Vitiligo nbUVB Treatment Protocol

By John E. Harris, MD, PhD and Mark Scharf, MD

The success of nbUVB (311-312) therapy for vitiligo was first reported by Westerhof and Nieuweboer-Krobotova in 1997 (*1*). Yones et al. reported superior efficacy of nbUVB over PUVA in 2007 (*2*). No evidence-based guidelines for treatment have been reported, and current protocols are based on experience. In general, a safe, aggressive treatment protocol is preferred to a conservative one for two reasons: 1) slow progression wastes time for the patient, who is eager to find the dose that will induce repigmentation. 2) slow progression encourages light adaptation in the skin, which blocks UV penetration and the beneficial effects, possibly prolonging the time it takes to reach a therapeutic dose.

Frequency: Treatment frequency should be 2-3x/wk. In two separate studies comparing 2x/wk vs. 3x/wk for vitiligo (Excimer laser)(*3*) and psoriasis (nbUVB)(*4*), 3x/weekly produced faster results than 2x/weekly, however eventually the two schedules resulted in equivalent efficacy. Therefore, if the patient's schedule allows, I recommend starting at 3x/weekly for the first 3 months, and then decreasing to 2x/weekly thereafter.

Dosing: A slight pink erythema lasting less than 24 hrs is thought to be an optimal response (*5*), which will occur at different light doses in different patients. The recommended starting dose for non-vitiligo treatment protocols is typically 50-70% of the MED assessed for each patient. Assessing MED for vitiligo is difficult due to limited involved skin, and arguably unnecessary since depigmented skin is similar to Type I skin, for which the average MED is 400. Therefore most protocols in use recommend basing the starting dose on this standard. Recommendations for increases at each visit are typically 5-20% of the previous dose, however many use a set dose increase that falls within this range for early treatments. Some protocols recommend soft holding doses, ranging from 500 – 3000 mJ/cm^2 (1000 for face), however others have no set limits and have reportly used up to 5000 mJ/cm^2. There have been no reports of increased skin cancer risk using nbUVB (unlike PUVA), and therefore there are currently no recommendations for maximum number of treatments (*6*).

Shielding: Shielding of sensitive anatomic sites is recommended by most protocols. A single study reported an increased cancer risk of nbUVB to male genitals (*7*), and therefore shielding of male genitals during treatment is recommended. Because female genitals are typically not exposed during treatment, shielding is not required. UVB has been implicated in the formation of cataracts (*8*), and therefore shielding with UVB-protective goggles is standard practice, however this prevents treatment of eyelids, with unsatisfactory results (*9*). Occasionally patients will be allowed to keep their eyes closed without goggles to expose the eyelids when necessary. Recent advances in contact lenses demonstrate the ability of Class I (Senofilcon A) soft contact lenses to block >99% UVB light and protect rabbit cornea from adverse effects (*10*). Therefore, we will allow our patients with periocular depigmentation to wear Class I soft contact lenses in place of goggles during the beginning of each treatment session. Eyelids will be evaluated for erythema separately from the rest of the body, replacing goggles for the remainder of the session once "eyelid dose" appropriate for the patient has been reached.

The first UMass protocol for nbUVB treatment of vitiligo (pre-2012) recommended a 200 mJ/cm^2 starting dose, increasing by 50 mJ/cm^2 at each visit; missed visits resulted in a dose decrease by 50% after 1-2 weeks or starting over after that. The following protocol was adapted by surveying other dermatology treatment centers (Henry Ford, UPenn), reviewing the methods for nbUVB efficacy studies in the literature, and from the current edition of Phototherapy Treatment Protocols (*11*). The current protocol will aim for mild erythema lasting 24-48 hrs, based on updated recommendations (*11*). These guidelines are subject to change, and suggestions for modification are welcome.

