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# Potential of label-free techniques with AFM measurements – a user story

Summer Workshop on BioAFM Microscopy 2023

September 6<sup>th</sup> 2023, CEITEC, Brno, CR

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Daniel Hadraba

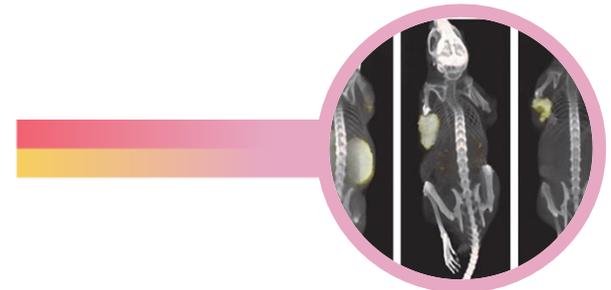
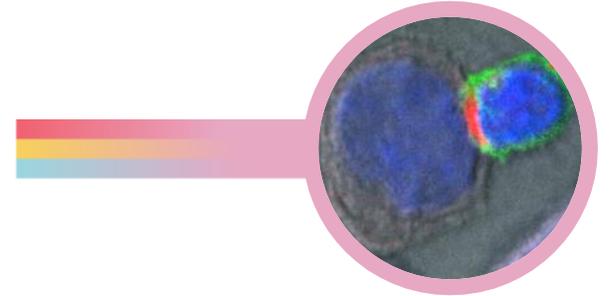
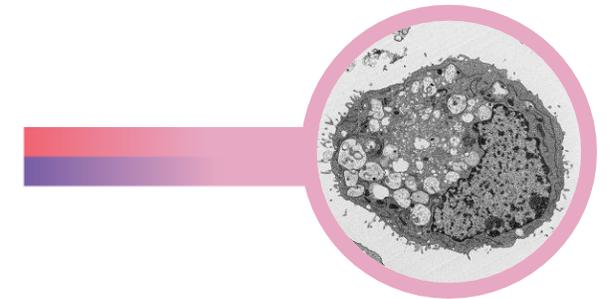
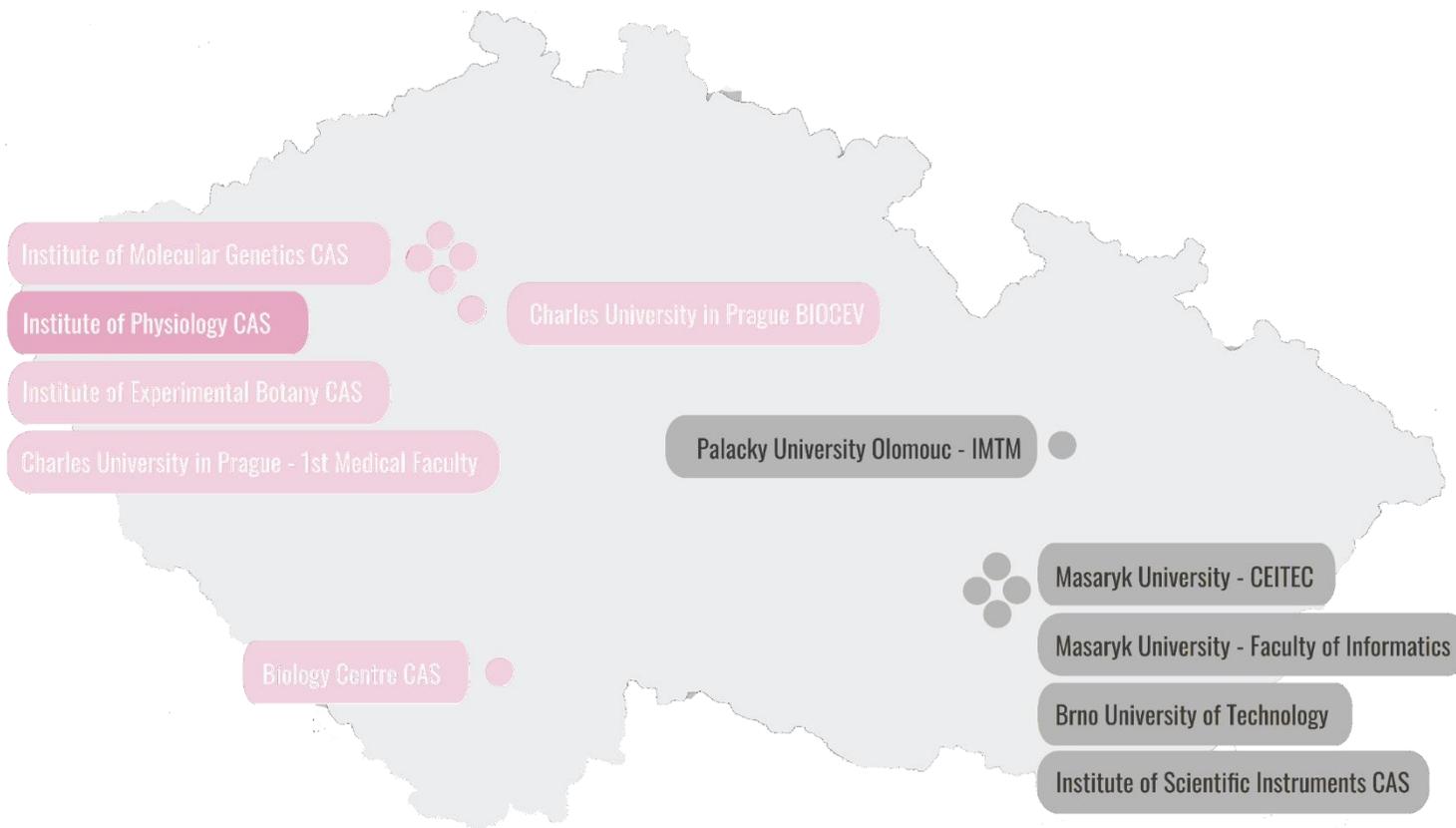
Biomathematics, IPHYS, CAS

