

# LASER NEUROENDOSCOPE FOR MULTIMODAL TUMOR THERAPY - MULTILAS

## Motivation

Endoscopic removal of brain tumors by means of keyhole surgery would reduce the »patient trauma«. With this objective in mind, the Fraunhofer ILT and partners in industrial and research fields have designed an endoscope for the multimodal local treatment of intracranial tumors. By employing five different radiation sources in a single endoscope, brain tumors can be ablated accurately, blood vessels can be cauterized and micro-metastases can be selectively destroyed by means of photodynamic therapy (PDT).

## Description

MultiLas operates on the basis of an endoscope with a micro-optical channel 2.8 mm in diameter which guides the therapeutic and diagnostic laser beams into the surgical cavity. The measuring radiation generated in the surgical cavity to monitor the therapy process is gathered by the same micro-optical channel and mapped onto a detection system. Tumors with a maximum diameter of 50 mm are ablated from the center to the perimeter with a picosecond laser. The ablated fragments of tissue are removed from the surgical cavity by a rinsing and suction system integrated in MultiLas. Prior to ablation, a continuous laser beam source cauterizes the blood

vessels supplying the tumor by means of laser coagulation to preclude internal hemorrhaging. To ensure that endoscopic tumor therapy is safe and precise, it is essential that both ablation and coagulation be reliably monitored inline. This is done using fluorescence diagnostics to distinguish between cancerous and healthy tissue, and optical coherence tomography (OCT) to detect and measure blood vessels.

## Applications

The MultiLas endoscope can be deployed for removal of deep-seated tumors in the brain which can be detected by photodynamic diagnosis.

## Technical Data

Laser Power	25 W
Repetition Rate	20 kHz
Pulse Duration	25 ps
Diameter Endoscope Tip	5.5 mm
Ablation Diameter	≤ 5 cm
Ablation Depth	≤ 12 cm

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1 Laser Neuroendoscope for Multimodal Tumor Therapy.

2 Tip of the Laser Neuroendoscope.