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# Method for skin disease classification using skin autofluorescence imaging

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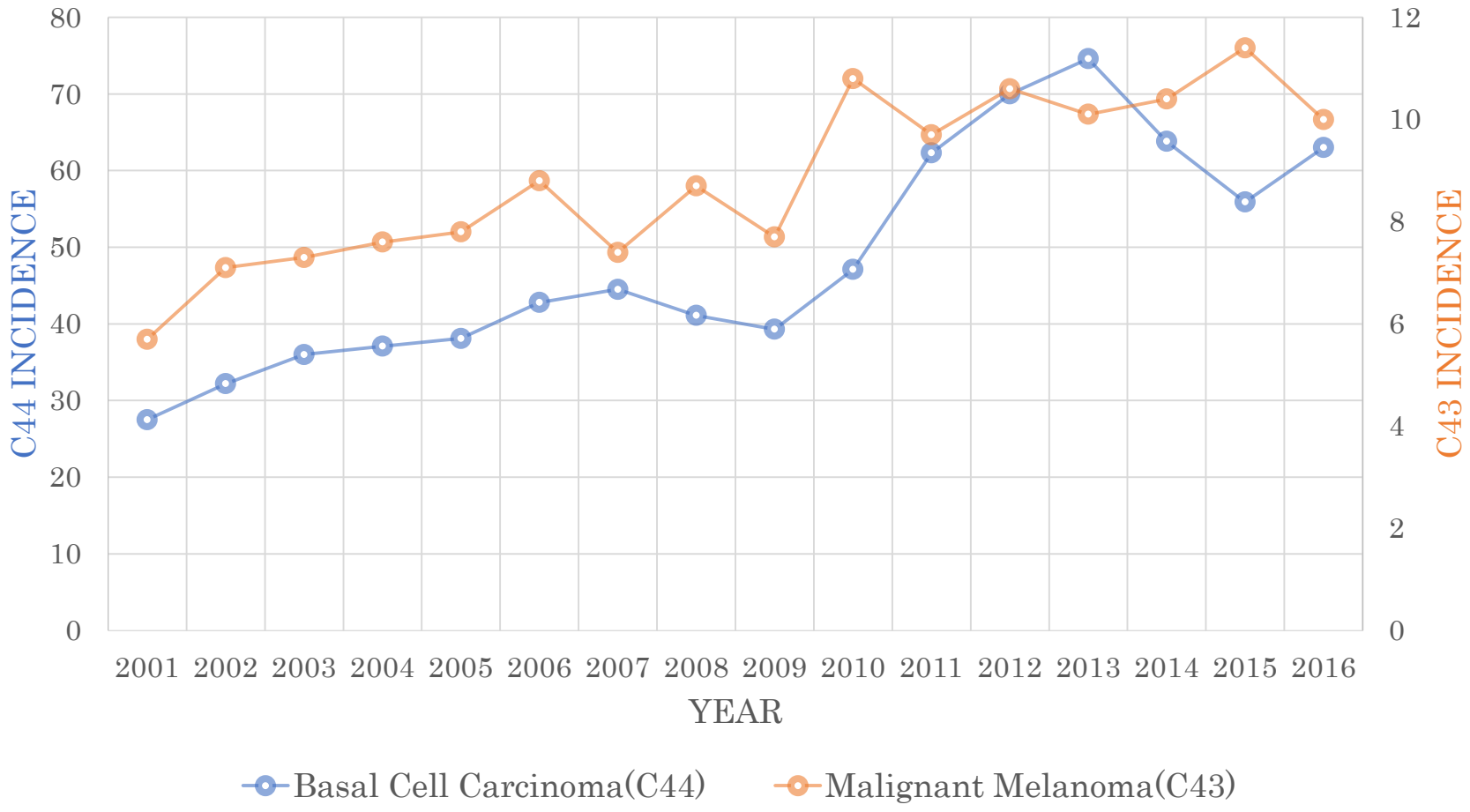
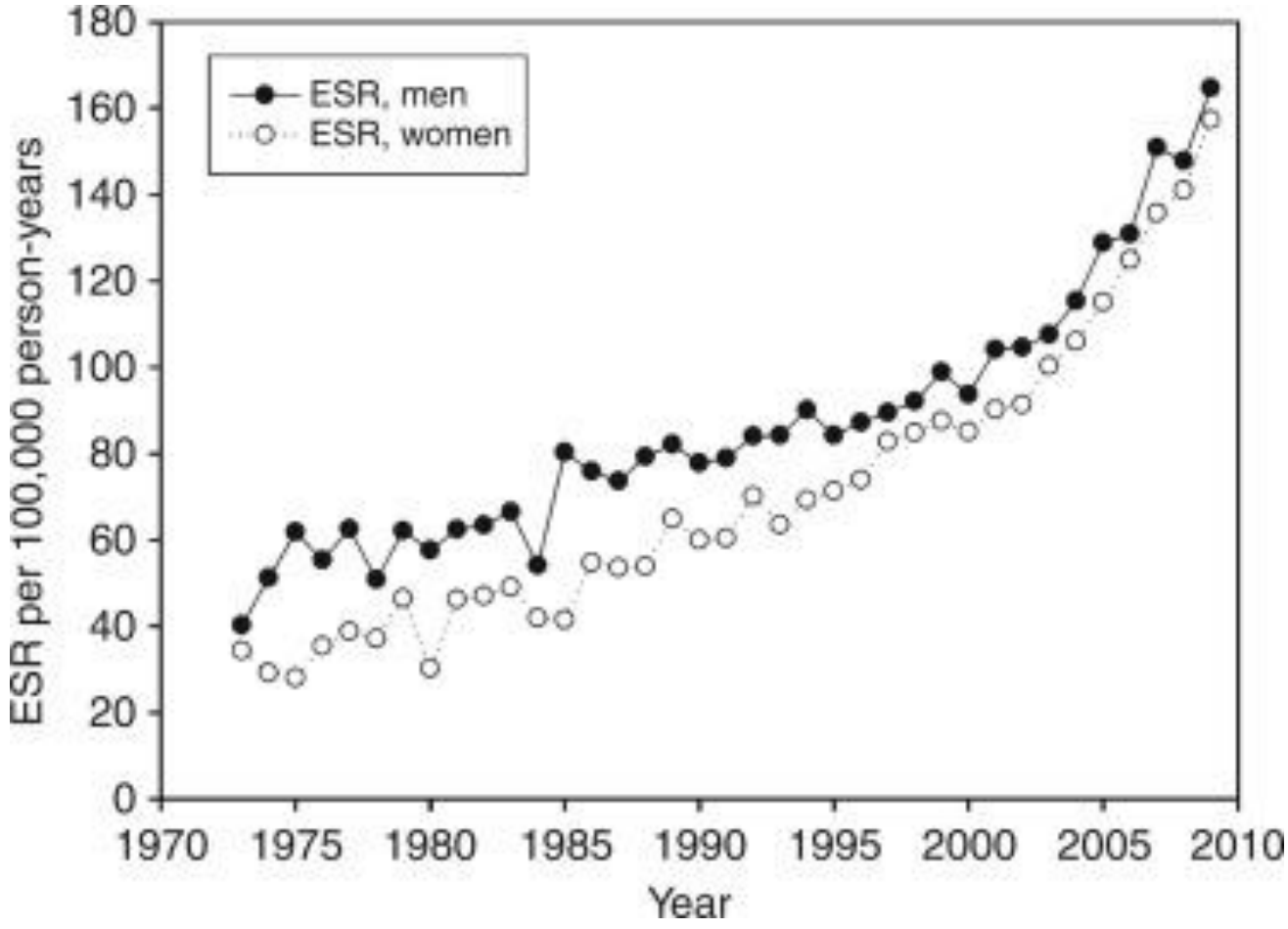
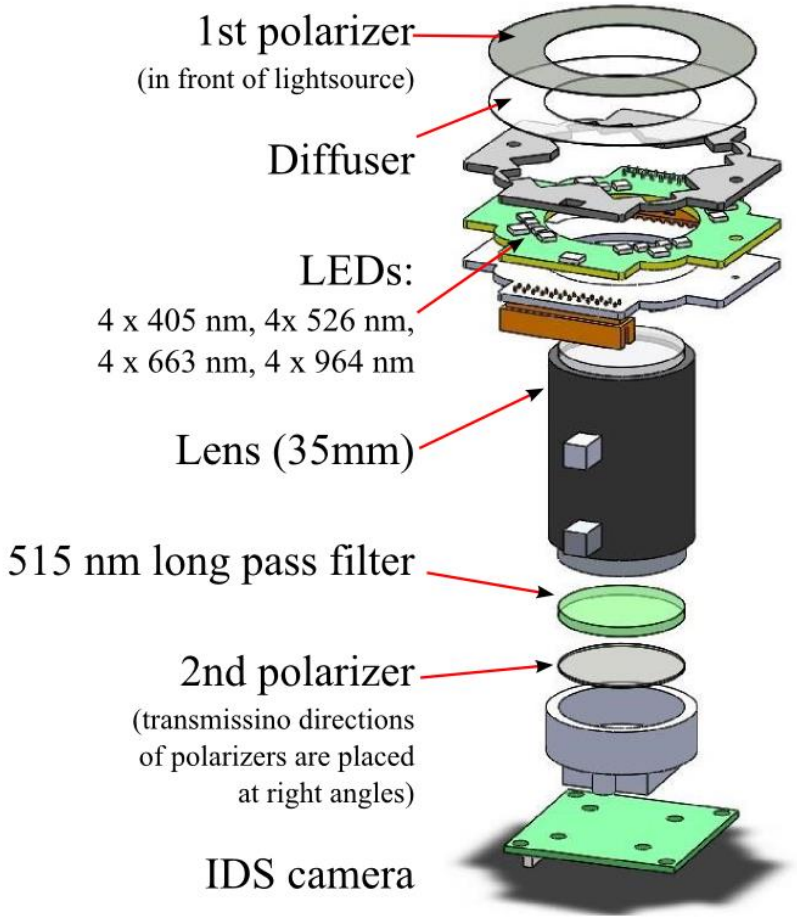
# Incidence of skin cancer in Latvia



