Collagen Induction Therapy in Mouse (IPL vs. Micro-needling)

Hyung Sik Moon, Seong Eon Kim, Duk-Sung Ko[1], Ai-Young Lee[2]

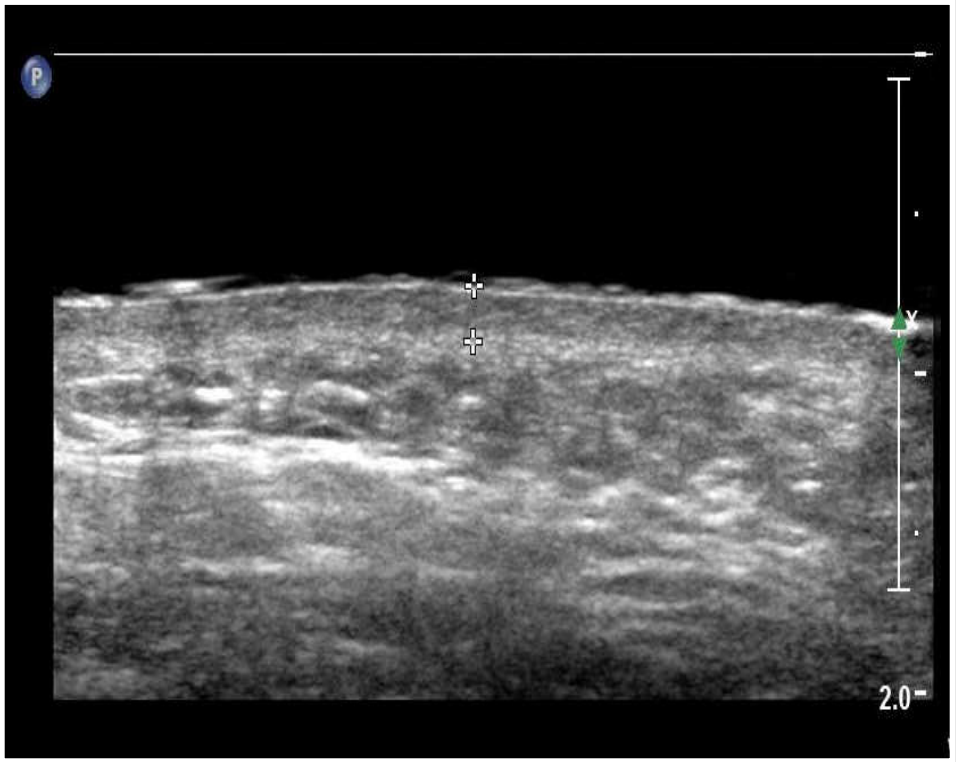
Department of Dermatology, Eulji University School of Medicine
Eulji Medical Science Laboratory[1]
Department of Dermatology, School of Medicine, Dongguk University[2]

