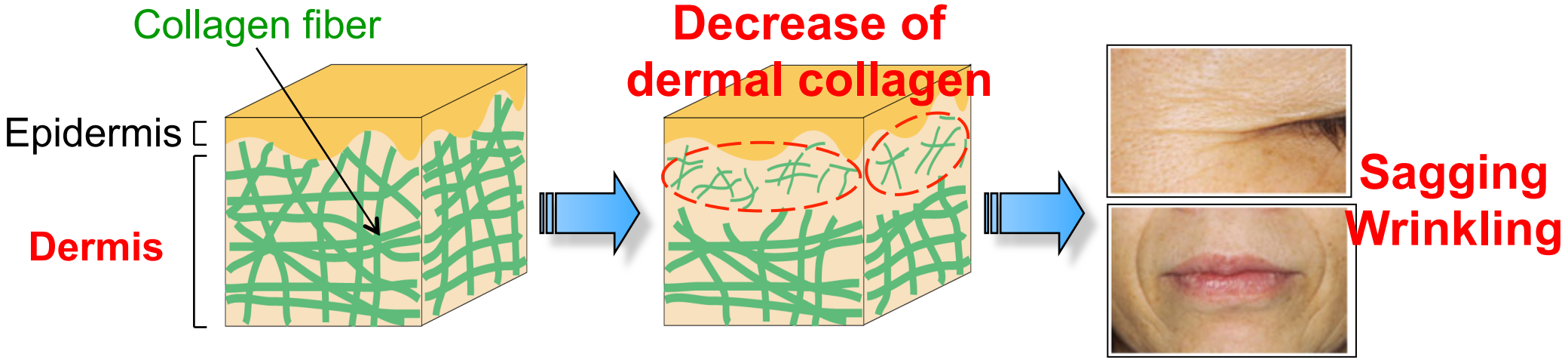
In vivo assessment of intrinsic aging and photoaging in human facial skin

in collaboration with Shiseido Co.

Skin aging

Intrinsic aging	Aging decreases the number and declines function of cells, resulting in the decrease of collagen production
Photoaging	UV rays stimulate the secretion of collagen degradation enzyme, resulting in the increase of collagen decomposition