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+420 776 441 811

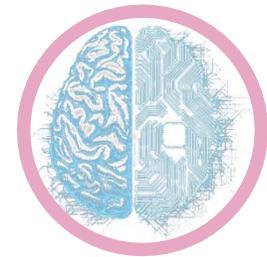
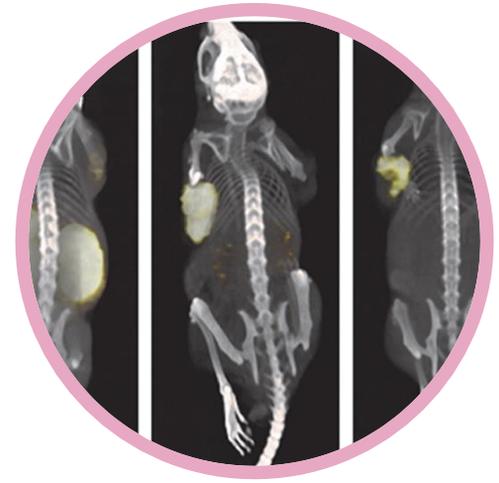
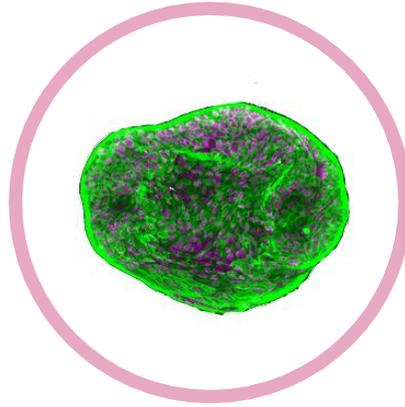
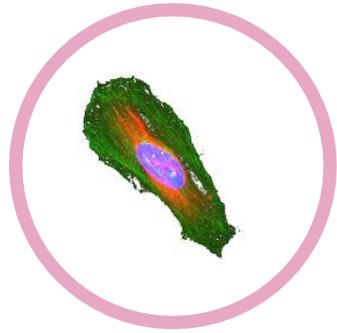


# Czech-BioImaging infrastructure



# specimen

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# specimen

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Clubfoot



Relapsed tissue



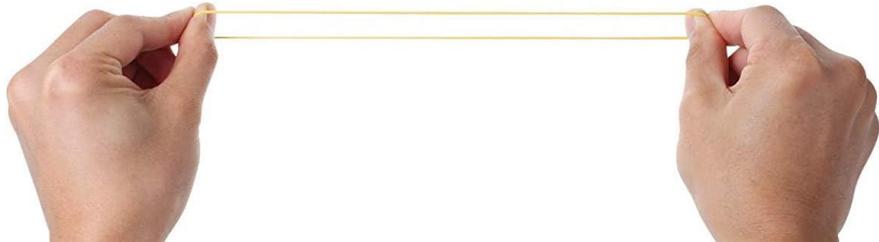
FAKULTA  
TĚLESNÉ VÝCHOVY  
A SPORTU  
Univerzita Karlova



# specimen

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Why?



