Cochrane Library

Cochrane Database of Systematic Reviews

Narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen-ultraviolet A photochemotherapy for psoriasis (Review)

Chen X, Yang M, Cheng Y, Liu GJ, Zhang M

Chen X, Yang M, Cheng Y, Liu GJ, Zhang M.
Narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen-ultraviolet A photochemotherapy for psoriasis.
Cochrane Database of Systematic Reviews 2013, Issue 10. Art. No.: CD009481.
DOI: 10.1002/14651858.CD009481.pub2.

www.cochranelibrary.com

WILEY

TABLE OF CONTENTS

ABSTRACT 1
PLAIN LANGUAGE SUMMARY 2
SUMMARY OF FINDINGS 4
BACKGROUND 11
OBJECTIVES 12
METHODS 12
RESULTS 15
Figure 1. 16
Figure 2. 19
Figure 3. 20
DISCUSSION 25
AUTHORS' CONCLUSIONS 27
ACKNOWLEDGEMENTS 27
REFERENCES 28
CHARACTERISTICS OF STUDIES 32
DATA AND ANALYSES 51
Analysis 1.1. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 1 PASI 75. 52
Analysis 1.2. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 2 PASI 75 (ITT analysis). 52
Analysis 1.3. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 3 Withdrawals due to side-effects. 52
Analysis 1.4. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 4 Withdrawals due to side-effects (ITT analysis). 53
Analysis 1.5. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 5 Clearance rate. 53
Analysis 1.6. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 6 Clearance rate (ITT analysis). 53
Analysis 1.7. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 7 Clearance lasting 6 months. 53
Analysis 1.8. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 8 Time to PASI 75. 53
Analysis 1.9. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 9 Relapse rate at 6 months after treatment completion. 54
Analysis 1.10. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 10 Withdrawals due to poor response. 54
Analysis 1.11. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 11 Adverse events. 54
Analysis 2.1. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 1 Clearance rate. 56
Analysis 2.2. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 2 Clearance rate (ITT analysis). 57
Analysis 2.3. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 3 PASI score reduction. 57
Analysis 2.4. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 4 Adverse events. 57
Analysis 3.1. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 1 Clearance rate. 58
Analysis 3.2. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 2 Clearance rate (ITT analysis). 58
Analysis 3.3. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 3 Relapse at 9 weeks after treatment completion. 59
Analysis 3.4. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 4 Marked improvement. 59
Analysis 3.5. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 5 Adverse events. 59
Analysis 4.1. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 1 PASI. 60
Analysis 4.2. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 2 PASI 75 (ITT analysis). 61
Analysis 4.3. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 3 Clearance rate. 61
Analysis 4.4. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 4 Clearance rate (ITT analysis). 61
Analysis 4.5. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 5 Relapse at 6 months after treatment completion. 61
Analysis 4.6. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 6 Clinical improvement. 62
Analysis 4.7. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 7 Tolerability assessed as good or very good by observers (ITT analysis). 62
Analysis 4.8. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 8 Tolerability assessed as good or very good by participants (ITT analysis). 62

Analysis 4.9. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 9 Adverse events. 62
Analysis 5.1. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 1 Withdrawal due to side-effects. 63
Analysis 5.2. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 2 Withdrawals due to side-effects (ITT analysis). 64
Analysis 5.3. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 3 Clearance rate. 64
Analysis 5.4. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 4 Clearance rate (ITT analysis). 64
Analysis 5.5. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 5 Clearance lasting 6 months. 64
Analysis 5.6. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 6 Adverse events. 64
Analysis 6.1. Comparison 6 NB-UVB versus conventional BB-UVB in different types of psoriasis, Outcome 1 Cumulative UV dose during the study. 65
Analysis 7.1. Comparison 7 NB-UVB plus dithranol versus conventional BB-UVB plus dithranol in different types of psoriasis, Outcome 1 Cumulative UV dose during the study. 65
ADDITIONAL TABLES 65
APPENDICES 67
WHAT'S NEW 70
HISTORY 70
CONTRIBUTIONS OF AUTHORS 70
DECLARATIONS OF INTEREST 71
SOURCES OF SUPPORT 71
DIFFERENCES BETWEEN PROTOCOL AND REVIEW 71
NOTES 71
INDEX TERMS 71

[Intervention Review]

Narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen-ultraviolet A photochemotherapy for psoriasis

Xiaomei Chen[1a], Ming Yang[2b], Yan Cheng[1], Guan J Liu[3], Min Zhang[1]

[1]Department of Dermatology & Venereology, West China Hospital, Sichuan University, Chengdu, China. [2]Center of Geriatrics and Gerontology, West China Hospital, Sichuan University, Chengdu, China. [3]Chinese Cochrane Centre, Chinese Evidence-Based Medicine Centre, West China Hospital, Sichuan University, Chengdu, China

[a]❖ Joint first author. [b]# Joint first author

Contact: Min Zhang, Department of Dermatology & Venereology, West China Hospital, Sichuan University, No. 37, Guo Xue Xiang, Chengdu, Sichuan, 610041, China. hxlily@163.com, lily666@medmail.com.cn.

Editorial group: Cochrane Skin Group.
Publication status and date: Stable (no update expected for reasons given in 'What's new'), published in Issue 4, 2016.

Citation: Chen X, Yang M, Cheng Y, Liu GJ, Zhang M. Narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen-ultraviolet A photochemotherapy for psoriasis. *Cochrane Database of Systematic Reviews* 2013, Issue 10. Art. No.: CD009481. DOI: 10.1002/14651858.CD009481.pub2.

ABSTRACT

Background

The most commonly used types of phototherapy for treating psoriasis are narrow-band ultraviolet B (NB-UVB); broad-band ultraviolet B (BB-UVB), which includes selective (delivering radiation with a wavelength range of 305 to 325 nm) and conventional BB-UVB (280 to 320 nm); and psoralen ultraviolet A photochemotherapy (oral or bath PUVA). There is substantial controversy regarding their efficacy when compared with each other.

Objectives

To assess the effects of narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen ultraviolet A photochemotherapy for psoriasis.

Search methods

We searched the following databases up to August 2013: the Cochrane Skin Group Specialised Register, CENTRAL in *The Cochrane Library* (2013, Issue 7), MEDLINE (from 1946), and EMBASE (from 1974). We searched the following databases up to November 2012: CNKI (from 1974) and CBM (from 1978). We also searched trials registers and the OpenGrey database.

Selection criteria

We included all randomised controlled trials (RCTs) that compared NB-UVB phototherapy with BB-UVB or PUVA for treating psoriasis, which included chronic plaque psoriasis (CPP), guttate psoriasis (GP), and palmoplantar psoriasis (PPP).

Data collection and analysis

Two review authors independently conducted the study selection, 'Risk of bias' assessment, and data extraction.

Main results

We included 13 RCTs, with a total of 662 participants. We report the results of intention-to-treat analyses (ITT) here. Our primary outcomes of interest were as follows: Participant-rated global improvement, Percentage of participants reaching Psoriasis Area and Severity Index (PASI) 75 (which meant equal to or more than 75% reduction in PASI score), Withdrawal due to side-effects, and Clearance rate.

In one RCT of NB-UVB compared with oral PUVA in participants with CPP, the difference in PASI 75 was not statistically significant (risk ratio (RR) 0.91, 95% confidence interval (CI) 0.63 to 1.32; N = 51; low quality). In three other RCTs of CPP, the clearance rates were inconsistent because in one, there was no difference between the groups (RR 1.01, 95% CI 0.91 to 1.12; N = 54), and in the other two, the clearance rates were statistically significantly in favour of oral PUVA: RR 0.66, 95% CI 0.47 to 0.93; N = 93 and RR 0.75, 95% CI 0.59 to 0.96; N = 100, respectively. Pooled data from these three studies indicated that withdrawals due to adverse events were not significantly different between either group (RR 0.71, 95% CI 0.20 to 2.54; N = 247; low quality).

The evidence from the comparison of NB-UVB with bath PUVA in terms of clearance rate for CPP was also inconsistent: Pooled data from two left-right body comparison RCTs found no significant difference between the NB-UVB and bath PUVA groups (RR 1.79, 95% CI 0.46 to 6.91; N = 92; low quality), while a parallel RCT favoured bath PUVA (RR 0.18, 95% CI 0.05 to 0.71; N = 36; low quality).

In participants with PPP, one RCT found there were no significant differences between NB-UVB treated sides and topical PUVA treated sides in terms of clearance rate (RR 0.09, 95% CI 0.01 to 1.56; N = 50; low quality).

Two RCTs found NB-UVB plus retinoid (re-NB-UVB) and PUVA plus retinoid (re-PUVA) had similar effects for treating people with CPP or GP in terms of clearance rate (RR 0.93, 95% CI 0.79 to 1.10; N = 90; low quality).

One RCT in people with CPP found no significant differences between NB-UVB and selective BB-UVB in terms of clearance rate (RR 1.40, 95% CI 0.92 to 2.13; N = 100; low quality) and withdrawals due to adverse events (RR 3.00, 95% CI 0.32 to 27.87; N = 100; low quality).

No studies reported our primary outcomes for NB-UVB compared with conventional BB-UVB.

Authors' conclusions

Current evidence is very heterogeneous and needs to be interpreted with caution. The clearance rate between oral PUVA and NB-UVB is inconsistent among the included studies. Evidence regarding NB-UVB versus bath PUVA is also inconsistent. Re-NB-UVB and re-PUVA are similarly effective for treating people with CPP or GP. In practice, NB-UVB may be more convenient to use since exogenous photosensitiser is not required before phototherapy.

NB-UVB is considered ineffective for PPP in clinical practice, and a small RCT did not detect a statistically significant difference between NB-UVB and topical PUVA for clearing PPP. NB-UVB seemed to be similar to selective BB-UVB for clearing CPP.

Larger prospective studies are needed to confirm the long-term safety of NB-UVB.

PLAIN LANGUAGE SUMMARY

Narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen ultraviolet A photochemotherapy for treating psoriasis

Psoriasis is a common, chronic inflammatory skin disease, with an estimated global prevalence ranging from 0.5% to 4.6%. Based on clinical features, psoriasis is generally divided into the following: chronic plaque psoriasis (CPP); psoriasis associated with psoriatic arthritis; and pustular, erythrodermic, or guttate psoriasis. We also considered psoriasis affecting the palms and soles (palmoplantar psoriasis, or PPP). Although psoriasis is rarely life-threatening, it can affect a person's quality of life significantly.

Phototherapy is an essential treatment option for people with psoriasis. The most commonly used types of phototherapy are narrow-band ultraviolet B (NB-UVB), broad-band ultraviolet B (BB-UVB), and psoralen ultraviolet A photochemotherapy (PUVA). PUVA can be further divided into oral, bath, and topical PUVA according to the administrative route of psoralen. NB-UVB delivers almost exclusively 311 nm radiation, whereas BB-UVB can be divided into two types: selective BB-UVB (305 to 325 nm radiation) and conventional BB-UVB (280 to 320 nm radiation).

This review included 13 small randomised controlled trials (RCT), with a total of 662 participants. Most of these were of poor methodological quality.

For treating CPP, the clearance rate between the NB-UVB and oral PUVA groups were inconsistent in three RCTs. In one, there was no difference between the groups, and in the other two, the clearance rate was in favour of oral PUVA. The evidence from the comparison of NB-UVB with bath PUVA in terms of clearance rate was also inconsistent: Pooled data from two left-right body comparison RCTs found no significant difference between the two groups, while another RCT favoured bath PUVA.

Two RCTs found NB-UVB plus retinoid (re-NB-UVB) and PUVA plus retinoid (re-PUVA) had similar effects for treating people with CPP or guttate psoriasis. One RCT found no significant differences between NB-UVB and selective BB-UVB for clearing CPP or in the number of withdrawals due to side-effects.

In participants with PPP, one RCT found there were no statistically significant differences between NB-UVB treated sides and topical PUVA treated sides in terms of clearance rate.

In summary, NB-UVB may be preferred to oral or bath PUVA because it is more convenient to use. NB-UVB seemed to be equal to selective BB-UVB for clearing CPP. Evidence regarding NB-UVB and conventional BB-UVB is limited. The long-term safety of NB-UVB needs to be confirmed. The efficacy of NB-UVB for clearing PPP needs to be confirmed in future studies.

SUMMARY OF FINDINGS

Summary of findings for the main comparison. NB-UVB compared with oral PUVA for chronic plaque psoriasis

NB-UVB compared with oral PUVA for chronic plaque psoriasis

Patient or population: People with chronic plaque psoriasis
Settings: -
Intervention: NB-UVB
Comparison: Oral PUVA

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Oral PUVA	NB-UVB				
Participant-rated global improvement	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Percentage of participants reaching PASI 75	**720 per 1000**	**655 per 1000** (454 to 950)	**RR 0.91** (0.63 to 1.32)	51 (1 study)	⊕⊕⊖⊖ **low**[1], [2]	This is the result of ITT analysis
Withdrawal due to side-effects	**32 per 1000**	**50 per 1000** (7 to 82)	**RR 0.71** (0.20 to 2.54)	247 (3 study)	⊕⊕⊖⊖ **low**[3]	This is the result of ITT analysis
Clearance rate	**Study population**		Not estimable	0 (0)	See comment	The results of 3 small RCTs are contradictory. Because of the significant statistical heterogeneity, the data were not pooled
	See comment	See comment				
	Moderate					

*Comment: The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in the footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] The study was of small sample size.
[2] The study was at high risk of bias.
[3] All of the 3 studies were of small sample size and at high risk of bias, and the result was based on less than 300 participants.

Summary of findings 2. NB-UVB compared with bath PUVA for chronic plaque psoriasis

NB-UVB compared with bath PUVA for chronic plaque psoriasis

Patient or population: People with chronic plaque psoriasis
Settings: -
Intervention: NB-UVB
Comparison: Bath PUVA

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Bath PUVA	NB-UVB				
Participant-rated global improvement	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Percentage of participants reaching PASI 75	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					

Withdrawal due to side-effects	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Clearance rate	**348 per 1000**	**623 per 1000** (160 to 1000)	**RR 1.79** (0.46 to 6.91)	92 (2 studies)	⊕⊕⊝⊝ **low**[1]	1. On the basis of studies performing left-right body comparison. 2. This is the result of ITT analysis
Clearance rate	**611 per 1000**	**110 per 1000** (31 to 434)	**RR 0.18** (0.05 to 0.71)	36 (1 study)	⊕⊕⊝⊝ **low**[2], [3]	1. On the basis of the study performing comparison between participants. 2. This is the result of ITT analysis

*Comment: The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in the footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Both of the studies were of small sample size and at high risk of bias, and the result was based on less than 300 participants.
[2] The study was at high risk of bias.
[3] The study was of small sample size, and the result was based on less than 300 participants.

Summary of findings 3. NB-UVB compared with topical PUVA for palmoplantar psoriasis

NB-UVB compared with topical PUVA for palmoplantar psoriasis

Patient or population: People with palmoplantar psoriasis
Settings: -
Intervention: NB-UVB
Comparison: Topical PUVA

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				

	Topical PUVA	NB-UVB				
Participant-rated global improvement	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Percentage of participants reaching PASI 75	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Withdrawal due to side-effects	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Clearance rate	**200 per 1000**	**18 per 1000** (2 to 312)	**RR 0.09** (0.01 to 1.56)	50 (1 study)	⊕⊕⊝⊝ **low**[1], [2]	This is the result of ITT analysis

* Comment: The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] This study was at unclear risk of bias.
[2] The study was of small sample size, and the result was based on less than 300 participants.

Summary of findings 4. NB-UVB plus retinoid compared with PUVA plus retinoid for chronic plaque or guttate psoriasis

NB-UVB plus retinoid compared with PUVA plus retinoid for chronic plaque or guttate psoriasis

Patient or population: People with chronic plaque or guttate psoriasis
Settings: -
Intervention: NB-UVB plus retinoid
Comparison: PUVA plus retinoid

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	PUVA plus retinoid	NB-UVB plus retinoid				
Participant-rated global improvement	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Percentage of participants reaching PASI 75	**Study population**		**RR 0.89** (0.59 to 1.35)	60 (1 study)	⊕⊕⊖⊖ **low**[1], [2]	This is the result of ITT analysis
	633 per 1000	**564 per 1000** (374 to 855)				
	Moderate					
Withdrawal due to side-effects	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Clearance rate	**756 per 1000**	**688 per 1000** (544 to 831)	**RR 0.93** (0.79 to 1.10)	90 (2 studies)	⊕⊕⊖⊖ **low**[2], [3]	This is the result of ITT analysis

*Comment: The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] This study was at high risk of bias.
[2] The studies were of small sample size, and the result was based on less than 300 people.
[3] Both of the studies were at high risk of bias.

Summary of findings 5. NB-UVB compared with selective BB-UVB for chronic plaque psoriasis

NB-UVB compared with selective BB-UVB for chronic plaque psoriasis

Patient or population: People with chronic plaque psoriasis
Settings: -
Intervention: NB-UVB
Comparison: Selective BB-UVB

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Selective BB-UVB	NB-UVB				
Participant-rated global improvement	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					
Percentage of participants reaching PASI 75	**Study population**		Not estimable	0 (0)	See comment	No included RCT addressed this outcome
	See comment	See comment				
	Moderate					

Withdrawal due to side-effects	**Study population**		**RR 3.00** (0.32 to 27.87)	100 (1 study)	⊕⊕⊝⊝ **low**[1], [2]	This is the result of ITT analysis
	20 per 1000	**60 per 1000** (6 to 557)				
	Moderate					
Clearance rate	**400 per 1000**	**560 per 1000** (368 to 852)	**RR 1.40** (0.92 to 2.13)	100 (1 study)	⊕⊕⊝⊝ **low**[1], [2]	This is the result of ITT analysis

*Comment: The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] The study was at unclear risk of bias.
[2] The study was of small sample size, and the result was based on less than 300 people.

BACKGROUND

Please note that unfamiliar terms and abbreviations are listed in Table 1 ('Glossary of some important terms and abbreviations used').

Description of the condition

Description and epidemiology

Psoriasis is a common, chronic inflammatory skin disease, with an estimated global prevalence ranging from 0.5% to 4.6% (Lebwohl 2003). The typical lesions of psoriasis include well-demarcated red plaques, with variable degrees of silvery thickening, and surface scale, particularly on the scalp, extensor aspects (backs of the elbows, fronts of the knees) of the limbs, and the trunk. Psoriatic arthritis, pustular psoriasis (a subtype of psoriasis with lesions containing purulent materials), or erythrodermic psoriasis (a subtype of psoriasis that affects nearly all body sites) may also be present. Among the various subtypes, psoriasis vulgaris is the most common form and accounts for more than 80% of psoriasis cases (Lebwohl 2003). The characteristic pathological changes of psoriasis present with hyperkeratosis (thickening of the stratum corneum, which is usually associated with an abnormality of the keratin and an increase of the granular layer), hyperplasia (increase in the number of cells) of the epidermis, inflammatory cell infiltration into the dermis and epidermis, and dilatation of dermal capillaries (dilated small blood vessels in the dermis). The diagnosis of psoriasis is mainly based on clinical features, and pathological changes are usually helpful to distinguish psoriasis from other diseases with a similar appearance.

Cause

The exact cause of psoriasis remains unclear. However, psoriasis appears to be a disorder of immune function (specifically involving the T set of lymphocytes), which causes an accelerated rate of cell turnover in the epidermal layer of the skin (Griffiths 1996). People seem to have a strong genetic predisposition to develop the condition. Certain medications (such as lithium, beta blockers, antimalarial drugs, and nonsteroidal anti-inflammatory drugs) and infections are thought to be possible triggers.

Impact

Although psoriasis is rarely life-threatening, the effect on a person's quality of life (QOL) can be profound, with a damaging effect on their self-esteem, due to the long-term nature of the disease, the persistent itching or pain of the skin, and the stigmatising effect of a disfiguring condition (De Korte 2004). It also seems to be associated with a significantly increased risk of cardiovascular disease (Gelfand 2006) and a variety of malignant diseases (Boffetta 2001; Gelfand 2003; Hannuksela-Svahn 2000).

Description of the intervention

Management of psoriasis should depend upon a number of factors: These include the severity of the disease, associated diseases (comorbidities), education about the chronic nature of the disease, and realistic expectations about the effect of treatments, as well as the use of medication. Complete clearance of psoriasis may be unrealistic, so the main aim of treatment is to reduce disease activity with minimal side-effects.

Interventions include topical therapy, ultraviolet light (phototherapy), systemic agents, and biological treatments. Those mildly affected can generally be treated adequately with topical medication, but 10% to 20% of those with moderate-to-severe psoriasis often depend upon phototherapy, systemic treatment, or combination therapy to achieve and sustain disease remission (Jensen 2010).

Phototherapy is an essential therapeutic option for people with psoriasis and has been used for more than 75 years. The most commonly used types of phototherapy are photochemotherapy using psoralen ultraviolet A (PUVA) and ultraviolet B (UVB) therapy.

Therapy with PUVA is administered by the use of a photosensitiser prior to exposure to the phototherapy. The photosensitiser, psoralen, is administered either orally, or in bath water, or as a cream (or a gel) before exposure to long wavelength (320 to 400 nm) ultraviolet A (UVA) radiation. In consequence, PUVA is divided into oral PUVA, bath PUVA, and topical PUVA. With oral PUVA, different psoralens may be applied, such as 8-methoxypsoralen (8-MOP) and 5-methoxypsoralen (5-MOP). The psoralen 8-MOP is the only available orally prescribed psoralen in the United States; it takes about one to three hours to reach peak concentration in the skin, so is usually administered at least two hours before UV irradiation. The most common side-effect of PUVA is nausea that develops shortly after ingestion. Many people withdraw from PUVA therapy because of severe nausea. For those who cannot tolerate 8-MOP, 5-MOP is an alternative choice, which is more commonly used in Europe (Braun 2000; Jensen 2010; Menter 2010). Trimethylpsoralen, which is used for bath PUVA, is largely used in Scandinavia, whereas 8-MOP in a hydrophilic water or oil emulsion is used for topical PUVA (Jensen 2010; Menter 2010).

Therapy with PUVA has been proven to be effective for most forms of psoriasis and induces complete or partial remission in 79% to 90% of those with psoriasis (De Gruijl 1996; Lauharanta 1997; Morison 1998). Unfortunately, current evidence shows a clear correlation between cumulative PUVA exposure and an increased risk of skin cancer and premature ageing of the skin (Lauharanta 1997; Lowe 1997; Stern 1988). Therefore, the British Association of Dermatologists' guideline on biological interventions for psoriasis recommended that PUVA should be limited to 150 lifetime treatments, to decrease the risk of skin cancer (Smith 2009). However, a combined analysis of two cohort studies with 944 participants treated with bath PUVA "found no increase in the risk of squamous cell carcinoma after a mean follow-up of 14.7 years", suggesting that bath PUVA is possibly safer than oral PUVA (Naldi 2010).

UVB (spectrum light 280 to 320 nm) has been used to treat psoriasis for at least 90 years (Anderson 1984). There are several types of UVB radiation in clinical practice:

1. conventional broad-band UVB (BB-UVB) lamps, which deliver radiation in the range of 280 to 320 nm;
2. selective BB-UVB, which has peaks at 305 to 325 nm; and
3. narrow-band UVB (NB-UVB) lamps, which deliver almost exclusively 311 nm radiation (Braun 2000; Ibbotson 2004).

Conventional BB-UVB has been proven to cause the clearance of psoriasis within six weeks, but the use of it is limited by burning (Boer 1980). Selective BB-UVB was also effective in treating

psoriasis (Parrish 1981). Phototherapy with NB-UVB was developed in the 1980s. It is emitted through Philips TL01 lamps and consists of a subset of the UVB spectrum between 311 and 313 nm. A study conducted by Parrish and Jaenicke demonstrated that the peak action spectrum for clinical antipsoriatic efficacy was between 308 and 312 nm (Fischer 1976; Parrish 1981). In this way, NB-UVB can theoretically achieve an optimal response while minimising the erythrogenic (redness of the skin) response to non-therapeutic wavelengths. In fact, several small-scale clinical studies (Coven 1997; Storbeck 1993; van Weelden 1988; Walters 1999) have shown an improved response of psoriasis to NB-UVB compared with conventional BB-UVB.

There is controversy regarding the risk of skin cancer with NB-UVB. Young 1995 summarised data from murine studies and reported NB-UVB might be two to three times more carcinogenic per minimal erythema dose (MED) than conventional BB-UVB. However, one systematic review (Pasker-de 1999) estimated that "the excess annual risk of non-melanoma skin cancer associated with UVB was likely to be less than 2%". Another systematic review found that UVB did not increase the risk of skin cancer during about 25 years' follow up (Lee 2005). Likewise, no increased risk of cancer was identified in 3867 people treated by NB-UVB in Scotland (Hearn 2008). Most recently, Archier 2012 found a lack of robust evidence of the carcinogenic risk of NB-UVB because of limited prospective studies.

