シワとコラーゲン配向の関係
～動物皮膚のex vivo計測～

阪大との共同研究

阪大基礎工・ヒト試験倫理委員会
承認 NO. 21-1

光老化によるシワの形成

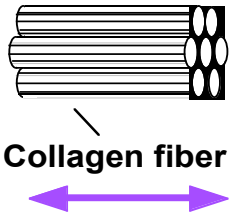
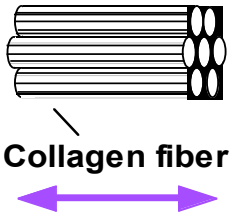
光老化した皮膚では深いシワが特徴的

シワ形成はコラーゲン線維の方向性と皮膚に対する繰り返し機械的付加が関連してる？

Present talk

光老化性のシワ走行方向とコラーゲン配向の関連性を偏光分解SHG顕微鏡で評価

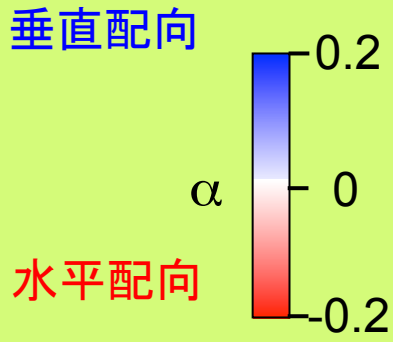
コラーゲン配向 vs. レーザー偏光

	Axial (Non-centrosymmetric)		Cross-sectional (Centrosymmetric)
	Parallel	Perpendicular	
Collagen orientation			
Laser polarization	↔	↕	↕ ↔
SHG light	Strong	Weak	None

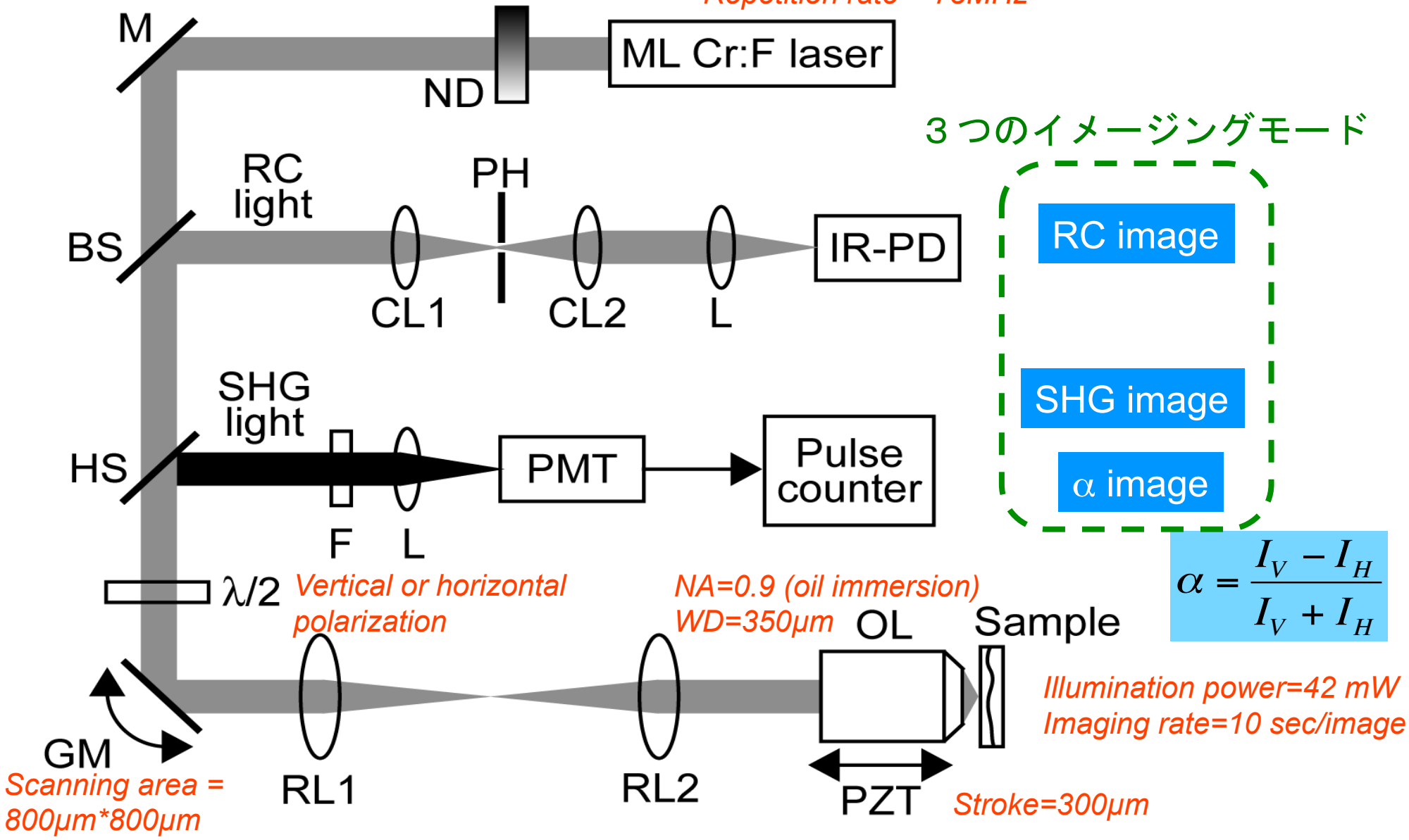
コラーゲン配向パラメーター(α)