# specimen

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Clubfoot



Relapsed tissue



# specimen

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Clubfoot



Relapsed tissue



# specimen

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Clubfoot



Relapsed tissue



# methods

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## Sample preparation



No fixative  
No staining  
No roughness  
No other tissue

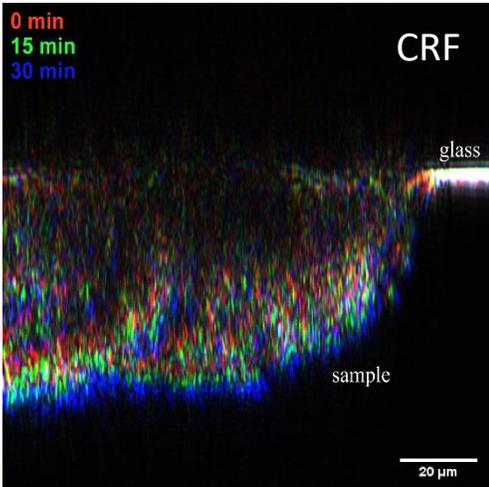
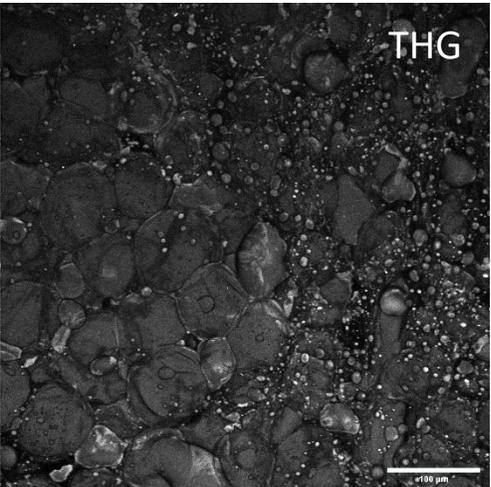
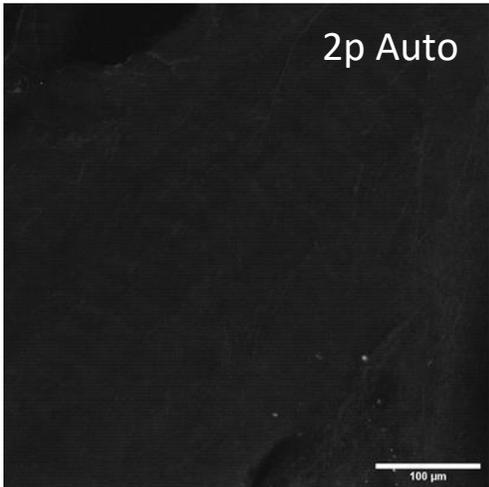
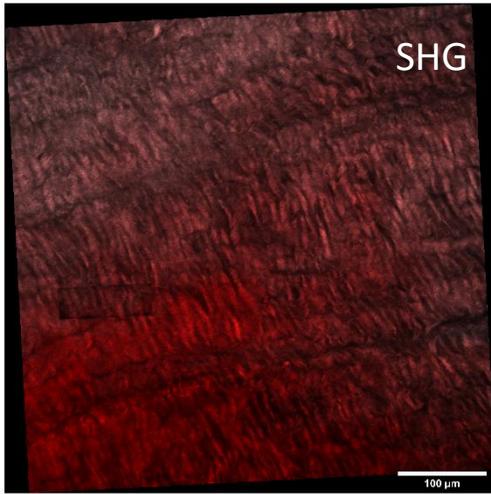


# methods

## Sample preparation



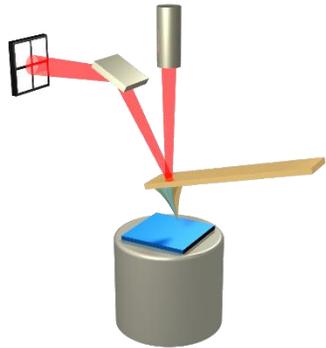
No fixative  
No staining  
No roughness  
No other tissue



# methods

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AFM measurement

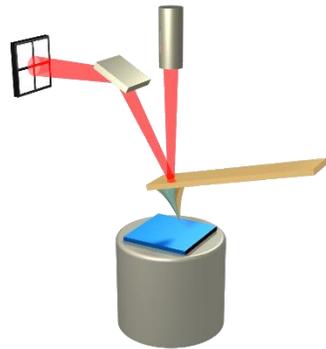


Where?

# methods

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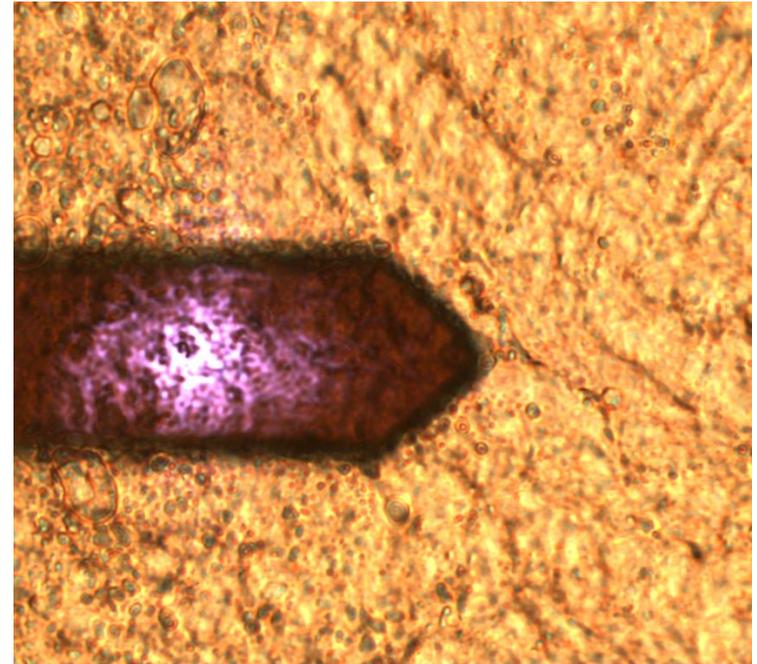
AFM measurement



Where?