Sometimes UVB or PUVA is combined with retinoids (e.g. etretinate and acitretin) to treat psoriasis. Retinoids have been established as an effective systemic therapy for psoriasis since the 1970s. They can be used as monotherapy or combined at low doses with UVB or PUVA for treating psoriasis. Etretinate was widely used initially; however, acitretin, the free acid of etretinate and its active metabolite, has replaced etretinate for treating psoriasis because of its more favourable pharmacokinetic profile (Saurat 1999). Generally, retinoids combined with NB-UVB or PUVA are abbreviated as re-NB-UVB or re-PUVA, respectively.

How the intervention might work

It has been found that UV exposure can affect cell signalling, favour development of T-helper 2 (Th2) immune responses, and reduce both the number and function of antigen-presenting Langerhans cells (Zanolli 2000).

Ultraviolet light in the UVA part of the spectrum is successfully used in the treatment of psoriasis, based on its ability to reduce mast cells and induce type I collagenase activity. Psoralen is used as a photosensitiser in PUVA therapy. Once psoralen is activated by UVA, "it crosslinks DNA strands, preventing replication of keratinocytes and inducing the death of activated T-cells in the skin" (Coven 1999). The significant effects of PUVA may be due to its immunosuppressive properties. The immunosuppressive mechanisms of PUVA mainly involve the following: decreasing the antigen-presenting capacity of epidermal Langerhans cells and the numbers and functional activity of T-helper cells and messenger RNA (mRNA) encoding for proinflammatory cytokines IL-6, IL-8, and TNF-α. They may also involve inhibition of cell proliferation, reduction of the percentage of CD3+ peripheral T lymphocytes producing IFN-gamma and IL-2, and induction of an anergy (failure of response) of type 1 activity in peripheral lymphocytes (Aubin 1998; Ashworth 1989; Borroni 1991; Kozenitzky 1992; Neuner 1994).

The exact mechanism of action of UVB is not fully understood. The proposed mechanism may cause apoptosis (cell death) of lymphocytes and epidermal cells, as well as immunosuppressive and anti-inflammatory effects (Aufiero 2006). It has been demonstrated that the peak action spectrum for clinical efficacy is between 308 and 312 nm, while the maximal erythrogenic response occurs around 297 nm (Fischer 1976; Parrish 1981). With NB-UVB, because the peak spectrum is at 311 nm, significant antipsoriatic efficacy can be achieved with a limited erythrogenic response.

The mechanism of the therapeutic effect of retinoids when combined with UVB or PUVA is also not yet fully understood. Pretreatment with retinoids can reduce "both desquamation and infiltration of psoriatic plaques", and in consequence might raise "the possibility of increased penetration of ultraviolet light" (Jensen 2010).

Why it is important to do this review

There have been many studies, of variable methodological quality, comparing the efficacy of different types of phototherapy. Some indicate that PUVA is more effective than BB-UVB radiation (Brenner 1983; Boer 1984; Honigsmann 1977; Morison 1995); others demonstrate that NB-UVB provides faster clearing of psoriasis, less burning reactions, and longer periods of remission than BB-UVB phototherapy (Coven 1997; Green 1988; Storbeck 1993). NB-UVB is also more convenient because no exogenous photosensitiser is needed before phototherapy. Recently, while some authors have claimed that NB-UVB therapy has similar efficacy to PUVA (Markham 2003), other authors (Dawe 2003; Gordon 1999; Tahir 2004) have found different results.

No systematic review has been conducted to summarise the evidence of the effects of NB-UVB phototherapy compared with BB-UVB or PUVA photochemotherapy for psoriasis. Therefore, we aimed to summarise results from randomised controlled trials (RCTs) to provide reliable evidence for clinicians and for those with psoriasis.

OBJECTIVES

To assess the effects of narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen ultraviolet A photochemotherapy for psoriasis.

METHODS

Criteria for considering studies for this review

Types of studies

We included any RCT involving NB-UVB phototherapy versus BB-UVB or PUVA photochemotherapy for psoriasis. We excluded quasi-randomised trials.

Types of participants

We included any individual with a diagnosis of any type of psoriasis, regardless of age, race, gender, or the severity of their lesions.

Types of interventions

Any NB-UVB phototherapy compared with BB-UVB or PUVA photochemotherapy, either as a single or combination therapy. The following comparisons were performed:

- NB-UVB versus oral PUVA;
- NB-UVB versus bath PUVA;
- NB-UVB versus topical PUVA;
- NB-UVB combined with retinoids (re-NB-UVB) versus PUVA combined with retinoids (re-PUVA);
- NB-UVB versus selective BB-UVB;
- NB-UVB versus conventional BB-UVB; and
- NB-UVB combined with dithranol versus BB-UVB combined with dithranol.

Types of outcome measures

Primary outcomes

1. Participant-rated global improvement.
2. Percentage of participants reaching Psoriasis Area and Severity Index (PASI) 75 (which meant equal to or more than 75% reduction in PASI score).
3. Withdrawal due to side-effects.
4. Clearance rate. (Clearance was defined as no lesions of psoriasis or minimal residual activity (MRA)).

Secondary outcomes

1. The Physician's Global Evaluation score.
2. Dermatology Life Quality Index (DLQI).
3. Number of treatments to clearance.
4. Cumulative UV dose to clearance.
5. Time to clearance.
6. Clearance lasting six months.
7. PASI score reduction (before and after treatment).
8. Time to PASI 75.
9. Relapse rate.
10. Duration of remission.
11. Withdrawal due to poor response.
12. Clinical improvement.
13. Reduction of peripheral T cells.
14. Tolerability.
15. Adverse events.

Search methods for identification of studies

We aimed to identify all relevant randomised controlled trials (RCTs) regardless of language or publication status (published, unpublished, in press, or in progress).

Electronic searches

We searched the following databases up to 8 August 2013:

- the Cochrane Skin Group Specialised Register using the search strategy in Appendix 1;
- the Cochrane Central Register of Controlled Trials (CENTRAL), Issue 7, 2013, in *The Cochrane Library* using the search strategy in Appendix 2;
- MEDLINE via OVID (from 1946) using the strategy in Appendix 3; and
- EMBASE via OVID (from 1974) using the strategy in Appendix 4.

We searched the following databases up to 27 November 2012:

- CNKI (China National Knowledge Infrastructure, from 1974) using the strategy in Appendix 5; and
- CBM (Chinese Biomedical Database, from 1978) using the strategy in Appendix 6.

Searching other resources

Trials registers

We searched the following trials registers using the strategy in Appendix 7 on 27 November 2012:

- The metaRegister of Controlled Trials (www.controlled-trials.com).
- The US National Institutes of Health Ongoing Trials Register (www.clinicaltrials.gov).
- The Australian New Zealand Clinical Trials Registry (www.anzctr.org.au).
- The World Health Organization International Clinical Trials Registry platform (www.who.int/ trialsearch).
- Chinese Clinical Trial Registry (www.chictr.org).

Reference lists

We scanned the references of all included trials and relevant systematic reviews or meta-analyses to identify further relevant trials.

Conference proceedings

We handsearched abstracts from the following dermatological conference proceedings for further RCTs up to November 2012:

- World Congress of Dermatology (from 1980);
- International Congress of Dermatology (from 1980); and
- European Academy of Dermatology and Venereology (from 1980).

Unpublished literature

We searched the OpenGrey database (www.opengrey.eu) for grey literature using the search strategy in Appendix 7.

We were not able to contact authors to obtain unpublished trials, as we had planned, because of time and resource constraints.

Adverse effects

We did not perform a separate search for adverse effects of the target interventions. We considered data on adverse effects from the included studies we identified.

Data collection and analysis

Selection of studies

Two review authors (XMC and YC) independently scanned the titles and abstracts of all articles identified from the searches according to our inclusion and exclusion criteria. For all initially selected articles, we obtained the full text; thereafter, two review authors (XMC and MY) independently assessed them to see whether they were eligible for inclusion.

We listed the studies that were excluded and the reasons for their exclusion in the review. During this process, we resolved discrepancies by discussion with MZ, who acted as an arbitrator.

Data extraction and management

Two review authors (XMC and MY) extracted the data from the included studies separately. We documented the process of resolving discrepancies in this review. We used the standard data extraction form recommended by the Cochrane Skin Group and recorded information about the following areas:

- general information (authors, title, source, year of publication, language of publication, trial numbers);
- trial characteristics (design; manner of recruitment; inclusion and exclusion criteria; duration of intervention period; reason for, and number of, dropouts and withdrawals);
- participants (baseline characteristics of participants in all groups, such as gender, age, psoriasis severity, and baseline health-related quality of life (HRQoL) scores);
- interventions (any intervention in both study and control groups); and
- outcomes (specific outcomes reported, assessment instrument used, adverse events).

We tried to contact trial authors for more information where necessary. One of us (MY) checked and entered the data into Review Manager (RevMan). Another author (XMC) double-checked the data. We resolved disagreements by discussion within the review team.

Assessment of risk of bias in included studies

Two authors (XMC and MY) independently assessed the methodological quality of the included studies. We settled discrepancies by discussion within the review team. We used The Cochrane Collaboration's tool for assessing risk of bias, which forms part of the 'Characteristics of included studies' tables (Higgins 2011), and we addressed the following issues:

(a) was there adequate sequence generation?;
(b) was allocation adequately concealed?;
(c) was knowledge of the allocated interventions adequately prevented during the study?;
(d) were incomplete outcome data adequately addressed?;
(e) were reports of the study free of suggestion of selective outcome reporting?; and
(f) was the study apparently free of other problems that could put it at a risk of bias?

We documented our judgements for each item and the reasons for our judgements in the 'Risk of bias' table for each included study within the review.

Where necessary, we attempted to contact trial authors for more information.

Measures of treatment effect

According to the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), we defined measures of treatment effects as follows.

Dichotomous data

We presented dichotomous outcomes as risk ratios (RR) with 95% confidence intervals (CIs) for individual trials. We discussed the main outcomes of each study and, if possible, pooled feasible data.

Continuous data

For continuous variables, such as the score of life quality index, we used the mean difference and 95% CI, unless different scales were used in the trials, in which case we used a standardised mean difference (SMD) and 95% CI to summarise the data.

Unit of analysis issues

Simple parallel RCTs

The unit of analysis was individual participants.

Cluster RCTs

In the protocol, we stated that if we identified cluster RCTs, we would try to re-analyse these trials by calculating the effective sample sizes according to the methods recommended in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), and if possible, we would calculate an estimate of the intracluster coefficient (ICC), using external estimates obtained from similar trials. We would not pool data from cluster RCTs with those from parallel RCTs. However, we found no eligible cluster trials.

Cross-over RCTs

In the protocol, we stated that if we identified cross-over RCTs, we would only extract and analyse data from the first period (Higgins 2011). We would not pool data from cross-over RCTs with those from parallel RCTs. However, we found no eligible cross-over RCTs.

Multiple intervention groups within a trial

No relevant trial was included in this review. If we identify relevant trials for future updates of this review, we will deal with them as we planned in the published protocol.

Multiple body parts receiving the same intervention

No relevant trial was included in this review. If we identify relevant trials for future updates of this review, we will deal with them as we planned in the published protocol.

Multiple body parts receiving different interventions

In some included trials, the left and right sides of the body were randomly allocated into different groups and to receive different interventions. In this regard, the unit of analysis was half-body.

Dealing with missing data

First, we attempted to contact the trial authors to get more information where necessary. If this did not succeed, we considered participants with missing outcomes as treatment failures for dichotomous outcomes. In the case of participant dropout, we conducted intention-to-treat (ITT) analyses for primary outcomes.

For continuous outcomes, we only extracted and analysed the available data. In addition, we explored the impact of missing data on the treatment effect by using sensitivity analyses, where possible. In future updates, if there were missing continuous data, we would state the whole process of dealing with the missing data and its potential impact on the results of the review in the Discussion section of our review.

Assessment of heterogeneity

We evaluated the level of clinical heterogeneity by comparing the differences between the trials in the administration of therapy, the type of comparators used, and the characteristics of the study population. If an appropriate level of clinical homogeneity existed, we analysed the level of statistical heterogeneity using the Chi^2 test on N-1 degrees of freedom, with an alpha of 0.1 used for statistical significance and the I^2 statistic. I^2 statistic values of 25%, 50%, and 75% correspond to low, medium, and high levels of heterogeneity (Higgins 2011). If heterogeneity existed, we attempted to probe the reasons for it and advised caution in the interpretation of our results.

Assessment of reporting biases

If we had identified sufficient RCTs, we would have used funnel plots to test for publication bias. However, we could not use funnel plots to test for publication bias, because for each outcome, there were insufficient studies to perform it (Higgins 2011).

Data synthesis

We pooled data using the random-effects model, unless there were less than three trials without clinical heterogeneity - in which case, we used the fixed-effect model. If we identified substantial heterogeneity, we reported the results qualitatively.

Subgroup analysis and investigation of heterogeneity

Because of insufficient information, we could only perform subgroup analysis to detect the potential heterogeneity induced by study design (e.g. some studies performed left-right body comparisons, while others performed comparisons between participants) in some outcomes.

Sensitivity analysis

In the protocol, we stated that we would perform sensitivity analyses, where possible, but we were unable to carry this out because of insufficient data.

RESULTS

Description of studies

See the 'Characteristics of included studies', 'Characteristics of excluded studies', and 'Studies awaiting classification' tables.

Results of the search

Our electronic search retrieved 1798 references excluding duplicates. After scanning the titles and abstracts, we identified 25 references as potentially relevant, which we retrieved in full text. Among these, 17 references referring to 13 RCTs met the inclusion criteria. One reference (Nazari 2005) was published in Turkish, and we are waiting for a translation. It is listed in Characteristics of studies awaiting classification. We excluded the remaining seven references. We identified no further reports by screening the reference lists of all included RCTs, relevant systematic reviews or meta-analyses, and dermatological conference proceedings. We present the screening process in Figure 1.

Figure 1. Study flow diagram

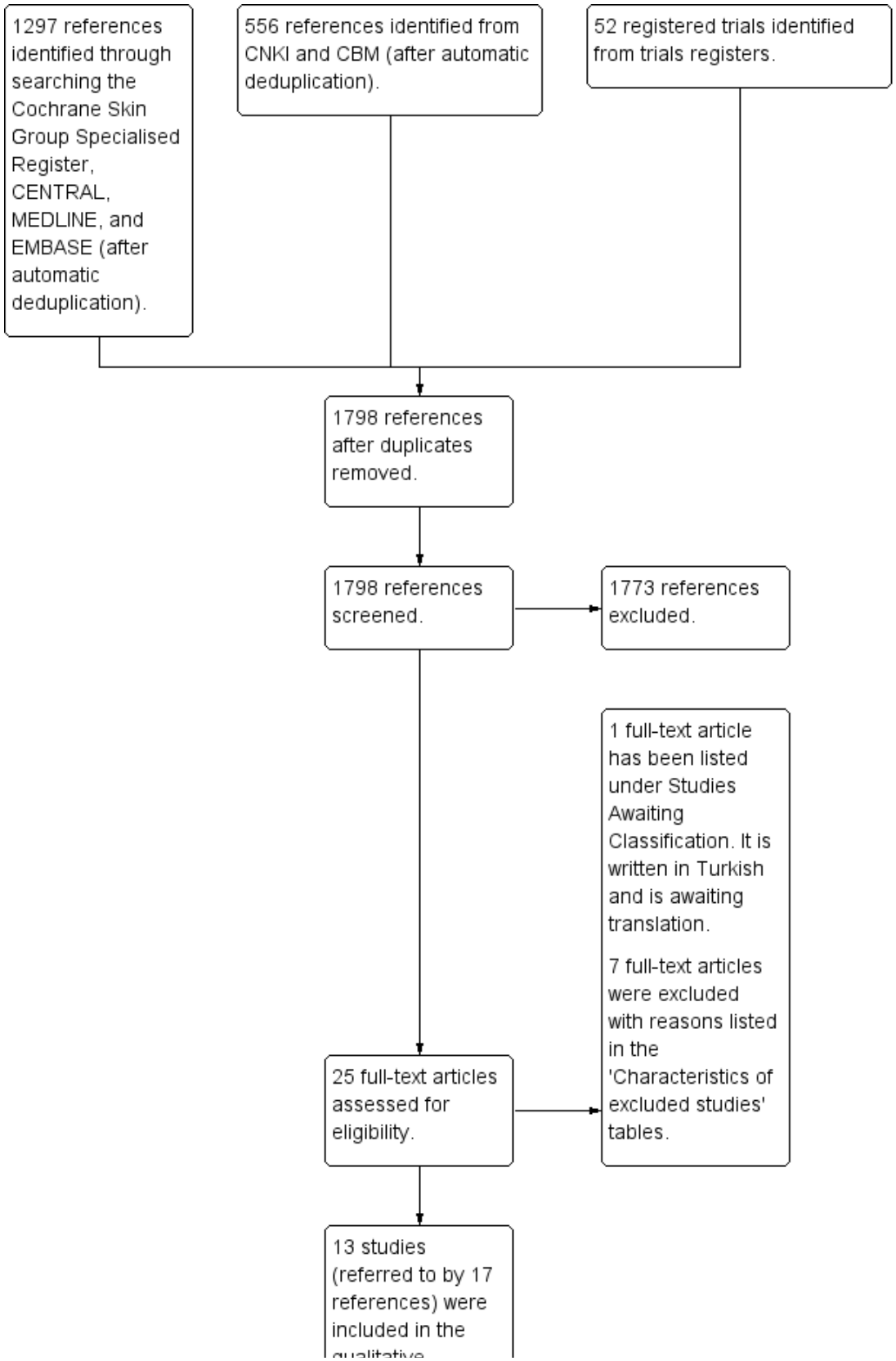
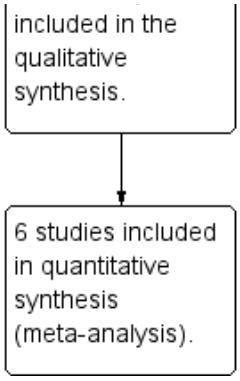


Figure 1. (Continued)



Included studies

In this review, we included 13 RCTs, with a total of 662 participants. More information about these 13 studies (Chauhan 2011; Dawe 2003; Gordon 1999; Green 1992; Kirke 2007; Larko 1989; Markham 2003; Özdemir 2008; Salem 2010; Sezer 2007; Snellman 2004; Storbeck 1993; Yones 2006) is available in the 'Characteristics of included studies' tables.

Design

Some of the included RCTs (Chauhan 2011; Green 1992; Gordon 1999; Kirke 2007; Markham 2003; Özdemir 2008; Salem 2010; Yones 2006) performed comparisons between participants, whereas others (Dawe 2003; Larko 1989; Sezer 2007; Snellman 2004; Storbeck 1993) performed within-patient comparisons (left-right body comparison).

Sample sizes

With regard to the size of the individual trials, participant numbers ranged from 18 to 100.

Setting

The included RCTs were published from 1989 to 2011. Five of them were conducted in the UK (Dawe 2003; Gordon 1999; Green 1992; Kirke 2007; Yones 2006); two, in Turkey (Özdemir 2008; Sezer 2007); the remaining RCTs were conducted in India (Chauhan 2011), Ireland (Markham 2003), Sweden (Larko 1989), Egypt (Salem 2010), Finland (Snellman 2004), and Germany (Storbeck 1993), respectively.

Participants

Most of the included studies recruited adults (≥18 years of age) except for two RCTs (Salem 2010; Storbeck 1993), which recruited participants aged from 13 to 63 years and 17 to 66 years, respectively. In addition, another RCT (Green 1992) did not report the age of the participants.

Most of the included RCTs (Chauhan 2011; Dawe 2003; Gordon 1999; Kirke 2007; Markham 2003; Özdemir 2008; Snellman 2004; Yones 2006) focused on chronic plaque psoriasis (CPP), and one RCT (Sezer 2007) paid attention to palmoplantar psoriasis (PPP), while the remaining RCTs (Green 1992; Larko 1989; Salem 2010; Storbeck 1993) included people with different kinds of psoriasis.

Interventions

The following comparisons were identified:

- NB-UVB versus oral PUVA (Chauhan 2011; Gordon 1999; Markham 2003; Yones 2006);
- NB-UVB versus bath PUVA (Dawe 2003; Salem 2010; Snellman 2004);
- NB-UVB versus topical PUVA (Sezer 2007);
- re-NB-UVB versus re-PUVA (Green 1992; Özdemir 2008);
- NB-UVB versus selective BB-UVB (Kirke 2007);
- NB-UVB versus conventional BB-UVB (Larko 1989; Storbeck 1993); and
- NB-UVB + dithranol versus conventional BB-UVB + dithranol (Storbeck 1993).

In most included trials, NB-UVB was performed three times weekly, except in two trials (Gordon 1999; Yones 2006), which carried out NB-UVB twice a week. In addition, BB-UVB was conducted three to five times weekly (Kirke 2007; Larko 1989; Storbeck 1993); bath PUVA, two (Dawe 2003) or three (Salem 2010; Snellman 2004) times weekly; oral PUVA was performed two (Gordon 1999; Green 1992; Markham 2003; Yones 2006) or three (Chauhan 2011; Özdemir 2008) times weekly; and topical PUVA was conducted three times weekly (Sezer 2007).

Outcomes

Outcome measurements were very variable. For example, some included RCTs reported "complete clearance" as their primary outcome, whereas others applied "minimal residual activity (MRA)" or clearance; some applied Psoriasis Area and Severity Index (PASI) score reduction to assess the improvement of psoriasis, whereas others presented the percentage of participants who achieved PASI 75 (which meant equal to or more than 75% reduction in PASI score). It was noteworthy that most of these outcomes were on the basis of judgement from clinicians and were subjective and relatively imprecise. Only one trial (Özdemir 2008) reported the tolerability of the treatment assessed by the participants themselves. Another trial (Yones 2006) assessed the participants' QOL, which is often omitted in clinical practice.

Excluded studies

We excluded seven studies. Our reasons for exclusion are shown in the 'Characteristics of excluded studies' tables.

Risk of bias in included studies

We applied The Cochrane Collaboration's tool for assessing risk of bias. Figure 2 and Figure 3 illustrate the overall risk of bias.