$$\alpha = \frac{I_V - I_H}{I_V + I_H}$$

I_V: 垂直偏光入射時のSHG光強度
I_H: 水平偏光入射時のSHG光強度



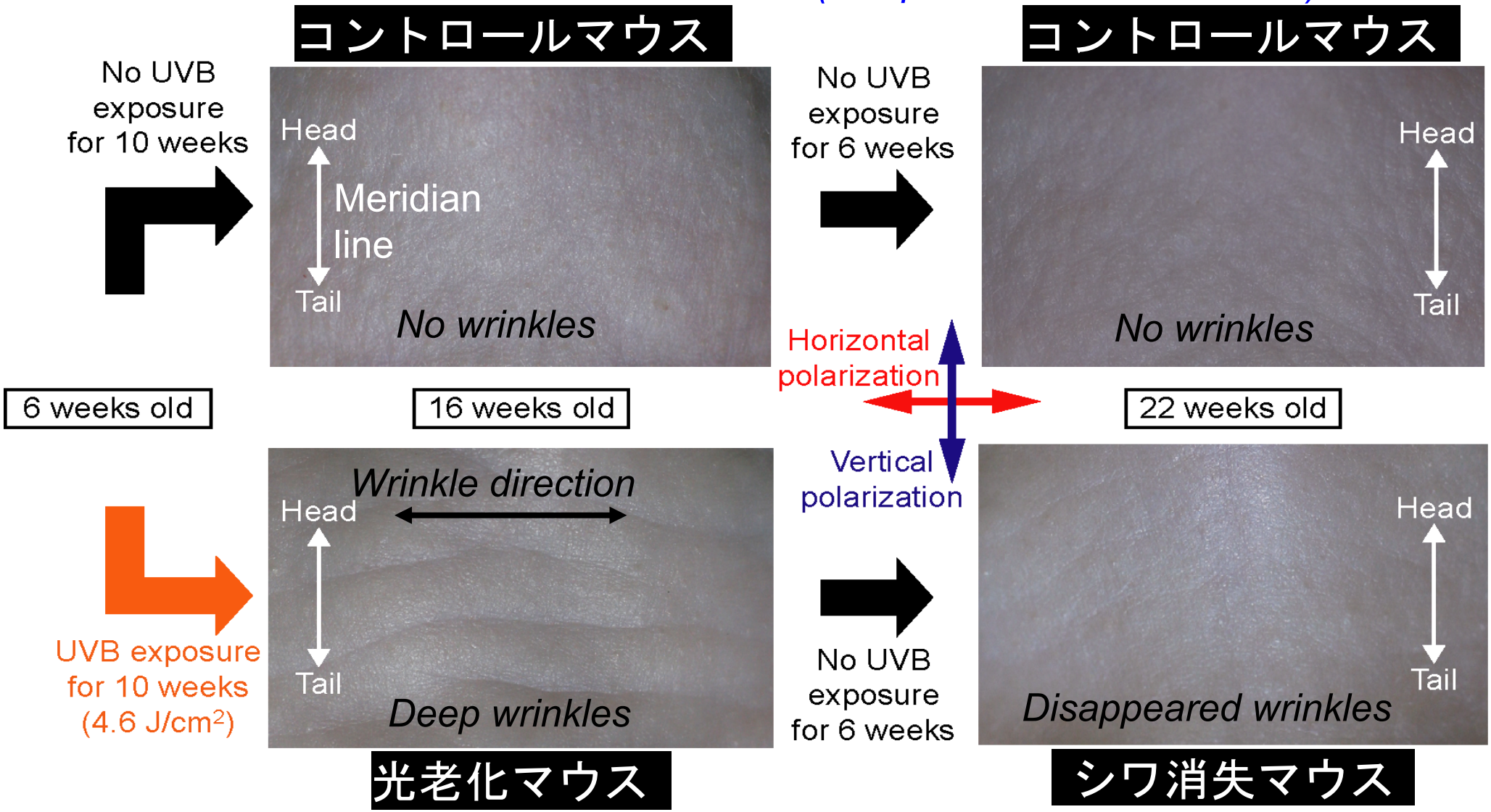
実験装置



$$\alpha = \frac{I_V - I_H}{I_V + I_H}$$

サンプル：マウス光老化モデル（背中皮膚）

*(sample size = 30mm*30mm)*