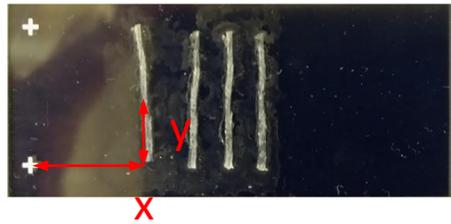
Bright field  
microscopy



# methods

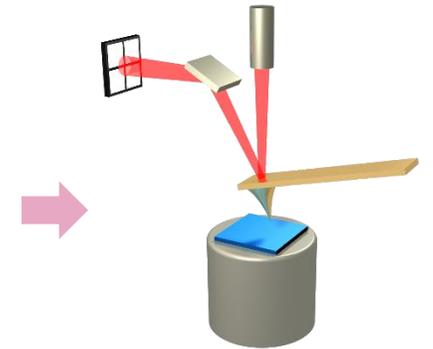
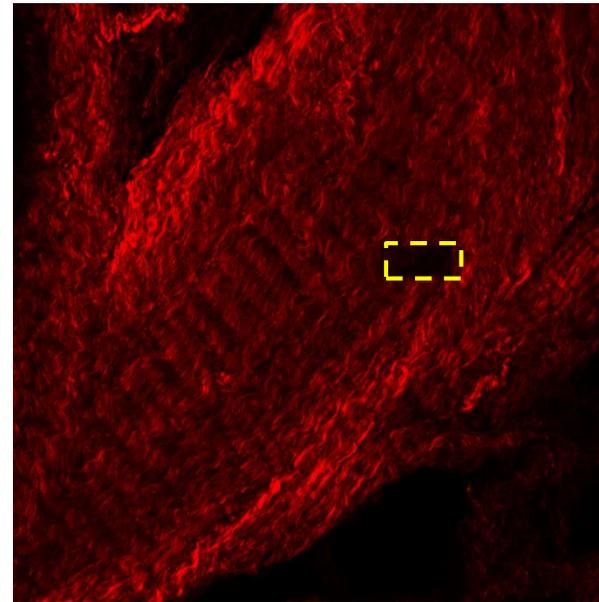
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## AFM measurement



Where? →

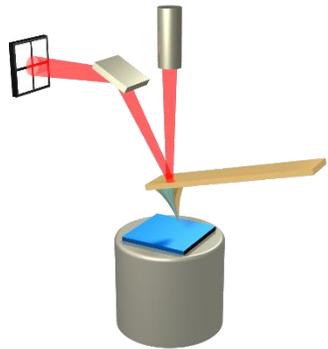
SGH  
+  
laser  
ablation



# methods

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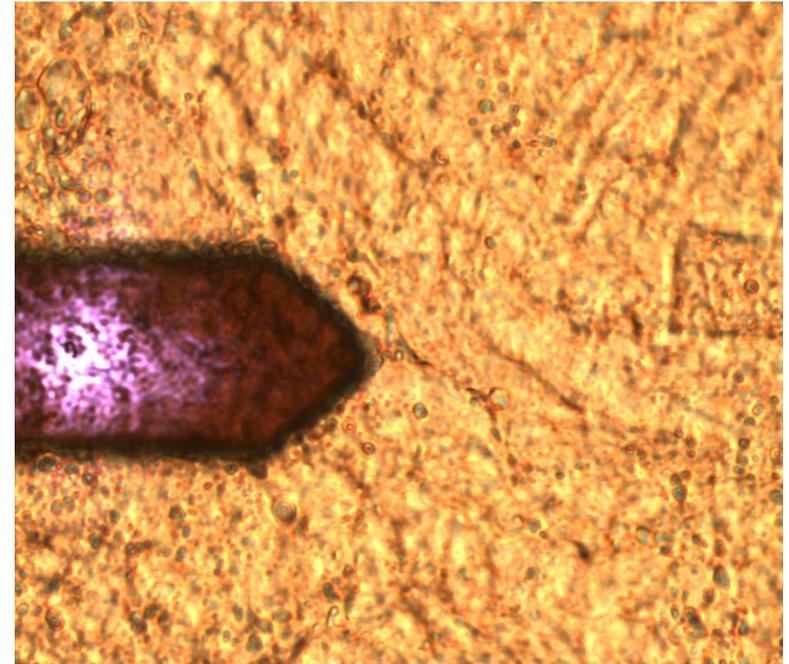
AFM measurement



Where?