Photoaging accelerates skin aging and increase risk of skin cancer

Need for in vivo assessment of skin aging

Measured position

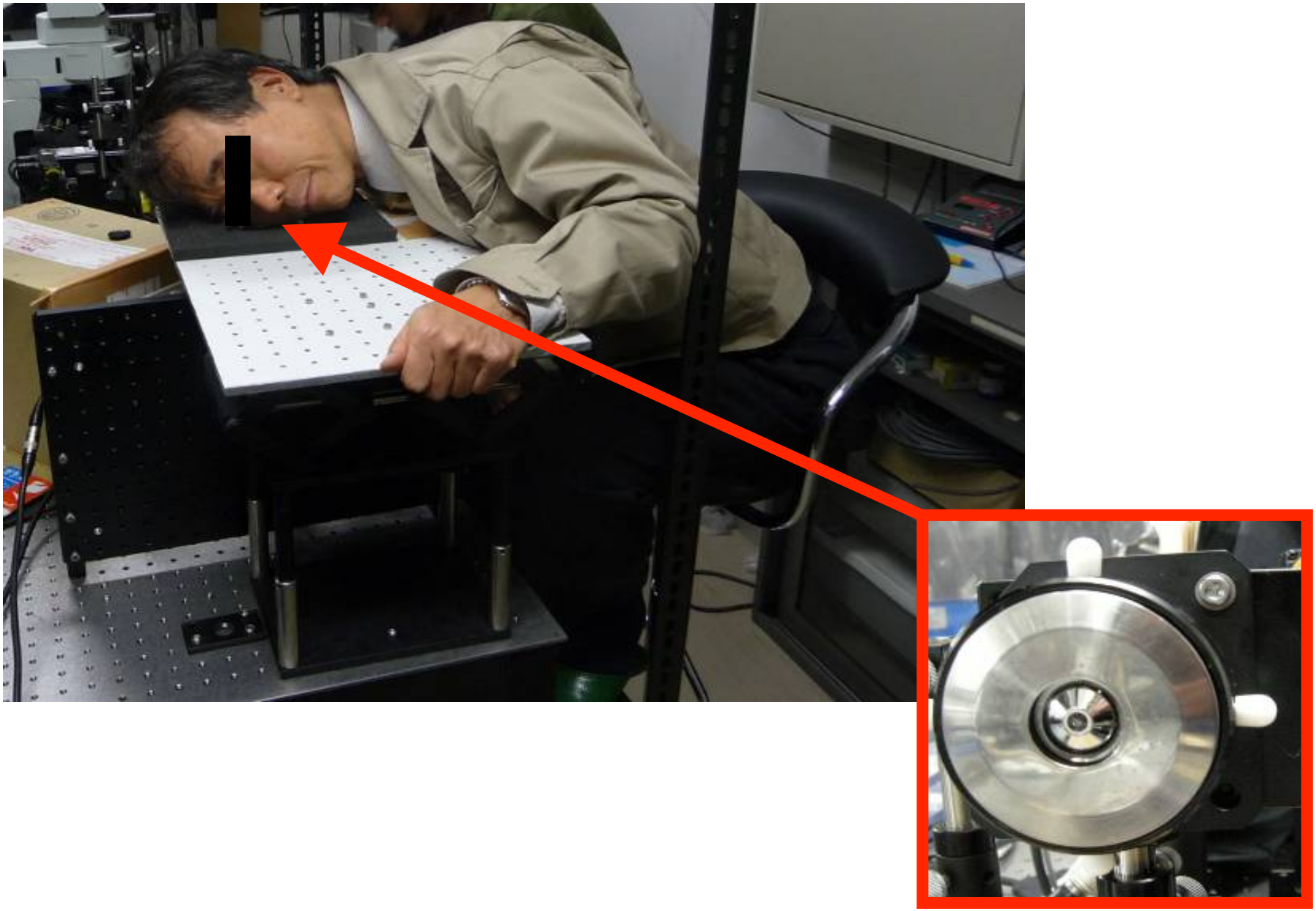
Cheek skin
- Thin epidermis
- Daily exposure of UVB
- Susceptible to photoaging

Subjects

	20's	30's	40's	50's	60's
Male	5	2	2	2	1
Female	2	1	2	2	

Written informed consents were obtained before the measurement

Approved by ethics committees in Osaka Univ. and Shideido Co., Ltd.