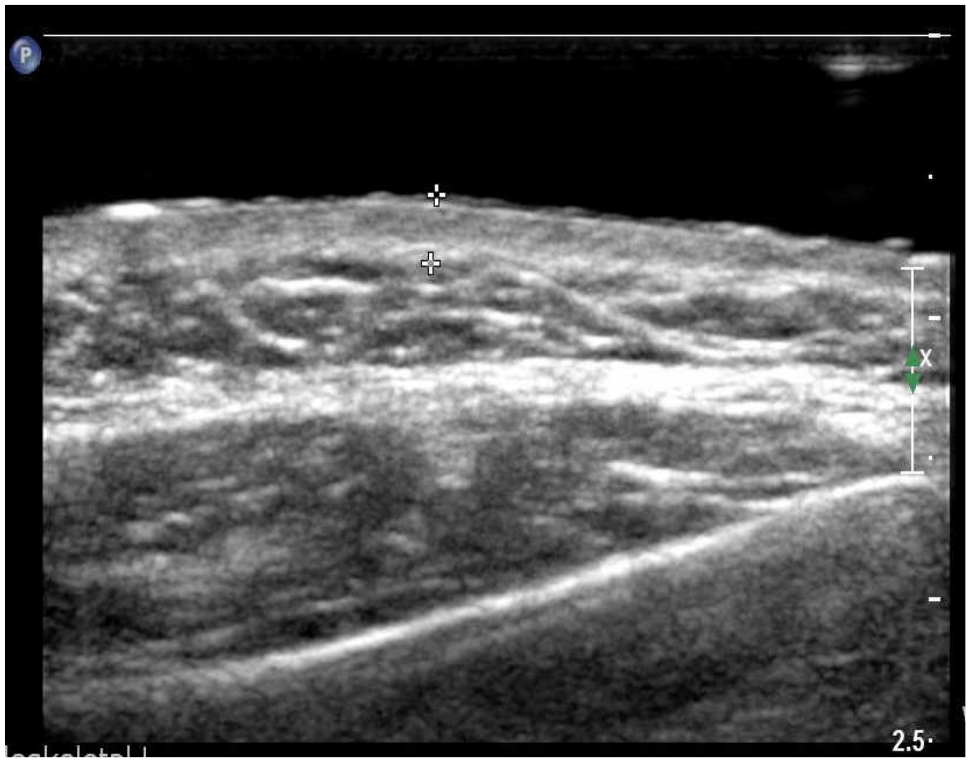
Background

Poster 141

5 months later

Poster 141





5 months later

Longitudinal: 1.91mm → **Longitudinal: 2.44mm**

Photo-rejuvenation

- IPL

Mechanical collagen inducing

- Micro-needling therapy (MTS)

Object

IPL VS. micro-needling

Skin thickness (calipers)

Microscopic evaluation (MT stain)

Collagen quantitative analysis

Collagen synthesis?

Materials & Methods

1. Mouse (ICR)

   Total: 54 (Control: 18 IPL: 18 MTS: 18)

2. Chemical epilation

   Thioglycolic acid 80% (니크린 크림™, 일동제약, Korea)

3. IPL

   Intense pulsed light (Ellipse, DDD, Denmark)

4. Micro-needling

   Microneedle therapy system (Dermaroller™, Clinical resolution, USA)