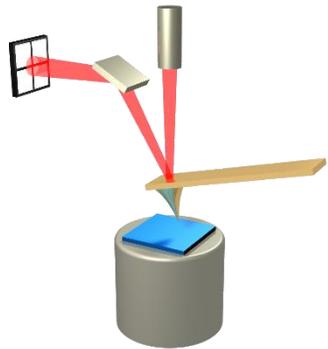
Bright field  
microscopy



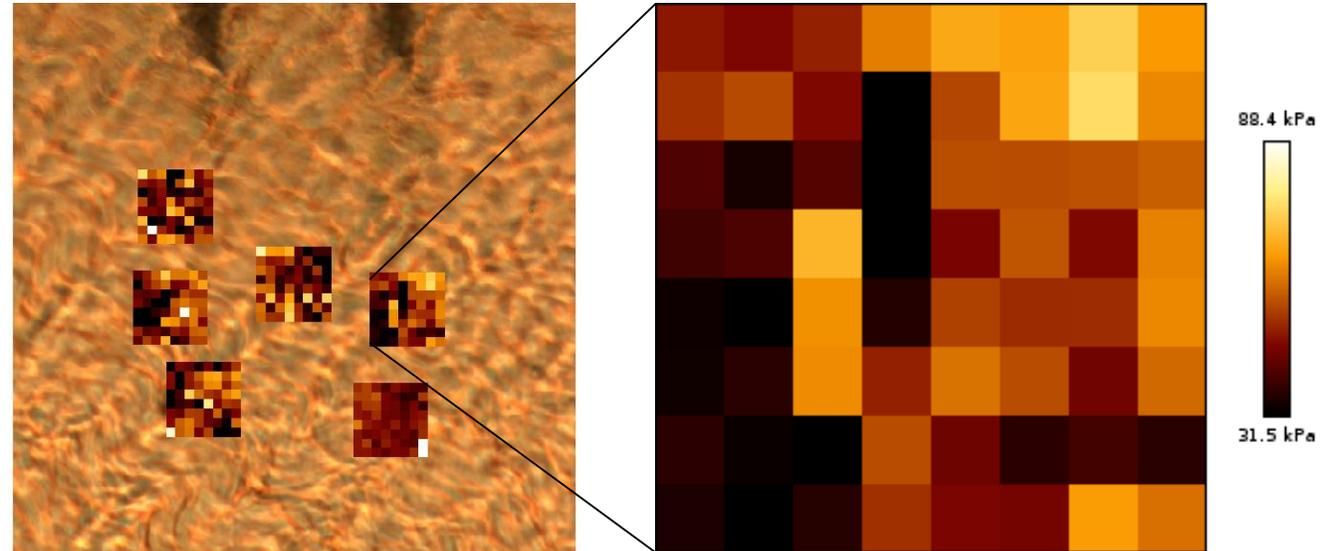
# methods

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## AFM measurement

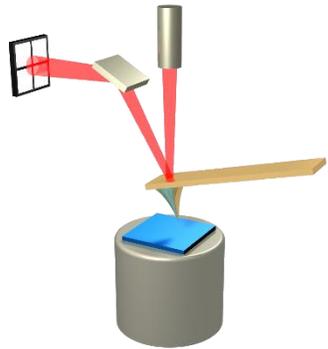


Young's  
modulus



