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OPINION ARTICLE

# Narrowband Ultraviolet B Therapy in Psoriasis: Reality, Outlook, and Uncertainty

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Developed and perfected as a specific treatment for psoriasis, narrowband ultraviolet B (UV-B) therapy entered the clinical practice of dermatology back in the last century, at the beginning of the 1980s. The hindsight afforded by a certain distance allows us to state that the arguments underlying the use of this treatment, that is, a peak close to 311 nm is the ideal UV-B band for the treatment of psoriasis, would prove more than debatable from a strictly scientific standpoint. Thus, the studies on which this paradigm was based had very small samples, and their methodology was not sufficiently rigorous to support such a forceful statement.[1,2]

Nevertheless, the history of medicine has occasionally shown that weakness in the concept is compensated by the benefit of experience. Thus, the evidence gathered over a short period proved sufficient to conclude that the old broadband UV-B therapy was surpassed both in efficacy and in ease of use by the then novel narrowband UV-B therapy, at least when the usual TL12 lamps (broadband UV-B) were compared with the TL01 lamps (narrowband UV-B). This nuance will be discussed below.[3]

The good results obtained compared to broadband UV-B therapy encouraged phototherapists to consider the new arrival as an interesting and powerful option, capable of challenging the—until then—undisputed psoralen UV-A therapy (or PUVA, that is, psoralens combined with UV-A). For almost 20 years, PUVA was considered the most effective treatment in the moderate and severe forms of psoriasis, not only with respect to other types of phototherapy, but also when compared with the available pharmacologic alternatives. Comparisons aside, and although we could cite methodologic nuances, an assessment of the most rigorous studies has shown some advantage for the old PUVA, in terms both of efficacy and of duration of response, which was longer the more severe the psoriasis.[4] However, this circumstance did not prevent the main dermatology societies from considering narrowband UV-A as a first-choice alternative in phototherapy for psoriasis.[5] PUVA became a victim of the times, and the long-term carcinogenic risks and discomfort meant that its demonstrated efficacy was no match for the presumably safer narrowband UV-B. This is a clear example of how the success of a treatment not only depends on its intrinsic qualities, but also on its ability to remain in tune with the trends and direction of a given moment in history.

Therefore, in just a few years, narrowband UV-B therapy has come to be considered the gold standard for phototherapy in psoriasis, and has even overcome the initial reticence from across the Atlantic, inevitable when a treatment is invented and developed in Europe. The usual tendency among dermatologists to extend success in some skin complaints to others—not always with related etiology—has borne its fruits in the case of narrowband UV-B. This is clear from the fact that it has achieved the status of a first-line therapy in the management of dermatoses that are varied in nature yet equal in terms of how difficult they are to treat—including vitiligo, photodermatosis, cutaneous T-cell lymphoma, or atopic dermatitis—and of one of the few remedies that is reasonably effective in processes with no known cure such as aquagenic pruritus or prurigo nodularis.[6]

However, the success of a treatment fades quickly nowadays, and vintage is more a burden than a virtue for a therapeutic alternative when faced with the shine—often fueled by underlying interests—of the new. It is therefore time to ask what future lies in store for narrowband UV-B therapy, and whether it can be improved upon.

Today, between 60% and 80% of patients with psoriasis achieve excellent results—improvements in the Psoriasis Area Severity Index (PASI) score of 75%-90%—with narrowband UV-B therapy.[7] Even with the lower limit, these expectations are more than considerable when compared with other therapeutic options, including some of the new and technologically impeccable biologic agents. Is it possible to improve upon these results? Our significant clinical experience to date has shown that the optimal frequency for treatment is 3 weekly sessions—a lower frequency might not have the desired therapeutic effect and a higher frequency, while accelerating the response,

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could lead to a greater cumulative dose.[8] We also know that, although erythematogenic regimens (in common use during the early years) can accelerate the response, their efficacy at the end of treatment is similar to that of suberythematogenic regimens (more comfortable and probably safer in the long term).[9,10] Therefore, it seems that the options in this area have been fully explored. However, overall expectations could be improved if the patients chosen for therapy are those with the greatest likelihood of having a response. Thus, although the extension of the skin disease is not a disadvantage, high PASI scores for infiltration and hyperkeratosis could be, particularly on the lower limbs. In this case, an alternative such as PUVA could prove more efficient.[11]