5. Caliper

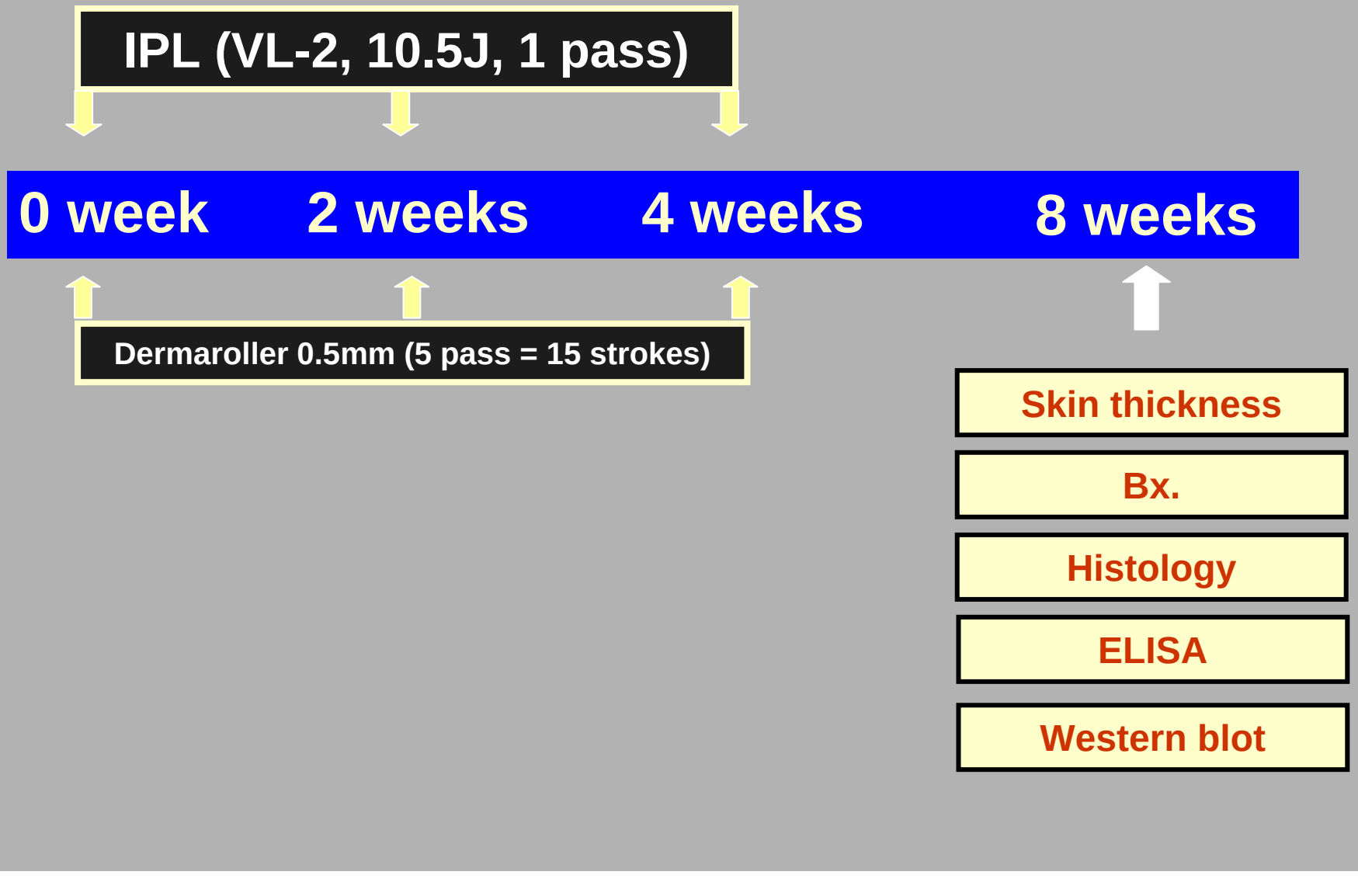
   Pocket thickness gage (Mituyoto™, Mituyoto corp., Japan)

6. MT staining

7. ELISA

   Sircol Collagen kit (Biocolor Ltd., Belfast Northern Ireland)