Figure 2. 'Risk of bias' summary: Review authors' judgements about each 'Risk of bias' item for each included study

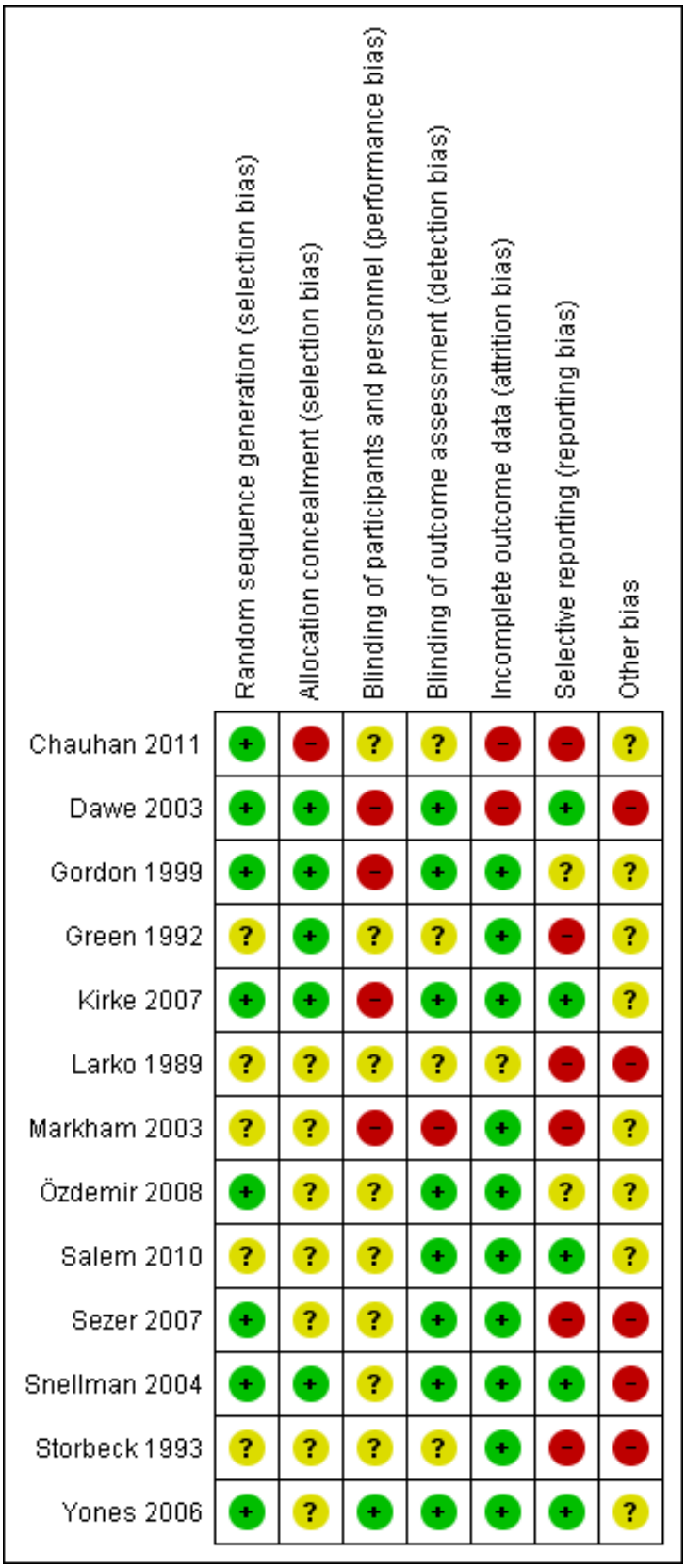
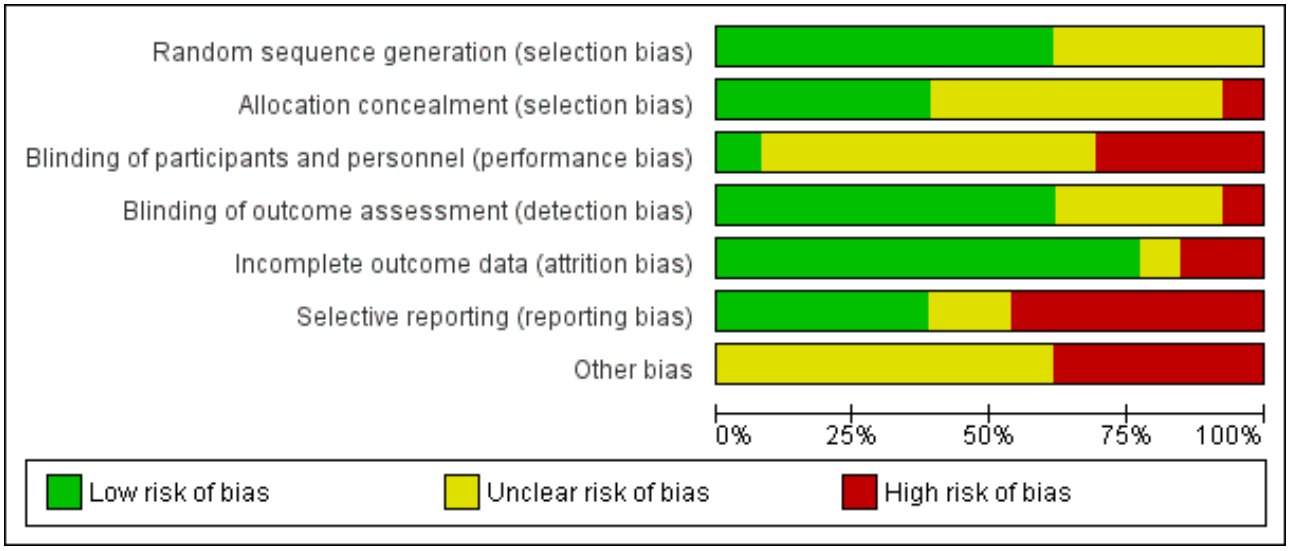


Figure 3. 'Risk of bias' graph: Review authors' judgements about each 'Risk of bias' item presented as percentages across all included studies



Allocation

Randomisation and concealment of allocation are thought to be essential components of a RCT to minimise bias. All included trials were reported as "randomised"; however, in five of them (Green 1992; Larko 1989; Markham 2003; Salem 2010; Storbeck 1993), no further methodological details were given, so we assessed these as having an 'unclear' risk of bias for this domain. In four of the included RCTs (Dawe 2003; Sezer 2007; Snellman 2004; Storbeck 1993), randomisation was conducted within participants; in other words, the left and right side of the participant's body were randomly allocated into different groups.

Seven included RCTs (Larko 1989; Markham 2003; Özdemir 2008; Salem 2010; Sezer 2007; Storbeck 1993; Yones 2006) did not explicitly report whether allocation concealment was performed or not, so we assessed these as having an unclear risk of bias for this domain. Another RCT (Chauhan 2011) clearly stated that "the random allocation list was not concealed," so we assessed this as at a high risk of bias for this domain.

Blinding

We evaluated blinding of participants and personnel and blinding of outcome assessment separately. We applied the former to check performance bias, whereas the latter was to check detection bias. Only one RCT (Yones 2006) performed blinding of participants and personnel. The reason may be that different devices and therapy schemes are needed to perform different types of UV irradiation, and consequently, it is hard to mask phototherapists and participants. In addition, eight RCTs (Dawe 2003; Gordon 1999; Kirke 2007; Özdemir 2008; Salem 2010; Sezer 2007; Snellman 2004; Yones 2006) performed blinding of the outcome assessment.

Incomplete outcome data

We labelled 10 of the 13 included studies as 'low risk of bias' in this regard. In most of the included trials, the rate of dropouts was lower than 20%, and the reasons were clearly reported and the withdrawals distributed equally between the groups. To be more specific, the rate of discontinuation in the included studies ranged from 0% (Green 1992; Storbeck 1993) to 36% (Dawe 2003). It was less than 10% in five RCTs (Gordon 1999; Green 1992; Salem 2010; Storbeck 1993; Yones 2006), 10% to 20% in six RCTs (Chauhan 2011; Kirke 2007; Markham 2003; Özdemir 2008; Sezer 2007; Snellman 2004), and more than 20% in one RCT (Dawe 2003). In Chauhan 2011, 16% of the participants discontinued the trial, and when assessing "time to relapse", only 57% of the participants were available for analysis. We assessed this study at 'high risk of bias'. One RCT (Larko 1989) did not report the rate of discontinuation, so we assessed this as unclear.

An intention-to-treat (ITT) analysis is often recommended as the least biased way to estimate intervention effects in RCTs (Higgins 2011). Three included RCTs (Dawe 2003; Kirke 2007; Snellman 2004) applied ITT analyses. In Dawe 2003, 10 (36%) participants discontinued the study, which might have induced significant attrition bias. As a result, we labelled this trial as 'high risk of bias', although ITT analyses were applied.

Selective reporting

Almost all included trials had no preliminarily published protocol or were not registered in any clinical trial database, except for one (Kirke 2007). In five trials (Dawe 2003; Kirke 2007; Salem 2010; Snellman 2004; Yones 2006), all outcomes described in their methods section were reported appropriately with statistical data in the results section, and in consequence, we labelled them as 'low risk of bias'. In two trials (Gordon 1999; Özdemir 2008), there was insufficient information to make a judgement. We labelled four RCTs (Larko 1989; Markham 2003; Sezer 2007; Storbeck 1993) at 'high risk of bias' where some outcomes were not supported by statistical data. Chauhan 2011 did not report in their results section some outcomes described in their methods section, and in Green 1992, the authors reported mean and range in the main outcomes, but not P values or 95% CIs, so we labelled these two studies as at 'high risk of bias' for this domain.

Other potential sources of bias

Five trials (Dawe 2003; Larko 1989; Sezer 2007; Snellman 2004; Storbeck 1993) conducted randomisation within participants, and as a result, withdrawal of one half-body for any reason inevitably caused withdrawal of the other half. In addition, because each participant received both treatment regimens, the treatment to one side might have affected the other. These effects might have induced other potential biases. In the other eight trials, there was insufficient information to make a judgement.

Effects of interventions

See: **Summary of findings for the main comparison** NB-UVB compared with oral PUVA for chronic plaque psoriasis; **Summary of findings 2** NB-UVB compared with bath PUVA for chronic plaque psoriasis; **Summary of findings 3** NB-UVB compared with topical PUVA for palmoplantar psoriasis; **Summary of findings 4** NB-UVB plus retinoid compared with PUVA plus retinoid for chronic plaque or guttate psoriasis; **Summary of findings 5** NB-UVB compared with selective BB-UVB for chronic plaque psoriasis

We made the decision to move one of our prespecified secondary outcomes to primary outcome 4 and rename it 'clearance rate'. We also added further outcomes to our secondary outcomes. We have explained our reasoning for making this change to our published protocol in the Differences between protocol and review section.

Please read this section with the following summaries:

- Summary of findings for the main comparison: NB-UVB compared with oral PUVA for chronic plaque psoriasis;
- Summary of findings 2: NB-UVB compared with bath PUVA for chronic plaque psoriasis;
- Summary of findings 3: NB-UVB compared with topical PUVA for palmoplantar psoriasis;
- Summary of findings 4: NB-UVB plus retinoid compared with PUVA plus retinoid for chronic plaque or guttate psoriasis; and
- Summary of findings 5: NB-UVB compared with selective BB-UVB for chronic plaque psoriasis.

1. NB-UVB compared with oral PUVA for chronic plaque psoriasis

Primary outcomes

1) Participant-rated global improvement

No included RCTs addressed this outcome for this comparison.

2) Percentage of participants reaching PASI 75

Only one trial (Chauhan 2011) reported the percentage of participants with chronic plaque psoriasis (CPP) who reached PASI 75. Seventeen of 21 (80.9%) participants in the NB-UVB group compared with 18 of 22 (81.8%) participants in the oral PUVA group reached PASI 75; the difference was not statistically significant (RR 0.99, 95% CI 0.74 to 1.32; N = 43; Analysis 1.1). Chauhan 2011 did not perform ITT analysis. As mentioned in the Methods section, we considered participants with missing outcomes as treatment failures for dichotomous outcomes and conducted ITT analysis. The result indicated that no significant difference was identified between NB-UVB and oral PUVA groups (RR 0.91, 95% CI 0.63 to 1.32; N = 51; Analysis 1.2).

3) Withdrawal due to side-effects

Pooled data from three trials (Gordon 1999; Markham 2003; Yones 2006) indicated that withdrawals due to adverse events were not significantly different between the NB-UVB group and the oral PUVA group in participants with CPP (RR 0.69, 95% CI 0.19 to 2.43; N = 231; Analysis 1.3). The ITT analysis revealed a similar result (RR 0.71, 95% CI 0.20 to 2.54; N = 247; Analysis 1.4).

4) Clearance rate

Three trials (Gordon 1999; Markham 2003; Yones 2006) compared NB-UVB to oral PUVA with respect to clearance rate in participants with CPP. Because we identified statistically significant heterogeneity between the three studies (I^2 statistic = 91%), we did not pool the data. Among them, Yones 2006 did not perform ITT analysis, and the result showed that the clearance rate was 51.1% in the NB-UVB group and 79.1% in the oral PUVA group (RR 0.65, 95% CI 0.47 to 0.89; N = 88; Analysis 1.5). We conducted ITT analysis using the data of Yones 2006 and found a very similar result: The clearance rate was 48.9% in the NB-UVB group and 73.9% in the oral PUVA group (RR 0.66, 95% CI 0.47 to 0.93; N = 93; Analysis 1.6). Gordon 1999 performed ITT analysis and found that the clearance rate was 62.7% in the NB-UVB group and 83.7% in the oral PUVA group (RR 0.75, 95% CI 0.59 to 0.96; N = 100; Analysis 1.6). Markham 2003 also performed ITT analysis; however, there was no significant difference between the NB-UVB and the oral PUVA groups with respect to clearance rate (96.6% versus 96%; RR 1.01, 95% CI 0.91 to 1.12; N = 54; Analysis 1.6).

Secondary outcomes

1) The Physician's Global Evaluation score

No included RCTs addressed this outcome for this comparison.

2) Dermatology Life Quality Index (DLQI)

Yones 2006 reported DLQI as an outcome in participants with CPP, which is a simple practical tool for assessing the QOL of people with skin diseases (Finlay 1994). The reduction of DLQI scores was statistically significantly greater in the oral PUVA group than in the NB-UVB group (the Mann-Whitney test, Z = -2.4, P = 0.02). In other words, the participants' QOL in the oral PUVA group was improved more than in the NB-UVB group.

3) Number of treatments to clearance

Three included trials (Gordon 1999; Markham 2003; Yones 2006) reported this outcome in participants with CPP. We could not perform meta-analysis because of insufficient data. Gordon 1999 showed the median number of treatments to clearance was 25.3 for NB-UVB and 16.7 for oral PUVA (P < 0.001). Markham 2003 reported the median number of treatments to clearance was 25.5 for NB-UVB and 19 for oral PUVA (the Mann-Whitney test, P = 0.03). Yones 2006 found the median number of treatments to clearance was 28.5 for NB-UVB and 17 for oral PUVA, and the difference was statistically significant (the Mann-Whitney test, Z = -3.7, P < 0.01).

4) Cumulative UV dose to clearance

There is evidence that lower cumulative UV dose is relevant to lower risk of skin cancer (Godar 2003). In the study by Gordon 1999, in participants with CPP, the median cumulative UV dose to clearance was 35 J/cm^2 for NB-UVB and 75.1 J/cm^2 for oral PUVA. However, the study authors did not clearly describe whether the difference between the two groups was statistically significant.

5) Time to clearance

In the study by Markham 2003, in people with CPP, the median time to clearance in the NB-UVB group was 66 days, whereas it was 67 days in the oral PUVA group. The difference between the two groups did not reach statistical significance (P = 0.46).

6) Clearance lasting six months

In the study by Yones 2006 in people with CPP, more skin lesions in the oral PUVA group achieved clearance lasting six months, which was statistically significant compared with those in the NB-UVB group (RR 0.51, 95% CI 0.28 to 0.94; N = 47; Analysis 1.7).

7) PASI score reduction (before and after treatment)

No included RCTs addressed this outcome for this comparison.

8) Time to PASI 75

In the study by Chauhan 2011, in participants with CPP, the mean time to PASI 75 was 9.9 weeks in both NB-UVB and oral PUVA groups (mean difference (MD) 0.00, 95% CI -2.03 to 2.03; N = 43; Analysis 1.8).

9) Relapse rate

Three included trials, which were conducted in participants with CPP, reported this outcome (Chauhan 2011; Gordon 1999; Markham 2003). Pooled data showed that the lesions in 36 of 90 (40%) participants who received NB-UVB compared with 31 of 82 (37.8%) participants who received oral PUVA group relapsed at six months after treatment completion, but the difference between groups did not reach statistical significance (RR 1.08, 95% CI 0.74 to 1.58; N = 162; Analysis 1.9). These studies defined relapse as 50% of the original extent of the lesions.

10) Duration of remission

In the study by Markham 2003, the median duration of remission for participants with CPP was 288.5 days in the NB-UVB group and 231 days in the oral PUVA group; however, the difference between groups was not statistically significant (P = 0.40). The study did not explicitly define remission.

11) Withdrawal due to poor response

In the study by Gordon 1999, in participants with CPP, withdrawals due to poor response were significantly more in the NB-UVB group than in the oral PUVA group (29.4% versus 6%; RR 4.80, 95% CI 1.48 to 15.57; N = 100; Analysis 1.10).

12) Clinical improvement

No included RCTs addressed this secondary outcome for this comparison.

13) Reduction of peripheral T cells

No included RCTs addressed this secondary outcome for this comparison.

14) Tolerability

No included RCTs addressed this secondary outcome for this comparison.

15) Adverse events

Four RCTs (Chauhan 2011; Gordon 1999; Markham 2003; Yones 2006) addressed the following adverse events conducted in participants with CPP: erythema (in different degrees), pruritus, polymorphic light eruption (PMLE), nausea, and folliculitis (Analysis 1.11). They were generally slight and reversible. Chauhan 2011 indicated that the incidence of any adverse events was not significantly different between NB-UVB and PUVA groups (RR 0.92, 95% CI 0.40 to 2.08; N = 43; Analysis 1.11, see Analysis 1.11.7).

Pooled data from three trials (Gordon 1999; Markham 2003; Yones 2006) indicated that the incidence of erythema was comparable between NB-UVB and oral PUVA groups (RR 0.99, 95% CI 0.47 to 2.09; N = 233; Analysis 1.11, see Analysis 1.11.1). Similarly, no significant difference was identified between NB-UVB and oral PUVA groups with respect to grade one erythema (Markham 2003; RR 0.93, 95% CI 0.68 to 1.26; N = 45; Analysis 1.11, see Analysis 1.11.5) and grade two erythema (Yones 2006; RR 0.48, 95% CI 0.13 to 1.79; N = 88; Analysis 1.11, see Analysis 1.11.6).

Pooled data from two trials (Chauhan 2011; Yones 2006) showed the incidence of nausea was significantly lower in the NB-UVB group than in the oral PUVA group (0% versus 12.3%; RR 0.12, 95% CI 0.02 to 0.94; N = 131; Analysis 1.11, see Analysis 1.11.2).

Furthermore, Chauhan 2011 found that the incidence of pruritus was not significantly different between NB-UVB and PUVA groups (23.8% versus 27.3%; RR 0.87, 95% CI 0.31 to 2.43; N = 43; Analysis 1.11, see Analysis 1.11.3), or between the NB-UVB and PUVA groups with respect to PMLE (9% versus 9.5%; RR 1.05, 95% CI 0.16 to 6.77; N = 43; Analysis 1.11, see Analysis 1.11.4).

2. NB-UVB compared with bath PUVA for chronic plaque psoriasis

Primary outcomes

Only one primary outcome was addressed for this comparison.

4) Clearance rate

Three trials (Dawe 2003; Salem 2010; Snellman 2004) compared NB-UVB to bath PUVA in participants with CPP. Among them, Dawe 2003 and Snellman 2004 conducted left-right body comparisons while Salem 2010 conducted comparisons between participants. Pooled data from Dawe 2003 and Snellman 2004 indicated that no significant difference between the two groups were identified (RR 2.03, 95% CI 0.29 to 14.06; N = 35; Analysis 2.1). However, Salem 2010 found that two of 16 participants (12.5%) in the NB-UVB group compared with 11 of 18 participants (61.1%) in the bath PUVA groups achieved statistically significant clearance (RR 0.20, 95% CI 0.05 to 0.79; N = 34; Analysis 2.1). Because we identified moderate statistical heterogeneity between Dawe 2003 and Snellman 2004 (I^2 statistic = 74%), the pooled data should be interpreted with caution.

Additionally, we conducted ITT analyses. The pooled data from Dawe 2003 and Snellman 2004 indicated that no significant difference between the two groups was identified (RR 1.79, 95% CI 0.46 to 6.91; N = 46; Analysis 2.2). Again, because of the moderate statistical heterogeneity between Dawe 2003 and Snellman 2004 (I^2 statistic = 52%), the pooled data should be interpreted with caution. However, the ITT analysis of Salem 2010 found that more participants in the bath PUVA group achieved clearance than those

in the NB-UVB group (RR 0.18, 95% CI 0.18 to 0.71; N = 36; Analysis 2.2).

Secondary outcomes

The following four of our secondary outcomes were addressed for this comparison.

3) Number of treatments to clearance

Dawe 2003 showed that the median number of treatments to clearance for participants with CPP was 24.5 for NB-UVB and 19 for bath PUVA, and the difference was statistically significant (P = 0.001).

7) PASI score reduction (before and after treatment)

Salem 2010 compared the PASI score reduction before and after therapy between groups in participants with CPP. The greater the reduction in score, the better the improvement in the lesions. The mean PASI score reduction was 11.71 in the NB-UVB group and 22.51 in the bath PUVA group (MD -10.80, 95% CI -16.23 to -5.37; N = 34; Analysis 2.3), which was statistically in favour of bath PUVA. In the study by Dawe 2003, the median PASI score reduction was 20 in the NB-UVB group and 17.5 in the bath PUVA group (P = 0.04).

13) Reduction of peripheral T cells

In the study by Salem 2010, in participants with CPP, the mean reduction (before-after treatment values) of percentage of CD4+ T cells was significantly lower in NB-UVB group than in the bath PUVA group (P = 0.03), but there was no significant difference between groups with respect to the mean change of CD8+ T cells (P = 0.27).

15) Adverse events

The following adverse events were addressed in three RCTs (Dawe 2003; Salem 2010; Snellman 2004) conducted in participants with CPP: erythema (in different degrees), pruritus, and folliculitis (Analysis 2.4).

Salem 2010 (N = 34) found no significant difference between groups with respect to the incidence of erythema (RR 1.13, 95% CI 0.18 to 7.09; N = 34; see Analysis 2.4.1), pruritus (RR 0.84, 95% CI 0.22 to 3.21; N = 34; see Analysis 2.4.2), and folliculitis (RR 0.37, 95% CI 0.02 to 8.55; N = 34; see Analysis 2.4.6).

The study by Dawe 2003 (N = 28) found no significant difference between groups in terms of grade one erythema (RR 1.31, 95% CI 0.89 to 1.93; see Analysis 2.4.3), grade two erythema (RR 1.25, 95% CI 0.58 to 2.69; see Analysis 2.4.4), and grade three erythema (RR 1.00, 95% CI 0.28 to 3.61; see Analysis 2.4.5).

However, Snellman 2004 (N = 17) found that erythema was more frequent in the NB-UVB group than in the PUVA group (RR 1.52, 95% CI 1.07 to 2.17; see Analysis 2.4.1), which was statistically significant.

3. NB-UVB compared with topical PUVA for palmoplantar psoriasis

Primary outcomes

Only one primary outcome was addressed for this comparison.

4) Clearance rate

Sezer 2007 conducted this within-patient study on people with PPP. Compared with the topical PUVA treated sides, the NB-UVB treated sides appeared harder to achieve clearance (0% versus 23.8%). However, the difference did not reach statistical significance (RR 0.09, 95% CI 0.01 to 1.55; N = 21; Analysis 3.1). Sezer 2007 did not perform ITT analysis. However, we carried out ITT analysis. The ITT analysis gave a very similar result (RR 0.09, 95% CI 0.01 to 1.56; N = 25; Analysis 3.2).

Secondary outcomes

The following three of our secondary outcomes were addressed for this comparison.

9) Relapse rate

In the study by Sezer 2007, the skin lesions in 12 of 21 (57.1%) NB-UVB treated sides compared with seven of 21 (33.3%) topical PUVA treated sides relapsed at nine weeks after treatment completion, but the difference was not statistically significant (RR 1.71, 95% CI 0.84 to 3.48; N = 21; Analysis 3.3). Relapse was defined as an increase in post-treatment Severity Index scores of PPP (see Table 1).

12) Clinical improvement

Sezer 2007 compared the effect of NB-UVB to topical PUVA in participants with PPP. The trial found that 42.9% of the sides treated with NB-UVB achieved marked clinical improvement, while 71.4% of those sides treated with topical PUVA achieved marked clinical improvement, but the difference was not statistically significant (RR 0.60, 95% CI 0.34 to 1.05; N = 21; Analysis 3.4). In this study, marked clinical improvement was defined as those who had a reduction of 70% or more with respect to the baseline Severity Index scores at nine weeks.

15) Adverse events

Sezer 2007 reported the following adverse events: phototoxicity, palmar hyperpigmentation, and mild xerosis. In this study, one participant dropped out because of a phototoxic reaction in the PUVA treated side. The incidence of palmar hyperpigmentation was significantly lower in the NB-UVB treated side than in the PUVA treated side (0% versus 52.4%; RR 0.04, 95% CI 0.00 to 0.69; N = 21; Analysis 3.5). Mild xerosis was observed on both sides of the body and responded to emollients.

4. NB-UVB plus retinoid (re-NB-UVB) compared with PUVA plus retinoid (re-PUVA) for chronic plaque or guttate psoriasis

Primary outcomes

Two of our primary outcomes were addressed for this comparison.

2) Percentage of participants reaching PASI 75

Only one trial (Özdemir 2008) addressed this comparison in participants with chronic plaque and guttate psoriasis. Özdemir 2008 found no significant difference between the two groups with respect to PASI 75 (RR 0.83, 95% CI 0.58 to 1.19; N = 52; Analysis 4.1). Özdemir 2008 also reported the result of ITT analysis: 17 of 30 (56.7%) participants in the retinoid NB-UVB group compared with 19 of 30 (63.3%) in the retinoid PUVA group reached PASI 75, but the difference between groups was not statistically significant (RR 0.89, 95% CI 0.59 to 1.35; N = 60; Analysis 4.2).

4) Clearance rate

Özdemir 2008 and Green 1992 addressed this comparison in people with chronic plaque and guttate psoriasis; pooled data found no significant difference between those who were treated with re-NB-UVB and those who treated re-PUVA in terms of clearance rate (RR 0.91, 95% CI 0.78 to 1.07; N = 82; Analysis 4.3). ITT analysis of the pooled data gave a very similar result (RR 0.93, 95% CI 0.79 to 1.10; N = 90; Analysis 4.4).

