

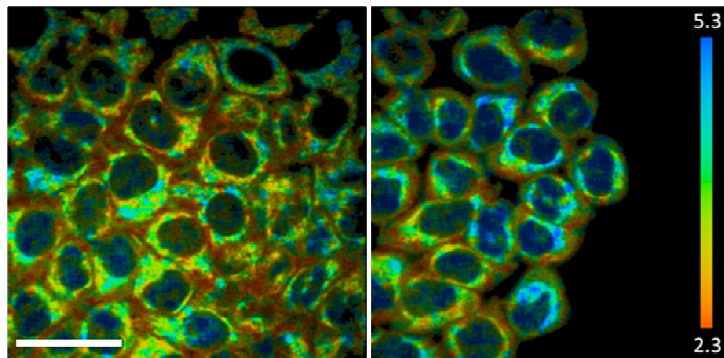
# Monitoring Cellular Metabolism with Fluorescence Lifetime of Reduced Nicotinamide Adenine Dinucleotide

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As a minimum invasive technique, autofluorescence spectroscopy has found its application in the characterization of tissues and diagnosis of diseases. The major distinguishing power arises from the change of the nano-environment, quantities and functional/conformational states of the endogenous fluorophores – mainly represented with aromatic aminoacids Trp, Tyr, and Phe, vitamin derivatives retinol, riboflavin and reduced nicotinamide adenine dinucleotide (NADH), as well as pyridolamine crosslinks in elastin and some collagens.

Formulation of the oxidative phosphorylation and its' first observation by means of fluorescence spectroscopy in the 60s of the previous century led to the acceptance of bioenergetics as a new field of studies. As such, fluorescence lifetime imaging microscopy (FLIM) has gained popularity as a sensitive technique to monitor the functional/conformational states of nicotinamide adenine dinucleotide reduced (NADH) – one of the main compounds of the oxidative phosphorylation. We hereby present a brief review on the development and current application of cellular metabolism observation via NADH FLIM, illustrating it with the examples of both physiological (cell density, apoptosis, necrosis) and pathological states (inhibition of the electron transfer chain).



**Figure 1.** NADH free/bound ratio mapping at the center and at the border of a HeLa cell colony in a culture. The images, color coded with the free/bound ratio, reveals different metabolic conditions at the edge and in the middle of a colony. The scale bar is 100  $\mu\text{m}$ .

## References:

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