8. Western blot

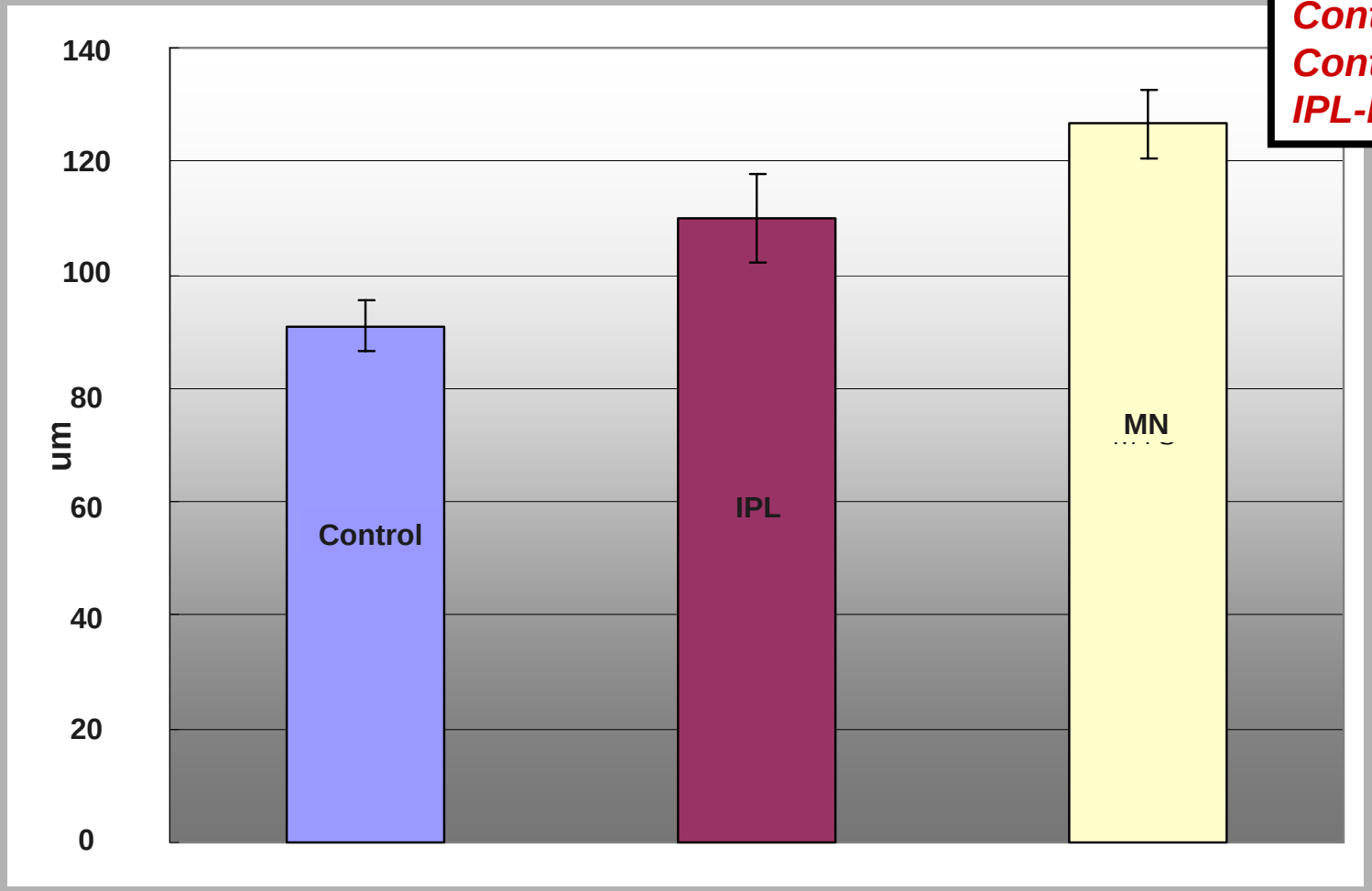

IPL (VL-2, 10.5J, 1 pass)
0 week
2 weeks
4 weeks
8 weeks
Dermaroller 0.5mm (5 pass = 15 strokes)
Skin thickness
Bx.
Histology
ELISA
Western blot

Result

Skin thickness (um)

control	IPL	Micro-needling
93	92	113
95	127	129
110	86	123
80	102	127
102	100	106
84	118	127
93	101	128
80	113	113
82	111	133
82	97	117
88	107	132
104	110	123
95	108	128
104	132	133
86	128	110
87	86	153
86	137	146
87	125	138