ref) Klingman, J. Am. Acad. Dermatol. ***21****, 623-631 (1989).*

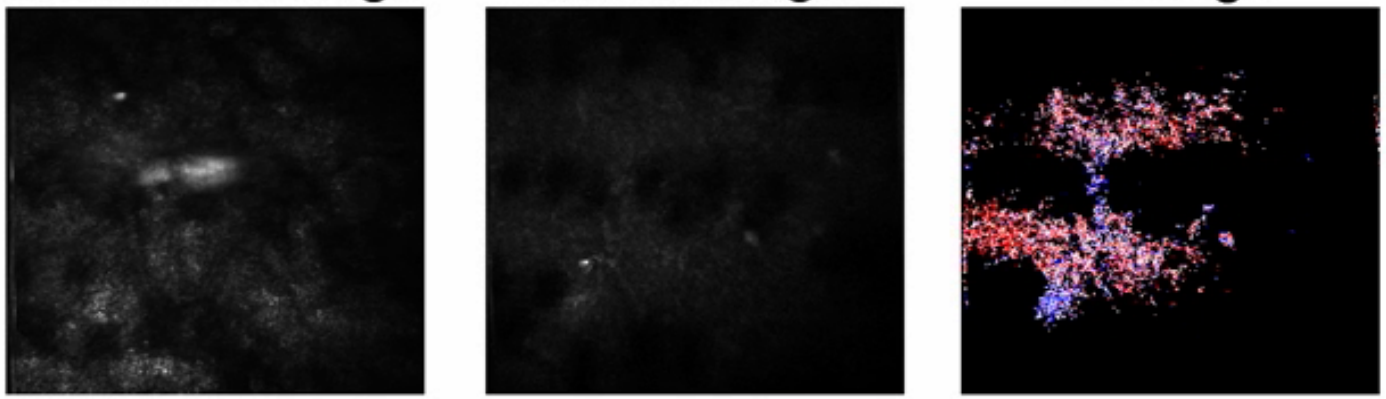
光老化マウスvs.コントロールマウス（同週齢）

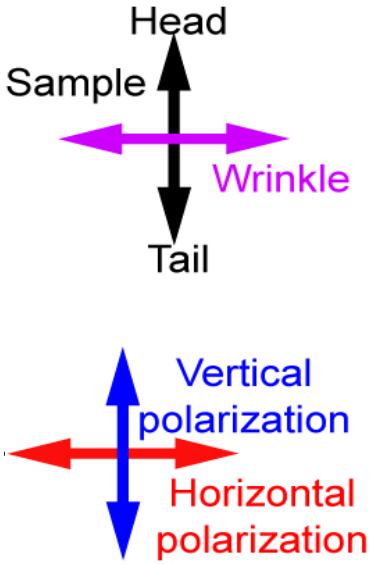
*(image size = 800μm*800μm)*

光老化マウス(16週齢)

