

A Single-Center, Randomized, Double-Blind, Placebo-Controlled Clinical Trial of the Effectiveness of ANT1 Soybean Extract Cream on Skin Recovery After Nd:YAG Laser Treatment

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Nd:YAG laser has been used extensively for its versatility in treating many common aesthetic problems, but numerous adverse effects are often complained by recipients of Nd:YAG laser. This study introduces the ANT1 soybean extract cream, which was formulated to alleviate adverse effects after laser therapy. This study explores whether ANT1 enhances the repair mechanism of the postlaser skin, decreases laser-induced complication, and shortens recovery time. The study also aims to pinpoint the ANT1 concentration that is most effective in improving the skin condition after Nd:YAG laser therapy.

Materials and Methods: This study was a single-center, randomized, double-blind, placebo-controlled trial. Patients eligible for the study were Asian women, aged 25 to 40 years, who were free of dermatological diseases and allergic reaction. There were a total of 45 subjects. Each subject received a session of Nd:YAG laser therapy every 2 weeks, totaling 3 sessions. Facial skin assessment was achieved via VISIA complexion analysis. VISIA complexion analysis quantitatively assessed the skin condition and tracked the recovery progress of each subject at baseline, immediately after all 3 laser sessions, and a week after the final laser treatment.

Results: Skin condition was evaluated by VISIA complexion analysis. Skin condition was recorded in aspects of pigmented spots, wrinkles, texture, pores, and red area. After Nd:YAG laser therapy, postlaser inflammation was observed in all subjects. Throughout the laser sessions and the outpatient follow-up clinic, the adverse effects of laser therapy, such as redness, spots, wrinkles, pores, and textures, decreased with the use of ANT1 cream. There has been a marked effect in wrinkle reduction in the patients who received a higher concentration of ANT1 cream ($P \leq 0.05$). Statistically significant improvement in spots and pores is also seen ($P \leq 0.05$).

Conclusions: Through this study, the results suggest that the application of ANT1 soybean extract cream ameliorates the complications and enhances the cosmetic effects of Nd:YAG laser therapy. A higher concentration of the ANT1 cream significantly reduces wrinkles and redness after laser. All in all, this study proves that the ANT1 soy extract cream may be a useful addition to postlaser care for an overall enhancement in skin condition and recovery.

Key Words: Nd:YAG, laser, VISIA complexion analysis, soy extract cream, texture, redness, pigmentation, wrinkles, pores, cosmetics, ANT1

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Nd:YAG laser has been used extensively due to its versatility in treating many common aesthetic problems, including hair removal for hypertrichosis, vascular lesions, pigmented lesions, unwanted tattoos, and wrinkles in photo-aged skin.^{1–5} However, despite the

numerous benefits, there are also numerous adverse effects often complained by recipients of Nd:YAG laser, such as swelling, redness, skin irritation, blistering, bruising, burning sensation, bleeding spots, and escharization.^{6–8} Postlaser skin care enhances the cosmetic results of laser treatments. Therefore, we focus on exploring and comparing the measures that can be taken to alleviate postlaser complications. This study introduces the ANT1 soybean extract cream, which is a patented product by Charsire Biotechnology Corporation in Tainan, Taiwan. It is a hydrolyzed soybean extract that was formulated to alleviate the adverse effects after cosmetic laser therapy. The efficacy of Charsire ANT1 cream lies in its ability to repair the dermis so as to restore the function of previously laser-damaged sebaceous glands. Metabolism is also enhanced in the epidermis, thereby preventing hyperpigmentation. Consequently, postlaser inflammation and hyperpigmentation can be reduced.⁹ This study aims to explore whether the use of ANT1 can enhance the repair mechanism of the postlaser skin, decrease laser-induced complication, and shorten the recovery time of a laser surgery, ultimately improving the skin condition of the tested subjects. As a difference in the concentration of ANT1 cream can lead to varying repair effects, the study also aims to pinpoint the ANT1 concentration that is most effective in improving the skin condition after Nd:YAG laser therapy.