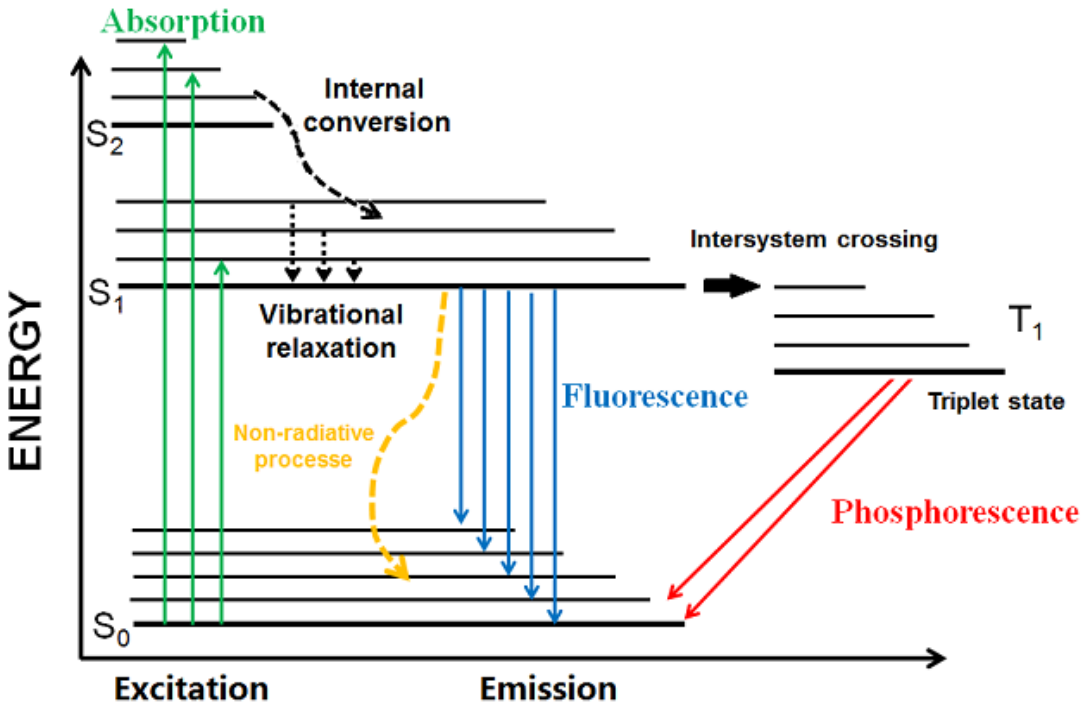
# Incidence of BCC in Denmark

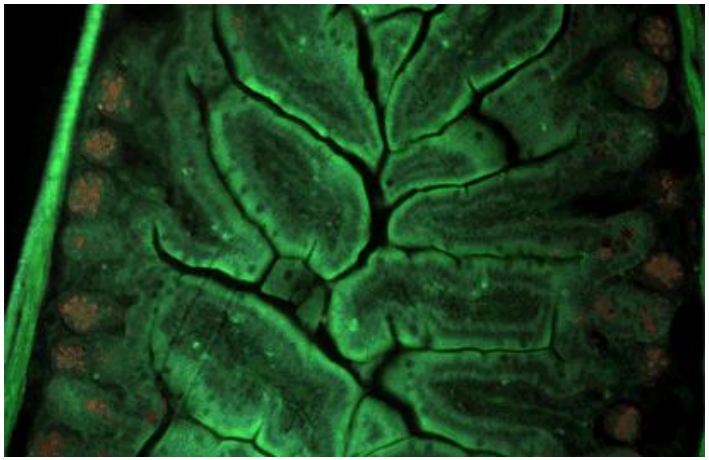


# Study methods

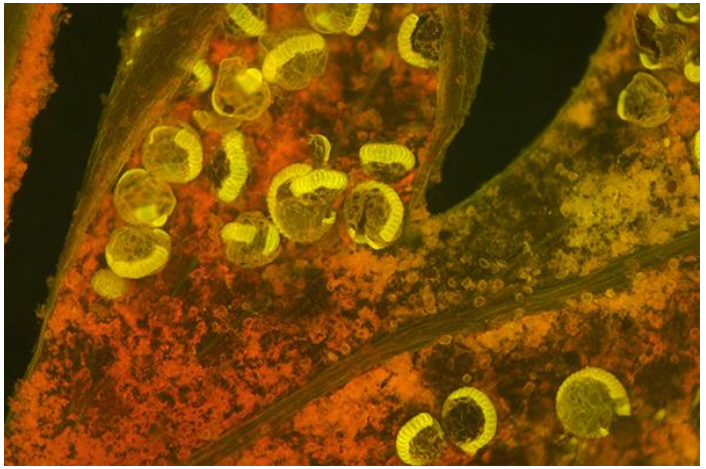


# Autofluorescence



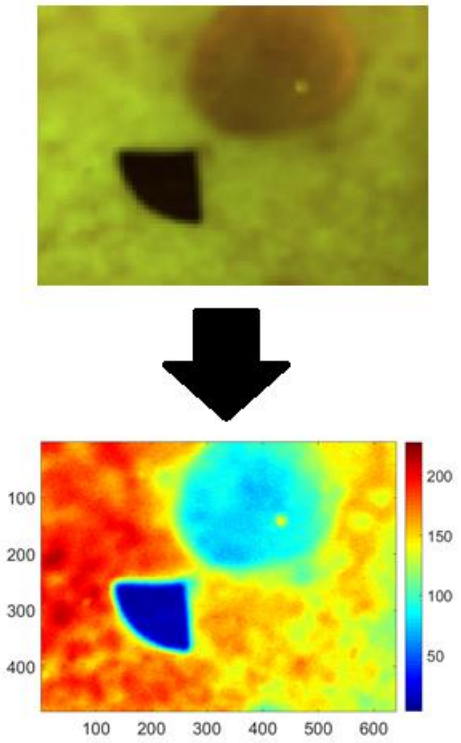
AF of mouse intestines