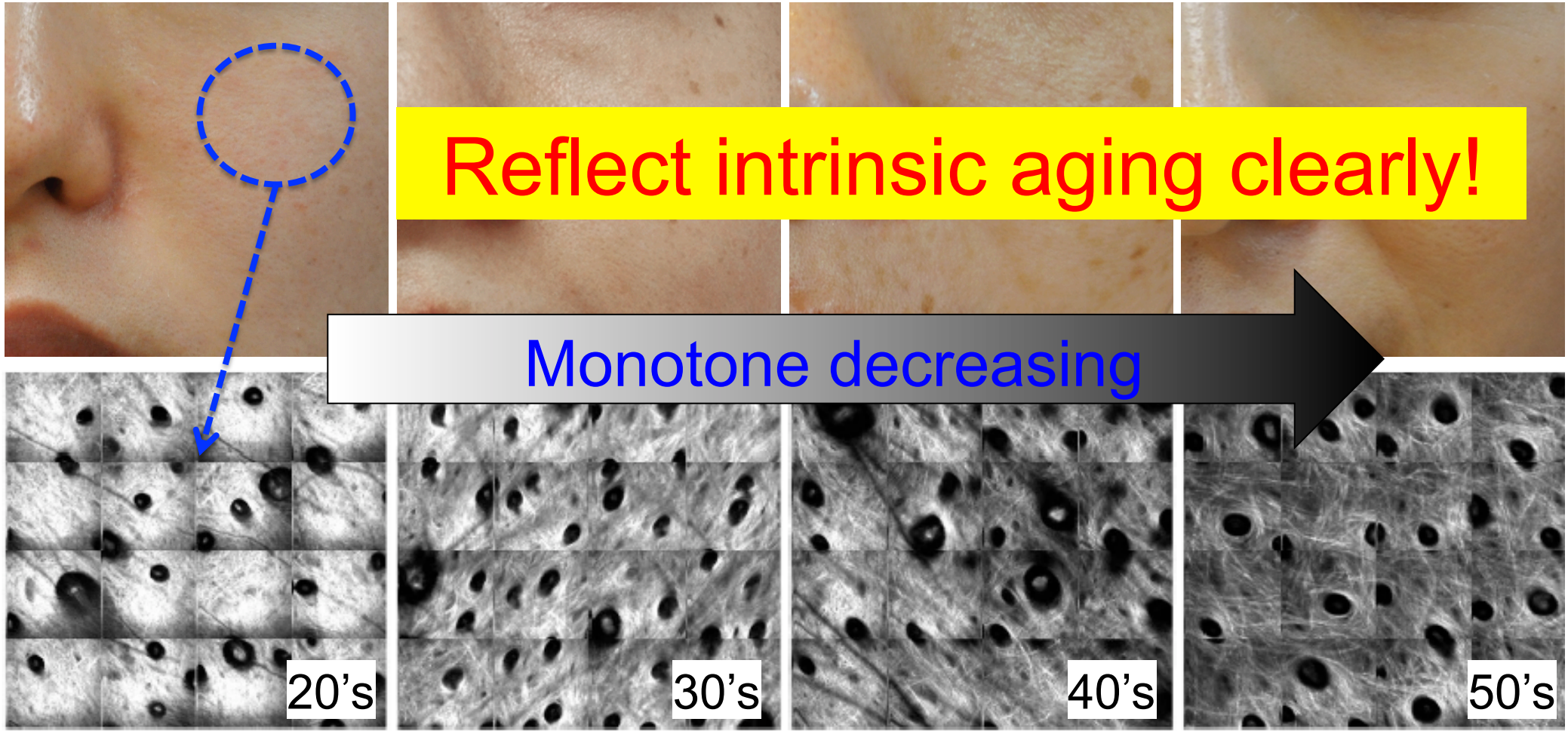


Risk evaluation of laser-induced photodamage to human skin under 40-mW laser irradiation

		Before experiment	Immediately after experiment	One month after experiment
Visual inspection by dermatologist	Normal	10	10	10
	Abnormal	0	0	0
Spectrophotometer	Normal	10	10	10
	Abnormal	0	0	0