000μm depth

Confocal image | SHG image | α image

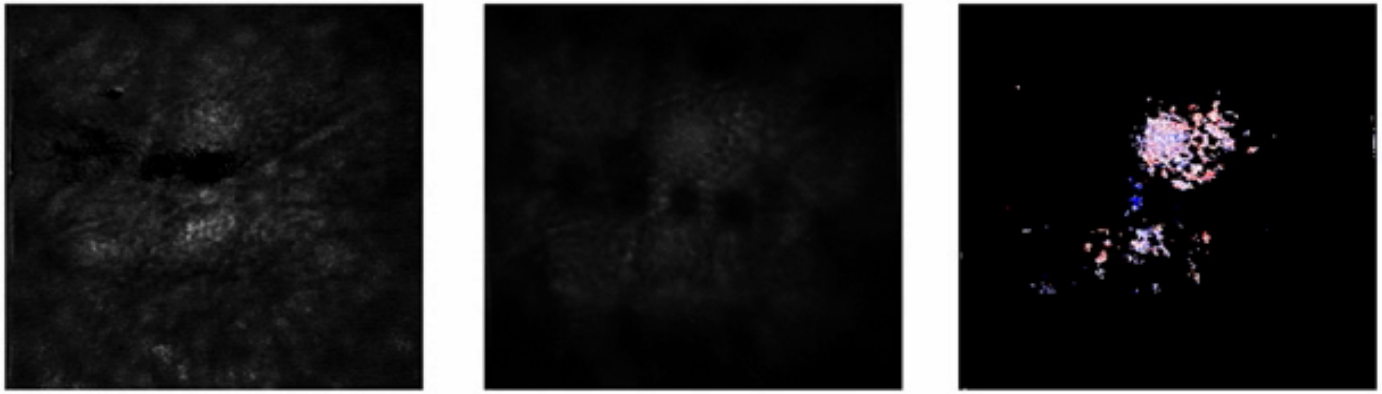


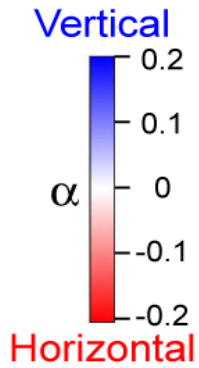


コントロールマウス(16週齢)