# methods

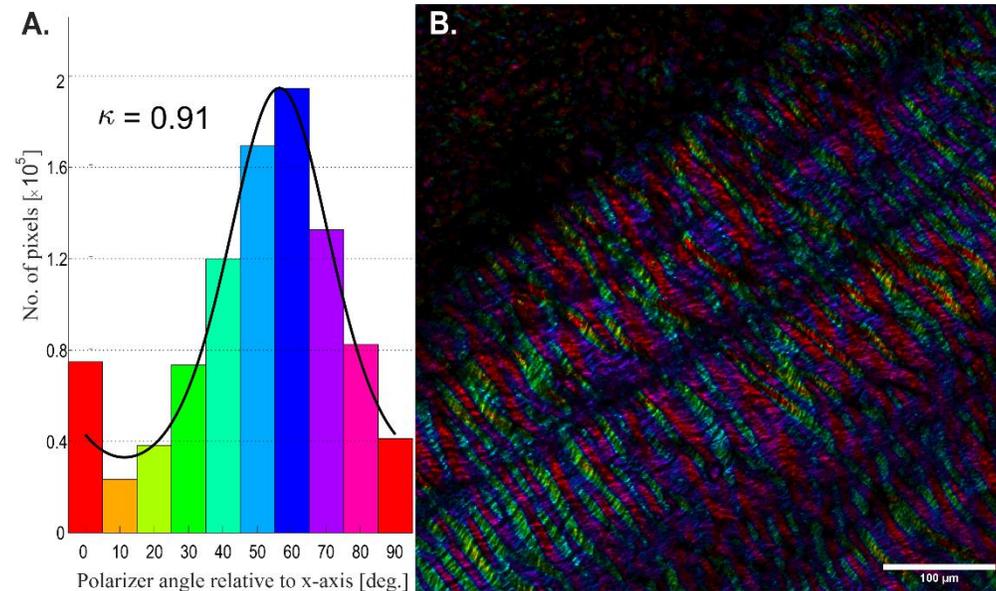
AFM measurement



+

Polarized  
light  
microscopy

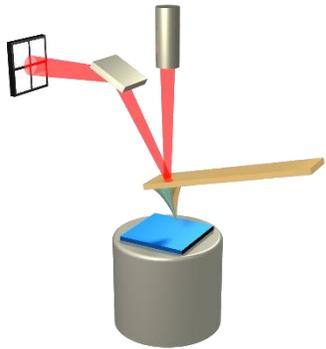
Collagen crimp pattern



# methods

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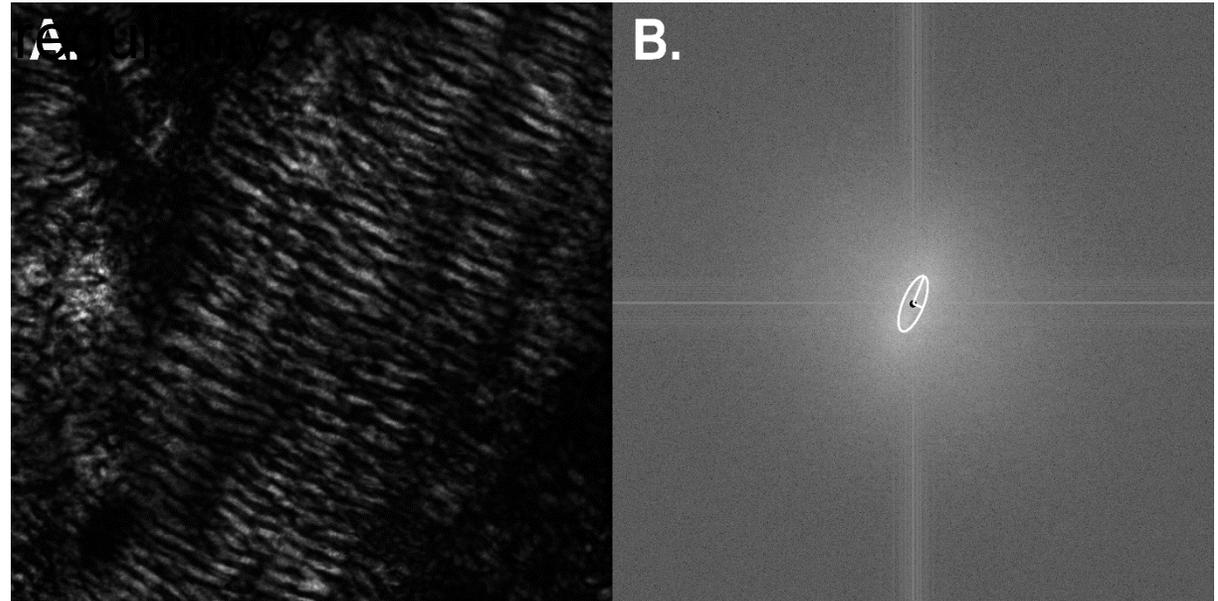
AFM measurement