Skin thickness



p-value
Control-IPL: 0.000
Control-MN: 0.000
IPL-MN: 0.001

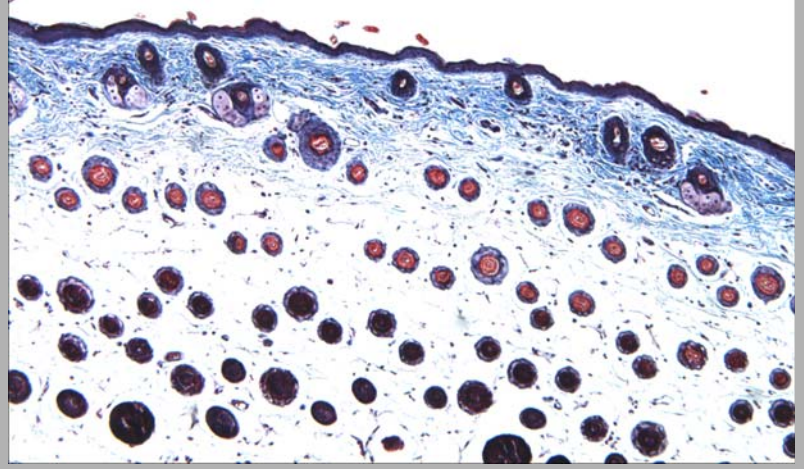
91.0±4.5

110.0±7.7

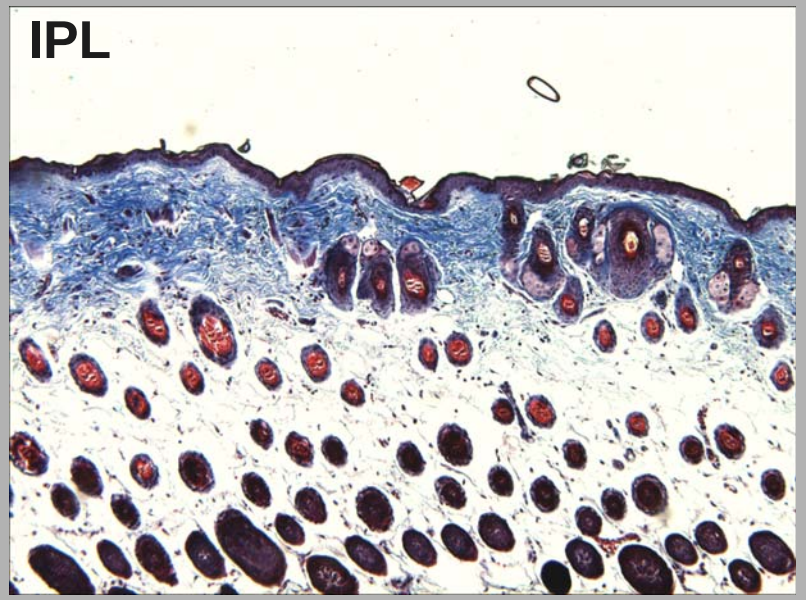
126.7±6.1

Histology (MT stain , X 100)