Secondary outcomes

The following five of our secondary outcomes were addressed for this comparison.

7) PASI score reduction (before and after treatment)

In the study by Özdemir 2008, in participants with chronic plaque and guttate psoriasis, the mean PASI score reduction was not significantly different between the re-NB-UVB group and the re-PUVA group (11.4 versus 12.6, P = 0.83).

9) Relapse rate

Green 1992 found no significant difference between re-NB-UVB and re-PUVA with respect to relapse at six months after treatment completion (60% versus 46.7%; RR 1.29, 95% CI 0.65 to 2.54; N = 30; Analysis 4.5). Relapse was defined as a return of psoriasis to 50% or more of that at baseline.

12) Clinical improvement

Özdemir 2008 (N = 60) reported the percentage of participants who achieved a marked improvement (which was defined as 50% to 75% improvement in PASI score), moderate improvement (which referred to 25% to 50% improvement in PASI score), slight improvement (which referred to 5% to 25% improvement in PASI score), or no improvement (which was defined as less than 5% improvement in PASI score). Using ITT analyses, no significant differences were found between the re-NB-UVB group and the re-PUVA group with respect to marked improvement (RR 1.00, 95% CI 0.28 to 3.63; Analysis 4.6, see Analysis 4.6.1), moderate improvement (RR 4.00, 95% CI 0.47 to 33.73; Analysis 4.6, see Analysis 4.6.2), slight improvement (RR 2.00, 95% CI 0.19 to 20.90; Analysis 4.6, see Analysis 4.6.3), or no improvement (RR 0.60, 95% CI 0.16 to 2.29; Analysis 4.6, see Analysis 4.6.4).

14) Tolerability

Özdemir 2008 (N = 60) showed there was no significant difference in the tolerability of re-NB-UVB or re-PUVA when assessed by the clinicians (RR 1.05, 95% CI 0.76 to 1.44; Analysis 4.7) or by the participants themselves (RR 1.05, 95% CI 0.73 to 1.53; Analysis 4.8).

15) Adverse events

Two RCTs (Green 1992; Özdemir 2008) addressed the following adverse events: erythema; pruritus; burning; diffuse hair loss; nausea; reversible hypertriglyceridaemia; dry lips, mouth, skin, and nose; joint pain; nose bleeding; taste loss; muscle pain; paronychia; xerophthalmia; nail fragility; headache; and gastrointestinal events.

In Analysis 4.9, no significant differences were identified between re-NB-UVB and re-PUVA with respect to the incidence of erythema (RR 1.32, 95% CI 0.60 to 2.94; N = 52; see Analysis 4.9.1), diffuse hair loss (RR 1.00, 95% CI 0.07 to 14.55; N = 30; see Analysis 4.9.2), reversible hypertriglyceridaemia (RR 0.33, 95% CI 0.04 to 2.85; N = 30; see Analysis 4.9.3), withdrawal due to pruritus and burning (RR 3.00, 95% CI 0.13 to 68.26; N = 30; see Analysis 4.9.4), or nausea (RR 0.33, 95% CI 0.01 to 7.58; N = 30; see Analysis 4.9.5).

5. NB-UVB compared with selective BB-UVB for chronic plaque psoriasis

Primary outcomes

The following two of our primary outcomes were addressed for this comparison.

3) Withdrawal due to side-effects

Kirke 2007 found no significant difference between NB-UVB and selective BB-UVB with respect to withdrawals due to adverse events (RR 2.80, 95% CI 0.3 to 25.81; N = 85; Analysis 5.1); Kirke 2007 also performed ITT analysis and found a similar result (RR 3.00, 95% CI 0.32 to 27.87; N = 100; Analysis 5.2).

4) Clearance rate

Kirke 2007 conducted this comparison in people with CPP. The study found there was no significant difference between the two groups with respect to clearance rate (RR 1.30, 95% CI 0.89 to 1.92; N = 85; Analysis 5.3). Kirke 2007 also performed ITT analysis and found 28 of 50 (56%) participants who received NB-UVB compared with 20 of 50 (40%) of those who received selective BB-UVB achieved clearance, but the difference did not reach statistical significance (RR 1.40, 95% CI 0.92 to 2.13; N = 100; Analysis 5.4). Additionally, more participants with skin type III/IV achieved clearance than those with skin type I/II, irrespective of the type of irradiation (odds of clearance = 3.22, 95% CI 1.40 to 7.43).

Secondary outcomes

The following four of our secondary outcomes were addressed for this comparison.

3) Number of treatments to clearance

Based on Kirke 2007, the median number of treatments to clearance was 28.4 for NB-UVB and 30.4 for selective BB-UVB, but the difference did not reach statistical significance (P = 0.43). In addition, the authors reported that "patients with skin type III/IV cleared faster than patients with skin type I/II," regardless of the type of irradiation.

4) Cumulative UV dose to clearance

According to the Kirke 2007 trial conducted in participants with CPP, the median cumulative UV dose to clearance was 40.9 J/cm^2 for NB-UVB and 39.9 J/cm^2 for selective BB-UVB, but they did not report the relevant P value or 95% CI.

6) Clearance lasting six months

Based on a single outcome event in the study by Kirke 2007, no significant difference was found in clearance lasting six months after treatment completion between those in the NB-UVB and selective BB-UVB groups (5.3% versus 0%; RR 2.10, 95% CI 0.09 to 47.89; N = 32; Analysis 5.5).

15) Adverse events

Kirke 2007 (N = 100) reported the following adverse events: severe erythema (which caused the participants to miss treatments),

PMLE, and pruritus (Analysis 5.6). There were no significant differences between NB-UVB and selective BB-UVB with respect to the incidence of severe erythema (RR 0.67, 95% CI 0.12 to 3.82; see Analysis 5.6.1), PMLE (RR 3.00, 95% CI 0.32 to 27.87; see Analysis 5.6.2), and pruritus (RR 0.20, 95% CI 0.01 to 4.06; see Analysis 5.6.3).

6. NB-UVB compared with conventional BB-UVB in people with different types of psoriasis

Primary outcomes

No included studies addressed our primary outcomes for this comparison.

Secondary outcomes

Only the following two of our secondary outcomes were addressed for this comparison.

4) Cumulative UV dose to clearance

Two RCTs (Larko 1989; Storbeck 1993) addressed this outcome; both trials conducted half-body irradiations by left-right comparison. Because there were insufficient data available in Larko 1989, meta-analysis could not be performed. In Storbeck 1993 (N = 10), the mean cumulative UV dose during the study that was statistically significant was 14.68 J/cm^2 with NB-UVB and 1.427 J/cm^2 with conventional BB-UVB (MD 13.25, 95% CI 7.11 to 19.39; Analysis 6.1). By contrast, in Larko 1989, the mean cumulative UV dose was 0.83 J/cm^2 with NB-UVB and 4.8 J/cm^2 with conventional BB-UVB (P value or 95% CI was not reported).

7) PASI score reduction (before and after treatment)

Storbeck 1993 compared NB-UVB with conventional BB-UVB in 10 participants with different types of psoriasis. The total decrease of the PASI was significantly greater with NB-UVB than with conventional BB-UVB ($P < 0.05$).

7. NB-UVB plus dithranol compared with conventional BB-UVB plus dithranol in people with different types of psoriasis

Primary outcomes

No included studies addressed our primary outcomes for this comparison.

Secondary outcomes

Only the following two of our secondary outcomes were addressed for this comparison.

4) Cumulative UV dose to clearance

Storbeck 1993 also compared NB-UVB plus dithranol with conventional BB-UVB plus dithranol in 13 participants with different types of psoriasis. The mean cumulative UV dose during the study that was statistically significant was 10.93 J/cm^2 for NB-UVB and 1.3 J/cm^2 for conventional BB-UVB (MD 9.63, 95% CI 7.09 to 12.17; Analysis 7.1).

7) PASI score reduction (before and after treatment)

Storbeck 1993 compared NB-UVB plus dithranol with conventional BB-UVB plus dithranol in 13 participants with different types of psoriasis. The total decrease of the PASI was statistically significantly greater with NB-UVB than with conventional BB-UVB ($P < 0.05$).

DISCUSSION

Summary of main results

We included 13 RCTs, with 662 participants, in this review, and the main results are listed as follows.

NB-UVB compared with oral PUVA in people with chronic plaque psoriasis: The percentage of participants reaching PASI 75 showed no statistically significant difference between the NB-UVB group and the oral PUVA group, and the ITT analysis gave a similar result. Pooled data from three RCTs indicated that withdrawals due to adverse events were not significantly different between the NB-UVB and the oral PUVA groups, and the ITT analysis gave a similar result. The clearance rate between groups was not consistent within the three included studies because in one, there was no difference between the groups, and in the other two, the clearance rate was statistically significantly in favour of oral PUVA. In one of these two studies, clearance was measured at six months, which was achieved by statistically significantly more participants in the oral PUVA group.

The median number of treatments to clearance was significantly lower in the oral PUVA group compared with NB-UVB, but time to clearance was similar between the two groups. The cumulative UV dose to clearance, relapse rate at six months after treatment, and duration of remission were not significantly different between the groups. Moreover, the participants' QOL in the oral PUVA group was improved more than in the NB-UVB group. Nausea was significantly higher in the oral PUVA group.

Narrow-band UVB compared with bath PUVA in people with chronic plaque psoriasis: The evidence addressing this comparison was not consistent. Two RCTs, which performed left-right body comparison, found no significant difference between the NB-UVB and bath PUVA groups, while another RCT, which performed the comparison between participants, favoured bath PUVA. Intention-to-treat (ITT) analyses did not significantly change the results.

Narrow-band UVB compared with topical PUVA in people with palmoplantar psoriasis: There were no significant differences between NB-UVB treated sides and topical PUVA treated sides in terms of clearance rate, marked improvement rate, and relapse rate. The incidence of palmar hyperpigmentation was statistically significantly higher in the PUVA treated sides.

Retinoid NB-UVB compared with retinoid PUVA in people with chronic plaque or guttate psoriasis: No significant difference was found between re-NB-UVB and re-PUVA with respect to effectiveness, tolerability, and adverse events, irrespective of using the retinoids, etretinate or acitretin, as adjuvant therapy.

Narrow-band UVB compared with selective BB-UVB in people with chronic plaque psoriasis: No significant differences were found between those treated with NB-UVB and those treated with selective BB-UVB in terms of withdrawal due to side-effects, clearance rate, number of treatments to clearance, cumulative UV dose to clearance, and adverse events.

Narrow-band UVB compared with conventional BB-UVB in people with different types of psoriasis: Based on one small RCT, NB-UVB seemed to be more effective than conventional BB-UVB.

However, cumulative UV dose to clearance in both groups was not consistent between the two included RCTs.

Narrow-band UVB plus dithranol compared with conventional BB-UVB plus dithranol in people with different types of psoriasis: Based on a small RCT, NB-UVB plus dithranol seemed to be more effective than conventional BB-UVB plus dithranol. However, cumulative UV dose to clearance was higher in the NB-UVB group than the BB-UVB group.

Overall completeness and applicability of evidence

Most included RCTs in this review were conducted in adults with psoriasis, but one RCT (Salem 2010) enrolled participants aged more than 13 years, while another RCT (Green 1992) did not report the age of the participants. The results of this review should therefore be applied to adults as the literature regarding the use of phototherapy in paediatric patients with psoriasis is limited (Menter 2010). In addition, these RCTs either did not include or separately reported pregnant women, and in consequence, our review did not contribute to this specific population. However, a recent guideline reported that NB-UVB has been used successfully in pregnant women with psoriasis and "should be considered first-line therapy in pregnant women with plaque and guttate psoriasis who need a systemic approach to treatment" (Menter 2010). Moreover, because most of the included participants suffered from chronic plaque psoriasis (CPP), the evidence for guttate psoriasis and palmoplantar psoriasis was limited, and only one trial (NB-UVB compared with selective BB-UVB) included participants with erythrodermic psoriasis.

In recent years, NB-UVB has replaced conventional BB-UVB as the first-line treatment for psoriasis and has been recommended by US and UK guidelines (Menter 2010; Smith 2009), respectively, or used in clinical practice. In the most recently published guideline (Paul 2012), neither conventional or selective BB-UVB has been mentioned. In this review, we identified only two RCTs (Larko 1989; Storbeck 1993) that compared NB-UVB with conventional BB-UVB; both of the studies were of high risk of bias and small sample sizes. They gave contrasting results with respect to cumulative UV dose to clearance; however, Storbeck 1993 showed that NB-UVB achieved a greater PASI score reduction than conventional BB-UVB. It is noteworthy that many non-RCTs (Coven 1997; Karvonen 1989; Picot 1992; Walters 1999) indicate that NB-UVB is preferable to conventional BB-UVB. The dosage and duration of phototherapy in different trials varied from each other, and no RCT so far has directly compared different dosing strategies and frequency of application.

Most included RCTs applied clearance, minimal residual activity (MRA), PASI, and clinical improvement as the main outcomes, which were subjective and measured by clinicians. Only one RCT (Yones 2006) assessed quality of life, an important outcome for people with psoriasis.

Additionally, the risk of carcinogenesis as a result of phototherapy attracted the greatest concern by the participants and clinicians. Because of the limited duration of follow-up, none of the included RCTs addressed this important issue. A clear relationship between cumulative PUVA exposure and an increased risk of skin cancer had been established (Naldi 2010; Paul 2012; Smith 2009), but there is controversy regarding the risk of skin cancer with NB-UVB or BB-UVB (Weischer 2004). Young 1995 summarised data from murine studies and reported that NB-UVB might be two to three times more carcinogenic per minimal erythema dose (MED) than conventional BB-UVB. However, the following systematic reviews of trials conducted in people with psoriasis (Hearn 2008; Lee 2005; Pasker-de 1999) found that UVB did not increase the risk of skin cancer. Most recently, Archier 2012 found no robust evidence of carcinogenic risk of NB-UVB because of limited prospective studies.

Quality of the evidence

The included trials were of varying methodological quality. In general, these trials did not fully follow good practice conduct and reporting guidelines, such as CONSORT (Consolidated Standards of Reporting Trials) (Schulz 2010). First, although all of the studies stated the participants (or half-bodies) were randomly allocated, four of them (Green 1992; Markham 2003; Salem 2010; Storbeck 1993) did not explicitly report the methods of randomisation. Second, allocation concealment was not clearly mentioned in six trials (Markham 2003; Özdemir 2008; Salem 2010; Sezer 2007; Storbeck 1993; Yones 2006), while another trial (Chauhan 2011) explicitly stated that allocation concealment was not performed. Insufficient randomisation or allocation concealment might cause potential selection bias. Third, using clearance, minimal residual activity (MRA), or PASI score as the end points was subjective and relatively imprecise. Thus, it is important to blind the evaluating observers to treatment allocation and treatment supervision. One included trial (Markham 2003) did not apply blinding; the other three trials (Chauhan 2011; Green 1992; Storbeck 1993) did not report whether blinding was used or not. Lack of blinding might cause an overestimation of the effects. It should be noted that different types of phototherapies were performed in different irradiation devices. Besides, PUVA needs use of a photosensitiser (in oral, bath, or topical form), while NB-UVB does not. Hence, it was hard to blind therapists and participants. Fourth, seven of 12 trials had more than 10% dropouts, but only two of them performed ITT analysis, which may be useful to maintain the unbiased group comparison supplied by randomisation. Lack of ITT analysis might lead to potential biases. Last but not least, the sample sizes of these included trials were generally small, which might compromise the value of the results. In a disease with poorly defined treatment outcome measures, small sample size might lead to an underpowered study.

Potential biases in the review process

We experienced some limitations during the review process. One published study (Nazari 2005) appeared to meet the inclusion criteria, but we have not yet been able to include or exclude this study. Requests for unpublished data from the authors of some included trials failed, and as a consequence, meta-analysis could not be performed for some outcomes and comparisons. Therefore, the results of this review have to be interpreted with caution.

Agreements and disagreements with other studies or reviews

A systematic review (Archier 2012a), which was published most recently, included three RCTs (Gordon 1999; Markham 2003; Yones 2006) that compared NB-UVB with PUVA in people with chronic plaque psoriasis. We included all three of these RCTs in our review. Archier 2012a did not include RCTs that compared NB-UVB with bath PUVA, and the outcomes were slightly different to those in our review: They combined "clearance" with "clearance or MRA" as a single outcome, whereas we reported them separately. In addition,

we reported more secondary outcomes; however, the authors drew a similar conclusion, which was that both PUVA and NB-UVB were effective for treating CPP, but oral PUVA was more effective than NB-UVB to "clear psoriasis, with fewer sessions, provided longer lasting clearance, and should therefore still be used in appropriate selected patients".

AUTHORS' CONCLUSIONS

Implications for practice

- Current available evidence is very heterogeneous and has to be interpreted or applied with caution.
- According to current limited evidence, in people with chronic plaque psoriasis, oral PUVA, compared with NB-UVB, leads to longer lasting clearance, a fewer number of treatments, and higher levels of QOL, but more nausea and a similar relapse rate at six months. The clearance rate between oral PUVA and NB-UVB is contradictory among the included studies. Evidence regarding NB-UVB versus bath PUVA is contradictory. Retinoids with NB-UVB and retinoids with PUVA have a similar effect for treating people with chronic plaque or guttate psoriasis. However, the long-term side-effects of PUVA, especially the potential risk of carcinogenesis, need to be taken into account. In practice, NB-UVB may be more convenient to use since exogenous photosensitiser is not required before phototherapy.
- Although NB-UVB is considered ineffective for palmoplantar psoriasis in clinical practice, a small included RCT did not detect a statistically significant difference in the efficacy of NB-UVB and topical PUVA in clearing palmoplantar psoriasis. This needs to be investigated in the future.
- NB-UVB is more effective than or at least equal to selective BB-UVB, irrespective of whether it is combined with dithranol.
- Evidence regarding NB-UVB and conventional BB-UVB is limited and of poor quality; none of the included studies addressed the primary outcomes in this comparison.

Implications for research

This review highlights the need for further high-quality research regarding the use of NB-UVB and PUVA for treating psoriasis. The following key points should be taken into account in future research: a big enough sample size to identify the presumptive difference, strict standardisation of the method of UV irradiation, and appropriate outcomes that matter to people (e.g. quality of life and the cost-effectiveness of the therapy). Good practice guidelines (e.g. CONSORT) must be followed during the process of study design, implementation, and reporting. In addition, prospective studies regarding the carcinogenic risk of NB-UVB therapy are urgently needed.

ACKNOWLEDGEMENTS

The authors appreciate the kind help given by Hywel Williams, Finola Delamere, Elizabeth Doney, and Laura Prescott from the Cochrane Skin Group during the process of drafting the review.

The Cochrane Skin Group editorial base wishes to thank Luigi Naldi who was the Key Editor for this review; Matthew Grainge and Ching-Chi Chi who were the Statistical and Methods Editors, respectively; the clinical referee, Robert Dawe and another clinical referee who wishes to remain anonymous; and the consumer referee, who also wishes to remain anonymous.

REFERENCES

References to studies included in this review

Chauhan 2011 *{published data only}*

Chauhan PS, Kaur I, Dogra S, De D, Kanwar AJ. Narrowband ultraviolet B versus psoralen plus ultraviolet A therapy for severe plaque psoriasis: an Indian perspective. *Clinical & Experimental Dermatology* 2011;**36**(2):169-73. [MEDLINE: 20545955]

Dawe 2003 *{published data only}*

Dawe RS, Cameron H, Yule S, Man I, Wainwright N J, Ibbotson S H, et al. A randomized controlled trial of narrowband ultraviolet B vs bath-psoralen plus ultraviolet A photochemotherapy for psoriasis. *British Journal of Dermatology* 2003;**148**(6):1194-204. [MEDLINE: 12828749]

Gordon 1999 *{published data only}*

Gordon PM, Diffey BL, Farr PM. A comparison of narrow-band TL01 phototherapy and psoralen-UVA photochemotherapy for psoriasis [Summary]. *British Journal of Dermatology* 1997;**137**(Suppl 50):15. [DOI: 10.1111/j.1365-2133.1997.tb01879.x]

* Gordon PM, Diffey BL, Matthews JN, Farr PM. A randomized comparison of narrow-band TL-01 phototherapy and PUVA photochemotherapy for psoriasis. *Journal of the American Academy of Dermatology* 1999;**41**(5 Pt 1):728-32. [MEDLINE: 10534635]

Green 1992 *{published data only}*

Green C, Lakshmipathi T, Johnson BE, Ferguson J. A comparison of the efficacy and relapse rates of narrowband UVB (TL-01) monotherapy vs. etretinate (re-TL-01) vs. etretinate-PUVA (re-PUVA) in the treatment of psoriasis patients. *British Journal of Dermatology* 1992;**127**(1):5-9. [MEDLINE: 1637696]

Kirke 2007 *{published data only}*

Kirke SM, Lowder S, Lloyd J, Matthews JN, Farr PM. A randomized comparison of selective broadband UVB and narrowband UVB in the treatment of psoriasism [Abstract RF-4]. The 85th BAD Annual Meeting 5-8th July 2005, Glasgow, UK. *British Journal of Dermatology* 2005;**153**(Suppl 1):10.