PATIENTS AND METHODS

This study was a single-center, randomized, double-blind, placebo-controlled trial. Patients eligible for the study were Asian women, aged 25 to 40 years, who were free of dermatological diseases and allergic reaction. Only women between the aforementioned ages were selected to prevent variation in skin condition caused by age difference or gender. The absence of skin allergy was confirmed by a negative reaction after the application of the testing product on the flexor aspect of the arm for 48 hours. Exclusion criteria are as follows: (a) facial wounds or infection; (b) photosensitive skin; (c) skin irritability, sun damaged skin, rash, folliculitis, pregnancy, and other conditions not fit for laser therapy; (d) using skin care products containing retinoid acid or the like. The study subjects must also agree to receive documentation of their facial condition via VISIA Facial Imaging System for Clinical Research (Canfield Imaging Systems Inc, Parsippany, NJ). The study has been approved by the Institutional Review Board (IRB KMUHIRB-2014-07-01(I)) of Kaohsiung Medical University Hospital. Informed consents were also obtained.

There were a total of 45 subjects, who were randomly divided into 3 groups of 15 subjects, with the control group receiving placebo, a first subject group (ANT1-01) receiving ANT1 of a given concentration, and a second subject group (ANT1-02) receiving ANT1 of 1.6 times the concentration of the first subject group. Both the participants and the physician were blinded. Each subject received a session of Nd:YAG laser therapy every 2 weeks, totaling 3 sessions. The doses of Nd:YAG laser were 2.0 J/cm² with a spot size of 8 mm. Approximately 1800 spots were delivered in each session.

Facial skin assessment was achieved via VISIA complexion analysis, which performs a rapid, noninvasive, contact-free skin assessment and matches the results with a worldwide database, all of which

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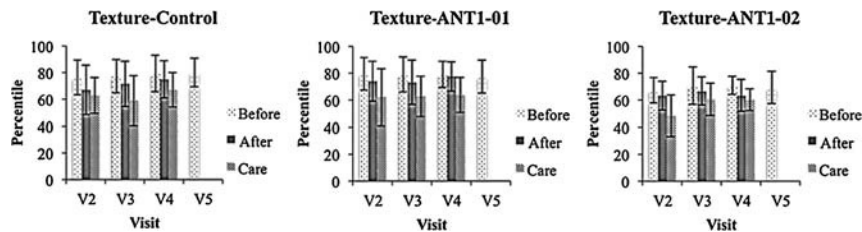


FIGURE 1. Effect on skin texture for each follow-up visit. In participants who received the higher ANT1 concentration (ANT1-02), there is a slight increase in percentile during visit 3 but the difference is not statistically significant. No significant improvement in texture was observed in the control group and the ANT1-01 group. Control: control group. ANT1-01: low-concentration ANT1 cream. ANT1-02: high-concentration ANT1 cream (1.6 times the concentration of ANT1-01). Visit 2: first Nd:YAG laser therapy (3 VISIA analyses taken: before, immediately after laser, after postlaser skin care). Visit 3: second Nd:YAG laser therapy (14 days after Visit 2) (3 VISIA analyses taken: before, immediately after laser, after postlaser skin care). Visit 4: third Nd:YAG laser therapy (14 days after visit 3) (3 VISIA analyses taken: before, immediately after laser, after postlaser skin care). Visit 5: outpatient follow-up session, seven days after visit 4.

can be accomplished within five minutes. More specifically, VISIA complexion analysis uses 3-point standard white light, ultraviolet light, and cross-polarized light for 3-light imaging to assess skin condition by gathering information on pigmented spots, wrinkles, texture, pores, and red areas.¹⁰ In this study, VISIA complexion analysis quantitatively assessed the skin condition and tracked the recovery progress of each subject before, immediately after all 3 laser sessions, right after skin care, and a week after the final laser treatment. The first VISIA analysis took place before the first session of laser therapy, which recorded the prelaser, baseline dermatological condition of the subject. The second analysis was performed immediately after all 3 laser sessions were completed, which recorded the immediate postlaser skin condition. The third analysis was arranged after the subject received standard postlaser skin care. The final VISIA analysis was performed 7 days after the very last session of Nd:YAG laser therapy, which followed up on the skin condition after a week of standard postlaser care. As for care after completing Nd:YAG laser therapy, each blinded subject was instructed to apply skin lotion and sunscreen twice per day, once in the morning and once in the evening. The results from VISIA complexion analysis for all four outpatient clinic visits were then collected for statistical analysis with the paired *t* test to determine the effectiveness of ANT1 soybean extract cream on postlaser facial skin care.