Laser irradiation does not any photodamage to human skin

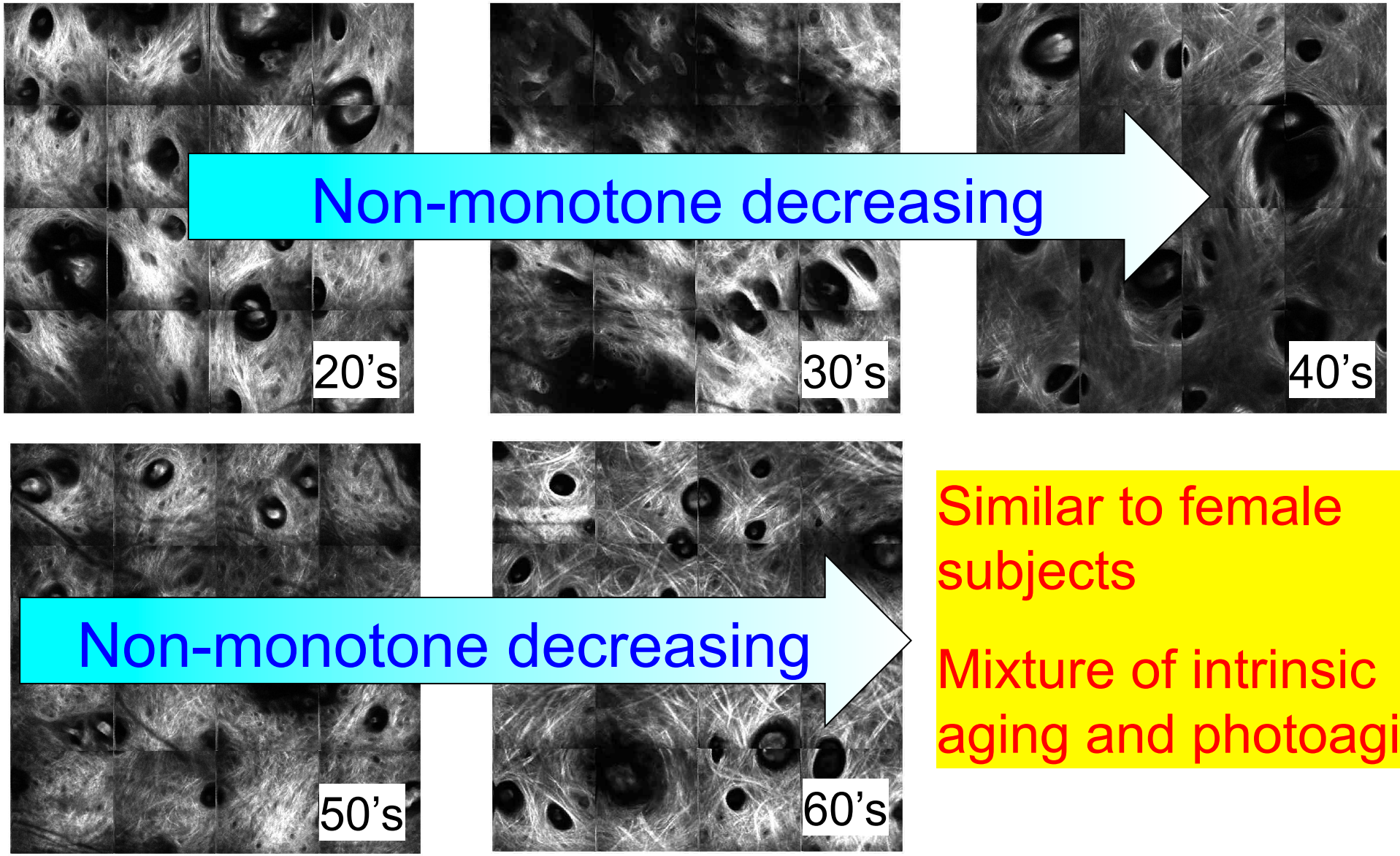
Structural change by aging (1) Female subjects



Decrease of dense distribution of fine collagen fibers
Coarse distribution of thick collagen fiber is still remained!

Structural change by aging (2)