000μm depth

Confocal image | SHG image | α image





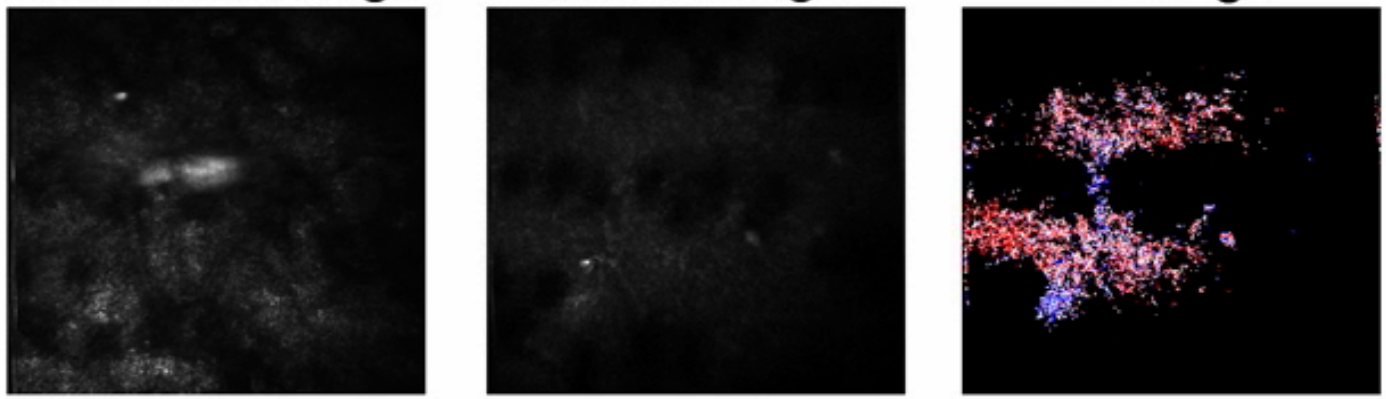
光老化マウス vs. シワ消失マウス

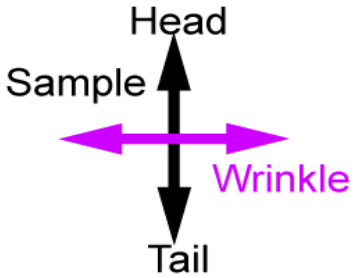
*(image size = 800μm*800μm)*

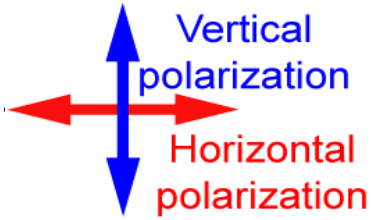
光老化マウス(16週齢)

000μm depth

Confocal image | SHG image | α image



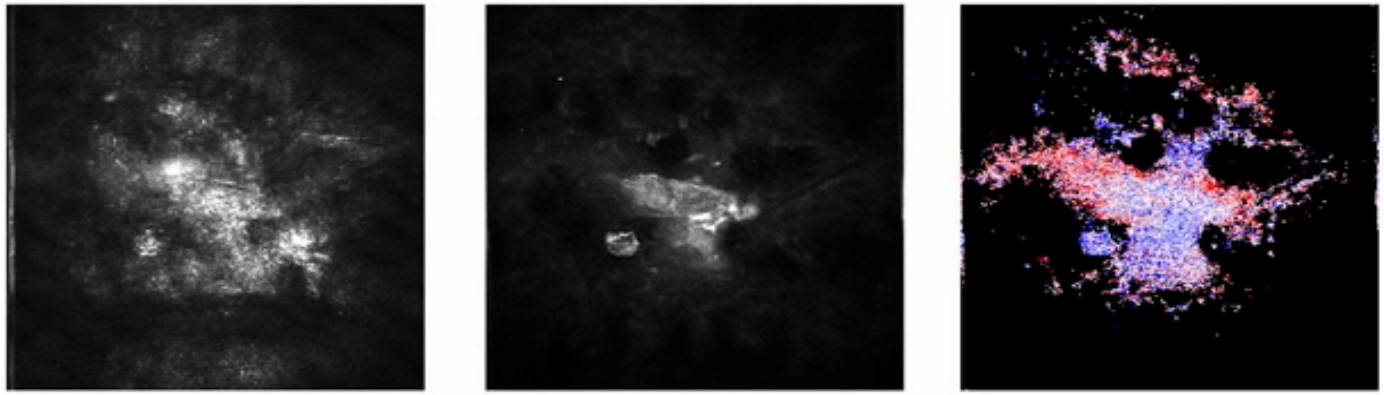


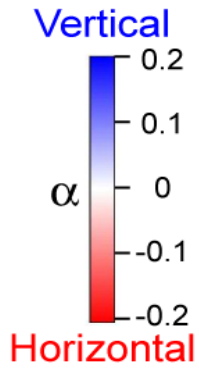


シワ消失マウス(22週齢)