RESULTS

The patented ANT1 soybean extract cream produced by Charsire Biotechnology Corporation has been tested to be nontoxic by animal studies for its chemical stability and safety. All eligible participants were randomly assigned to 3 groups for testing. The participants were only given the ANT1 cream for testing after signing permissions for the IRB (KMUHIRB-2014-07-01(I)). The participants received LUTRONIC laser therapy (Nd:YAG laser) on regular intervals of 1 therapy per 2 weeks, totaling 3 therapies. An outpatient follow-up session was arranged a week after the laser therapy, totaling 4 outpatient follow-ups.

Before every Nd:YAG laser therapy, VISIA complexion analysis was performed for noninvasive assessment of prelaser skin condition. After each laser therapy, standard nursing practice was carried out by applying and leaving moisturizing lotion (containing the tested product) on the entire face for fifteen minutes, then finishing by applying sunscreen (also containing the tested product) on the entire face. A 2-week supply of moisturizing lotion and sunscreen, both containing the tested product, was provided for daily morning and evening application for 14 days. Skin condition was evaluated and recorded by VISIA complexion analysis before and after every laser therapy, and after each aforementioned standard nursing practice.

VISIA complexion analysis evaluates the skin for its texture, red areas, pigmented spots, wrinkles, and pores and then gathers data for visit 2, visit 3, visit 4, and visit 5. The collected data are statistically analyzed with the paired *t* test and presented in the following figures: the *x* axis indicates which outpatient follow-up; the *y* axis shows the percentile from the baseline obtained by the VISIA complexion analysis, with a higher percentile indicating a better skin condition. For all 3 groups, the improvement rate of each participant in each tested item for all 3 rounds is analyzed for any statistical significance between the control and subject groups.

Texture measures the smoothness of the skin by identifying the elevations and depressions of the skin. Elevated areas include pimples, milia, blackheads, and dead skin cells. Depressions are fine lines, open pores, and open hair follicles. The results are presented in Figure 1. The effects of different concentrations of ANT1 cream are compared among the control group and the 2 subject groups. In participants who received the higher ANT1 concentration (ANT1-02), there is a slight increase in percentile during visit 3 but the difference is not statistically significant. No significant improvement in texture was observed in the control group and the ANT1-01 group.

Red areas are weakened and broken capillaries, signifying sub-surface vascular conditions such as inflammation, spider veins, rosacea, or acne. The results are presented in Figure 2). After statistical analysis,

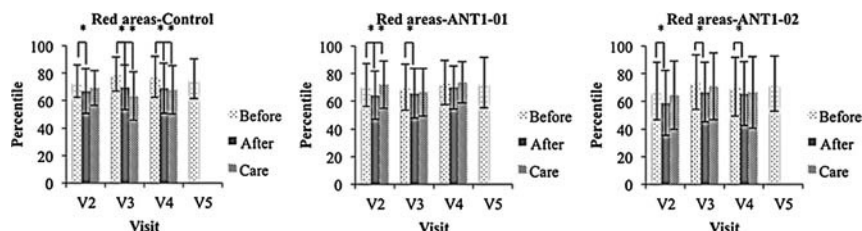


FIGURE 2. Effect on red areas (skin redness) for each follow-up visit. The percentile after laser therapy significantly decreased in all 3 groups (control, ANT1-01, ANT1-02), meaning that laser therapy causes facial redness ($P < 0.05$). In the control group, better results are seen during visit 3 and visit 4. In both ANT1-01 and ANT1-02 groups, improvement in skin redness after nursing care is higher than that after laser therapy.

