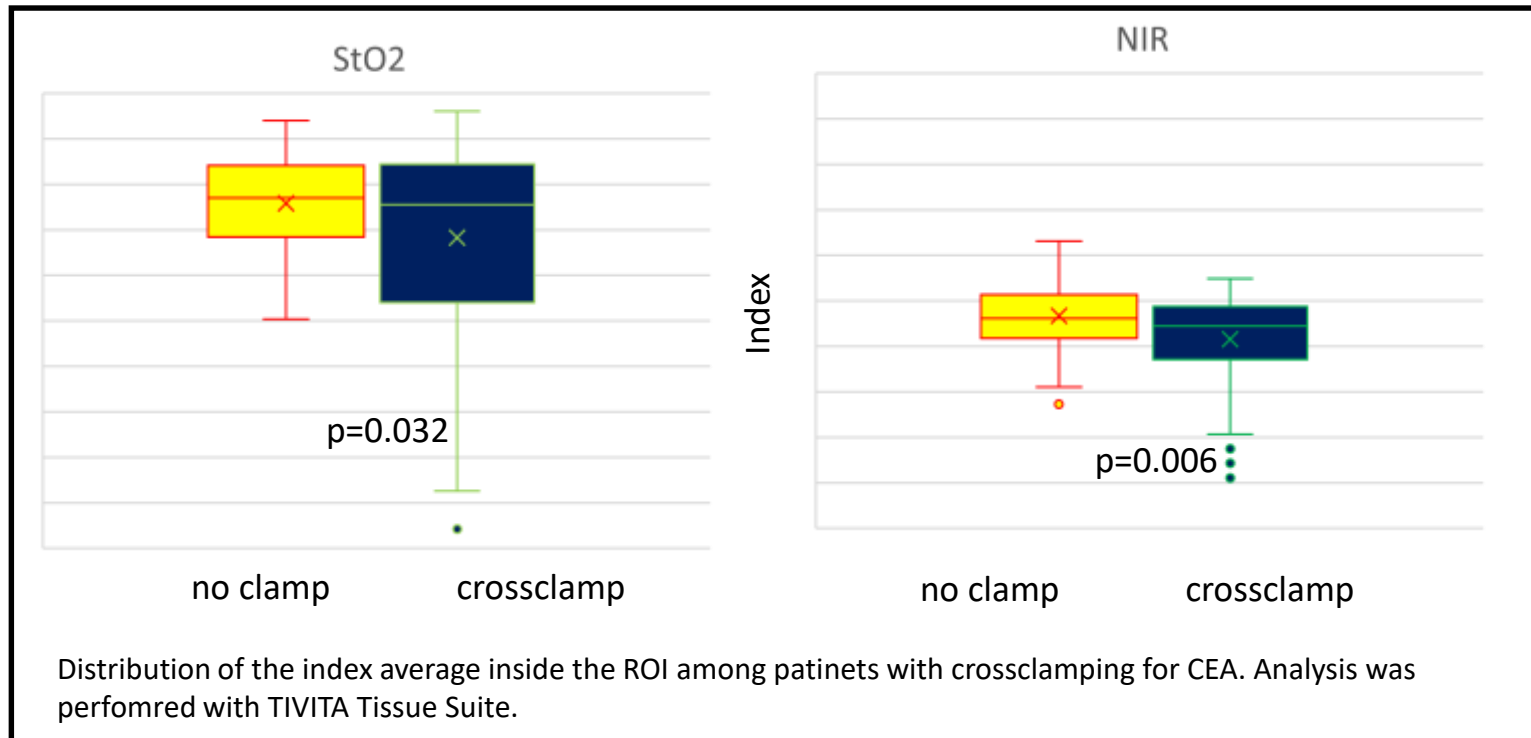
# Measured Tissue Spectra (Right Forehead) Before and During Crossclamping



# Measured Tissue Spectra of Left and Right Forehead Before Crossclamping



# Crossclamping During CEA Resulted in an Average 10% Decrease in Oxygenation (StO<sub>2</sub>) and 11% Decrease in Perfusion (NIR) in our cohort