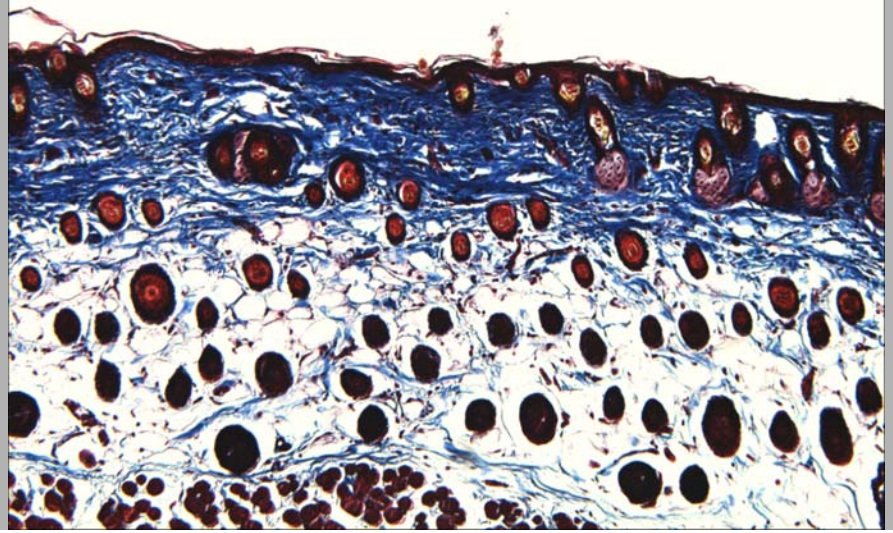
Control



IPL



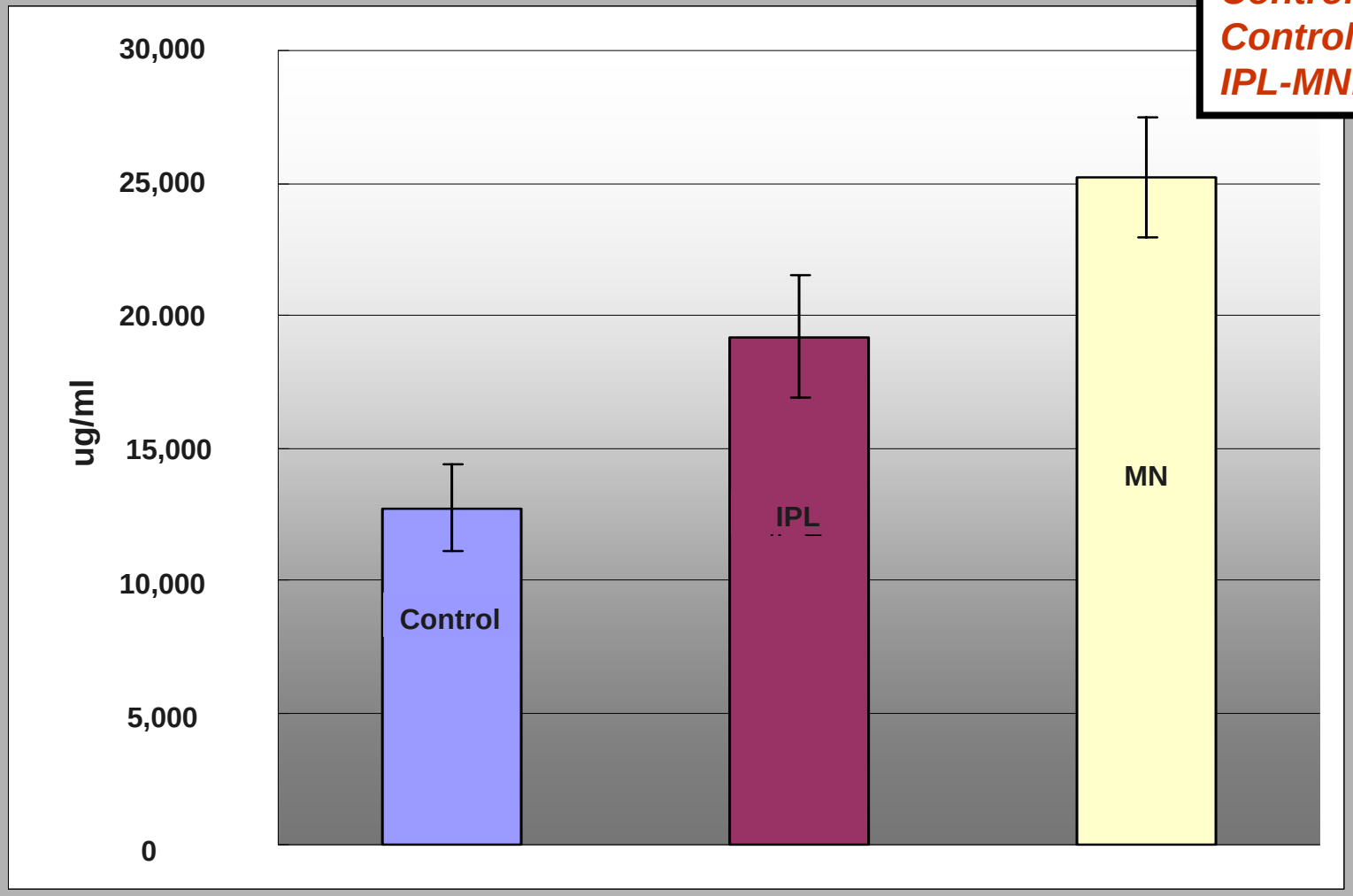
Micro-needling



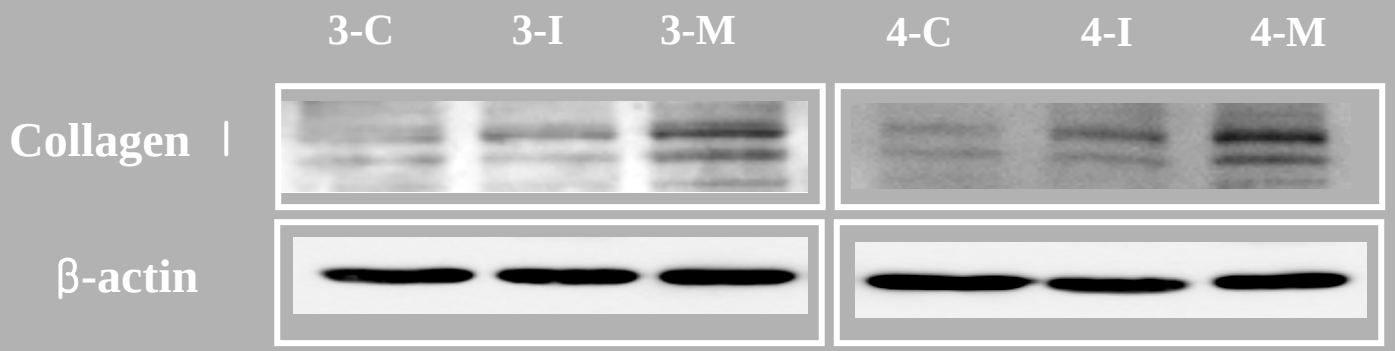
Collagen quantitative analysis (ELISA)

control	IPL	Micro-needling
13.873	22.298	23.600
13.683	21.957	53.300
16.027	15.069	20.877
12.275	21.776	16.108
7.470	17.425	26.460
14.101	29.545	41.100
10.749	13.702	23.768
18.218	23.094	21.886
19.957	17.606	12.921
10.796	19.176	31.921
16.111	9.756	21.080
8.636	15.165	20.225
10.253	17.554	19.683
11.032	20.425	29.178
9.757	16.298	18.916
11.790	18.642	21.909