Male subjects

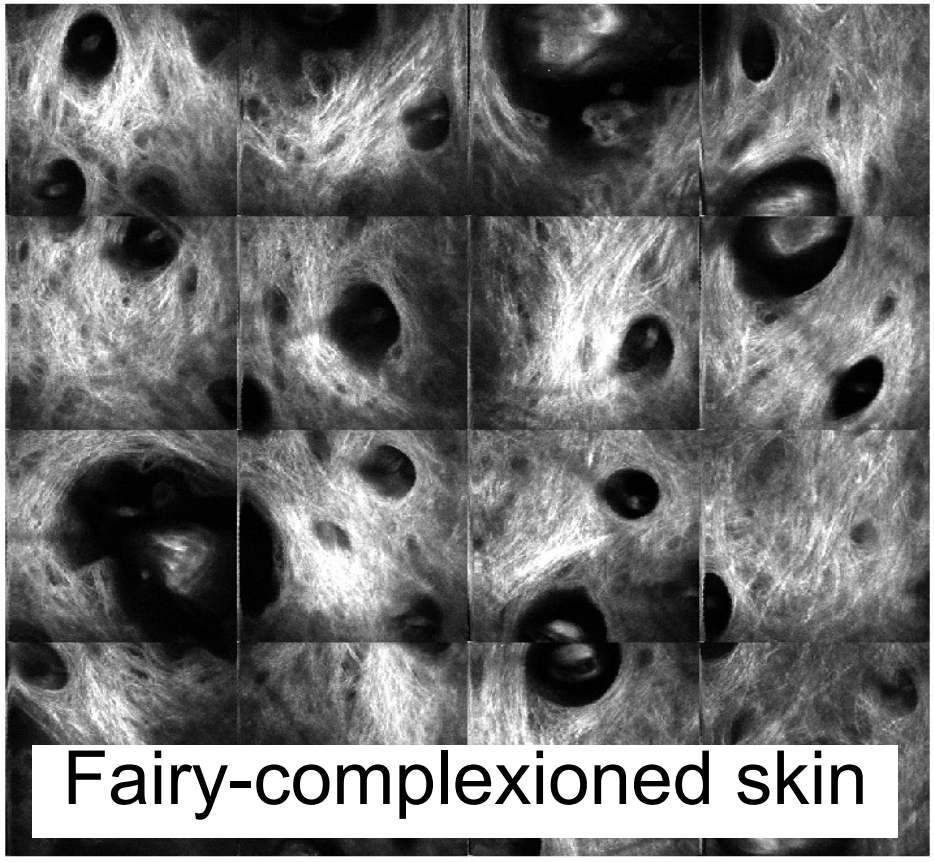


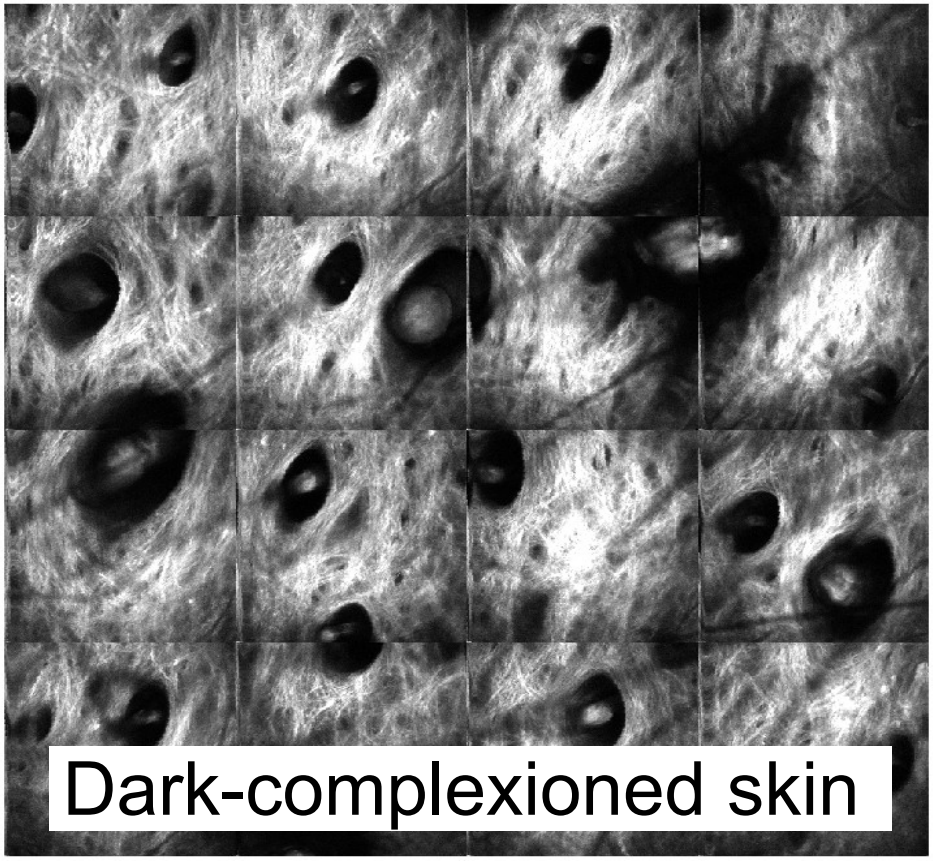
Similar to female subjects

Mixture of intrinsic aging and photoaging

Influence of UVB exposure (1)

