

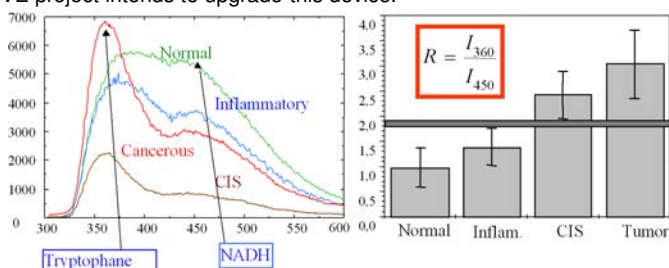
## Early cancers detection device (UVE EM98)



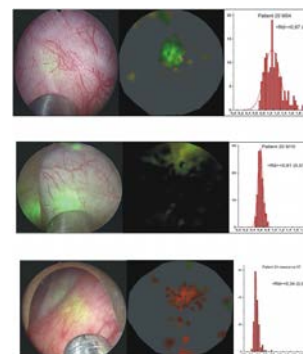
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The UVE EM98 consortium is aiming at developing an electro-optical device dedicated to cancer detection at early stages. Cancerous tissues contain NADH and Tryptophane molecules that, once illuminated under UV light (wavelength: 308 nm), react by autofluorescence in the UV and in the blue slots. The ratio between the peak responses at 370 nm and at 450 nm allows for a classification, indicating whether or not the zone is cancerous and must be cured. The University of Villetaneuse has already carried successful trials with a first demonstrator. UVE project intends to upgrade this device.

Endogenous fluorophore	$\lambda_{excitation} [nm]$	$\lambda_{emission} [nm]$
<b>Tryptophane</b> Responsible for 90% of the protein fluorescence	220 to 310	350
<b>NADH</b> Involved in the respiratory chain	260 to 351	440-460
<b>FAD, flavines</b> Involved in the respiratory chain	375 to 450	535
+ Collagène, elastin, porphyrins		

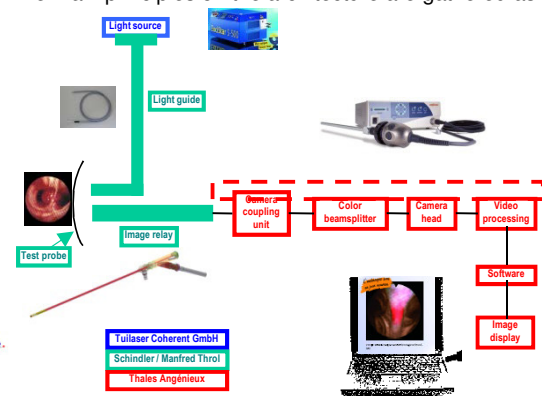


A 308 nm wavelength for the excitation has finally been selected. The ratio between the fluorescence signals in the UV band and the blue slot yields a clear and reliable information, stating whether or not the zone may be regarded as a potential threat.



The hopes offered by such a solution have been demonstrated through a set of tests, conducted by the Tenon Hospital and the Villetaneuse University alongside, on 23 patients.

The rate of success has reached up a level of 93%. The main principles of the architecture are gathered as follows:



The stakes were there to propose a design which might comply with an acceptable signal to noise ratio. All the parameters that could into play (transmissions, resolutions...) have been optimized.

The main choices consist in singling out a multi-spectral fiber bundle, both dedicated to the visible and diagnosis channels, such a solution is free from any parallax effect. This requires special fiber sets that both exhibit no fluorescence and may build a visible image with enough resolution (100x100) whilst transmitting both UV and blue lights. The chore module calls for a beamsplitter architecture with dedicated optical components. Two cameras are foreseen, devoted to the direct viewing channel and to the diagnosis path.

Binning processes for the diagnosis channel are coming into play to improve the signal to noise ratio.

Now, we are in the integration stage.

Further steps will aim at finding out multi-spectral fibers whose bending radius could suit bronchoscope or lungs diseases applications whilst meeting a sufficient level of flexibility.

A special care has been taken to corner the further device price within a reasonable frame, accordingly to the market survey which has been carried out: the endoscope has been already been developed by Schindler Company and tested.

An excimer laser source has been provided by Tuilaser Coherent, too.