* 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. *Journal of Investigative Dermatology* 2007;**127**(7):1641-6. [MEDLINE: 17380117]

Larko 1989 *{published data only}*

Larko O. Treatment of psoriasis with a new UVB-lamp. *Acta Dermato-Venereologica* 1989;**69**(4):357-9. [EMBASE: 1989165254]

Markham 2003 *{published data only}*

Markham T, Rogers S, Collins P. A comparison of oral 8-methoxypsoralen PUVA and narrowband UVB (TL-OI) phototherapy in the management of chronic plaque psoriasis [Summary]. *British Journal of Dermatology* 2001;**145**(Suppl 59):25. [DOI: 10.1046/j.1365-2133.2001.012ff.x]

* Markham T, Rogers S, Collins P. Narrowband UV-B (TL-01) phototherapy vs oral 8-methoxypsoralen psoralen-UV-A for the treatment of chronic plaque psoriasis. *Archives of Dermatology* 2003;**139**(3):325-8. [MEDLINE: 12622624]

Özdemir 2008 *{published data only}*

Özdemir M, Engin B, Baysal I, Mevlitoglu I. A randomized comparison of acitretin-narrow-band TL-01 phototherapy and acitretin-psoralen plus ultraviolet A for psoriasis. *Acta Dermato-Venereologica* 2008;**88**(6):589-93. [MEDLINE: 19002344]

Salem 2010 *{published data only}*

Salem SA, Barakat MA, Morcos CM. Bath psoralen+ultraviolet A photochemotherapy vs. narrow band-ultraviolet B in psoriasis: a comparison of clinical outcome and effect on circulating T-helper and T-suppressor/cytotoxic cells. *Photodermatology, Photoimmunology & Photomedicine* 2010;**26**(5):235-42. [MEDLINE: 20831697]

Sezer 2007 *{published data only}*

Sezer E, Erbil AH, Kurumlu Z, Tastan HB, Etikan I. Comparison of the efficacy of local narrowband ultraviolet B (NB-UVB) phototherapy versus psoralen plus ultraviolet A (PUVA) paint for palmoplantar psoriasis. *Journal of Dermatology* 2007;**34**(7):435-40. [MEDLINE: 17584319]

Snellman 2004 *{published data only}*

Snellman E, Klimenko T, Rantanen T. Randomized half-side comparison of narrowband UVB and trimethylpsoralen bath plus UVA treatments for psoriasis. *Acta Dermato-Venereologica* 2004;**84**(2):132-7. [MEDLINE: 15206693]

Storbeck 1993 *{published data only}*

Storbeck K, Holzle E, Schurer N, Lehmann P, Plewig G. Narrow-band UVB (311 nm) versus conventional broad-band UVB with and without dithranol in phototherapy for psoriasis. *Journal of the American Academy of Dermatology* 1993;**28**(2 Pt 1):227-31. [MEDLINE: 8432920]

Yones 2006 *{published data only}*

Yones SS, Garibadinos T, Seed P, Csaszar M, Hawk J. A prospective randomized double blind trial of the efficacy of narrowband UVB (TL01) phototherapy and psoralen photochemotherapy (PUVA) in the treatment of chronic plaque psoriasis (CPP) [Abstract FC11.10]. 14th Congress of the European Academy of Dermatology and Venereology, London, UK. 12-15th October 2005. *Journal of the European Academy of Dermatology & Venereology* 2005;**19**(Suppl 2):47. [DOI: 10.1111/j.1468-3083.2005.01310.x]

* Yones SS, Palmer RA, Garibaldinos TT, Hawk JL. Randomized double-blind trial of the treatment of chronic plaque psoriasis: efficacy of psoralen-UV-A therapy vs narrowband UV-B therapy. *Archives of Dermatology* 2006;**142**(7):836-42. [MEDLINE: 16847198]

References to studies excluded from this review

Boer 1984 *{published data only}*

Boer J, Hermans J, Schothorst AA, Suurmond D. Comparison of phototherapy (UV-B) and photochemotherapy (PUVA) for clearing and maintenance therapy of psoriasis. *Archives of Dermatology* 1984;**120**(1):52-7. [MEDLINE: 6691715]

Coven 1997 *{published data only}*

Coven TR, Burack LH, Gilleaudeau R, Keogh M, Ozawa M, Krueger JG. Narrowband UV-B produces superior clinical and histopathological resolution of moderate-to-severe psoriasis in patients compared with broadband UV-B. *Archives of Dermatology* 1997;**133**(12):1514-22. [MEDLINE: 9420535]

Dayal 2010 *{published data only}*

Dayal S, Mayanka, Jain VK. Comparative evaluation of NBUVB phototherapy and PUVA photochemotherapy in chronic plaque psoriasis. *Indian Journal of Dermatology, Venereology & Leprology* 2010;**76**(5):533-7. [MEDLINE: 20826993]

Malhotra 2010 *{published data only}*

Malhotra V. Comparative efficacy of photochemotherapy and narrow band ultraviolet B radiation in the treatment of severe plaque-type psoriasis [Summary PD-9]. Conference: 90th Annual Meeting of the British Association of Dermatologists Manchester United Kingdom. Conference Start: 20100706 Conference End: 20100708. *British Journal of Dermatology* 2010;**163**(Suppl 1):134-5. [EMBASE: 70234375]

Roson 2005 *{published data only}*

Roson E, Garcia-Doval I, Florez A, Cruces M. Comparative study of the treatment of psoriasis plaques with PUVA baths and narrow-band UVA (311 NM). *Actas Dermo-Sifiliograficas* 2005;**96**(6):371-5. [MEDLINE: 16476256]

Tanew 1996 *{published data only}*

Tanew A, Fijan S, Honigsmann H. Halfside comparison study on narrow-band UV-B phototherapy versus photochemotherapy (PUVA) in the treatment of severe psoriasis [Abstract 212]. 1996 Annual Meeting Society for Investigative Dermatology . *Journal of Investigative Dermatology* 1996;**106**(4):841. [DOI: 10.1111/1523-1747.ep12346478]

Ul 2005 *{published data only}*

Ul Bari A, Iftikhar N, Ber Rahman S. Comparison of PUVA and UVB therapy in moderate plaque psoriasis. *Journal of Pakistan Association of Dermatologists* 2005;**15**(1):26-31. [EMBASE: 2006474827]

References to studies awaiting assessment

Nazari 2005 *{published data only}*

Nazari S, Ozarmagan G, Erzengin D, Akar U. A randomized comparison of narrow-band UVB phototherapy and PUVA photochemotherapy in the management of plaque-type psoriasis [Psoriasiste PUVA ve dar bant UVB tedavilerinin klinik etkinliklerinin karsilastirilmasi]. *Turkderm Deri Hastaliklari ve Frengi Arsivi* 2005;**39**(2):103-8. [EMBASE: 2006204570]

Additional references

Anderson 1984

Anderson TF, Waldinger TP, Voorhees JJ. UV-B phototherapy. An overview. *Archives of Dermatology* 1984;**120**(11):1502-7. [MEDLINE: 6388509]

Archier 2012

Archier E, Devaux S, Castela E, Gallini A, Aubin F, Le Maitre M, et al. Carcinogenic risks of psoralen UV-A therapy and narrowband UV-B therapy in chronic plaque psoriasis: a systematic literature review. *Journal of the European Academy of Dermatology and Venereology* 2012;**26**(Suppl 3):22-31. [MEDLINE: 22512677]

Archier 2012a

Archier E, Devaux S, Castela E, Gallini A, Aubin F, Le Maitre M, et al. Efficacy of psoralen UV-A therapy vs. narrowband UV-B therapy in chronic plaque psoriasis: a systematic literature review. *Journal of the European Academy of Dermatology and Venereology* 2012;**26**(Suppl 3):11-21. [MEDLINE: 22512676]

Ashworth 1989

Ashworth J, Kahan MC, Breathnach SM. PUVA therapy decreases HLA-DR+ CDIa+ Langerhans cells and epidermal cell antigen-presenting capacity in human skin, but flow cytometrically-sorted residual HLA-DR+ CDIa+ Langerhans cells exhibit normal alloantigen-presenting function. *British Journal of Dermatology* 1989;**120**(3):329-39. [MEDLINE: 2469456]

Aubin 1998

Aubin F, Humbert P. Immunomodulation induced by psoralen plus ultraviolet A radiation. *European Journal of Dermatology* 1998;**8**(3):212-3. [MEDLINE: 9649704]

Aufiero 2006

Aufiero BM, Talwar H, Young C, Krishnan M, Hatfield JS, Lee HK, et al. Narrow-band UVB induces apoptosis in human keratinocytes. *Journal of Photochemistry & Photobiology* 2006;**82**(2):132-9. [MEDLINE: 16309917]

Boer 1980

Boer J, Schothorst AA, Suurmond D. UV-B phototherapy of psoriasis. *Dermatologica* 1980;**161**(4):250-8. [MEDLINE: 7409285]

Boffetta 2001

Boffetta P, Gridley G, Lindelof B. Cancer risk in a population-based cohort of patients hospitalized for psoriasis in Sweden. *Journal of Investigative Dermatology* 2001;**117**(6):1531-7. [MEDLINE: 11886519]

Borroni 1991

Borroni G, Zaccone C, Vignati G, Fietta A, Gatti M, Brazzelli V, et al. Lymphopenia and decrease in the total number of circulating CD3+ and CD4+ T cells during 'long-term' PUVA treatment for psoriasis. *Dermatologica* 1991;**183**(1):10-4. [MEDLINE: 1837524]

Braun 2000

Braun Falcon O, Plewig G, Wolff HH, Burgdorf WHC. Physical methods of therapy. In: Braun Falcon O, Plewig G, Wolff HH editor(s). Dermatology. Berlin: Springer-Verlag, 2000:1767-80.

Brenner 1983

Brenner W, Jaschke E, Honigsmann H. UV-B phototherapy in psoriasis [UV-B-Phototherapie der Psoriasis]. *Zeitschrift fur Hautkrankheiten* 1983;**58**(15):1113-24. [MEDLINE: 6636924]

Coven 1999

Coven TR, Walters IB, Cardinale I, Krueger JG. PUVA-induced lymphocyte apoptosis: mechanism of action in psoriasis. *Photodermatology, Photoimmunology & Photomedicine* 1999;**15**(1):22-7. [MEDLINE: 9990665]

De Gruijl 1996

De Gruijl FR. Long-term side effects and carcinogenesis risk in UVB therapy. In: Honigsmann H, Jori G, Young AR editor(s). The Fundamental Bases of Photo-therapy. Milan, Italy: OEMF, 1996:153-70.

De Korte 2004

De Korte J, Sprangers MA, Mombers FM, Bos JD. Quality of life in patients with psoriasis: a systematic literature review. *Journal of Investigative Dermatology Symposium* 2004;**9**(2):140-7. [EMBASE: 2004161605]

Finlay 1994

Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI): a simple practical measure for routine clinical use. *Clinical & Experimental Dermatology* 1994;**19**:210-6. [MEDLINE: 8033378]

Fischer 1976

Fischer T. UV-light treatment of psoriasis. *Acta Dermato-Venereologica* 1976;**56**(6):473-9. [EMBASE: 0978025023]

Fitzpatrick 1988

Fitzpatrick TB. The validity and practicality of sunreactiveskin type-I through type-VI. *Arch. Dermatol* 1988;**124**:869–871.

Gelfand 2003

Gelfand JM, Berlin J, Van Voorhees A, Margolis DJ. Lymphoma rates are low but increased in patients with psoriasis: results from a population-based cohort study in the United Kingdom. *Archives of Dermatology* 2003;**139**(11):1425-9. [MEDLINE: 14623702]

Gelfand 2006

Gelfand JM, Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB. Risk of myocardial infarction in patients with psoriasis. *JAMA* 2006;**296**(14):1735-41. [MEDLINE: 17032986]

Godar 2003

Godar DE, Urbach F, Gasparro FP, van der Leun JC. UV doses of young adults. *Photochem Photobiol* 2003;**77**(4):453-7.

Green 1988

Green C, Ferguson J, Lakshmipathi T, Johnson BE. 311 nm UVB phototherapy--an effective treatment for psoriasis. *British Journal of Dermatology* 1988;**119**(6):691-6. [MEDLINE: 3203066]

Griffiths 1996

Griffiths CE, Voorhees JJ. Psoriasis, T cells and autoimmunity. *Journal of the Royal Society of Medicine* 1996;**89**(6):315-9. [MEDLINE: 8758188]

Hannuksela-Svahn 2000

Hannuksela-Svahn A, Pukkala E, Laara E, Poikolainen K, Karvonen J. Psoriasis, its treatment, and cancer in a cohort of Finnish patients. *Journal of Investigative Dermatology* 2000;**114**(3):587-90. [MEDLINE: 10692122]

Hearn 2008

Hearn RM, Kerr AC, Rahim KF, Ferguson J, Dawe RS. Incidence of skin cancers in 3867 patients treated with narrow-band ultraviolet B phototherapy. *British Journal of Dermatology* 2008;**159**(4):931-5. [MEDLINE: 18834483]

Higgins 2011

Higgins JPT, Green S, (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.

Hofer 2006

Hofer A, Fink-Puches R, Kerl H, Quehenberger F, Wolf P. Paired comparison of bath water versus oral delivery of 8-methoxypsoralen in psoralen plus ultraviolet: A therapy for chronic palmoplantar psoriasis.. *Photodermatol Photoimmunol Photomed* 2006;**22**:1-5.

Honigsmann 1977

Honigsmann H, Fritsch P, Jaschke E. UV-therapy of psoriasis. Half-side comparison between oral photochemotherapy (PUVA) and selective UV-phototherapy (SUP) [UV-Therapie der Psoriasis Halbseitenvergleich zwischen oraler Photochoemotherapie (PUVA) und selektiver UV-Phototherapie (SUP)]. *Zeitschrift fur Hautkrankheiten* 1977;**52**(21):1078-82. [MEDLINE: 930225]

Ibbotson 2004

Ibbotson SH, Bilsland D, Cox NH, Dawe RS, Diffey B, Edwards C, et al. An update and guidance on narrowband ultraviolet B phototherapy: a British Photodermatology Group Workshop Report. Brithish Journal of Dermatology 2004; Vol. 151, issue 2:283-97. [MEDLINE: 15327535]

Jensen 2010

Jensen P, Skov L, Zachariae C. Systemic combination treatment for psoriasis: a review. *Acta Dermato-Venereologica* 2010;**90**(4):341-9. [MEDLINE: 20574597]

Karvonen 1989

Karvonen J, Kokkonen E L, Ruotsalainen E. 311 nm UVB lamps in the treatment of psoriasis with the Ingram regimen. *Acta Dermato-Venereologica* 1989;**69**(1):82-5. [MEDLINE: 2563617]

Kozenitzky 1992

Kozenitzky L, David M, Sredai B, Albeck M, Shohat B. Immunomodulatory effects of AS101 on interleukin-2 production and T-lymphocyte function of lymphocytes treated with psoralens and ultraviolet A. *Photodermatology, Photoimmunology & Photomedicine* 1992;**9**(1):24-8. [MEDLINE: 1390119]

Lauharanta 1997

Lauharanta J. Photochemotherapy. *Clinics in Dermatology* 1997;**15**(5):769-80. [MEDLINE: 9313975]

Lebwohl 2003

Lebwohl M. Psoriasis. *Lancet* 2003;**361**(9364):1197-204. [MEDLINE: 12686053]

Lee 2005

Lee E, Koo J, Berger T. UVB phototherapy and skin cancer risk: a review of the literature. *International Journal of Dermatology* 2005;**44**(5):355-60. [MEDLINE: 15869531]

Lowe 1997

Lowe NJ, Chizhevsky V, Gabriel H. Photo(chemo)therapy: general principles. *Clinics in Dermatology* 1997;**15**(5):745-52. [EMBASE: 1997295624]

Menter 2010

Menter A, Korman NJ, Elmets CA, Feldman SR, Gelfand JM, Gordon KB, et al. Guidelines of care for the management of psoriasis and psoriatic arthritis: Section 5. Guidelines of care for the treatment of psoriasis with phototherapy and photochemotherapy. *Journal of the American Academy of Dermatology* 2010;**62**(1):114-35. [MEDLINE: 19811850]

Morison 1995

Morison WL. Combination of methoxsalen and ultraviolet B (UVB) versus UVB radiation alone in treatment of psoriasis: a bilateral comparison study. *Photodermatology, Photoimmunology & Photomedicine* 1995;**11**(1):6-8. [MEDLINE: 7654566]

Morison 1998

Morison WL, Baughman RD, Day RM, Forbes PD, Hoenigsmann H, Krueger GG, et al. Consensus workshop on the toxic effects of long-term PUVA therapy. *Archives of Dermatology* 1998;**134**(5):595-8. [MEDLINE: 9606329]

Naldi 2010

Naldi L. Malignancy concerns with psoriasis treatments using phototherapy, methotrexate, cyclosporin, and biologics: facts and controversies. *Clinics in Dermatology* 2010;**28**(1):88-92. [MEDLINE: 20082957]

Neuner 1994

Neuner P, Charvat B, Knobler R, Kirnbauer R, Schwarz A, Luger TA, et al. Cytokine release by peripheral blood mononuclear cells is affected by 8-methoxypsoralen plus UV-A. *Photochemistry & Photobiology* 1994;**59**(2):182-8. [MEDLINE: 8165238]

Parrish 1981

Parrish JA, Jaenicke KF. Action spectrum for phototherapy of psoriasis. *Journal of Investigative Dermatology* 1981;**76**(5):359-62. [MEDLINE: 7229428]

Pasker-de 1999

Pasker-de Jong PC, Wielink G, van der Valk PG, van der Wilt GJ. Treatment with UV-B for psoriasis and nonmelanoma skin cancer: a systematic review of the literature. *Archives of Dermatology* 1999;**135**(7):834-40. [MEDLINE: 10411159]

Paul 2012

Paul C, Gallini A, Archier E, Castela E, Devaux S, Aractingi S, et al. Evidence-based recommendations on topical treatment and phototherapy of psoriasis: systematic review and expert opinion of a panel of dermatologists. *Journal of the European Academy of Dermatology and Venereology* 2012;**26**(Suppl 3):1-10. [MEDLINE: 22512675]

Picot 1992

Picot E, Meunier L, Picot-Debeze MC, Peyron JL, Meynadier J. Treatment of psoriasis with a 311-nm UVB lamp. *British Journal of Dermatology* 1992;**127**(5):509-12. [MEDLINE: 1467291]

Saurat 1999

Saurat JH. Retinoids and psoriasis: novel issues in retinoid pharmacology and implications for psoriasis treatment. *Journal of the American Acadmy Dermatology* 1999;**41**(3 Pt 2):s2-6. [MEDLINE: 10459139]

Schulz 2010

Schulz KF, Altman DG, Moher D, CONSORT Group. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *PLoS Medicine* 2010;**7**(3):e1000251. [MEDLINE: 20352064]

Smith 2009

Smith CH, Anstey AV, Barker JN, Burden AD, Chalmers RJ, Chandler DA, et al. British Association of Dermatologists' guidelines for biologic interventions for psoriasis 2009. *British Journal of Dermatology* 2009;**161**(5):987-1019. [MEDLINE: 19857207]

Stern 1988

Stern RS, Lange R. Non-melanoma skin cancer occurring in patients treated with PUVA five to ten years after first treatment. *Journal of Investigative Dermatology* 1988;**91**(2):120-4. [EMBASE: 1988194616]

Tahir 2004

Tahir R, Mujtaba G. Comparative efficacy of psoralen - UVA photochemotherapy versus narrow band UVB phototherapy in the treatment of psoriasis. *Journal of the College of Physicians & Surgeons - Pakistan* 2004;**14**(10):593-5. [MEDLINE: 15456547]

van Weelden 1988

van Weelden H, De La Faille HB, Young E, van der Leun JC. A new development in UVB phototherapy of psoriasis. *British Journal of Dermatology* 1988;**119**(1):11-9. [MEDLINE: 3408653]

Walters 1999

Walters IB, Burack LH, Coven TR, Gilleaudeau P, Krueger JG. Suberythemogenic narrow-band UVB is markedly more effective than conventional UVB in treatment of psoriasis vulgaris. *Journall of American Academic Dermatology* 1999;**40**(6 Pt 1):893-900. [MEDLINE: 10365919]

Weischer 2004

Weischer M, Blum A, Eberhard F, Rocken 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 Dermato-Venereologica* 2004;**84**(5):370-4. [MEDLINE: 15370703]

Young 1995

Young AR. Carcinogenicity of UVB phototherapy assessed. *Lancet* 1995;**345**(8962):1431-2. [DOI: 10.1016/S0140-6736(95)92617-8]

Zanolli 2000

Zanolli MD, Camisa C, Feldman S, Gulliver W, Menter A. Psoriasis: the high notes on current treatment. Program of the American Academy of Dermatology. Nashville, TN, August 5, 2000.

* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Chauhan 2011

Methods	This was a randomised controlled trial conducted in India
Participants	**Inclusion criteria of the trial** • People with Fitzpatrick skin types IV and V (Fitzpatrick 1988) who had plaque-type psoriasis with involvement of more than 20% body surface area (BSA) **Exclusion criteria of the trial** • Those normally recommended for PUVA or NB-UVB • Those with pustular psoriasis or erythroderma 51 participants were recruited; 43 of them completed the study Age: 35.7 ± 13.1 years Men: 35 Women: 8
Interventions	**Group 1** • NB-UVB 3 times weekly on nonconsecutive days. Following a standard starting dose of 280 mJ/cm^2, the UV dose was increased by 20% at each subsequent visit, depending on erythema and any subjective symptoms **Group 2** • PUVA 3 times weekly on nonconsecutive days. The initial dose depended on skin type (2.0 J/cm^2 for skin type IV, and 2.5 J/cm^2 for skin type V). The dosage of UVA was increased by 1 to 1.5 J/cm^2 at every second visit. Participants also received oral methoxsalen tablets 0.6 mg/kg body weight followed by UVA exposure 2 hours later In both groups, no concomitant treatment was allowed except for emollients and antihistamines If no improvement in disease severity was observed after treatment for 6 weeks, the treatment was stopped and considered a treatment failure. The treatment protocol was continued until a participant achieved > 75% reduction in PASI or for up to 4 months, whichever was earlier
Outcomes	1. Participants reached PASI 75 2. Time taken to achieve PASI 75 3. Relapse rate within 6 months after treatment completion 4. Total UV dose required 5. Adverse events

Chauhan 2011 *(Continued)*

Notes	The trial included participants with skin types IV and V. In addition, the authors defined the following outcomes but did not report them: no response rate, mild improvement rate, and moderate improvement rate

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	The participants were randomly assigned using a computer-generated random number table
Allocation concealment (selection bias)	High risk	Quote: "The random allocation list was not concealed"
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	The authors did not clearly state whether blinding was used or not
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The authors did not clearly state whether blinding was used or not
Incomplete outcome data (attrition bias) All outcomes	High risk	8 (16%) participants discontinued the trial. When assessing "time to relapse", only 29 (57%) participants were available for analysis
Selective reporting (reporting bias)	High risk	The following outcomes were described in the methods section, but were not reported in the results section: no response rate, mild improvement rate, and moderate improvement rate
Other bias	Unclear risk	Insufficient information was available

Dawe 2003

Methods	This was a randomised, controlled, single-blind, within-patient, side-to-side comparison trial conducted in the UK from September 1996 to May 1999
Participants	**Inclusion criteria of the trial** • People with chronic plaque psoriasis **Exclusion criteria of the trial** • Age < 18 years • A history of skin cancer or solar keratoses • Phototherapy, PUVA, or systemic therapy for psoriasis within the preceding 3 months 28 participants were included; 18 of them completed the study Age: 22 to 71 years Men: 17 Women: 11

Dawe 2003 *(Continued)*

Interventions	The randomisation was performed within participants. Each half-body (sagittal plane) was treated independently. The side allocated to NB-UVB therapy was treated first, followed by bath water application of trimethoxypsoralen (TMP), and later on, UVA irradiation to the other side of the body. Hence, the unit of analysis was half of the participant's body **Group 1** • NB-UVB 3 times weekly. The starting dose was 70% of minimal erythemal dose (MED), then the UV dose was increased by 20% (reducing to 10%) at each subsequent visit. The maximum exposure dose stopping treatment was 2066 mJ/cm^2 **Group 2** • Bath PUVA 2 times weekly. The starting dose was 40% of the minimal phototoxic dose (MPD), then the UV dose was increased by 20% (reducing to 10%) at each subsequent visit. The maximum exposure dose stopping treatment was 15 J/cm^2 Treatment was stopped when the participant was clear or after the fourth exposure following first documentation of minimal residual activity (MRA), whichever was earlier. Moreover, the authors set a maximum limit of 30 treatments to either side
Outcomes	1. The median treatments to achieve clearance of the lesions or minimal residual activity (MRA) 2. The median time to achieve clearance of the lesions or MRA 3. Percentage of participants who achieved clearance of the lesions or MRA 4. The median fall in psoriasis severity score 5. Adverse events
Notes	Loss to follow up was very high (36%) in this trial. In addition, randomisation was performed within participants. The unit of analysis was the "half-body". Furthermore, only participants with skin phototype I to III participated in this trial

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A statistical book was consulted for a "random number"
Allocation concealment (selection bias)	Low risk	The random number was held by a departmental secretary who was not directly involved in the trial
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and nurse phototherapists in this study were not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The observer was masked
Incomplete outcome data (attrition bias) All outcomes	High risk	10 (36%) participants were lost to follow up, although it reported findings for ITT analysis (full analysis set) and per-protocol analysis set
Selective reporting (reporting bias)	Low risk	All outcomes described in the methods section were reported in the results of the trial report. In addition, the mean, 95% CI, and P value were all reported for the main outcomes

Dawe 2003 *(Continued)*

Other bias	High risk	The included participants were atypical of the psoriasis participant population as a whole, because they were more likely to have been treated with PUVA before and appeared to have more treatment-resistant psoriasis than non-participants. In other words, the baseline in both groups seemed to be unequal. In addition, the study withdrawal was extremely high, and withdrawal of 1 body-half for any reason inevitably caused withdrawal of the other half. Third, each participant received both treatment regimens, so the treatment to 1 side might have affected the other. All of these pitfalls might have induced other bias

Gordon 1999

Methods	This was a single-blind, parallel, randomised, controlled trial conducted in the UK from July 1996 to September 1997
Participants	**Inclusion criteria of the trial** • People with chronic plaque psoriasis, Fitzpatrick skin type I to IV **Exclusion criteria of the trial** • People receiving other systemic therapy for psoriasis, such as acitretin or methotrexate • People who received any form of UV therapy within the preceding 6 months • People who received any therapy other than emollient in the 4 weeks before beginning treatment 100 participants were included; 94 participants completed the study Age: 43.3 ± 12.9 years in the NB-UVB group; 41.0 ± 11.2 in the PUVA group Gender: not reported
Interventions	**Group 1** • NB-UVB twice weekly. The initial dose was 70% of the MED. Weekly dose increments were used, starting with 30% to 40%, reducing stepwise to 5% to 10% by the sixth week **Group 2** • Oral PUVA twice weekly. The initial dose ranged from 1 to 2.5 J/cm^2 and was chosen according to previous PUVA history, skin type, and experience of sunburn. The dose was then increased if tolerated in approximately equal steps to the previously determined MPD, given on the third and fourth treatment days or to a maximum of 6 J/cm^2. Weekly dose increments were used, starting with 40%, reducing stepwise to 10% by the sixth week. Oral methoxsalen was given using a dosing system on the basis of BSA (25 mg/m^2) Participants whose skin failed to improve significantly after 16 treatments were withdrawn from the trial
Outcomes	1. Clearance of psoriasis 2. Number of exposures for clearance 3. Cumulative UV dose for clearance 4. Relapse rate at 3 and 6 months after treatment completion 5. Adverse events
Notes	NB-UVB was performed twice weekly in this trial; this regimen might not be optimal, as there was evidence that NB-UVB might be more effective when given more frequently. In addition, the trial included participants with skin type I to IV