12.180	24.741	20.448
11.791	21.253	29.942

Collagen quantitative analysis (ELISA)



Collagen quantitative analysis (Western blot)



1. **Skin thickness:**
   Control < IPL < Micro-needling
2. **MT Stain (collagen fiber):**
   Control < IPL < Micro-needling
3. **Collagen quantative anaysis (ELISA,WB):**
   Control < IPL < Micro-needling

Conclusion

Micro-needling

mechanical collagen inducing Tx.

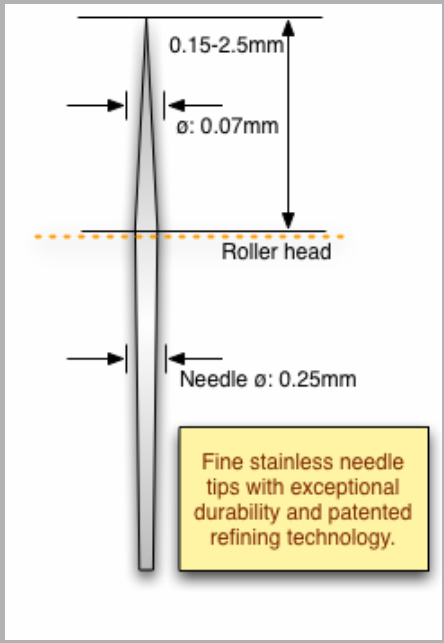
↓

Rejuvenation, Pore, Acne scar

Micro-needle therapy system (MTS)

– Natural response to wounding the skin

Penetrate (1.5mm)