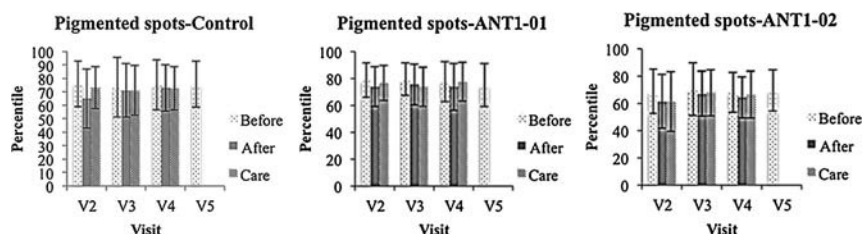


FIGURE 3. Effect on pigmented spots for each follow-up visit. No significant difference is seen between the control and 2 subject groups after laser therapy and standard nursing care.

the percentile after laser therapy significantly decreased in all 3 groups (control, ANT1-01, ANT1-02), meaning that laser therapy causes facial redness ($P < 0.05$). In the control group, better results are seen during visit 3 and visit 4. In both ANT1-01 and ANT1-02 groups, improvement in skin redness after nursing care is higher than that after laser therapy. Significant reduction in skin redness is seen in ANT1-02 with $P = 0.031$ ($P < 0.05$).

Pigmented spots are focal melanocyte accumulations that are visible to the naked eye. Results are presented in Figure 3. No significant difference is seen between the control and 2 subject groups after laser therapy and standard nursing care. A possible explanation can be due to the difference in the participants' lifestyle, extrinsic factors, or the fact there are only 3 therapy sessions in this study, thereby making no significant difference.

Wrinkles are furrows, folds, or creases in the skin that increase over time as a result of aging and sun exposure. Wrinkles are associated with decreased collagen and elastin in the dermis. Results are presented in Figure 4. In the ANT1-02 experiment group, significant improvement in wrinkles is seen after standard nursing care during visit 3 and visit 4. No significant improvement is seen for the lower concentration ANT1-01 experiment group. Therefore, it can be induced that the application of high concentration ANT1 cream can reduce wrinkles with $P = 0.019$ ($P < 0.05$).

Pores are skin openings of sweat and oil gland ducts, and the sebum from pores can help thermal regulation and prevent skin from drying out. People with the oily skin type have much more active sweat and oil glands, as well as excess sebum, which if in adequate amount moisturize and regulate heat of the skin, can build up, and clog the pores. Clogging and eventual enlargement of pores can also result from improper cleaning. Larger pores can also be attributed to the male gender, aging process, the external physical environment, stress, and lifestyle habits. The VISIA system can distinguish pores from spots based on size as pores are much smaller than spots. The results are presented in Figure 5. After statistical analysis, no significant difference was observed among the control group, ANT1-01 experimental group, and ANT1-02 experimental group.

DISCUSSION

Many complications are associated with laser therapy. For instance, postinflammatory hyperpigmentation can often occur after laser

therapies, which may be even more of a concern for Asians.⁷ Topical application of soy is not a novel concept as it has been used for improving hyperpigmentation, skin elasticity, oil control, and skin moisturizing. Soy has also been used for its potential antioxidative qualities of decreasing skin photoaging and skin cancer.¹¹ High levels of protein and essential amino acids, omega-3 fatty acids, fat-soluble vitamins, polysaccharides, and insoluble fibers are detected in soybean and its extracts.¹² Moreover, soybeans also carry a rich source of isoflavones,¹³ which possess antihemolytic, antioxidative, antifungal, estrogenic, and antitumoral effects.^{14–17} More specifically, genistin, which is the main isoflavone found in soy, has been reported to produce in vitro and in vivo anti-inflammatory effects.¹⁸ For instance, in vivo studies have demonstrated that topical soybean-germ oil protects against ultraviolet B–induced skin inflammation.¹⁹

For an objective evaluation of the effectiveness of ANT1 cream on skin condition, VISIA complexion analysis was chosen for its high-tech RBX skin photo system where internal position and standard illumination produce consistent and repeatable images. In addition, the system also allows for an objective comparison of women of the same age group and ethnicity. Because of its noninvasive nature, as well as its prominent features of high-definition, specificity, quantitiveness, repeatability, and a sizeable global database, the VISIA complexion analysis serves as an ideal modality to acquire objective assessment results.²⁰ According to Goldsberry et al.,²¹ patients prefer going to a practice equipped with the VISIA system than one without because it aids in patient education and understanding of their own skin condition. Specific qualities of the skin, such as skin pores, can be readily assessed with the VISIA system as well.²²

