

Skin blot examination for changes in systemic cytokine profiles induced by indirect irradiation of ultraviolet-free light on atopic dermatitis patients: an interventional pre-post study

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Background

- Atopic dermatitis (AD) is a skin disease characterized by dry, itchy, and inflamed skin.
- One remedy for AD is an ultraviolet (UV)-free light therapy.
- UV-free therapy is effective even when the light is irradiated to the normal skin far from the AD-affected sites¹; however, mechanisms has not been investigated.

Aim

To investigate the changes that occur with improvement in AD by indirect irradiation using UV-free light, with a focus on systemic cytokine changes.

Methods

- Five non-AD (M:1, F:4, age: 21-40) and four AD (M:1, F:3, age: 21-48) were enrolled with written informed consent.
- Intervention was exposing the soles of the feet to UV-free light for 15 min three times weekly for six weeks.
- Improvement of AD was assessed by Patient-Oriented Eczema Measure (POEM)².
- Systemic cytokines were collected using a skin blotting method, which can noninvasively capture circulating proteins through the skin³, pre- and post-intervention.
- Cytokines were measured by means of a human cytokine array kit (Abcam, UK).



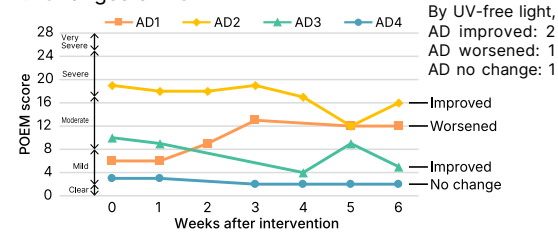
This study was approved by the ethics committee of Ishikawa Prefectural Nursing University (#2023-153-3)

Results

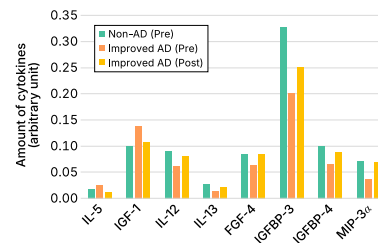
1. Participants' characteristics

	AD (n = 4)	Non-AD (n = 5)
Age, average(min-max)	30.5(21-48)	28.4(21-40)
Sex (female), n(%)	3(75.0)	4(80.0)
Use of moisturizer, n(%)	4(100)	3(60.0)
Topical medication, n(%)	3(75.0)	-
Corticosteroids	3(75.0)	-
Antihistamines	2(50.0)	-
Heparinoids	2(50.0)	-

2. Changes of POEM



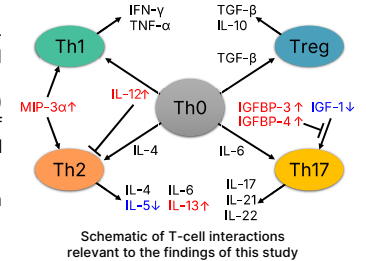
3. Changes of systemic cytokines



In individuals with improved AD,
2 cytokines were decreased and
6 cytokines were increased
after UV-free light treatment

Discussion

- The cytokines that showed changes were key regulators of helper T-cells (Th) (macrophage inhibitory protein (MIP)-3α, insulin-like growth factor (IGF)-1, IGF binding protein (IGFBP)-3, and IGFBP-4) and responders (including interleukin (IL)-5, IL-12, and IL-13), as summarized in the figure.
- Increase of IL-12 (which increases Th1) and decrease of IL-5 (Th2 cytokine) suggested improved balance of Th1 and Th2⁴.
- Decrease of IGF-1 (which leads to Th17-prone condition) and increase of IGF-1 inhibitors (IGFBPs) imply improvement of Th17/regulatory T cell (Treg) balance⁵.
- MIP-3α could be a master regulator of Th1 and Th2⁶.



Conclusion

Our skin blot examination results revealed changes in T cell-related cytokines (MIP-3α, IGF-1, IGFBP-3, IGFBP-4, IL-5, IL-12, and IL-13) following irradiation of unaffected skin with UV-free light in AD patients.

References

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