20's male subject

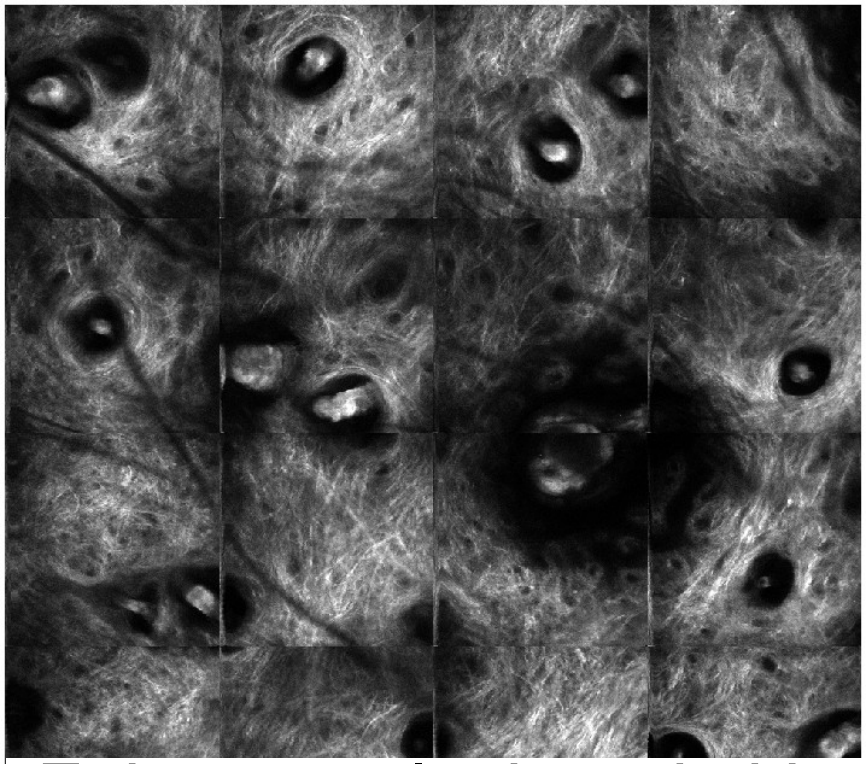




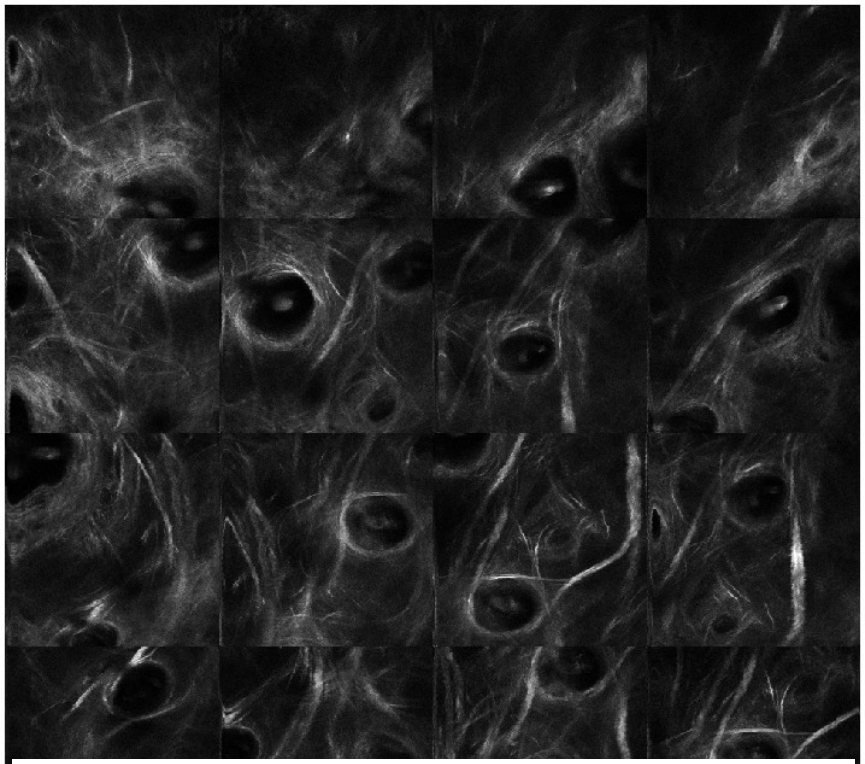
Little structural difference of collagen fiber
Smooth turnover from damaged collagen fiber to renewed one

Influence of UVB exposure (2)