Gordon 1999 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Treatment allocation was based on randomised permuted blocks within strata"
Allocation concealment (selection bias)	Low risk	Sealed envelopes were used
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and phototherapists were not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Assessments were made by a clinician, unaware of the treatment allocation"
Incomplete outcome data (attrition bias) All outcomes	Low risk	Only 6 (6%) participants were lost to follow up
Selective reporting (reporting bias)	Unclear risk	Insufficient information was available
Other bias	Unclear risk	Insufficient information was available

Green 1992

Methods	This was a parallel, randomised, controlled trial conducted in the UK
Participants	**Inclusion criteria of the trial** • People with extensive chronic plaque or guttate psoriasis if they either 1) failed to respond to UVB or PUVA previously, 2) had experienced rapid relapse following UVB or PUVA, or 3) had a high cumulative PUVA dose (> 1000 J/cm^2) **Exclusion criteria of the trial** • Coexistent hepatic or renal malfunction • PUVA, methotrexate, or retinoid therapy in the preceding 2 months • A history of Ischaemic heart disease, hyperlipidaemia, or cutaneous malignancy • Fertile women without contraception 45 participants were included and completed the study Age: not reported Men: 25 Women: 20
Interventions	**Group 1** • NB-UVB 3 times weekly. The initial dose was 70% of MED; thereafter, incremental increases of 40% were chosen to achieve slight erythema with each subsequent dose. Once the clearance or MRA was achieved, treatment was continued for a further 2 weeks

Green 1992 *(Continued)*

	Group 2 • NB-UVB and retinoid. Etretinate was applied at a dose of 1 mg/kg unless adverse events necessitated a dose reduction. Pretreatment with etretinate for 2 weeks was followed by NB-UVB 3 times weekly in combination with etretinate. Once the clearance or MRA was achieved, treatment was continued for a further 2 weeks **Group 3** • PUVA and retinoid. Pretreatment with etretinate (1 mg/kg per day) for 2 weeks was followed by a combination of etretinate and PUVA. PUVA included oral 8-methoxypsoralen (0.6 mg/kg twice weekly) plus UVA irradiation. The initial dose was 0.5 J/cm^2, with increments of 0.5 to 1.0 J/cm^2 weekly. Once the clearance or MRA was achieved, treatment was continued for a further 2 weeks
Outcomes	1. Participants reached clearance or MRA 2. Mean number of treatments to achieve clearance or MRA 3. Time to achieve clearance or MRA 4. Mean total exposure dose to achieve clearance or MRA 5. Relapse rate within 6 months after treatment completion 6. Adverse events
Notes	This trial included 3 interventions. According to our preliminary protocol, only data regarding NB-UVB and retinoids versus PUVA and retinoids were extracted and applied in this review. In addition, the trial did not report the participants' skin type

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Patients were randomised" Comment: The detail of randomisation was not clear
Allocation concealment (selection bias)	Low risk	"A sealed code kept in the pharmacy" was used
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Insufficient information was available
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Insufficient information was available
Incomplete outcome data (attrition bias) All outcomes	Low risk	No participant was lost to follow up
Selective reporting (reporting bias)	High risk	The authors only reported mean and range in main outcomes, and relevant P value or 95% CI were not stated in the study. We failed to make contact with them to get more information
Other bias	Unclear risk	Insufficient information was available

Kirke 2007

Methods	This was a randomised, controlled, single-blind, parallel trial conducted in the UK from May 2003 to June 2005
Participants	**Inclusion criteria of the trial** • People with plaque-type psoriasis **Exclusion criteria of the trial** • Younger than 18 years • Those who received phototherapy or systemic agents for psoriasis in the preceding 3 months 100 participants were included in the study; 85 of them completed the study Age: 19 to 77 years Men: 45 Women: 55
Interventions	**Group 1** • NB-UVB 3 times weekly **Group 2** • Selective BB-UVB 3 times weekly The initial treatment dose was 70% of the MED, and the dose was increased after alternate treatments by 40%, decreasing stepwise to 5% by the 18th treatment. If erythema developed during treatment, depending on the severity, planned dose increments were postponed or treatments were missed until the erythema resolved. Participants who cleared, and those who did not clear but received at least 16 exposures, were judged to have completed the trial Adjunctive therapy was restricted to emollients
Outcomes	1. The number of treatments to clearance 2. Cumulative UV dose for clearance 3. Clearance rate 4. PASI score for non-clearing participants 5. Continued clearance at 3 or 6 months after treatment completion 6. Adverse events
Notes	The trial included participants with skin type I to IV

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Treatment allocation was "based on randomised permuted blocks within strata"
Allocation concealment (selection bias)	Low risk	Quote: "Treatment allocation used opaque, sequentially numbered, sealed envelopes"
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and nurse phototherapists were not blinded

Kirke 2007 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Low risk	Observers were masked
Incomplete outcome data (attrition bias) All outcomes	Low risk	15 (15%) participants discontinued the study. The reason for discontinuation was clearly stated in the study, and the withdrawals were distributed equally between the groups. Furthermore, ITT analysis was used
Selective reporting (reporting bias)	Low risk	All outcomes described in the protocol were reported in the results of the trial report. In addition, the mean, 95% CI, and P value were all reported for the main outcomes
Other bias	Unclear risk	Insufficient information was available

Larko 1989

Methods	This was a randomised, double-blind, within-patient trial conducted in Sweden
Participants	**Inclusion criteria of the trial** • People with psoriasis **Exclusion criteria of the trial** • The exclusion criteria was not reported 29 participants were included in this study. The author did not report how many participants completed this study The median age was 35 (range from 19 to 76 years) Men: unclear Women: unclear
Interventions	The NB-UVB (TL-01) and conventional BB-UVB (TL-12) treatments were assigned randomly to the left or right side. The maximum irradiation time was set to 30 minutes **Group 1** • NB-UVB, 0.07 mW/cm^2, 3 to 5 times per week, for a maximum of 8 weeks **Group 2** • Conventional BB-UVB, 0.7 mW/cm^2, 3 to 5 times per week, for a maximum of 8 weeks Adjunctive therapy was restricted to emollients
Outcomes	1. Mean cumulative UV dose 2. Scores of symptoms
Notes	This was a left-right comparison study. In addition, the trial did not report the participants' skin type

Risk of bias

Bias	Authors' judgement	Support for judgement

Larko 1989 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Although the left and right sides of the participants received NB-UVB (TL-01) or conventional BB-UVB (TL-12), respectively in "randomized order", the method of randomisation was not clearly described
Allocation concealment (selection bias)	Unclear risk	Insufficient information was available
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Insufficient information was available, although the author stated that this study was a "double-blind" study in the abstract. The method of blinding was not addressed in the report
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Insufficient information was available, although the author stated that this study was a "double-blind" study in the abstract. The method of blinding was not addressed in the report
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	The author did not report relevant information
Selective reporting (reporting bias)	High risk	The author did not report a P value or 95% CI for most of the outcomes
Other bias	High risk	The unit of analysis was the half-body. Withdrawal of 1 body-half for any reason inevitably caused withdrawal of the other half. In addition, each participant received both treatment regimens; the treatment to 1 side might have affected the other. All of these pitfalls might have induced other bias

Markham 2003

Methods	This was an open-label, parallel, randomised, controlled trial conducted in Ireland from January 1999 to June 2000
Participants	**Inclusion criteria of the trial** • People with chronic plaque psoriasis who had at least 8% psoriasis extent on the truck and limbs and had not received any specific antipsoriatic treatment within 2 weeks prior to the study or phototherapy treatment for 4 months beforehand • People with skin types I, II, or III **Exclusion criteria of the trial** • Younger than 16 years of age • Pregnant or lactating • Renal or hepatic disease • Active systematic therapy within the previous 8 weeks for psoriasis • Abnormal photosensitivity • Previous failure or intolerance to phototherapy 54 participants were included; 45 participants completed the study Age: 27 to 52 years Men: 30 Women: 14

Markham 2003 *(Continued)*

Interventions	**Group 1** • NB-UVB 3 times weekly. The initial dose was 70% of the MED. Incremental dose (at each visit) was 20% of the previous dose. The maximum dose was 2140 mJ/cm^2 **Group 2** • PUVA twice weekly. The initial dose was 70% of the MPD. Incremental dose (at each visit) was 20% of the previous dose. Oral 8-methoxypsoralen at a dose of 0.6 mg/kg were taken 2 hours before UVA exposure. For those who could not tolerate 8-methoxypsoralen, 5-methoxypsoralen at a dose of 1.2 mg/kg was prescribed The end point of the study was complete clearance of psoriasis
Outcomes	1. The number of treatments for clearance 2. Time for clearance 3. Time for remission 4. Adverse events
Notes	Some outcomes (e.g. grade 2 erythema, pruritus, subgroup analyses according to PASI score, etc) were not fully reported with statistical data. In addition, the trial included only participants with skin type I to III

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Although participants were "randomly allocated to either treatment group", the method of randomisation was not clearly described
Allocation concealment (selection bias)	Unclear risk	Insufficient information was available
Blinding of participants and personnel (performance bias) All outcomes	High risk	The authors stated that it was an "open trial"
Blinding of outcome assessment (detection bias) All outcomes	High risk	Only 1 outcome (namely "remission") was assessed by "a blinded observer"
Incomplete outcome data (attrition bias) All outcomes	Low risk	Although 9 (17%) participants discontinued the study, the reason for discontinuation was clearly reported, and the withdrawals were distributed equally between both groups
Selective reporting (reporting bias)	High risk	Some outcomes (e.g. grade 2 erythema, pruritus, subgroup analyses according to PASI score, etc) were not supported by statistical data
Other bias	Unclear risk	Insufficient information was available

Salem 2010

Methods	This was a randomised controlled trial conducted in Egypt
Participants	**Inclusion criteria of the trial**

Salem 2010 *(Continued)*

	• People with psoriasis who were suitable for phototherapy **Exclusion criteria of the trial** • Any topical or systemic treatment for at least 1 month • People suffering from hepatitis, diabetes, asthma, anaemia, or any chronic infection 36 participants were included for randomisation, and 34 of them completed the study Age: 13 to 63 years Men: 18 Women: 16
Interventions	**Group 1** • Bath PUVA 3 times weekly up to a maximum of 24 sessions or until their psoriasis cleared. Before the UVA irradiation, 250 mg of methoxsalen was dissolved in 100 L of bath water giving a concentration of 2.5 mg/l, and then the participants soaked in the water for 20 minutes. Following the soak, participants were immediately exposed to the UVA. Fitzpatrick's skin types I to II received an initial dose of 0.5 J/cm^2; skin type III received 0.75 J/cm^2; skin type IV received 1 J/cm^2; and skin type V received 1.25 J/cm^2. There was a routine increase in the UVA dose of 0.25 to 0.5 J/cm^2 per visit depending on the skin phototype and the degree of erythema **Group 2** • NB-UVB 3 times weekly up to a maximum of 24 sessions or until their psoriasis cleared. The initial dose was determined according to the participant's skin type: skin types I and II received 0.3 J/cm^2; skin types III and IV received 0.5 J/cm^2; and skin types V and VI received 0.8 J/cm^2. Dose increments of 20% were applied every session if there was no erythema; 10% if there was minimal erythema; while no increments were applied in the presence of intense erythema, edema, blister, or any of the aforementioned Adjunctive therapy was restricted to emollients
Outcomes	1. PASI score reduction 2. Clearence rate 3. Number of treatments 4. Cumulative UV dose 5. Peripheral CD4+ T cell (%) 6. Peripheral CD8+ T cell (%) 7. CD4+/CD8+ ratio 8. Adverse events
Notes	PASI evaluation was of the lesions in the trunk and upper and lower extremities. In other words, facial or scalp psoriasis was not taken into account. In addition, PASI score was higher in the bath PUVA group than in the NB-UVB group. Also, the trial included participants with skin type I to V

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "...simple randomisation" Comment: There was no further information
Allocation concealment (selection bias)	Unclear risk	Insufficient information was available

Salem 2010 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Insufficient information was available
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Assessment of the disease severity before and after treatment was carried out by two dermatologists in an observer-blinded fashion"
Incomplete outcome data (attrition bias) All outcomes	Low risk	Only 2 (6%) participants withdrew from the study after randomisation. The reasons for withdrawal were reported and had no relation to the study
Selective reporting (reporting bias)	Low risk	All outcomes described in the methods section were reported in the results of the trial report. In addition, the mean, 95% CI, and P value were all reported for the main outcomes
Other bias	Unclear risk	Insufficient information was available

Sezer 2007

Methods	This was a randomised, controlled, within-patient, side-to-side comparison trial conducted in Turkey
Participants	**Inclusion criteria of the trial** • People with biopsy-proven palmoplantar psoriasis (PPP) of more than 6 months duration in which conventional therapies other than phototherapy proved ineffective **Exclusion criteria of the trial** • Topical treatment with corticosteroids within 2 weeks or systemic treatment with systemic immunosuppressive agents and retinoids within the last 4 weeks • Unilateral disease • Pregnancy • The inability to meet for follow-up consultations 25 participants were included; 21 of them completed the study Age: 19 to 75 years Men: 14 Women: 11
Interventions	The NB-UVB and PUVA treatments were assigned randomly to the left or right hand, foot, or both. The treatments in both groups were used 3 times weekly over 9 weeks **Group 1** • NB-UVB was administered 3 times weekly with an initial dose of 0.15 J/cm^2. An increasing percentile dose schedule based on an increase of 20% was used in every session, until a final dose of 2 J/cm^2 was reached **Group 2** • UVA was administered 3 times weekly with an initial dose of 1.0 J/cm^2, with an increase of 0.5 J/cm^2 every second session until a final dose of 7.5 J/cm^2 was achieved. The hand, foot, or both, was painted with 1% 8-methoxypsoralen in a hydrophilic water/oil emulsion 15 minutes before the UVA exposure

Sezer 2007 *(Continued)*

	Only topical emollients were allowed between treatment sessions in both groups
Outcomes	1. Severity Index (SI) scores of PPP 2. Clearance rate 3. Marked improvement rate 4. Severity of relapse 5. Adverse events
Notes	The unit of analysis was the half-body. Additionally, the trial did not report the participants' skin type

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomisation was performed using a computer-based programme
Allocation concealment (selection bias)	Unclear risk	Insufficient information was available
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Insufficient information was available
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Clinical assessments were performed by a blinded investigator"
Incomplete outcome data (attrition bias) All outcomes	Low risk	4 (16%) participants dropped out. The reasons for dropouts were reported and unrelated to the study
Selective reporting (reporting bias)	High risk	Some outcomes (e.g. cumulative doses) were not fully reported. Standard deviation and P value were omitted
Other bias	High risk	The unit of analysis was the half-body. Withdrawal of 1 body-half for any reason inevitably caused withdrawal of the other half. In addition, each participant received both treatment regimens; the treatment to 1 side might have affected the other. All of these pitfalls might have induced other bias

Snellman 2004

Methods	This was a randomised, controlled, single-blind, within-patient, side-to-side comparison trial conducted in Finland from September 2001 to March 2002
Participants	**Inclusion criteria of the trial** • People with chronic plaque psoriasis who were suitable for and in need of phototherapy • Skin type should be II to IV • Wash-out period was 2 months for all systemic psoriasis treatments or phototherapy, and 2 weeks for topical antipsoriasis treatments **Exclusion criteria of the trial** • Not clearly reported

Snellman 2004 *(Continued)*

	18 participants were enrolled; 17 of them completed the study Age: 46 ± 12 years Men: 13 Women: 4
Interventions	Half-bodies (left or right) of the included participants were randomly assigned to receive NB-UVB or bath PUVA. A maximum of 30 treatments of each type of irradiation were given. After disappearance of psoriasis on either treatment side, that treatment was withdrawn, but the other was continued **Group 1** • NB-UVB 3 times weekly. NB-UVB was given first to avoid interaction with TMP. The initial dose was 50% of the MED, then it was incrementally increased each time by 20% to 30% until erythema appeared or a dose of 1 J/cm^2 was reached. Thereafter, the dose was increased by 10% to 20%. If erythema developed, the dose was kept constant, reduced, or not given **Group 2** • PUVA 3 times weekly. A standard commercial alcohol solution of trioxysalen 50 mg/100 ml was diluted in 150 l of tap water to produce a standard 0.33 mg/l bath concentration. The bathing time was 10 minutes. For skin phototype II, the initial dose was 0.05 J/cm^2, and each dose was applied at least 3 times. Increments were initially 20% to 30%, and thereafter, 10%. For skin phototypes III and IV, the initial dose was slightly higher, 0.07 J/cm^2, and each dose was used at least twice Adjunctive therapy was restricted to emollients and salicylic acid in white petrolatum
Outcomes	1. PASI score reduction 2. Global Improvement Score (GIS) reduction 3. Target Lesion Score (TLS) reduction 4. Time to clearance 5. Clearance rate 6. Adverse events
Notes	The unit of analysis was the half-body. In addition, the trial included participants with skin type II to IV

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	The randomisation was on the basis of "an automatically computed random number table"
Allocation concealment (selection bias)	Low risk	"Sealed envelopes" were used
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Insufficient information was available
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The investigator was masked
Incomplete outcome data (attrition bias) All outcomes	Low risk	3 (18%) participants discontinued the study; 1 of them withdrew before any interventions or assessments were performed because of his busy schedule and was not analysed. The other 2 withdrew due to personal reasons and deterio-

Snellman 2004 *(Continued)*

		ration on the PUVA side, respectively. The latter 2 participants were included in the analysis
Selective reporting (reporting bias)	Low risk	All outcomes described in the methods section were reported appropriately in the results of the trial report
Other bias	High risk	The unit of analysis was the half-body. Withdrawal of 1 body-half for any reason inevitably caused withdrawal of the other half. In addition, each participant received both treatment regimens; the treatment to 1 side might have affected the other. All of these pitfalls might have induced other bias

Storbeck 1993

Methods	This was a randomised, controlled, within-patient, side-to-side comparison trial conducted in Germany from October 1989 to May 1990
Participants	**Inclusion criteria of the trial** • People with Fitzpatrick skin type I to IV who had widespread symmetric psoriasis, including plaque type, guttate type, and erythroderma type **Exclusion criteria of the trial** • Not reported 23 participants were included and completed the study Age: 17 to 66 years Gender: not reported
Interventions	**Group 1** • NB-UVB and dithranol **Group 2** • Selective BB-UVB and dithranol **Group 3** • NB-UVB **Group 4** • Selective BB-UVB Irradiation was performed 3 to 5 times weekly. The initial dose of both irradiation doses was 70% of the MED. Dose increments of 10% were applied every session if there was no erythema, 5% if there was slight erythema, while no increments were applied in the presence of moderate erythema. Dose decrements of 10% were applied every session if there was marked erythema. Irradiation was suspended if there was burning
Outcomes	1. PASI score reduction 2. Cumulative irradiation dose
Notes	The unit of analysis was the half-body. The trial included participants with skin type I to IV
Risk of bias	

Storbeck 1993 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The method of randomisation was not reported
Allocation concealment (selection bias)	Unclear risk	No related information was available
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	The authors did not mention whether the blinding method was used or not
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The authors did not mention whether the blinding method was used or not
Incomplete outcome data (attrition bias) All outcomes	Low risk	All included participants completed the study and were analysed and reported as well
Selective reporting (reporting bias)	High risk	Some outcomes were not supported by statistical data. For example, In 11 of 13 patients the Philips TL 01/100 W lamp proved to be more effective than the Sylvania lamp"
Other bias	High risk	The unit of analysis was the half-body. Each participant received both treatment regimens; the treatment on 1 side might have affected the other, which might have induced other bias

Yones 2006

Methods	This was a randomised, placebo-controlled, double-blind trial conducted in the UK from April 2002 to March 2005
Participants	**Inclusion criteria of the trial** • People with moderate-to-severe chronic plaque psoriasis **Exclusion criteria of the trial** • Younger than 18 years or older than 70 years • Previous skin malignancy • Photo(chemo)therapy in the preceding 3 months or more than 150 sessions in the participant's lifetime • Administration of a drug known to frequently cause photosensitisation • Topical antipsoriatic treatment in the previous 4 weeks or systemic antipsoriatic treatment in the previous 3 months • Pregnancy, lactation, renal, or hepatic disease • A history of photosensitivity 93 participants were included; 88 of them completed the study Men: 64 Women: 9
Interventions	Participants were randomly assigned to receive NB-UVB and PUVA therapy

Yones 2006 *(Continued)*

	Group 1 • NB-UVB twice weekly combined with placebo tablets. The initial irradiation dose was 70% of the MED. 20% incremental increases were used at each visit, if tolerated. The maximum dose was 5 J/cm^2. Doses were adjusted according to the occurrence of any erythema after treatments **Group 2** • PUVA twice weekly combined with 8-methoxypsoralen (25 mg/m^2 BSA). If participants did not tolerate 8-methoxypsoralen due to nausea, 5-methoxypsoralen (50 mg/m^2 BSA) was the alternative choice. The initial irradiation dose was 70% of the MPD. 20% incremental increases were used at each visit, if tolerated. The maximum dose was 15 J/cm^2. Doses were adjusted according to the occurrence of any erythema after treatments Adjunctive therapy was restricted to emollients and aqueous cream. Treatment was terminated in the event of any of the following: clearance of psoriasis, absent or minimal improvement after 16 treatments or very slow progress thereafter, intolerance to therapy, or the completion of 30 treatments
Outcomes	1. PASI score 2. Physician's Global Evaluation score 3. Dermatology Life Quality Index score 4. Visual analogy scale 5. Replase rate 6. Adverse events
Notes	The trial included participants with skin type I to VI

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"A sequentially numbered list" was used
Allocation concealment (selection bias)	Unclear risk	Insufficient information was available
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants were blinded. It was not clear whether personnel were blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Observers were blinded
Incomplete outcome data (attrition bias) All outcomes	Low risk	Only 5 (5%) participants discontinued the study. The withdrawals were distributed equally between both groups
Selective reporting (reporting bias)	Low risk	All outcomes described in the methods section were reported appropriately in the results of the trial report
Other bias	Unclear risk	Insufficient information was available

Özdemir 2008

Methods	This was a randomised, controlled, single-blind, parallel trial conducted in Turkey from August 2005 to Decemeber 2006
Participants	**Inclusion criteria of the trial** • People with Fitzpatrick's skin type II to V who were diagnosed with moderate to severe plaque psoriasis (more than 20% of their total BSA and a minimum PASI of 10) • People should also have stopped all topical therapy at least 4 weeks before the study and all systemic therapies for at least 6 months before the study **Exclusion criteria of the trial** • Pregnant women • Age < 18 years • A history of skin cancer or solar keratoses • A history of phototherapy • Localised palmoplantar psoriasis • Pregnancy, lactation, renal, or liver diseases • Hyperlipoproteinemias • Severe cardiac and neurological diseases • People receiving other systemic therapy for psoriasis, such as acitretin or methotrexate • Those who had received any form of UV therapy within the preceding 6 months • People with guttate, erythrodermic, or pustular psoriasis 60 participants were included; 52 of them completed the study Age: 37.2 ± 11.6 years in the NB-UVB group; 36.1 ± 9.9 years in the PUVA group Men: 34 Women: 26
Interventions	During the first week, participants in both groups received acitretin (0.3 to 0.5 mg/kg per day). NB-UVB or PUVA were then started in the second week in the different groups, respectively **Group 1** • Combined with acitretin, NB-UVB was used 3 times weekly. The initial dose was 70% of the MED, which subsequently increased by 10% to 20% increments at each visit **Group 2** • Combined with acitretin, PUVA was used 3 time weekly. Additionally, 2 hours before irradiation (0.6 mg/kg) 8-methoxypsoralen was administered. The initial dose of PUVA was 70% of the MPD, with 20% increments weekly During the study and the follow-up period, additional therapy was restricted to the use of emollients that were applied once daily in the evening Treatments were discontinued when neither improvement nor exacerbation was seen after 6 weeks, or when severe side-effects occurred or laboratory analyses showed abnormalities
Outcomes	1. The mean reduction in PASI score before and after treatment 2. The number of participants who reached PASI 75, marked improvement, moderate improvement, slight improvement, unchanged, and exacerbation in PASI, respectively 3. Overall tolerability of treatment (assessed by clinicians) 4. Overall tolerability of treatment (assessed by participants) 5. Adverse events

Özdemir 2008 *(Continued)*

Notes	The trial included participants with skin type II to V

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Randomised assignment of the two treatments was performed by asking the patients to throw a dice without knowing the underlying allocation criteria"
Allocation concealment (selection bias)	Unclear risk	Insufficient information was available
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Insufficient information was available
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Observers were masked
Incomplete outcome data (attrition bias) All outcomes	Low risk	8 (13%) participants discontinued the study. The reasons for discontinuation were clearly reported, and the withdrawals were distributed equally between both groups. ITT analyses were performed for the main outcomes
Selective reporting (reporting bias)	Unclear risk	All outcomes described in the methods section were reported in the results of the trial report
Other bias	Unclear risk	Insufficient information was available

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Boer 1984	This was a non-randomised controlled trial
Coven 1997	This was a non-randomised controlled trial
Dayal 2010	This was not a real randomised controlled trial. Participants who were recruited on Monday, Wednesday, or Friday received NB-UVB, whereas those who were recruited on Tuesday, Thursday, or Saturday received PUVA
Malhotra 2010	This was an abstract of a conference paper (not a RCT)
Roson 2005	This was a quasi-randomised trial
Tanew 1996	This was an abstract of a conference paper; it was a non-randomised controlled trial
Ul 2005	The authors compared PUVA with UVB in this trial. They did not clearly define the type of UVB they used. Was it NB-UVB, BB-UVB, or both of them? We could not draw a conclusion from the paper. And we failed to make contact with the corresponding author to get more information

Characteristics of studies awaiting assessment *[ordered by study ID]*

Nazari 2005

Methods	This was a randomised controlled trial conducted in Turkey
Participants	32 participants with chronic plaque psoriasis were included
Interventions	• Group 1: NB-UVB 3 times weekly • Group 2: PUVA 3 time weekly
Outcomes	1. Clearance of psoriasis 2. Remission rate within 6 months after treatment completion
Notes	The study was published in Turkish, and we are awaiting a translation

DATA AND ANALYSES

Comparison 1. NB-UVB versus oral PUVA in CPP

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 PASI 75	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2 PASI 75 (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
3 Withdrawals due to side-effects	3	231	Risk Ratio (M-H, Random, 95% CI)	0.69 [0.19, 2.43]
4 Withdrawals due to side-effects (ITT analysis)	3	247	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.20, 2.54]
5 Clearance rate	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6 Clearance rate (ITT analysis)	3		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7 Clearance lasting 6 months	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
8 Time to PASI 75	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
9 Relapse rate at 6 months after treatment completion	3	172	Risk Ratio (M-H, Random, 95% CI)	1.08 [0.74, 1.58]
10 Withdrawals due to poor response	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
11 Adverse events	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
11.1 erythema	3	233	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.47, 2.09]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
11.2 nausea	2	131	Risk Ratio (M-H, Random, 95% CI)	0.12 [0.02, 0.94]
11.3 pruritus	1	43	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.31, 2.43]
11.4 PMLE	1	43	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.16, 6.77]
11.5 grade 1 erythema	1	45	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.68, 1.26]
11.6 grade 2 erythema	1	88	Risk Ratio (M-H, Random, 95% CI)	0.48 [0.13, 1.79]
11.7 any adverse events	1	43	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.40, 2.08]

Analysis 1.1. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 1 PASI 75.