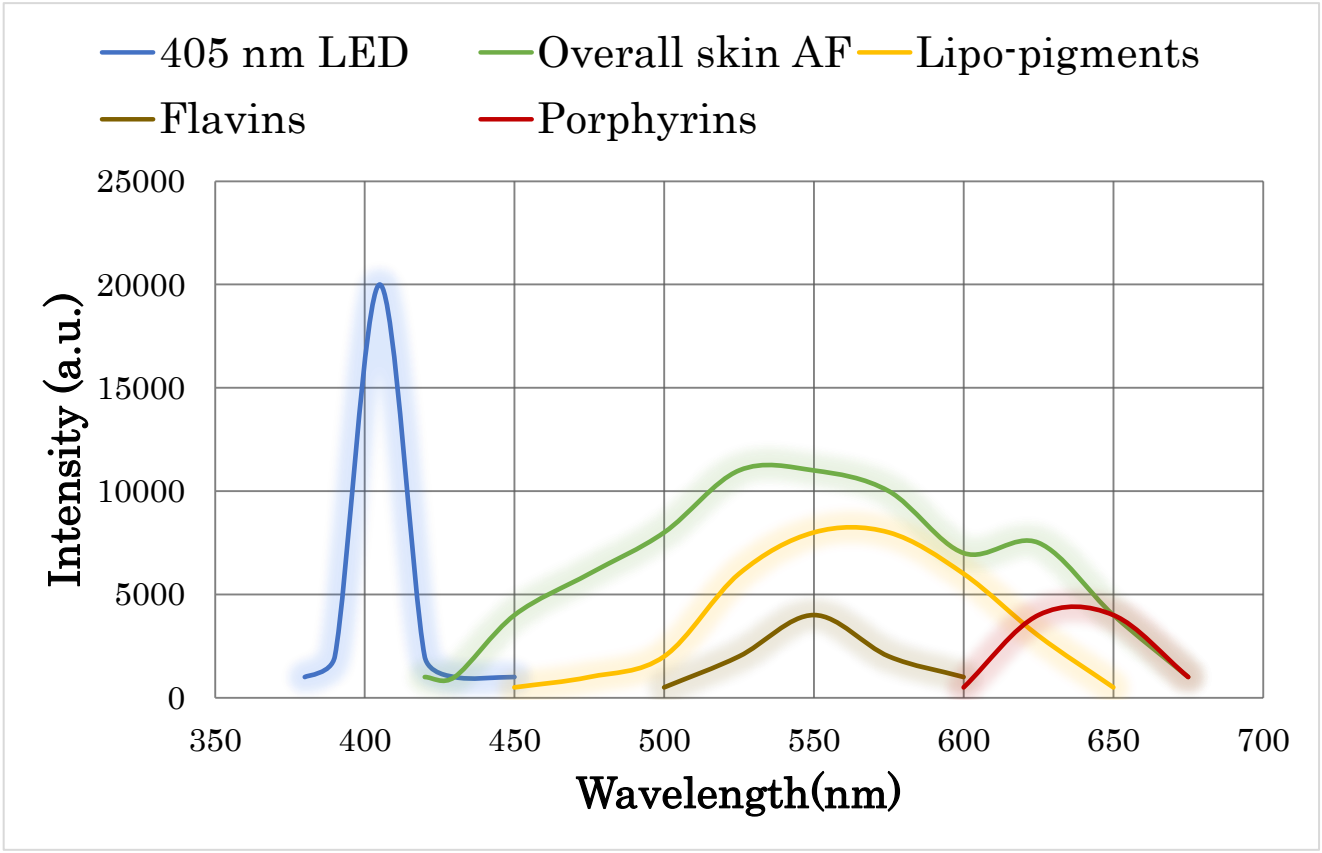


AF of fern leaf

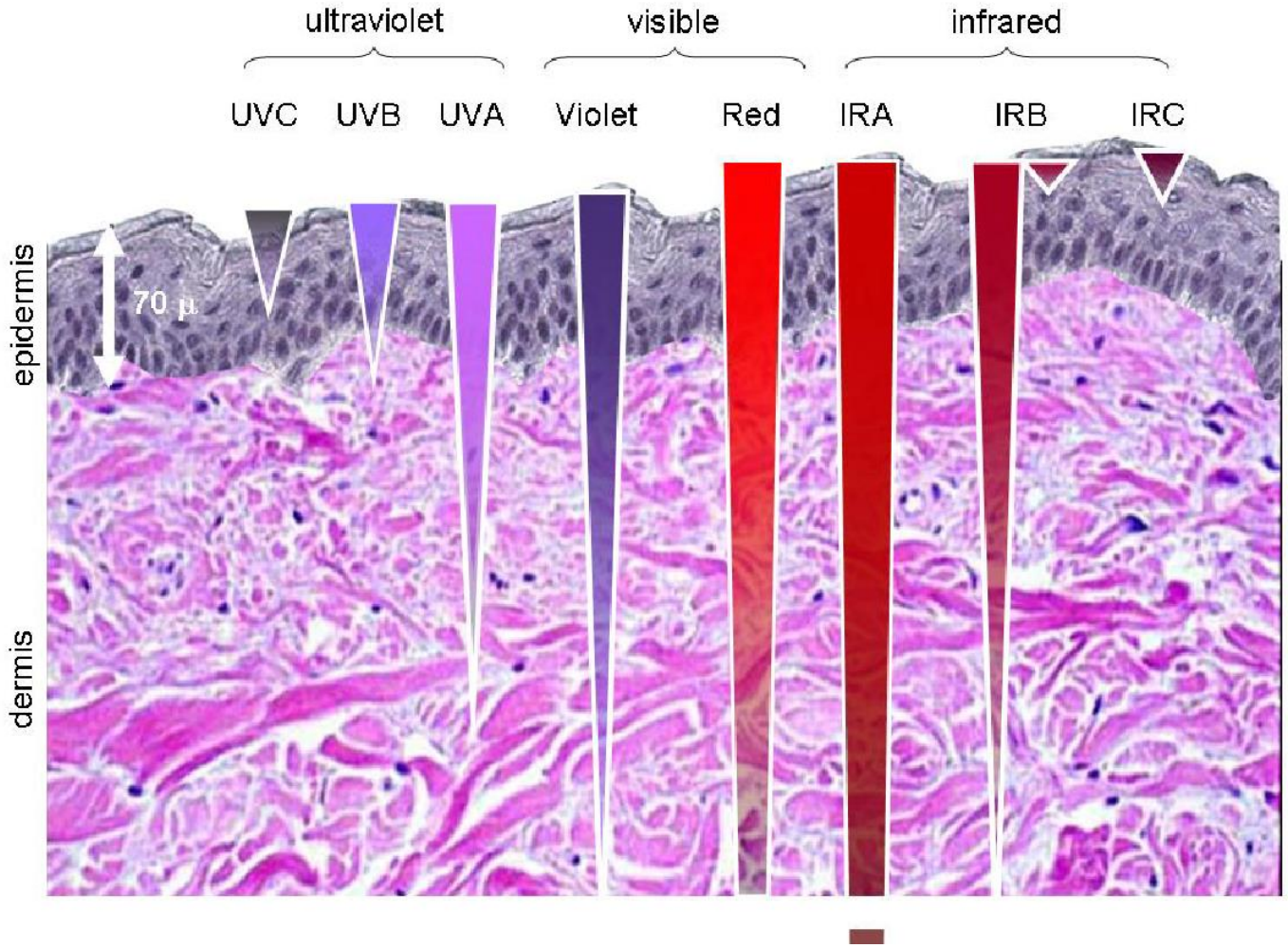
# AF of the skin at 405 nm excitation

Papilloma G channel

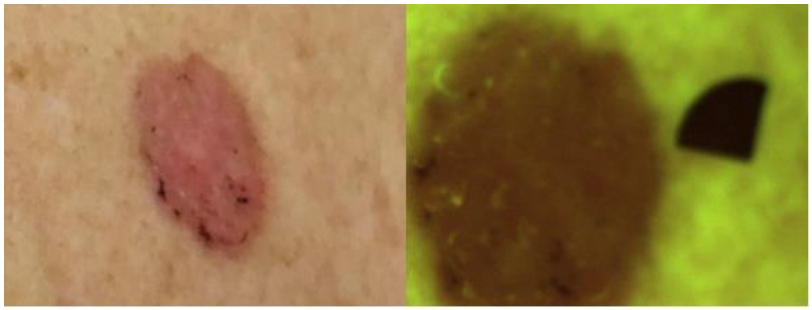


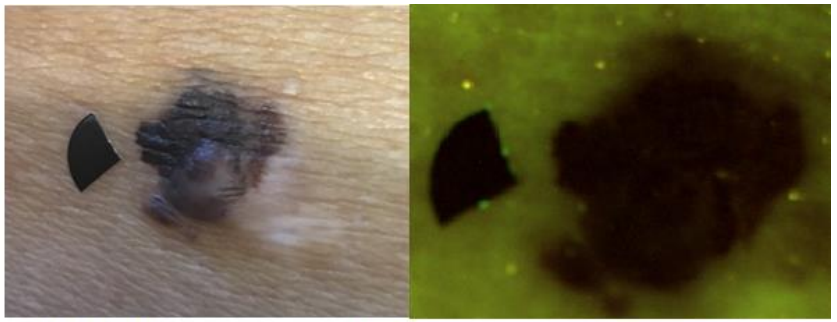