50's male subject



Fairy-complexioned skin



Dark-complexioned skin

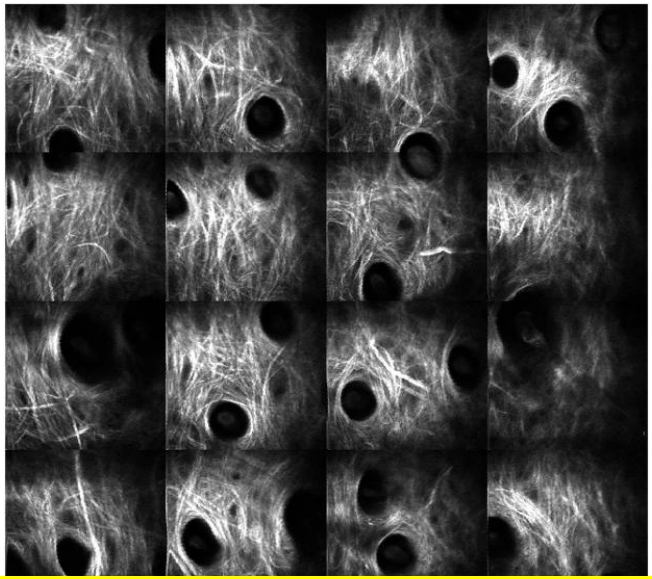
Large structural difference of collagen fiber
Delayed turnover due to declined activity of fibroblast

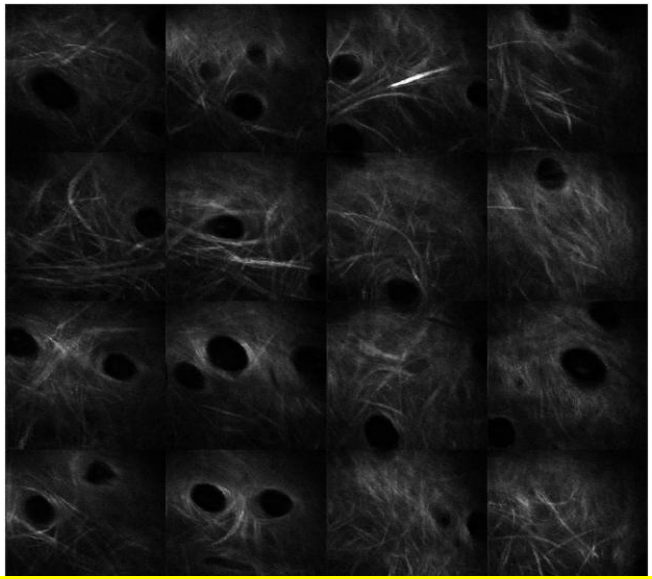
Influence of UVB exposure (3)

50's female subject

Fair-complexioned skin
(Rare UVB exposure)

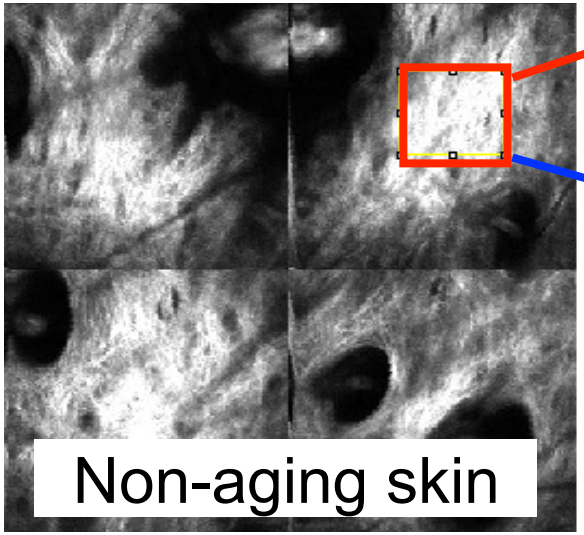
Fair-complexioned skin
(Frequent UVB exposure)