References:

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Protocol

1. Ensure the patient has been properly consented for treatment and has signed the consent form.
2. Have the patient undress and expose the areas of vitiligo to be treated. Male patients should wear an athletic supporter or other appropriate shielding for the genitals, and all patients should cover nipples with zinc paste unless otherwise directed or permitted by the attending physician.
3. Eye protection in the form of UV goggles OR UV-protective contact lenses (as directed by the attending physician) must be worn by all patients when inside the phototherapy unit.
4. The irradiance (mW/cm^2) of the nbUVB light inside the unit should be recorded once monthly using the standard method of the manufacturer of the phototherapy unit. Record this irradiance on the phototherapy record sheet or keep an irradiance log book for the equipment used in patient care.
5. The initial nbUVB dose (mJ/cm^2) will be the same for all patients with vitiligo. It is 200 mJ/cm^2.
6. The manual method for calculation of the time (seconds) to set the nbUVB control panel to deliver the dose from #5 is the following equation. The measurement of the irradiance can be obtained from the log book kept on a monthly basis.

$$\text{TIME (seconds)} = \text{DOSE } (mJ/cm^2) / \text{IRRADIANCE } (mW/cm^2)$$

7. The duration of a treatment or total dose of nbUVB to be delivered can often be calculated by the UV light unit by following the manufacturer's instructions in the operations manual and inputting the correct information on the control panel prior to the delivery of the treatment.
8. Set the time (dose) on the UV light unit. In some phototherapy units the session duration is dependent on the dose measured by an internal photometer and the time must be estimated by the technician.
9. Verify that the UV light unit is set on nbUVB.
10. Turn on the fan and have the patient stand in the center of the UV light unit with their arms at rest or in the best position to expose required areas. Double-check that they are wearing eye protection.
11. Instruct the patient to come out of the UV light box when the lights go out or if they become uncomfortable during the treatment either from burning or stinging of the skin. Inform the patient that the unit doors are not locked.
12. Start the treatment.
13. The frequency of nbUVB light treatments for the diagnosis of vitiligo is 2-3x weekly as ordered by the attending physician.
14. On subsequent visits, ask the patient about pinkness/tenderness of the skin the previous days, and document the response in the phototherapy record.
15. If there was no pinkness following the previous dose of nbUVB, increase the dose of UVB by 50 mJ/cm^2. If the patient reports that there was pinkness or there is mild pinkness today, maintain the dose. If there is moderate pinkness with or without pain today, decrease the dose by 25 mJ/cm^2. If there is severe pinkness/redness or there is pain, ask physician to evaluate the patient, wait until it resolves, and restart at a 15% decreased dose. Once the ordered holding dose is reached, hold at that

dose until next evaluated by a physician, which will generally be 6-12 weeks after starting therapy. The holding dose may be increased at that time.

16. Dose adjustments for missed treatments. If the patient has missed:

    Up to 1 week – maintain previous dose
    1-2 weeks - Decrease by 25%
    2-3 weeks - Decrease by 50%
    2-3 weeks - Decrease by 75%
    > 4 weeks - Restart at 200 mJ/cm^2

Vitiligo nbUVB Treatment Protocol Summary

Vitiligo starting dose = **200 mJ/cm^2** (0.5 x MED for Type I skin, 400 mJ/cm^2)

Increase dose by **50 mJ/cm^2** at each visit until mild erythema lasting <24 hrs reported by patient

Hold dose at **800 mJ/cm^2** – this may vary or be increased over the course of treatment, and will be marked in the physician order.

Skin assessment	Dose adjustment
No erythema reported after last treatment	Increase 50 mJ/cm^2
Mild erythema but not painful	Hold dose constant
Moderate erythema or painful	Decrease 25 mJ/cm^2
Severe, painful erythema	Call a physician, wait until resolution, decrease dose by 15%

Length of time since previous dose	Dose adjustment
Up to 1 week	Maintain dose
1-2 weeks	Decrease by 25%
2-3 weeks	Decrease by 50%
3-4 weeks	Decrease by 75%
>4 weeks	Restart at 200 mJ/cm^2