Equally enterprising have been efforts to optimize response using different therapeutic combinations, the most notable of which—given the attention they have received in the literature—are vitamin D derivatives or acitretin. However, a stringent assessment of the studies published reveals, in the best of cases, a far from negligible reduction in the cumulative dose and an accelerated response, but no objective improvement in the results at the end of treatment.[5] A noteworthy novelty is to be found in the proposal for pretreatment with cyclosporine A and methotrexate for a few weeks, using strategies similar to those applied with some biologic agents whose end result is, however, as pointed out above.[12] Thus, at least with currently available equipment, the best results possible are likely to be observed in specialized clinics, although the benefits of the combinations are more superficial than substantial.

Narrowband UV-B is considered safe in the short term, although there are some reservations as to the long term. Various experimental approaches based on laboratory models indicate that the carcinogenic potential of narrowband UV-B therapy is greater than that of broadband UV-B therapy. Moreover, in much the same way as PUVA some years ago, the reasonable limit proposed as a safe dose has been set at 450 sessions during a patient's lifetime.[13] However, the basis and starting point of this proposal is a theoretical appraisal, and the retrospective data available to date have not been able to reveal an increase in the incidence of skin cancer among patients treated with narrowband UV-B.[14] This circumstance could be indicative both of a latency period that is too short to allow us to draw conclusions, and, though not common, of a certain lack of precision in assuming real consequences from laboratory findings. In any case, by applying well established criteria used in other types of phototherapy and general knowledge from photobiology, optimal safety seems likely to be achieved by using suberythematogenic regimens and by protecting and limiting the areas exposed to UV radiation in the environment or workplace.

One of the unstudied, yet reasonable, explanations for why narrowband UV-B therapy is purportedly underused—and this could apply to other types of phototherapy—is to be found in the area of logistics. That is, the patient must attend a phototherapy center several times a week. Obtaining time off work, personal reasons, and the limited number of centers and appointments available limit the potential number of patients who could undergo this treatment. The potential solutions are complex to apply, as they involve increasing resources by making more hospitals available, preparing day hospitals with longer timetables, or even considering a change of strategy by bringing phototherapy to the patient. This apparently complex possibility has been successfully explored in some European countries, and has resulted in an efficient home phototherapy system. The results obtained by the authors are similar to those expected in a hospital unit, with a very acceptable safety profile and greater comfort for the patient. The possibility of applying one's treatment at home also gives patients a greater feeling of control over their own disease, a variable of some worth in these times when such a high priority is given to subjective opinion.[15] However, access to the necessary resources and, in particular, the management and coordination between the different parties involved (eg, dermatologists, technicians, nursing staff in charge of training and supervising treatment, staff responsible for logistics and equipment maintenance), while apparently accessible in other areas, seem somewhat difficult to achieve in our area. In fact, it is not uncommon for the manager not only to be ignorant of the efficiency of phototherapy, but also to be uneasy with, even scornful of, a technology that he or she believes limited to cosmetic or recreational use.

Another important question in the global assessment of narrowband UV-B therapy is its cost. A study carried out 2 years ago calculated the mean cost of 2 years of treatment to be €325 per patient, most of which (70%) were staff costs.[16] Although these figures lead us to believe that it is possible to reduce costs by optimizing timetables and facilities, the victory becomes somewhat Pyrrhic given the current emphasis on biologic agents. Paradoxically, their apparent advantage could become a drawback. It never ceases to amaze how the public health system or health insurance companies penalize clients who attend phototherapy clinics by enforcing copayment for sessions. This approach is pushing many patients toward biologic agents, which are much more expensive.[17] Although copayment for sessions has not yet affected the Spanish health system, phototherapy patients are at a comparative disadvantage in that, even in the public health system, they must assume the indirect costs of treatment (eg, transport, work hours lost). This could move patients towards

therapeutic resources that are more expensive for the system, yet more comfortable for them.

The mechanism of action of narrowband UV-B, which is based on lymphocyte apoptosis and immunomodulatory effects limited to the skin, gives the technique an attractive safety profile in combination with various treatments, including the new biologic agents. In fact, there is evidence of the beneficial effect of the combination of narrowband UV-B therapy with alefacept and etanercept aimed at accelerating or improving the clinical response, and even as a strategy to control limited or generalized exacerbations during treatment with efalizumab.[18-20] Despite the praise for narrowband UV-B in the approaches proposed here, its role is necessarily secondary, no more than a tactical support that is usually limited in time in a new setting in which biologic agents emerge as the main player.