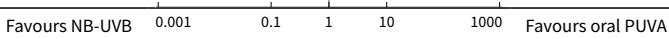
Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Chauhan 2011	17/21	18/22		0.99[0.74,1.32]

Analysis 1.2. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 2 PASI 75 (ITT analysis).

Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Chauhan 2011	17/26	18/25		0.91[0.63,1.32]

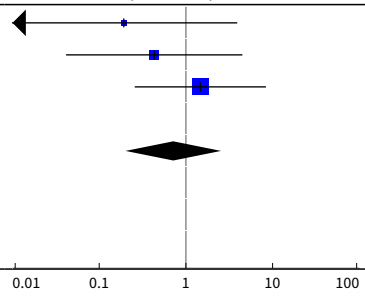
Analysis 1.3. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 3 Withdrawals due to side-effects.

Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Gordon 1999	0/51	2/49		17.62%	0.19[0.01,3.91]
Markham 2003	1/24	2/19		29.59%	0.4[0.04,4.04]
Yones 2006	3/45	2/43		52.79%	1.43[0.25,8.16]
Total (95% CI)	**120**	**111**		**100%**	**0.69[0.19,2.43]**
Total events: 4 (NB-UVB), 6 (Oral PUVA)					
Heterogeneity: Tau^2=0; Chi^2=1.61, df=2(P=0.45); I^2=0%					
Test for overall effect: Z=0.58(P=0.56)					



Analysis 1.4. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 4 Withdrawals due to side-effects (ITT analysis).

Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Gordon 1999	0/51	2/49		17.72%	0.19[0.01,3.91]
Markham 2003	1/29	2/25		29.35%	0.43[0.04,4.48]
Yones 2006	3/47	2/46		52.93%	1.47[0.26,8.38]
Total (95% CI)	**127**	**120**		**100%**	**0.71[0.2,2.54]**
Total events: 4 (NB-UVB), 6 (Oral PUVA)					
Heterogeneity: Tau^2=0; Chi^2=1.58, df=2(P=0.45); I^2=0%					
Test for overall effect: Z=0.52(P=0.6)					



Analysis 1.5. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 5 Clearance rate.

Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Yones 2006	23/45	34/43		0.65[0.47,0.89]

Analysis 1.6. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 6 Clearance rate (ITT analysis).

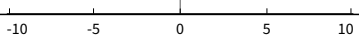
Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Gordon 1999	32/51	41/49		0.75[0.59,0.96]
Markham 2003	28/29	24/25		1.01[0.91,1.12]
Yones 2006	23/47	34/46		0.66[0.47,0.93]

Analysis 1.7. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 7 Clearance lasting 6 months.

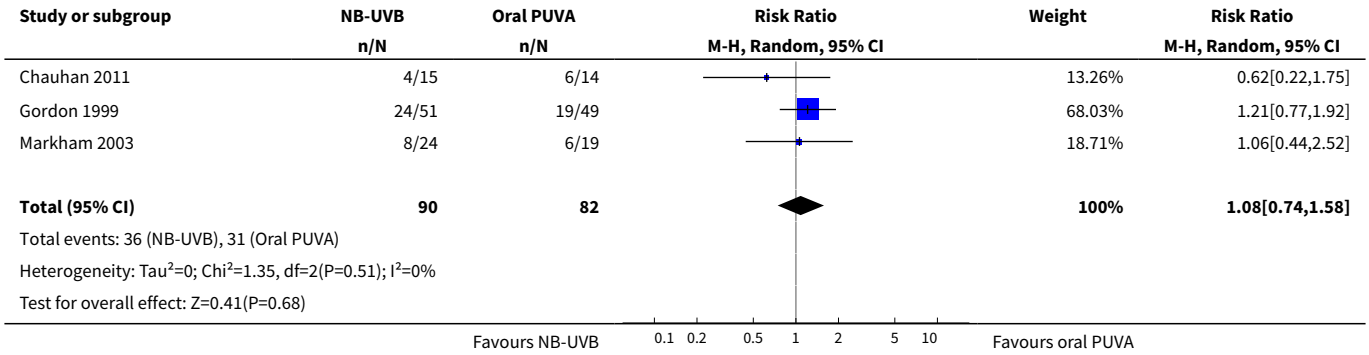
Study or subgroup	NB-UVB n/N	Oral PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Yones 2006	8/23	23/34		0.51[0.28,0.94]

Analysis 1.8. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 8 Time to PASI 75.

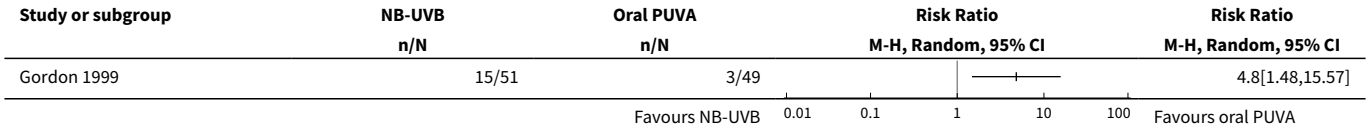
Study or subgroup	NB-UVB N	NB-UVB Mean(SD)	Oral PUVA N	Oral PUVA Mean(SD)	Mean Difference Random, 95% CI	Mean Difference Random, 95% CI
Chauhan 2011	21	9.9 (3.3)	22	9.9 (3.5)		0[-2.03,2.03]



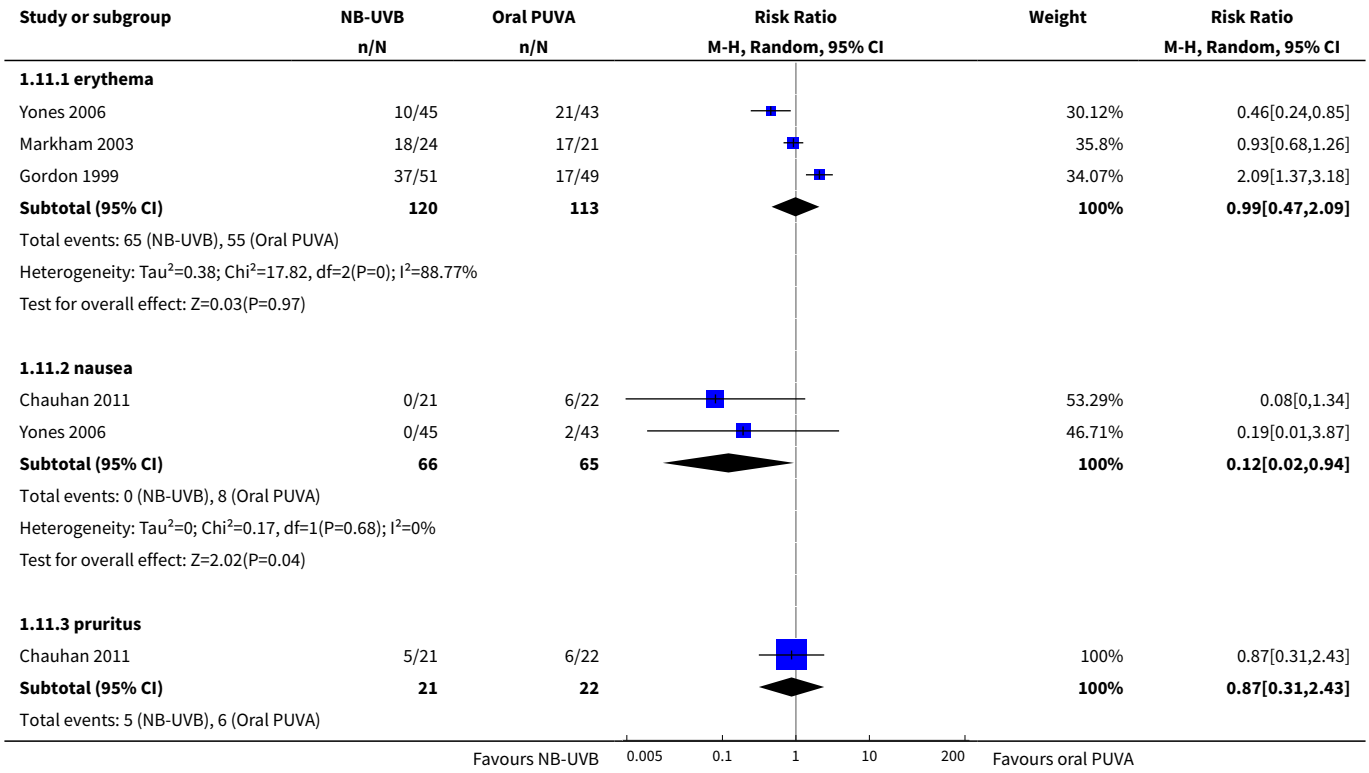
Analysis 1.9. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 9 Relapse rate at 6 months after treatment completion.

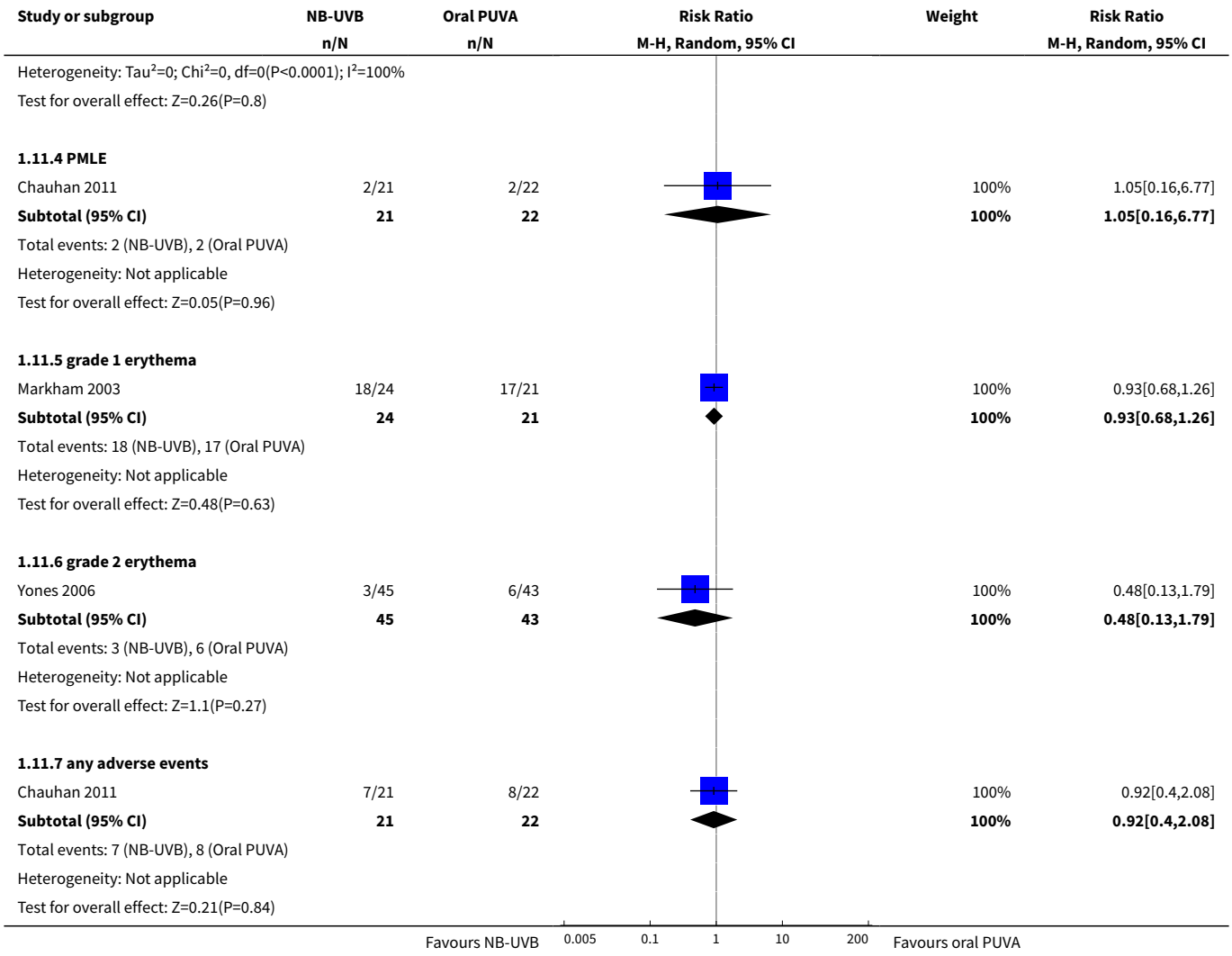


Analysis 1.10. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 10 Withdrawals due to poor response.



Analysis 1.11. Comparison 1 NB-UVB versus oral PUVA in CPP, Outcome 11 Adverse events.



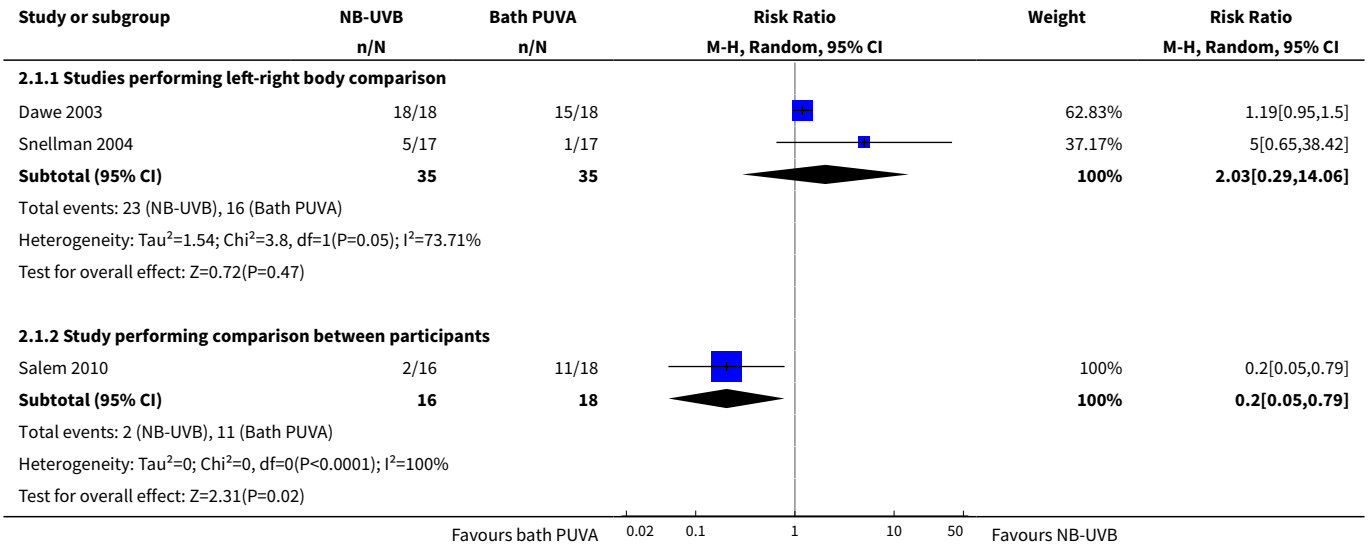


Comparison 2. NB-UVB versus bath PUVA in CPP

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Clearance rate	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.1 Studies performing left-right body comparison	2	70	Risk Ratio (M-H, Random, 95% CI)	2.03 [0.29, 14.06]
1.2 Study performing comparison between participants	1	34	Risk Ratio (M-H, Random, 95% CI)	0.20 [0.05, 0.79]
2 Clearance rate (ITT analysis)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
2.1 Studies performing left-right body comparison	2	92	Risk Ratio (M-H, Random, 95% CI)	1.79 [0.46, 6.91]

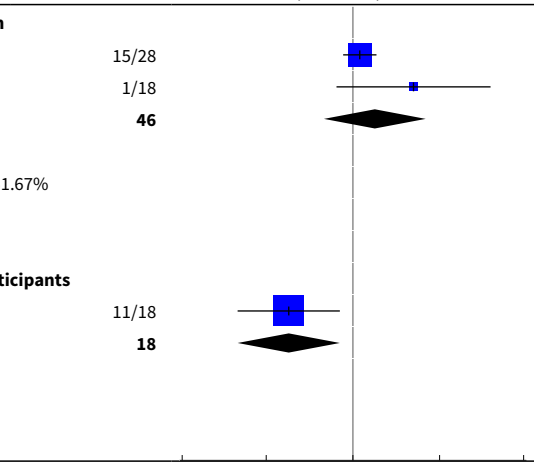
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.2 Studies performing comparisons between participants	1	36	Risk Ratio (M-H, Random, 95% CI)	0.18 [0.05, 0.71]
3 PASI score reduction	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
4 Adverse events	3		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
4.1 erythema	2		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.2 pruritus	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 grade 1 erythema	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.4 grade 2 erythema	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.5 grade 3 erythema	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.6 folliculitis	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.7 any adverse events	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 2.1. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 1 Clearance rate.



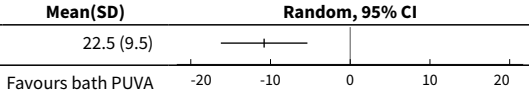
Analysis 2.2. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 2 Clearance rate (ITT analysis).

Study or subgroup	NB-UVB n/N	Bath PUVA n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
2.2.1 Studies performing left-right body comparison					
Dawe 2003	18/28	15/28		72.01%	1.2[0.77,1.87]
Snellman 2004	5/18	1/18		27.99%	5[0.65,38.65]
Subtotal (95% CI)	**46**	**46**		**100%**	**1.79[0.46,6.91]**
Total events: 23 (NB-UVB), 16 (Bath PUVA)					
Heterogeneity: Tau^2=0.61; Chi^2=2.07, df=1(P=0.15); I^2=51.67%					
Test for overall effect: Z=0.84(P=0.4)					
2.2.2 Studies performing comparisons between participants					
Salem 2010	2/18	11/18		100%	0.18[0.05,0.71]
Subtotal (95% CI)	**18**	**18**		**100%**	**0.18[0.05,0.71]**
Total events: 2 (NB-UVB), 11 (Bath PUVA)					
Heterogeneity: Not applicable					
Test for overall effect: Z=2.46(P=0.01)					



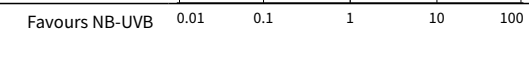
Analysis 2.3. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 3 PASI score reduction.

Study or subgroup	NB-UVB N	NB-UVB Mean(SD)	bath PUVA N	bath PUVA Mean(SD)	Mean Difference Random, 95% CI	Mean Difference Random, 95% CI
Salem 2010	16	11.7 (6.5)	18	22.5 (9.5)		-10.8[-16.23,-5.37]



Analysis 2.4. Comparison 2 NB-UVB versus bath PUVA in CPP, Outcome 4 Adverse events.

Study or subgroup	NB-UVB n/N	Bath PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
2.4.1 erythema				
Salem 2010	2/16	2/18		1.13[0.18,7.09]
Snellman 2004	17/17	11/17		1.52[1.07,2.17]
2.4.2 pruritus				
Salem 2010	3/16	4/18		0.84[0.22,3.21]
2.4.3 grade 1 erythema				
Dawe 2003	21/28	16/28		1.31[0.89,1.93]
2.4.4 grade 2 erythema				
Dawe 2003	10/28	8/28		1.25[0.58,2.69]
2.4.5 grade 3 erythema				
Dawe 2003	4/28	4/28		1[0.28,3.61]
2.4.6 folliculitis				
Salem 2010	0/16	1/18		0.37[0.02,8.55]



Study or subgroup	NB-UVB n/N	Bath PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
2.4.7 any adverse events				
Salem 2010	5/16	9/18		0.63[0.26,1.48]

Favours NB-UVB 0.01 0.1 1 10 100 Favours PUVA

Comparison 3. NB-UVB versus topical PUVA in PPP

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Clearance rate	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2 Clearance rate (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
3 Relapse at 9 weeks after treatment completion	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
4 Marked improvement	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5 Adverse events	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5.1 palmar hyperpigmentation	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 3.1. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 1 Clearance rate.

Study or subgroup	NB-UVB n/N	Topical PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Sezer 2007	0/21	5/21		0.09[0.01,1.55]

Favours topical PUVA 0.001 0.1 1 10 1000 Favours NB-UVB

Analysis 3.2. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 2 Clearance rate (ITT analysis).

Study or subgroup	NB-UVB n/N	Topical PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Sezer 2007	0/25	5/25		0.09[0.01,1.56]

Favours topical PUVA 0.01 0.1 1 10 100 Favours NB-UVB

Analysis 3.3. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 3 Relapse at 9 weeks after treatment completion.

Study or subgroup	NB-UVB n/N	Topical PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Sezer 2007	12/21	7/21		1.71[0.84,3.48]

Favours NB-UVB 0.2 0.5 1 2 5 Favours topical PUVA

Analysis 3.4. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 4 Marked improvement.

Study or subgroup	NB-UVB n/N	Topical PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Sezer 2007	9/21	15/21		0.6[0.34,1.05]

Favours topical PUVA 0.5 0.7 1 1.5 2 Favours NB-UVB

Analysis 3.5. Comparison 3 NB-UVB versus topical PUVA in PPP, Outcome 5 Adverse events.

Study or subgroup	NB-UVB n/N	Topical PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
3.5.1 palmar hyperpigmentation				
Sezer 2007	0/21	11/21		0.04[0,0.69]

Favours NB-UVB 0.001 0.1 1 10 1000 Favours topical PUVA

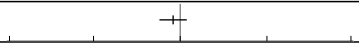
Comparison 4. NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 PASI	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2 PASI 75 (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
3 Clearance rate	2	82	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.78, 1.07]
4 Clearance rate (ITT analysis)	2	90	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.79, 1.10]
5 Relapse at 6 months after treatment completion	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6 Clinical improvement	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6.1 Marked improvement (50% to 75% improvement in PASI, ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2 Moderate improvement (25% to 50% improvement in PASI, ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 Slight improvement (5% to 25% improvement in PASI, ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.4 No improvement (< 5% improvement in PASI, ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Tolerability assessed as good or very good by observers (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
8 Tolerability assessed as good or very good by participants (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
9 Adverse events	2		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
9.1 erythema	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.2 diffuse hair loss	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 reversible hypertriglyceridaemia	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.4 withdrawal due to pruritus and burning	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.5 nausea	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 4.1. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 1 PASI.