+

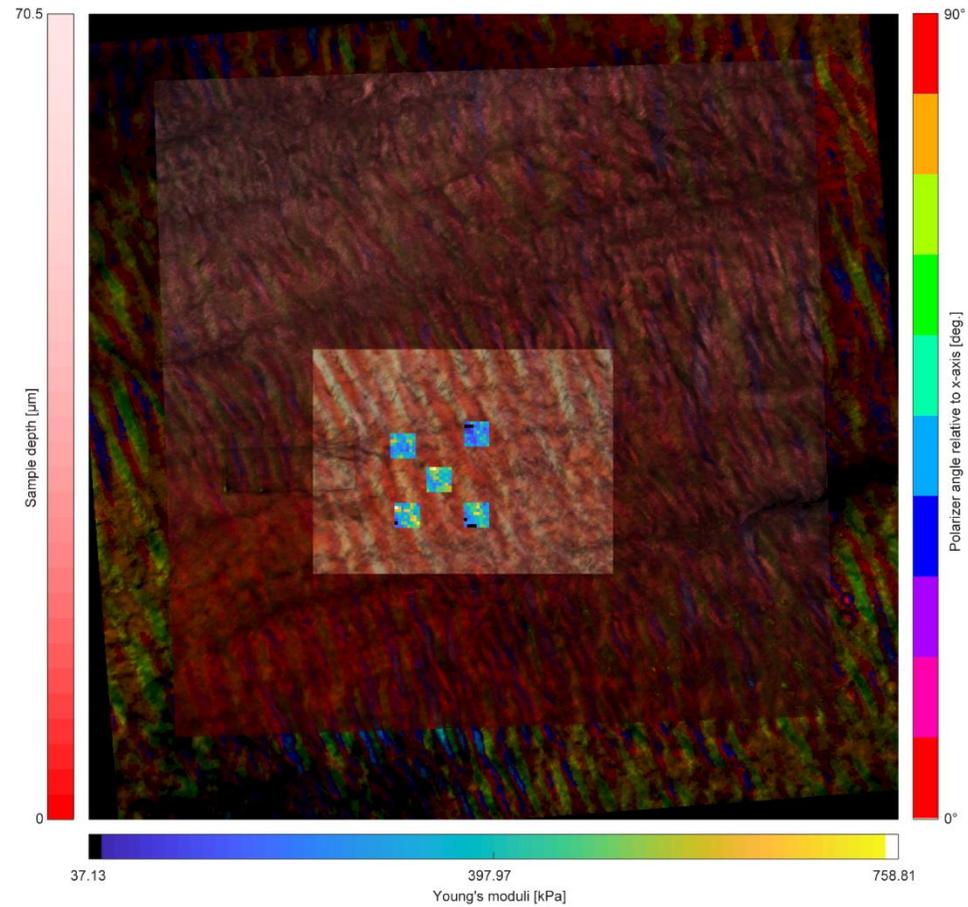
Polarized  
light  
microscopy

Collagen orientation



# results

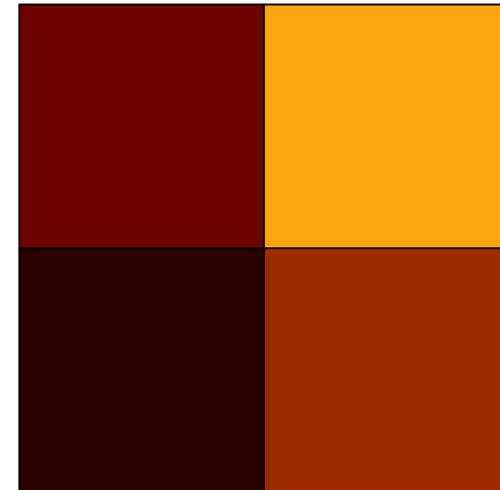
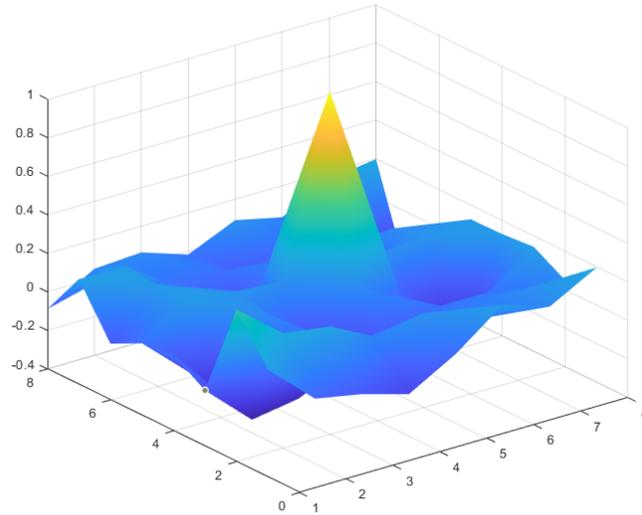
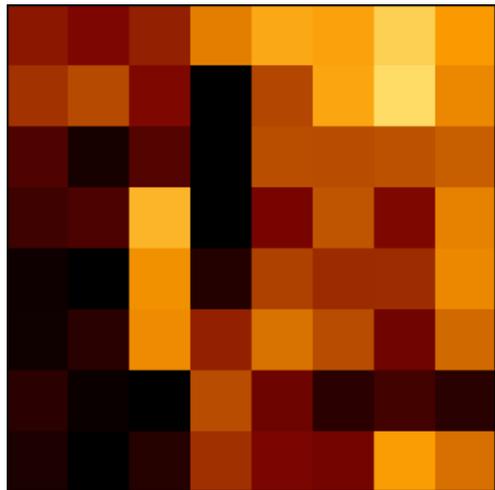
Combine it all