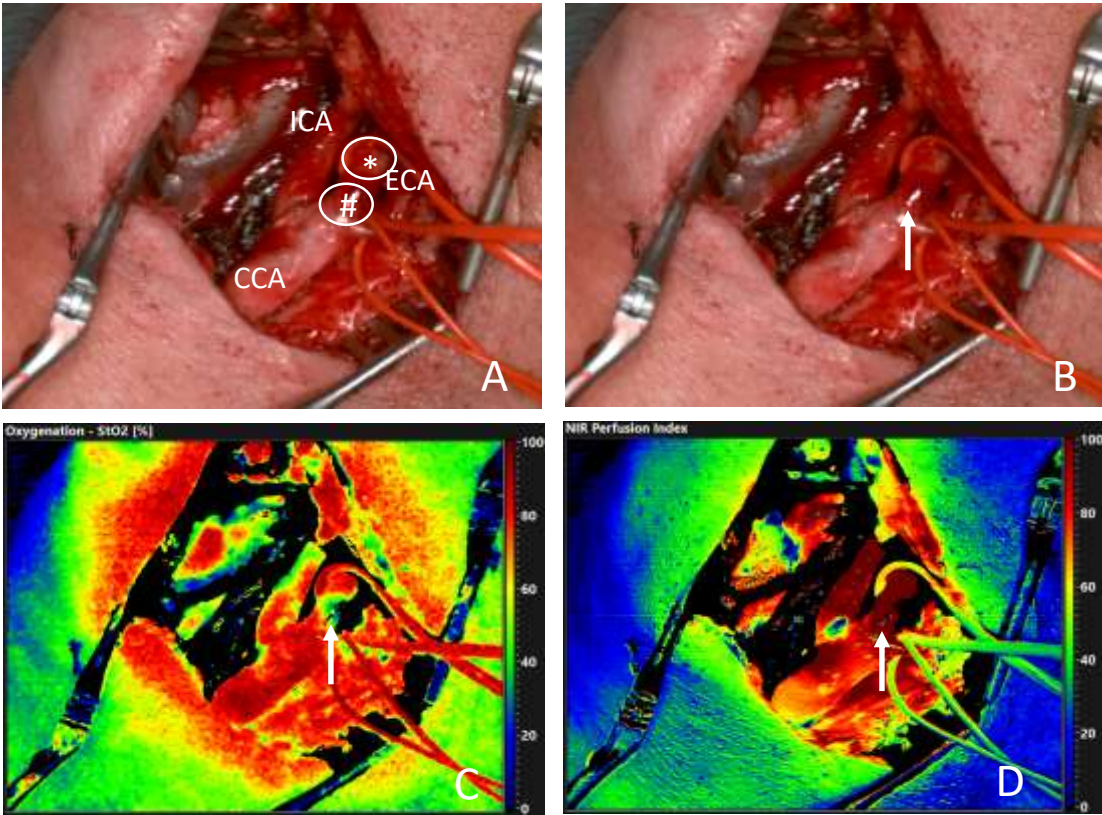


Patient	decrease StO <sub>2</sub>	decrease NIR	NIRS decrease rSo <sub>2</sub>
1	20%	43%	31%
2	40%	17%	32%
3	n.s.	n.s.	2%
4	n.s.	11%	6%
5	n.s.	n.s.	n.s.
6	11%	5%	10%
7	n.s.	n.s.	n.s.
8	25%	17%	21%
9	n.s.	n.s.	n.s.
10	27%	22%	17%

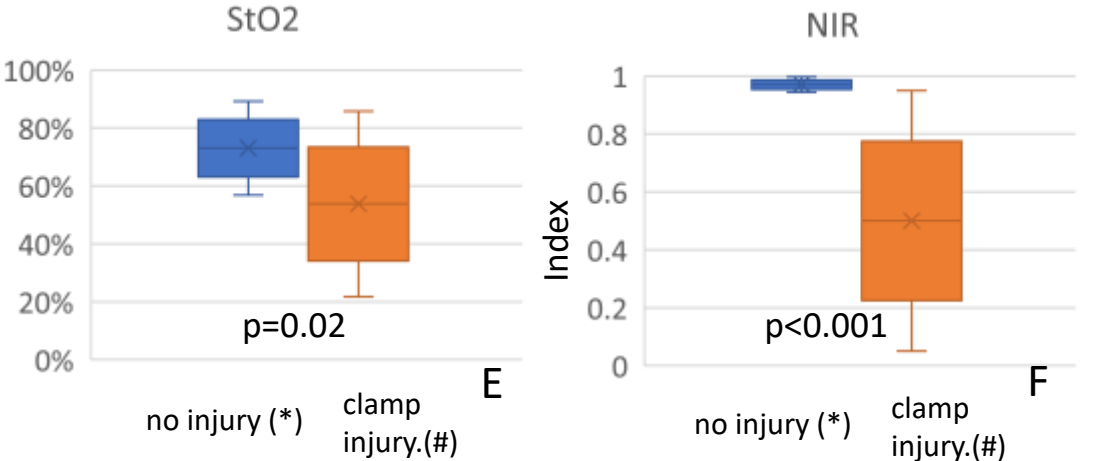
Correlation HSI and NIRS



# Hyperspectral Imaging is a Useful Tool to Visualize and Quantify Collateral Damage of Vessel Wall Adventitia Caused by Vascular Clamps During CEA.



Intraoperative images during CEA surgery, acquired by the TIVITA<sup>®</sup> Hyperspectral Camera device. The RGB image (A) of the operation situs, displays the common carotid artery (CCA) and carotid bifurcation with the internal carotid artery (ICA) and external carotid artery (ECA). Region of interest (ROI) markers (white circles) were placed on the on the area where vascular clamps were applied (#) and on the unaffected vessel wall (\*) of the ECA for control. The white arrow in B, as an example, indicates the clamp injury on the ECA. False color images for (StO<sub>2</sub>) tissue oxygenation (C) and (NIR) near infrared tissue perfusion (D) display inhomogeneous vessel wall oxygenation and perfusion at the area of suspect clamp injury



Thank you!

[robert.sucher@medizin.uni-leipzig.de](mailto:robert.sucher@medizin.uni-leipzig.de)



# Hyperspectral Earth Observation Instrument On ISS