Unlike pharmacologic treatments, for which clinical trials enable us to establish reasonably efficient dosages, narrowband UV-B requires physical therapy involving factors related to the technique itself (eg, type of cabinet, calibration) and to the user (eg, phototype, characteristics of psoriasis, age), both of which make it difficult to adopt a uniform approach between different geographic areas, and even between different centers. In this sense, one interesting step in the optimization process would involve specialized scientific societies directing their efforts toward standardizing protocols and adapting them to the specific characteristics of different types of patient. This initiative has been undertaken by the main dermatology societies, including the Spanish Academy of Dermatology and Venereology through the Spanish Photobiology Group, whose first fruits, already published, were the protocols for PUVA therapy, narrowband UV-B, and PUVA bath.[21,22] The use of web sites and new computer technology could facilitate the dissemination of information to professionals and users, a far from negligible aim, given the lack of commercial support for the treatment. A masterly approach to this strategy has been taken by a group of Scottish dermatologists led by Professor Ferguson.[23]

This detailed analysis of the current situation leads us to consider the outlook for narrowband UV-B therapy to treat psoriasis in a very dynamic future in which biologic agents dictate the pace. Treatment strategies using mainly excimer and other types of laser at similar frequencies to the narrowband UV-B current used, and focused exclusively on the lesions, while attractive in theory, have proven to be only moderately successful due to the cost of the equipment and the practical difficulties encountered when treating patients who have widespread lesions. Furthermore, one might expect that the progress made in the dynamic field of photobiology will advance the search for an even more suitable and safer radiation band for psoriasis and minimize the adverse effects. The future might even hold a surprise or two, such as the return of broadband UV therapy, this time using V6 lamps, which, unlike the old Phillips TL12 lamps, restrict the emission of erythematogenic radiation to below 400 nm.[24] In addition, the development of cabinets that are increasingly adapted to the physical characteristics of radiation and to the patient's profile could enable a treatment that is more homogeneous, effective, and safe, and even adapted to the severity of the skin disease on different parts of the body.

However, as stated above, the potential progression of narrowband UV-B will depend not only on its intrinsic value and its technical potential, but also on its ability to blend with the interests of dermatologists and patients, and with those of the industry that must satisfy those very interests. In this sense, dermatologists must take on an active role, not only in administering treatment, but also in the optimization of this important therapeutic resource. Recently, the Spanish Photobiology Group approved the launch of a website dedicated to photobiology and phototherapy. If the project—still in its early stages—is successful, it will have 3 objectives. First, to promote communication and coordination between phototherapy centers throughout Spain, and to standardize treatment regimens and follow-up programs for each of the different types of phototherapy. Second, to promote training of dermatologists and medical residents in photobiology and phototherapy. And third, yet no less relevant, to bring this technique closer to the patients, thus favoring quality training and information that would be difficult to obtain by other methods.

**Conflicts of Interest**

The authors declare no conflicts of interest.

## References


1. Parrish JA, Jaenicke KF. Action spectrum for phototherapy of psoriasis. J Invest Dermatol. 1981;76:359-62.
2. Fisher T. UV-light treatment of psoriasis. Acta Derm Venereol (Stockh). 1976;56:473-9.
3. Dawe RS. A quantitative review of studies comparing the efficacy of narrow-band and broad-band ultraviolet B for psoriasis. Br J Dermatol. 2003;149:655-68.
4. Tanew A, Radakovic-Fijan S, Schemper M, Hönigsmann H. Narrow-band UV-B phototherapy vs photochemotherapy in the treatment of chronic plaque-type psoriasis. A paired comparison study. Arch Dermatol. 1999;135:519-24.
5. Ibbotson SH, Bilsland D, Cox NH, Dawe RS, Diffey B, Edwards C. An update and guidance on narrowband ultraviolet B phototherapy: a British Photodermatology Group Workshop Report. Br J Dermatol. 2004;151:283-97.
6. Carrascosa JM. Fototerapia y fotoquimioterapia. Actas Dermosifiliogr. 2004;95:259-84.

