Aushang

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Systematic evaluation of the effect of different fixation methods on multiphoton autofluorescence in colon and muscle tissue

Introduction: Label-free multiphoton microscopy (MPM) is a powerful tool for bio-medical studies *ex vivo* as well as *in vivo*. MPM can be used for label-free imaging of 3-dimensional tissue structure based on molecular contrast from natural autofluorescence (AF) and second harmonic generation (SHG). However, in order to evaluate the intensity of native AF, it is essential to examine fresh tissue samples that are not older than a few hours, in order to eliminate effects such as cell death or tissue decay. This constraint can be a practical limitation for many studies, especially when samples cannot be prepared in the same laboratory and need to be shipped or transported between different laboratories. There are several fixation methods available in order to preserve native tissue samples for long time. The most commonly used fixations are based on Paraformaldehyde (PFA), shock-freezing Methylcanoy or on Glutaraldehyde. Although the general tissue morphology is usually not altered upon correct use of such fixation, the effect on the non-linear AF used for multiphoton microscopy is not yet fully understood.

Task: It is the aim of this project to systematically evaluate the intensity of natural AF from two different tissue types before and after fixation. Thereby, a clear conclusion on the effect of each fixation methods on the signal intensity of native AF signals should be deduced. The student will learn how to correctly apply tissue fixation and how to perform multiphoton microscopy. The intended study should be carefully designed in order to compare AF signature of skeletal muscle and colon tissues before and after fixation.

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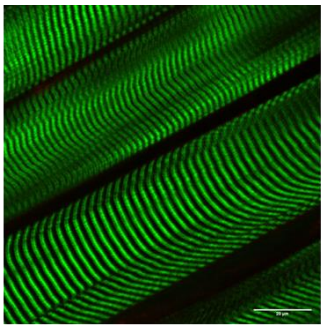
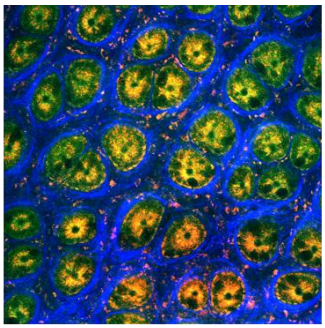
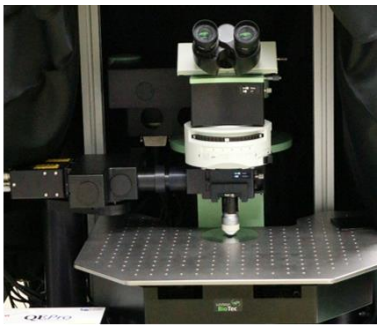


Skeletal muscle/ *Soleus*
SHG from Myosin-II



Colon
SHG from Collagen-I
AF from NADH
AF from FAD



2-photon microscope