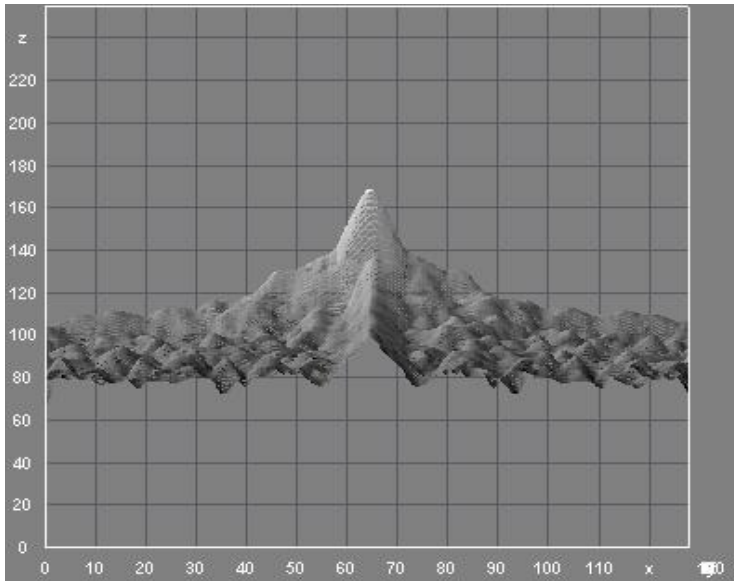
Photoaging is confirmed in fairy-complexioned skin

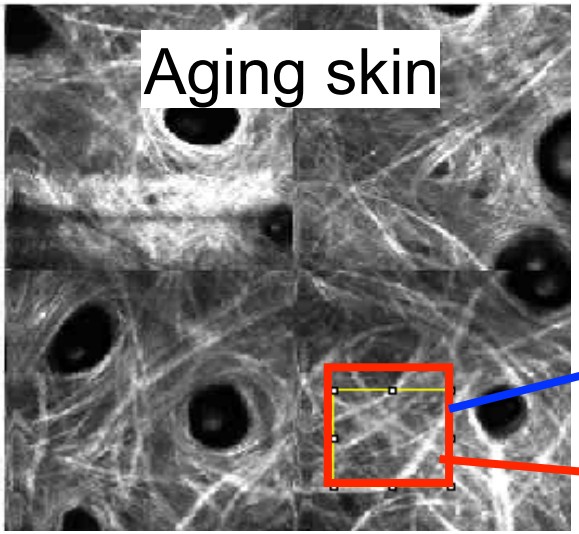
2D Fourier-transform analysis of SHG image



Dense distribution of fine collagen fiber

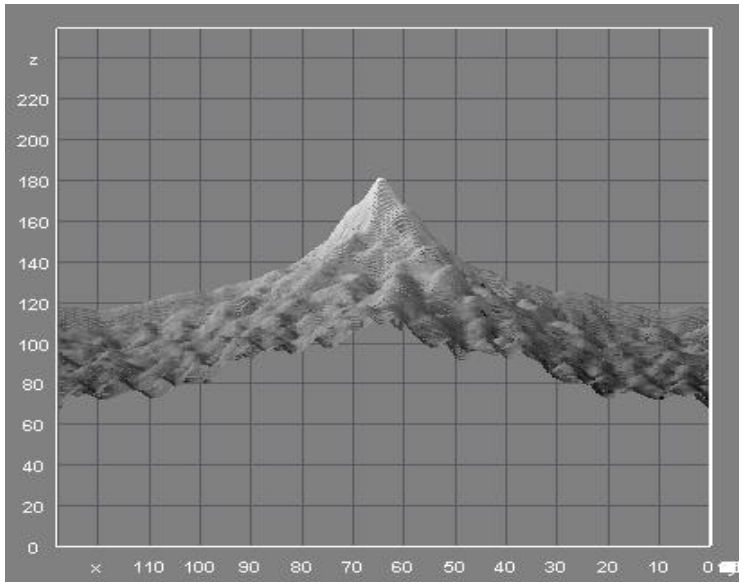
2D-FT of ROI





2D-FT of ROI

Coarse distribution of thick collagen fiber



Parameter of skin aging

- Select 5 ROIs (64pixel*64pixel) from each SHG image
- Perform 2D-FT of ROI
- Determine width of FT spectrum