# Light penetration depth in skin



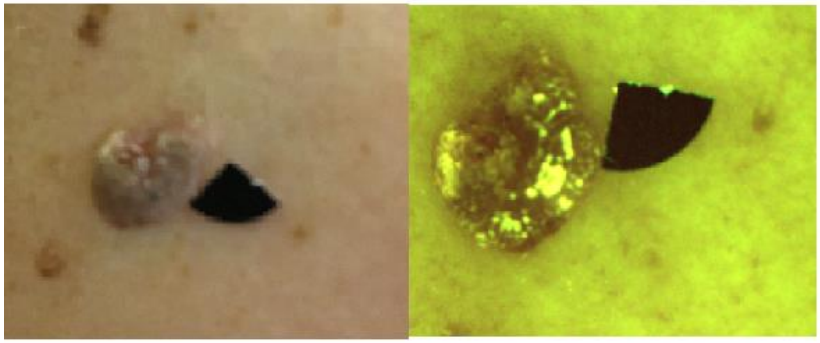
# AF of skin diseases



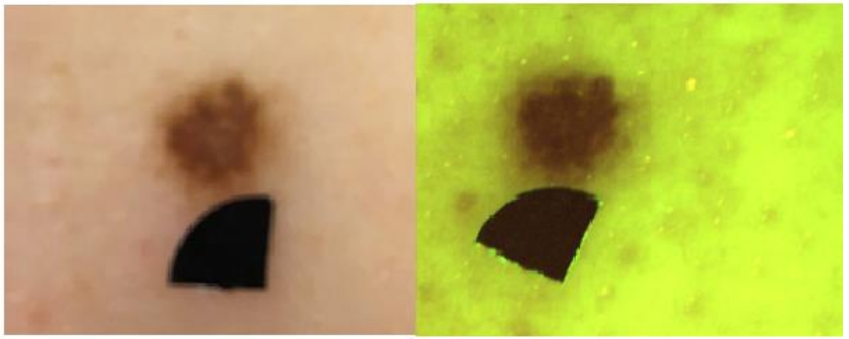
(1)Basal cell carcinoma



(3)Malignant melanoma



(2)Seborrheic keratosis



(4)Healthy mole

# Skin diseases studied

Malignant:

- Basal cell carcinoma (BCC)
- Malignant melanoma (MM)

Benign:

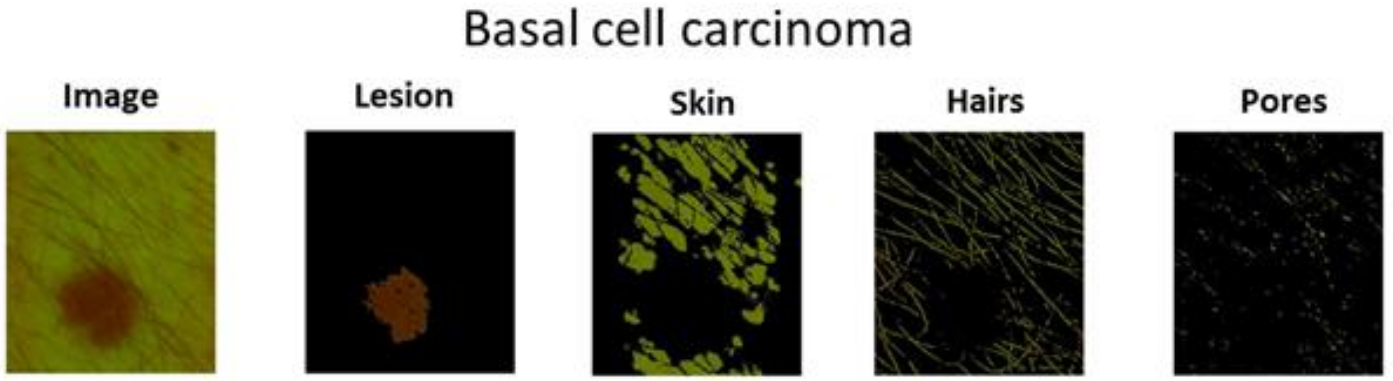
- Seborrheic keratosis
- Hyperkeratosis
- Papilloma
- Papillofibroma
- Moles
- Psoriasis
- Hemangioma
- Lupus erythematosus
- Dermatitis

# Image parameters studied

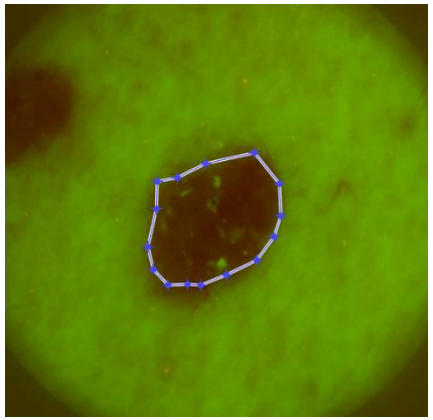
- Mean intensity of a diseased (pathological) region of skin: $I_{pat}$
- Ratio between mean diseased skin AF intensity and surrounding skin intensity $\frac{I_{pat}}{I_{surr}}$
- Ratio between mean diseased skin AF intensity and the mean AF intensity of a healthy skin region of the subject $\frac{I_{pat}}{I_{skin}}$

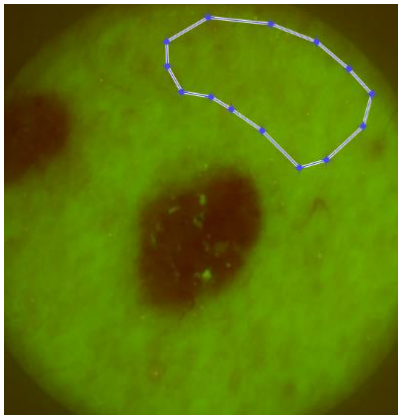
# Selection for region of interest (ROI)

Automatic:

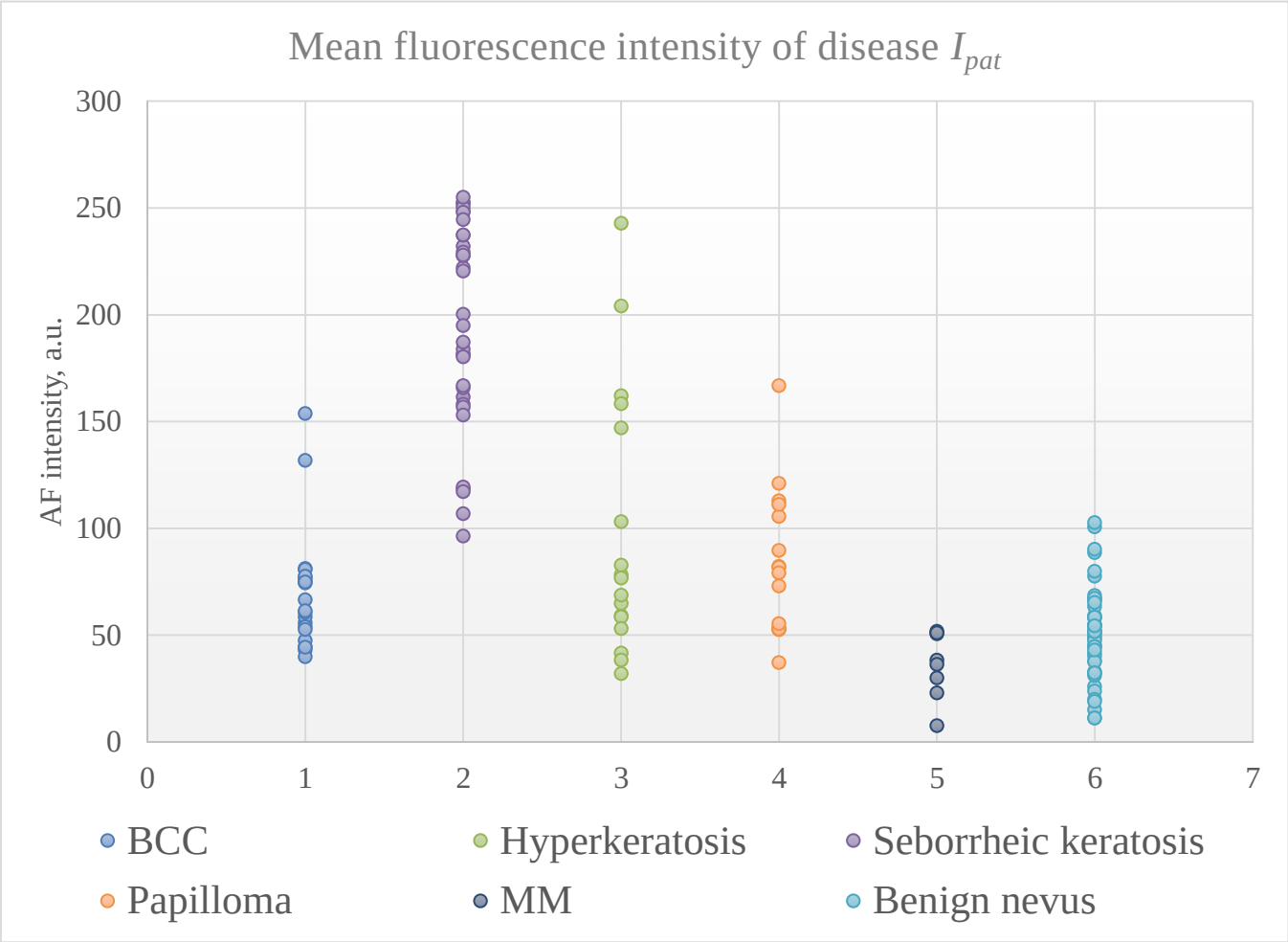



Manual:

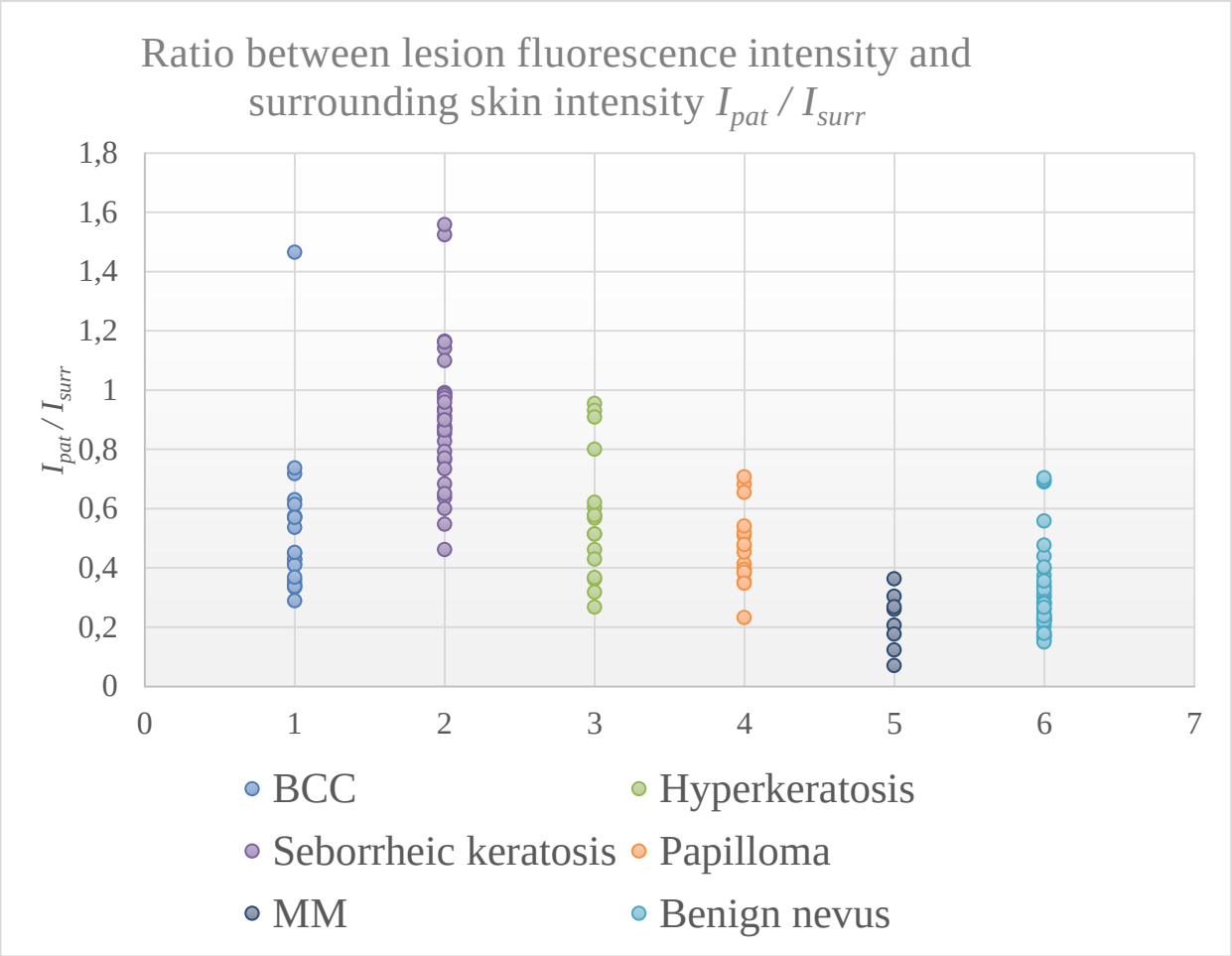




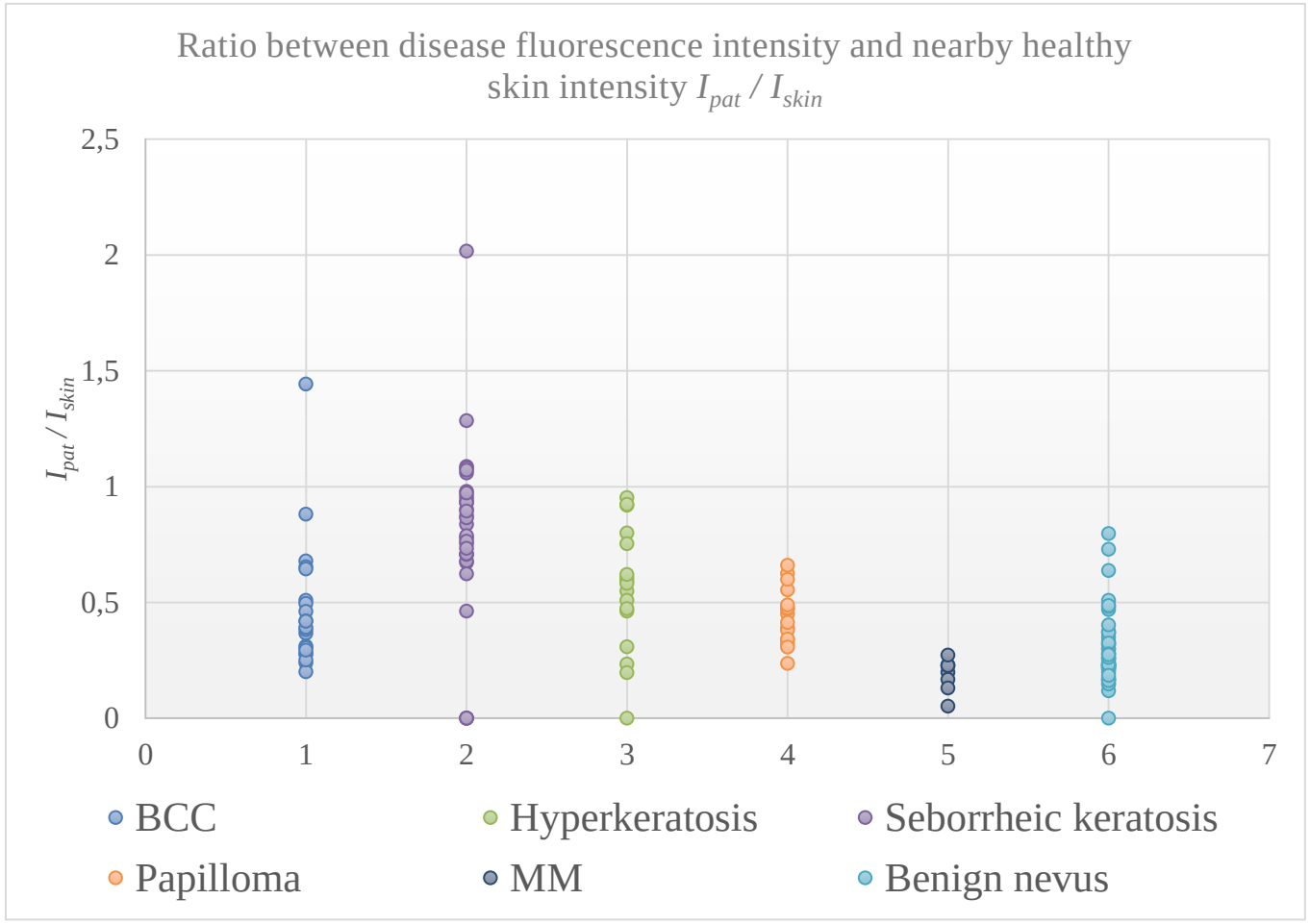
# Prominent mean intensity results



# Prominent $\frac{I_{pat}}{I_{surr}}$ results



# Prominent $\frac{I_{pat}}{I_{skin}}$ results



# Data used in classification

- 27 BCC
- 8 MM
- 36 seborrheic keratosis
- 17 hyperkeratosis
- 16 papilloma
- 49 moles

# Conclusions

Melanoma could be differentiated from all considered benign diseases in

- 78% of cases for mean AF intensity
- 62% of cases for ratio $\frac{I_{pat}}{I_{surr}}$
- 75% of cases for ratio $\frac{I_{pat}}{I_{skin}}$

BCC could be differentiated in:

- 86% of the cases from seborrheic keratosis by mean AF intensity
- 54% of the cases from non-pigmented benign diseases

# Potential improvements and studies

- Consulting general dermatologists who can classify benign diseases more accurately
- A more stable 405 nm LED source will be used in further studies
- A stable light source will allow the collection of AF photobleaching data

# Acknowledgment

This work has been supported by European Regional Development Fund project ‘Portable Device for Non-contact Early Diagnostics of Skin Cancer’ under grant agreement # 1.1.1.1/16/A/197



# Thank you for your attention!