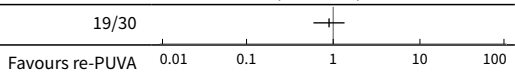
Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Özdemir 2008	17/27	19/25		0.83[0.58,1.19]



Favours re-PUVA — Favours re-NBUVB

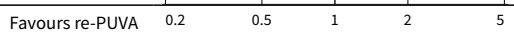
Analysis 4.2. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 2 PASI 75 (ITT analysis).

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Özdemir 2008	17/30	19/30		0.89[0.59,1.35]



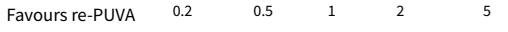
Analysis 4.3. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 3 Clearance rate.

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Green 1992	14/15	15/15		80.23%	0.94[0.78,1.12]
Özdemir 2008	17/27	19/25		19.77%	0.83[0.58,1.19]
Total (95% CI)	**42**	**40**		**100%**	**0.91[0.78,1.07]**
Total events: 31 (re-NB-UVB), 34 (re-PUVA)					
Heterogeneity: Tau^2=0; Chi^2=0.61, df=1(P=0.44); I^2=0%					
Test for overall effect: Z=1.1(P=0.27)					



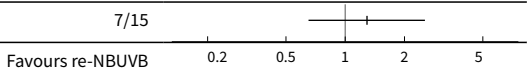
Analysis 4.4. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 4 Clearance rate (ITT analysis).

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Green 1992	14/15	15/15		84.08%	0.94[0.78,1.12]
Özdemir 2008	17/30	19/30		15.92%	0.89[0.59,1.35]
Total (95% CI)	**45**	**45**		**100%**	**0.93[0.79,1.1]**
Total events: 31 (re-NB-UVB), 34 (re-PUVA)					
Heterogeneity: Tau^2=0; Chi^2=0.08, df=1(P=0.78); I^2=0%					
Test for overall effect: Z=0.87(P=0.38)					



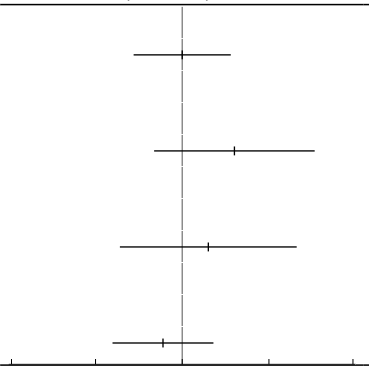
Analysis 4.5. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 5 Relapse at 6 months after treatment completion.

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Green 1992	9/15	7/15		1.29[0.65,2.54]



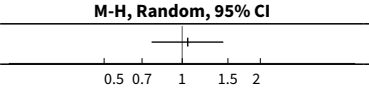
Analysis 4.6. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 6 Clinical improvement.

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
4.6.1 Marked improvement (50% to 75% improvement in PASI, ITT analysis)				
Özdemir 2008	4/30	4/30		1[0.28,3.63]
4.6.2 Moderate improvement (25% to 50% improvement in PASI, ITT analysis)				
Özdemir 2008	4/30	1/30		4[0.47,33.73]
4.6.3 Slight improvement (5% to 25% improvement in PASI, ITT analysis)				
Özdemir 2008	2/30	1/30		2[0.19,20.9]
4.6.4 No improvement (< 5% improvement in PASI, ITT analysis)				
Özdemir 2008	3/30	5/30		0.6[0.16,2.29]
		re-PUVA	0.01 0.1 1 10 100	re-NBUVB



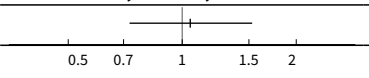
Analysis 4.7. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 7 Tolerability assessed as good or very good by observers (ITT analysis).

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Özdemir 2008	22/30	21/30		1.05[0.76,1.44]
		Favours re-PUVA	0.5 0.7 1 1.5 2	Favours re-NBUVB



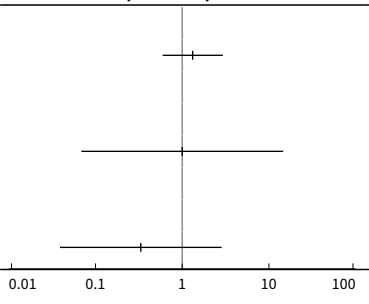
Analysis 4.8. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 8 Tolerability assessed as good or very good by participants (ITT analysis).

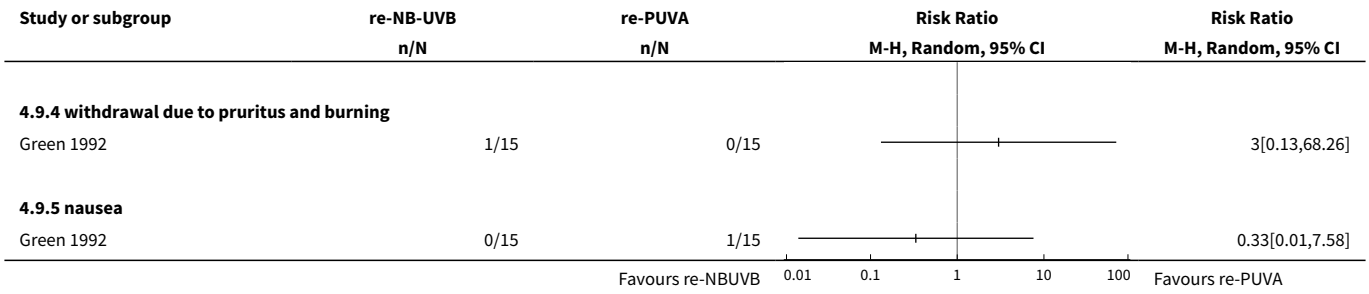
Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Özdemir 2008	20/30	19/30		1.05[0.73,1.53]
		Favours re-PUVA	0.5 0.7 1 1.5 2	Favours re-NBUVB



Analysis 4.9. Comparison 4 NB-UVB plus retinoid versus PUVA plus retinoid in chronic plaque or guttate psoriasis, Outcome 9 Adverse events.

Study or subgroup	re-NB-UVB n/N	re-PUVA n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
4.9.1 erythema				
Özdemir 2008	10/27	7/25		1.32[0.6,2.94]
4.9.2 diffuse hair loss				
Green 1992	1/15	1/15		1[0.07,14.55]
4.9.3 reversible hypertriglyceridaemia				
Green 1992	1/15	3/15		0.33[0.04,2.85]
		Favours re-NBUVB	0.01 0.1 1 10 100	Favours re-PUVA

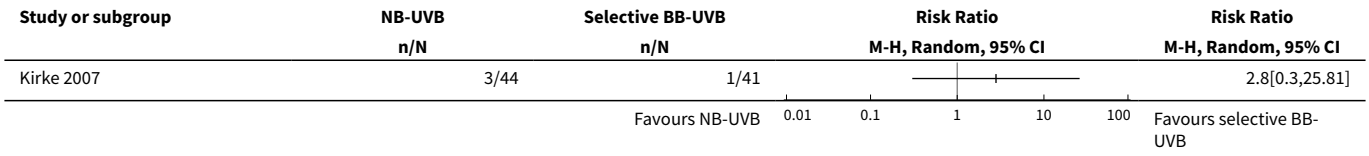




Comparison 5. NB-UVB versus selective BB-UVB in CPP

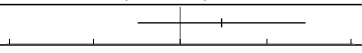
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Withdrawal due to side-effects	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2 Withdrawals due to side-effects (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
3 Clearance rate	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
4 Clearance rate (ITT analysis)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5 Clearance lasting 6 months	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6 Adverse events	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6.1 severe erythema	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.2 PMLE	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 pruritus	1		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 5.1. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 1 Withdrawal due to side-effects.



Analysis 5.2. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 2 Withdrawals due to side-effects (ITT analysis).

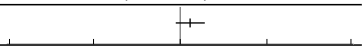
Study or subgroup	NB-UVB n/N	Selective BB-UVB n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Kirke 2007	3/50	1/50		3[0.32,27.87]



Favours NB-UVB | Favours selective BB-UVB

Analysis 5.3. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 3 Clearance rate.

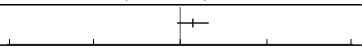
Study or subgroup	NB-UVB n/N	Selective BB-UVB n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Kirke 2007	28/44	20/41		1.3[0.89,1.92]



Favours selective BB-UVB | Favours NB-UVB

Analysis 5.4. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 4 Clearance rate (ITT analysis).

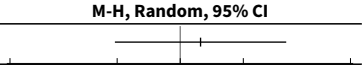
Study or subgroup	NB-UVB n/N	Selective BB-UVB n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Kirke 2007	28/50	20/50		1.4[0.92,2.13]



Favours selective BB-UVB | Favours NB-UVB

Analysis 5.5. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 5 Clearance lasting 6 months.

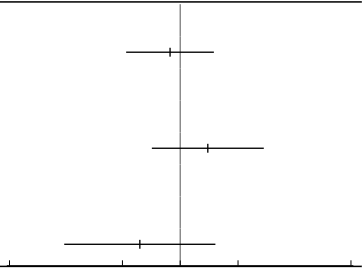
Study or subgroup	NB-UVB n/N	Selective BB-UVB n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
Kirke 2007	1/19	0/13		2.1[0.09,47.89]



Favours selective BB-UVB | Favours NB-UVB

Analysis 5.6. Comparison 5 NB-UVB versus selective BB-UVB in CPP, Outcome 6 Adverse events.

Study or subgroup	NB-UVB n/N	Selective BB-UVB n/N	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI
5.6.1 severe erythema				
Kirke 2007	2/50	3/50		0.67[0.12,3.82]
5.6.2 PMLE				
Kirke 2007	3/50	1/50		3[0.32,27.87]
5.6.3 pruritus				
Kirke 2007	0/50	2/50		0.2[0.01,4.06]



Favours NB-UVB | Favours selective BB-UVB

Comparison 6. NB-UVB versus conventional BB-UVB in different types of psoriasis

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Cumulative UV dose during the study	1		Mean Difference (IV, Random, 95% CI)	Totals not selected

Analysis 6.1. Comparison 6 NB-UVB versus conventional BB-UVB in different types of psoriasis, Outcome 1 Cumulative UV dose during the study.

Study or subgroup	NB-UVB N	NB-UVB Mean(SD)	BB-UVB N	BB-UVB Mean(SD)	Mean Difference Random, 95% CI	Mean Difference Random, 95% CI
Storbeck 1993	10	14.7 (9.8)	10	1.4 (1.1)	+	13.25[7.11,19.39]
				Favours NB-UVB	-200 -100 0 100 200	Favours BB-UVB

Comparison 7. NB-UVB plus dithranol versus conventional BB-UVB plus dithranol in different types of psoriasis

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Cumulative UV dose during the study	1		Mean Difference (IV, Random, 95% CI)	Totals not selected

Analysis 7.1. Comparison 7 NB-UVB plus dithranol versus conventional BB-UVB plus dithranol in different types of psoriasis, Outcome 1 Cumulative UV dose during the study.

Study or subgroup	NB-UVB plus dithranol N	NB-UVB plus dithranol Mean(SD)	BB-UVB plus dithranol N	BB-UVB plus dithranol Mean(SD)	Mean Difference Random, 95% CI	Mean Difference Random, 95% CI
Storbeck 1993	13	10.9 (4.6)	13	1.3 (0.6)	+	9.63[7.09,12.17]
				Favours NB-UVB + dith	-20 -10 0 10 20	Favours BB-UVB + dith

ADDITIONAL TABLES

Table 1. Glossary of some important terms and abbreviations used

Medical term and abbreviations	Explanation
Apoptosis	The process of programmed cell death that occurs during growth and development of multicellular organisms. It is generally considered a part of normal cell aging, but it can also be a response to cellular injury
BB-UVB	Broad-band ultraviolet B
Collagenase	An enzyme that breaks the peptide bonds in collagen

Table 1. Glossary of some important terms and abbreviations used *(Continued)*

CPP	Chronic plaque psoriasis
Cytokines	Small protein molecules that are secreted by cells of the nervous system or the immune system. They are used in intercellular communication
Defective maturation of epidermal keratinocytes	Incomplete formation of keratin (the horny material in nails) due to rapid growth of cells in the epidermal layer of the skin
Dilatation of dermal capillaries	Dilation of small blood vessels in the skin
Erythrodermic psoriasis	A subtype of psoriasis that affects nearly all body sites
Erythrogenic response	Redness of the skin caused by light exposure
Extensor aspects	An anatomical term - when a joint bends, the parts of the skin on the opposite side of the joint are called the extensor aspects
Hyperkeratosis	Thickening of the stratum corneum (outermost layer of the skin) usually associated with an abnormality of the keratin and an increase of the granular layer of the skin
Hyperplasia	An increase in the number of cells
Hyperproliferation	An abnormally high rate of proliferation of cells by rapid division
Hypertriglyceridaemia	High levels of triglyceride fatty acids
ITT	Intention-to-treat: An ITT analysis is often recommended as the least biased way to estimate intervention effects in RCTs. The principals of ITT analysis are as follows: 1. keep participants in the intervention group to which they were randomised, regardless of the intervention they actually received; 2. measure outcome data on all participants; and 3. include all randomised participants in the analysis
MRA	Minimal residual activity
MOP	Methoxypsoralen
NB-UVB	Narrow-band ultraviolet B
Paronychia	Swelling of the skin over the nail
PASI	Psoriasis Area and Severity Index. The higher the score, the more severe the lesions are
PASI 75	Equal to or more than 75% reduction in PASI score
PPP	Palmoplantar psoriasis
Psoralen	A compound that can be used as a kind of photosensitiser to improve the influence of natural or artificial light
PUVA	Psoralen plus ultraviolet A
Photosensitiser	Chemical treatments that are used to sensitise the skin and enhance the effect of light treatments
Pustular	Lesions containing purulent materials
QOL	Quality of life

Table 1. Glossary of some important terms and abbreviations used *(Continued)*

Re-NB-UVB	NB-UVB combined with retinoid
Re-PUVA	PUVA combined with retinoid
Severity index of PPP	A tool developed by Hofer 2006 to evaluate the severity of palmoplantar psoriasis. The separate scores of erythema, scaling, pustulation, and infiltration for palms and soles were added to calculate the severity index (0 = absent; 1 = slight; 2 = moderate; 3 = marked; and 4 = very marked)
Xerophthalmia	Dryness of the eye, especially the cornea and conjunctiva
Xerosis	Extreme dryness of the skin

APPENDICES

Appendix 1. Skin Group Specialised Register search strategy

(psoria* or “palmoplantar* pustulosis” or “pustulosis palmaris et plantaris” or “pustulosis and palms and soles”) and (Phototherap* or Photochemotherap* or “light therap*” or “photodynamic therap*” or “photoradiation therap*” or Ultraviolet or BBUVB or NBUVB or “BB-UVB” or “NB-UVB” or “broad band uvb” or “broad band ultraviolet b” or “narrow band uvb” or “narrow band ultraviolet b” or psoralen or PUVA)

Appendix 2. CENTRAL (Cochrane Library) search strategy

#1 (psoria*):ti,ab,kw or (palmoplantar* pustulosis):ti,ab,kw or (pustulosis palmaris et plantaris):ti,ab,kw or (pustulosis and palms and soles):ti,ab,kw
#2 MeSH descriptor Psoriasis, this term only
#3 (#1 OR #2)
#4 MeSH descriptor Phototherapy, this term only
#5 MeSH descriptor Ultraviolet Therapy, this term only
#6 MeSH descriptor PUVA Therapy, this term only
#7 MeSH descriptor Photochemotherapy, this term only
#8 (photodynamic therap*):ti,ab,kw or (phototherap*):ti,ab,kw or (photochemotherap*):ti,ab,kw or (puva):ti,ab,kw or (ultraviolet):ti,ab,kw
#9 (light therap*):ti,ab,kw or (photoradiation therap*):ti,ab,kw or (BBUVB):ti,ab,kw or (NBUVB):ti,ab,kw or (BB-UVB or NV-UVB):ti,ab,kw
#10 (broad band uvb):ti,ab,kw or (broad band ultraviolet b):ti,ab,kw or (narrow band uvb):ti,ab,kw or (narrow band ultraviolet b):ti,ab,kw
#11 (psoralen ultraviolet a):ti,ab,kw or (psoralen uva):ti,ab,kw
#12 (#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11)
#13 (#3 AND #12)

Appendix 3. MEDLINE (OVID) search strategy

1. exp Psoriasis/ or psoria$.mp.
2. palmoplantar$ pustulosis.mp.
3. pustulosis palmaris et plantaris.mp.
4. (pustulosis and palms and soles).mp.
5. 1 or 2 or 3 or 4
6. exp Phototherapy/
7. exp Ultraviolet Therapy/
8. exp PUVA Therapy/
9. exp Photochemotherapy/
10. photodynamic therap$.mp.
11. phototherap$.mp.
12. photochemotherap$.mp.
13. puva.mp.
14. ultraviolet.mp.
15. light therap$.mp.
16. photoradiation therap$.mp.

17. BBUVB.mp.
18. NBUVB.mp.
19. BB-UVB.mp.
20. NB-UVB.mp.
21. broad band uvb.mp.
22. broad band ultraviolet b.mp.
23. narrow band uvb.mp.
24. narrow band ultraviolet b.mp.
25. psoralen ultraviolet a.mp.
26. psoralen uva.mp.
27. or/6-26
28. randomized controlled trial.pt.
29. controlled clinical trial.pt.
30. randomized.ab.
31. placebo.ab.
32. clinical trials as topic.sh.
33. randomly.ab.
34. trial.ti.
35. 28 or 29 or 30 or 31 or 32 or 33 or 34
36. (animals not (human and animals)).sh.
37. 35 not 36
38. 5 and 27 and 37

Appendix 4. EMBASE (OVID) search strategy

1. photodynamic therap$.ti,ab.
2. phototherap$.ti,ab.
3. photochemotherap$.ti,ab.
4. puva.ti,ab.
5. ultraviolet.ti,ab.
6. light therap$.ti,ab.
7. photoradiation therap$.ti,ab.
8. BBUVB.ti,ab.
9. NBUVB.ti,ab.
10. BB-UVB.ti,ab.
11. NB-UVB.ti,ab.
12. broad band uvb.ti,ab.
13. broad band ultraviolet b.ti,ab.
14. narrow band uvb.ti,ab.
15. narrow band ultraviolet b.ti,ab.
16. psoralen ultraviolet a.ti,ab.
17. psoralen uva.ti,ab.
18. exp phototherapy/
19. exp PUVA/
20. exp photochemotherapy/
21. or/1-20
22. exp PSORIASIS/
23. psoria$.ti,ab.
24. palmoplantar$ pustulosis.ti,ab.
25. pustulosis palmaris et plantaris.ti,ab.
26. (pustulosis and palms and soles).ti,ab.
27. 22 or 23 or 24 or 25 or 26
28. random$.mp.
29. factorial$.mp.
30. (crossover$ or cross-over$).mp.
31. placebo$.mp. or PLACEBO/
32. (doubl$ adj blind$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]
33. (singl$ adj blind$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]
34. (assign$ or allocat$).mp.
35. volunteer$.mp. or VOLUNTEER/

36. Crossover Procedure/
37. Double Blind Procedure/
38. Randomized Controlled Trial/
39. Single Blind Procedure/
40. 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39
41. 21 and 27 and 40

Appendix 5. CNKI search strategy (in Chinese)

#1 psoriasis/exp

#2 psoriasis or "palmoplantar pustulosis"

#3 #1 or #2

#4 Phototherapy/exp

#5 Ultraviolet Therapy/exp

#6 PUVA Therapy/exp

#7 Photochemotherapy/exp

#8 photodynamic therapy

#9 phototherapy

#10 photochemotherapy

#11 photoradiation therapy

#12. broad band ultraviolet

#13 narrow band ultraviolet

#14 psoralen ultraviolet

#15 #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14

#16 #3 and #15

Appendix 6. CBM search strategy (in Chinese)

#1 psoriasis/exp

#2 psoriasis or "palmoplantar pustulosis"

#3 #1 or #2

#4 Phototherapy/exp

#5 Ultraviolet Therapy/exp

#6 PUVA Therapy/exp

#7 Photochemotherapy/exp

#8 photodynamic therapy

#9 phototherapy

#10 photochemotherapy

#11 photoradiation therapy

#12. broad band ultraviolet

#13 narrow band ultraviolet

#14 psoralen ultraviolet

#15 #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14

#16 #3 and #15

Appendix 7. Trial registers and OpenGray database search strategy

(psoriasis or palmoplantar pustulosis) and (phototherapy or ultraviolet therapy or photochemotherapy or photoradiation therapy or PUVA or NB-UVB or BB-UVB or NBUVB or BBUVB)

WHAT'S NEW

Date	Event	Description
5 January 2016	Review declared as stable	There were no ongoing studies listed in the last published review, and a search of MEDLINE and PubMed in December 2014 did not find any relevant results. A new search in January 2016 did not reveal any new relevant trials. This review has been deemed stable as an update has not been considered necessary for two successive years. Our Information Specialist will run a new search in 2017 to re-assess whether an update is needed.

HISTORY

Protocol first published: Issue 12, 2011
Review first published: Issue 10, 2013

Date	Event	Description
23 December 2014	Amended	There were no ongoing studies listed in the last published review, and a search of MEDLINE and PubMed in December 2014 did not find any relevant results. Thus, an update has not been considered necessary at this time. Our Trials Search Co-ordinator will run a new search in 2015 to re-assess whether an update is needed.

CONTRIBUTIONS OF AUTHORS

Ming Yang and Xiaomei Chen are joint first authors as they contributed equally to this review.
Min Zhang was the contact person with the editorial base, co-ordinated contributions from the co-authors, and wrote the final draft of the review.
Xiaomei Chen, Yan Cheng, and Ming Yang screened papers against eligibility criteria.
Xiaomei Chen and Yan Cheng appraised the quality of the papers.
Xiaomei Chen and Ming Yang extracted data for the review and sought additional information about papers.
Ming Yang entered data into RevMan.
Ming Yang, Xiaomei Chen, and Guanjian Liu analysed and interpreted data.
Xiaomei Chen and Ming Yang worked on the methods sections.
Xiaomei Chen and Min Zhang drafted the clinical sections of the background.
Yan Cheng was the consumer co-author and checked the review for readability and clarity, as well as ensuring outcomes are relevant to consumers.
Min Zhang is the guarantor of the update.

Disclaimer

The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the NIHR, NHS or the Department of Health, UK.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- Dermatology Department, West China Hospital of Sichuan University, China.

External sources

- The National Institute for Health Research (NIHR), UK.

  The NIHR, UK, is the largest single funder of the Cochrane Skin Group.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We added some useful information to the background regarding the categories of psoriasis, and the treatments PUVA and BB-UVB. These additional pieces of information might help readers understand the relevance of the contents more easily.

We moved one of our prespecified secondary outcomes, namely 'Percentage of participants who achieved complete clearance in the clinician's opinion', to a primary outcome, and we also renamed it 'Clearance rate'. The reason we did this is because 'clearance rate' is an important outcome for both clinicians and people with psoriasis, and during the process of working on the review, we identified some studies that reported 'complete clearance' and 'minimal residual activity (MRA)' as an independent outcome named 'clearance', and in our opinion, it was a reasonable change to make.

We also added further outcomes to our secondary outcomes, which we identified while working on the review, and we thought they might be valuable for users to make an optimal treatment choice.

In the protocol, we planned to search for information regarding adverse events from non-RCTs. However, we did not carry out these further searches for three reasons:

1. The included RCTs revealed that phototherapy is generally well-tolerated although some mild adverse events might exist.
2. The included RCTs had paid much attention to the adverse events.
3. According to the *Cochrane Handbook for Systematic Reviews of Interventions*, it is reasonable to use either identical or different eligibility criteria for selecting studies that address beneficial effects and adverse effects.

In addition, in the protocol, we planned to use an alpha of 0.05 for the Chi^2 test. However, during the process of drafting, we found that the number of trials included in meta-analyses was few. In this case, we used a P value of 0.10 for the Chi^2 test.

NOTES

There were no ongoing studies listed in the last published review, and a search of MEDLINE and PubMed in December 2014 did not find any relevant results. A new search in January 2016 did not reveal any new relevant trials. This review has been deemed stable as an update has not been considered necessary for two successive years. Our Information Specialist will run a new search in 2017 to re-assess whether an update is needed.

INDEX TERMS

Medical Subject Headings (MeSH)

Photochemotherapy [*methods]; Photosensitizing Agents [*therapeutic use]; Psoriasis [*drug therapy] [pathology]; Randomized Controlled Trials as Topic; Treatment Outcome; Ultraviolet Therapy [*methods]

MeSH check words

Humans