# results

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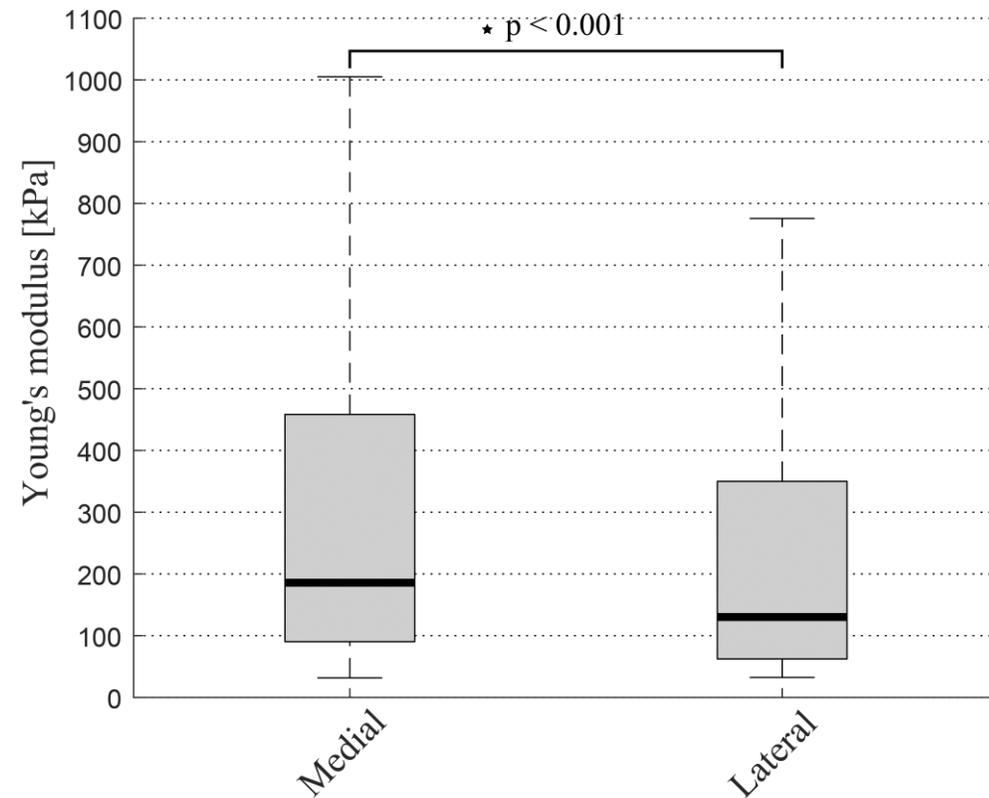
How to treat the variability



# results

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Is there a clinical significance?



# acknowledgement

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TĚLESNÉ VÝCHOVY  
A SPORTU  
Univerzita Karlova

David Vondrášek



Martin Ošťádal



Jan Příbyl



Jiří Janáček

# upcoming events 2023!



Mechanical characterization of biological samples using correlative methods

November 10<sup>th</sup> – 11<sup>th</sup>

Methodical pipeline for light microscopy of small animal models

December 4<sup>th</sup> – 6<sup>th</sup>

**METHODOLOGICAL PIPELINE  
FOR LIGHT MICROSCOPY  
SMALL ANIMAL MODELS**

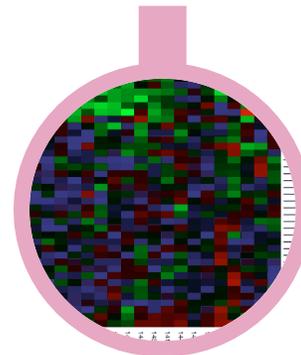
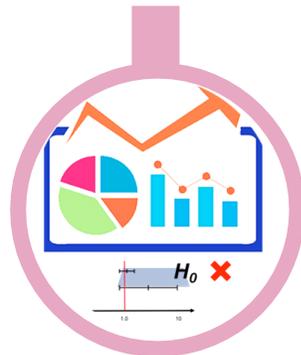
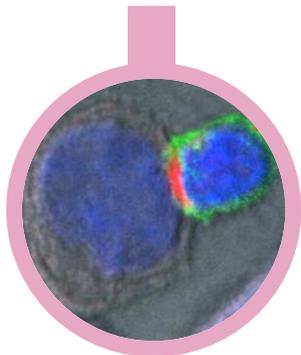
IN VIVO IMAGING OF SMALL ANIMALS ■ PRACTICAL CRANIAL WINDOW SIMULATOR ■ HANDS-ON DEMONSTRATION OF 2-PHOTON MICROSCOPY  
FUTURE OF ANIMAL IMAGING ■ DATA ANALYSIS ■ ANIMAL UNIT SETUP

**4. - 6.12.2023 - 9:30**

REGISTRATION FEE €100 ■ [IPHYSBIOIMAGING@FGU.CAS.CZ](mailto:IPHYSBIOIMAGING@FGU.CAS.CZ)  
INSTITUTE OF PHYSIOLOGY ■ KRC CAMPUS  
VIDENSKA 1083 ■ PRAGUE ■ CR



EPI REC  





# For future development, we need **YOU!**



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