7. Carrascosa JM, Bigatà X. UVB terapia de banda estrecha: experiencia en la práctica clínica y factores predictivos de respuesta. Actas Dermosifiliogr. 2000;91:555-62.
8. Dawe RS, Wainwright NJ, Cameron H, Ferguson J. Narrow-band (TL-01) ultraviolet B phototherapy for chronic plaque psoriasis: three times or five times weekly treatment? Br J Dermatol. 1998;138:833-9.
9. Diffey BL. Investigative report. Towards optimal regimens for the UVB phototherapy of psoriasis: A mathematical model. Acta Derm Venereol. 2004;84:259-64.
10. Boztepe G, Akinci H, Sahin S, Karaduman A, Evans SE, Erkin G, et al. In search of an optimum dose escalation for narrowband UVB phototherapy: Is it time to quit 20% increments? J Am Acad Dermatol. 2006;55:269-71.
11. Gökdemir G, Kivanç-Altunay I, Köslü A. Narrow-band ultraviolet B phototherapy in patients with psoriasis: for which types of psoriasis is it more effective? Br J Dermatol. 2005;32:436-41.
12. Calzavara-Pinton P, Leone G, Venturini M, Sala R, Colombo D, La Parola IL, et al. A comparative non randomized study of narrow-band (NB) (312 ± 2 nm) UVB phototherapy versus sequential therapy with oral administration of low-dose Cyclosporin A and NB-UVB phototherapy in patients with severe psoriasis vulgaris. Eur J Dermatol. 2005;15:470-3.
13. Diffey BL. Factors affecting the choice of a ceiling on the number of exposures with TL01 ultraviolet B phototherapy. Br J Dermatol. 2003;149:428-30.
14. Weischer M, Blum A, Eberhard F, Röcken M, Berneburg M. No evidence for increased skin cancer risk in psoriasis patients treated with broadband or narrowband UVB phototherapy: a first retrospective study. Acta Derm Venereol. 2004;84:370-4.
15. Cameron H, Yule S, Moseley H, Dawe RS, Ferguson J. Taking treatment to the patient: development of a home TL-01 ultraviolet B phototherapy service. Br J Dermatol. 2002;147:957-65.
16. Langan SM, Heerey A, Barry M, Barnes L. Cost analysis of narrowband UVB phototherapy in psoriasis. J Am Acad Dermatol. 2004;50:623-6.
17. Simpson JF, Yelverton CB, Balkrishnan R, Fleischer A Jr, Lide W, Feldman SR. Would elimination of copayments for phototherapy decrease the cost of treating psoriasis with systemic biologics? A cost analysis. Manag Care Interface. 2006;19:39-43.
18. Carrascosa JM, Soria X, Ferrándiz C. Effective management of a psoriatic flare with narrowband UVB phototherapy during efalizumab therapy without discontinuing treatment. J Eur Acad Dermatol Venereol. 2007;21:828-9.
19. Ortonne JP, Khemis A, Koo JY, Choi J. An open-label study of alefacept plus ultraviolet B light as combination therapy for chronic plaque psoriasis. J Eur Acad Dermatol Venereol. 2005;19:556-63.
20. Kircik L, Bagel J, Korman N, Menter A, Elmets CA, Koo J, et al. Unite Study Group. Utilization of narrow-band ultraviolet light B therapy and etanercept for the treatment of psoriasis (UNITE): efficacy, safety, and patient-reported outcomes. J Drugs Dermatol. 2008;7: 245-53.
21. Rodríguez-Granados MT, Carrascosa JM, Gárate T, Gómez-Díez S, Guimaraens-Juantorena D. Documento de consenso sobre la modalidad terapéutica del baño-PUVA. Actas Dermosifiliogr. 2007;98:164-70.
22. Carrascosa JM, Gardeazábal J, Pérez-Ferriols A, Alomar A, Manrique P, Jones-Caballero M, et al. Grupo Español de Fotobiología. Documento de consenso sobre fototerapia: terapias PUVA y UVB de banda estrecha. Actas Dermosifiliogr. 2005;96:635-58.
23. http://www.photonet.scot.nhs.uk/
24. Kirke SM, Lowder S, Lloyd JJ, Diffey BL, Matthews JN, Farr PM. A randomized comparison of selective broadband UVB and narrowband UVB in the treatment of psoriasis. J Invest Dermatol. 2007;127:1570-1.