000μm depth

Confocal image | SHG image | α image





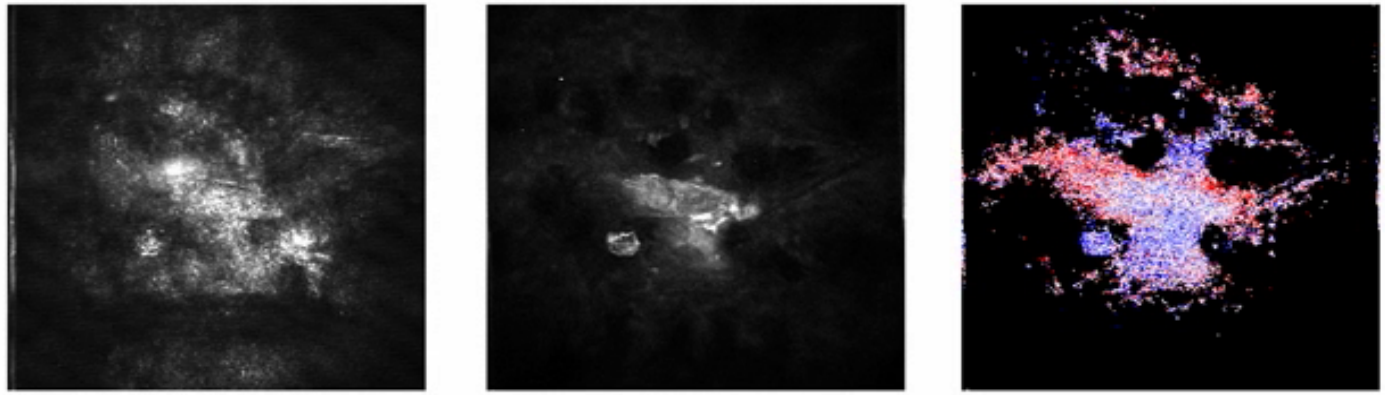
シワ消失マウス vs. コントロールマウス（同週齢）

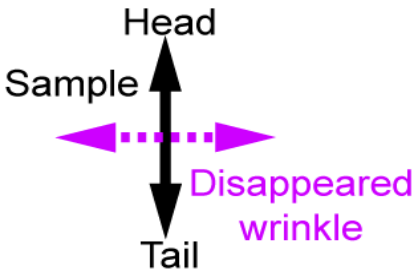
*(image size = 800μm*800μm)*

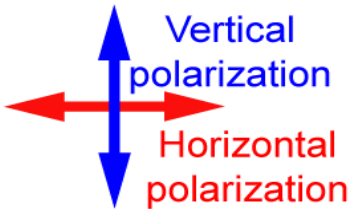
シワ消失マウス(22週齢)

000μm depth

Confocal image | SHG image | α image



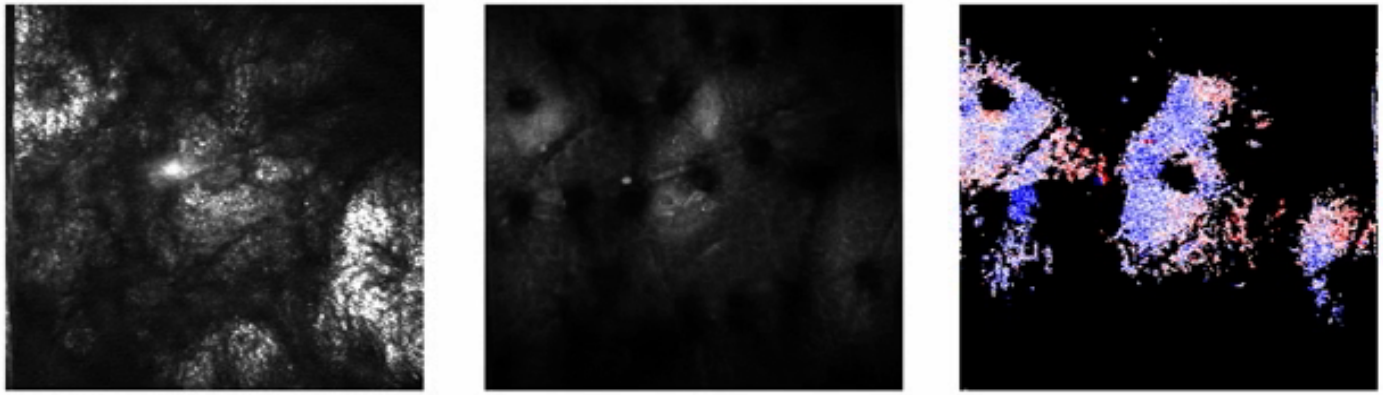


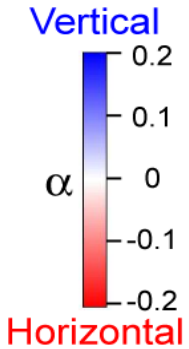


コントロールマウス(22週齢)