Chemical cascade

Fibroblast growth factor

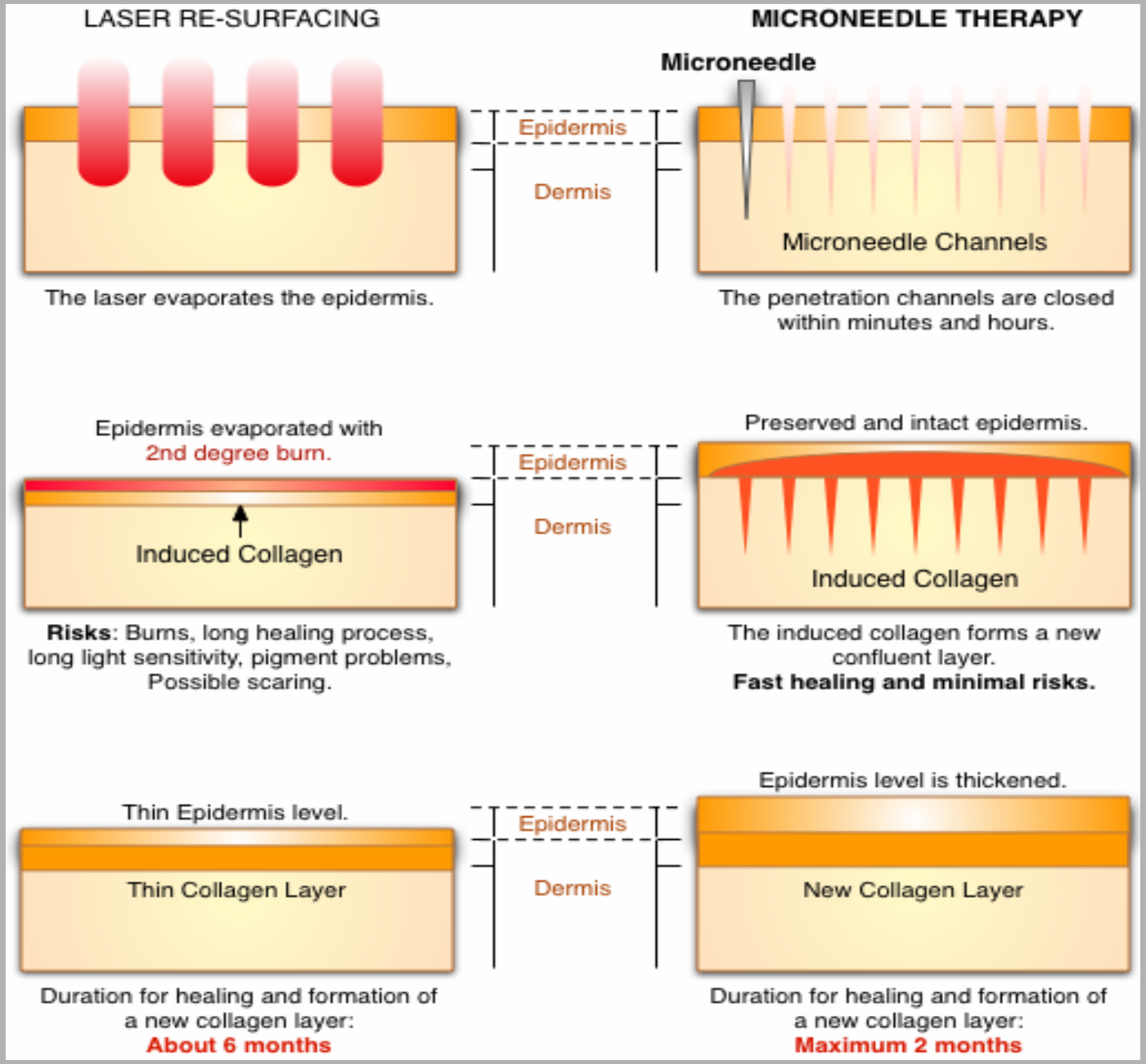
Transforming growth factor

Platelet derived growth factor

Collagen and elastin production

Collagen III (acute phase)

Collagen I (several years)


LASER RE-SURFACING
MICRONEEDLE THERAPY
Microneedle
Epidermis
Dermis
Microneedle Channels
The laser evaporates the epidermis.
The penetration channels are closed within minutes and hours.
Epidermis evaporated with 2nd degree burn.
Induced Collagen
Preserved and intact epidermis.
Induced Collagen
Risks: Burns, long healing process, long light sensitivity, pigment problems, Possible scaring.
The induced collagen forms a new confluent layer.
Fast healing and minimal risks.
Thin Epidermis level.
Thin Collagen Layer
Epidermis level is thickened.
New Collagen Layer
Duration for healing and formation of a new collagen layer:
About 6 months
Duration for healing and formation of a new collagen layer:
Maximum 2 months