The VISIA system is currently widely used for its outstanding ability to perform facial assessments regarding treatments. In a study on the efficacy of over-the-counter skincare regimen for the treatment of acne vulgaris by Rodan et al.²³ in 2017, evaluations for effectiveness, such as skin redness and inflammation, were performed at baseline and weeks 2, 4, and 6 by capturing digital images of the face via the VISIA system. In Narurkar's 2016 study on the efficacy of hydrolyzed roe cream in the reduction of facial erythema after a chemical peel treatment, digital evaluation of erythema and edema scores was performed with the VISIA system at baseline and 8 and 24 hours postfacial peel.²⁴ According to Peterson et al.,²⁵ their evaluation of the cleansing efficacy/protective effect of a sonic brush versus manual cleansing against

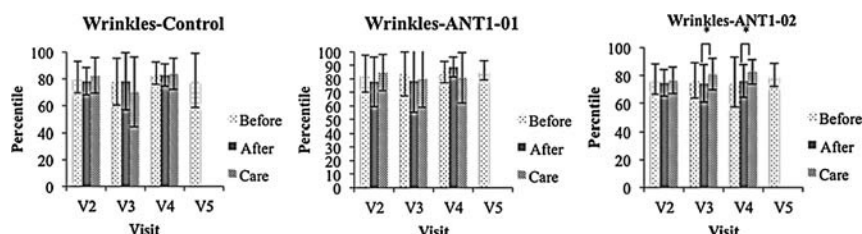


FIGURE 4. Effect on wrinkles for each follow-up visit. In the ANT1-02 experiment group, significant improvement in wrinkles is seen after standard nursing care during visit 3 and visit 4. No significant improvement is seen for the lower concentration ANT1-01 experiment group. Therefore, it can be induced that application with high concentration ANT1 cream can reduce wrinkles.

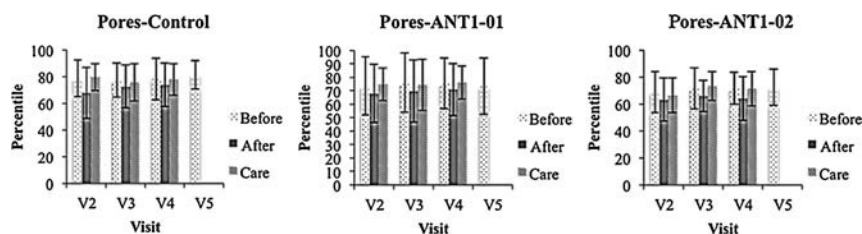


FIGURE 5. Effect on skin pores for each follow-up visit. No significant difference was observed among the control group, ANT1-01 experimental group, and ANT1-02 experimental group.

particulate pollution was conducted with the VISIA system regarding color intensity at baseline, precleansing, and postcleansing.

Both subject groups that received a lower and higher concentration of ANT1 cream showed improvement in cosmetic results with a more marked wrinkle reduction in patients who received the higher concentration of ANT1 cream ($P \leq 0.05$). The aspects that show insignificant improvement, such as in skin texture, may indicate that more therapy sessions are needed. When it comes to determining how many sessions of Nd:YAG laser therapy is required, Yongqian et al²⁶ observed that a statistically significant improvement in wrinkles and skin texture can be achieved after an average of 7.76 ± 2.99 sessions compared with the untreated face. Also, the degree of skin rejuvenation positively correlates with the number of treatment sessions.²⁶ According to the study on improving postsurgical scar by 1064 nm Nd:YAG laser by Ezra et al,²⁷ the complications of laser treatments were limited to less than 2 hours of erythema, and no incidences of adverse effects were reported.

CONCLUSIONS

There are many common short-term adverse effects associated with skin laser treatment, and Nd:YAG laser therapy is not an exception. Measures can be taken to decrease and even prevent such complications. Through this study, the results suggest that the application of ANT1 soybean extract cream ameliorates the complications and enhances the cosmetic effects of Nd:YAG laser therapy. A higher concentration of the ANT1 cream significantly reduces wrinkles and redness after laser. All in all, this study proves that the ANT1 soy extract cream may be a useful addition to postlaser care for an overall enhancement in skin condition and recovery.

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