000μm depth

Confocal image | SHG image | α image

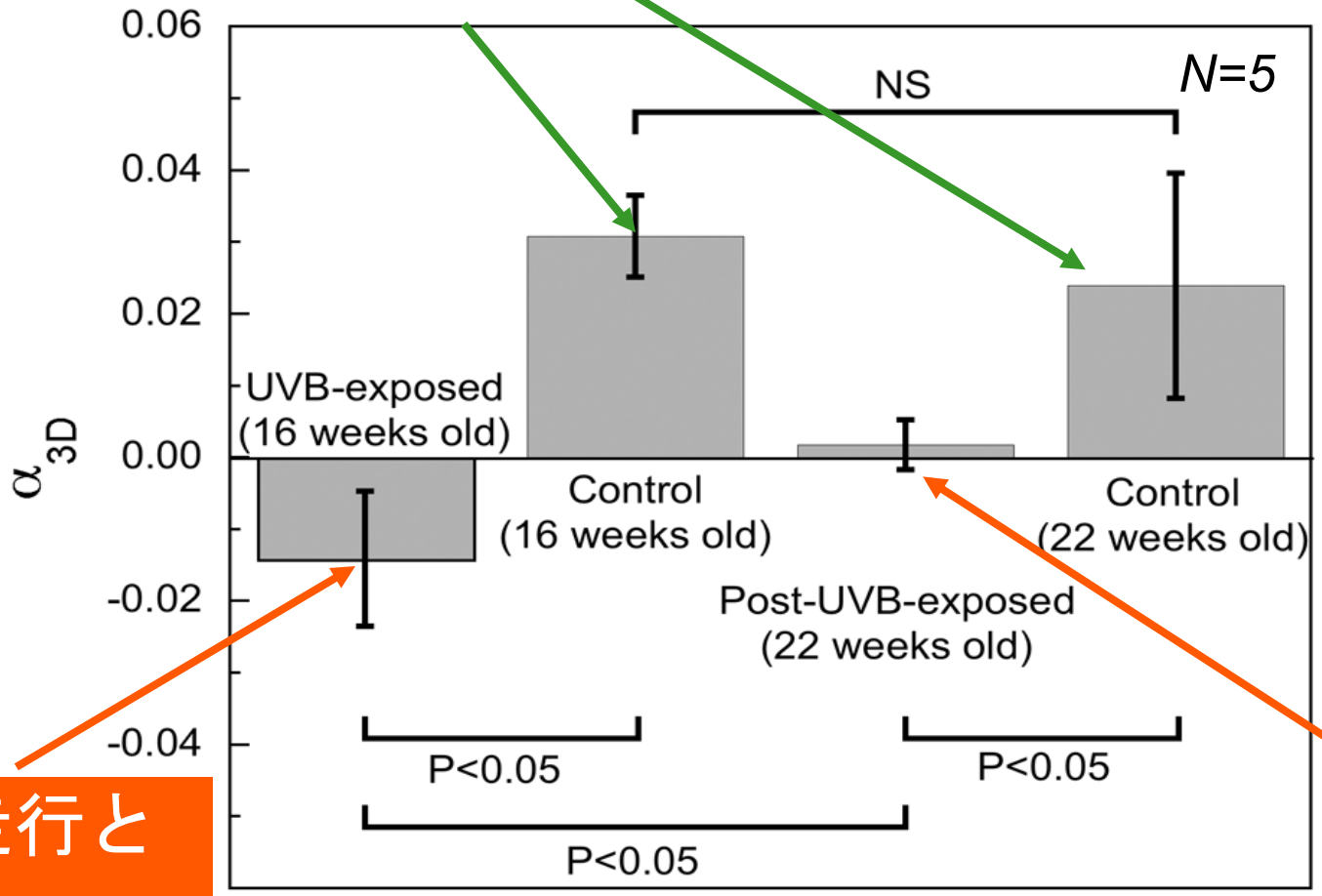




αの統計学的解析（3次元ボリューム）

(800μm*800μm*300μm-depth)

正中線と平行



シワ走行と平行

コントロールと光老化マウスの中間

光老化性シワはコラーゲン配向と深く関連がある！