Disclosure

• Investigator, PCORI
  (Patient-Centered Outcomes Research Institute)
UV-based Therapy

• NB-UVB
• Targeted phototherapy
• Tips during pandemic
• UVA1
• PUVA
Utilization of Phototherapy
(Tan, SY, Buzney, E, Mostaghimi, A. JAAD 2018 (Oct); 79:672. Boston)

Guidelines on NB-UVB

• **Psoriasis** – AAD Psoriasis Guidelines:

• **CTCL** – US Cutaneous Lymphoma Consortium:

• **Vitiligo** – Vitiligo Working Group:
References


UV-based Therapy

- NB-UVB
NB-UVB: Common Indications

- Psoriasis
- Vitiligo
- Cutaneous T-cell lymphoma
- Polymorphous light eruption
- Atopic dermatitis
- Pruritus
NB-UVB for Psoriasis

Before

PUVA > NB-UVB > BB-UVB

After 21 tx
NB-UVB: Cost Analysis

- 6 yrs (till Jan 2015). 420,000 pts with psoriasis

  - Cost of topical meds: ↓40% after starting NB-UVB

  - Phototherapy achieves cost savings of £2200 per patient by the delay of drug-based treatment
    - Foerster, J, Dawe, R. Photodermatol Photoimmunol Photomed 2020 March; 36:90. Dundee, Scotland
NB-UVB: DLQI

- 97 pts. Phtx: adalimumab: placebo 1:1:1
  - DLQI (Dermatology Life Quality Index): Phtx and adalimumab > placebo
  - Pts on phtx had more improvement in overall health-related quality of life compared with pts on adalimumab
Phototherapy and Biologics

Advantages

**Phototherapy:**
- Effective
- Rapid acting (targeted photophtx)
- **Known long term safety record**
- Reasonable cost

**Biologics:**
- Highly effective (takes 8-12 wks)
- Immune modulators
- Good safety record
- Convenient to administer.
Phototherapy and Biologics

Limitations

**Phototherapy:**
- Availability and access
- Equipment/staff/space
- Pt’s time and effort
- Patient education (for home phototx)

**Biologics:**
- Cost
- Precautionary measures in pts with active COVID-19 infection
NB-UVB for Mycosis Fungoides

Before

After 16 tx (PR)

(Gathers, RC, JAAD 8/02; 47:191)
NB-UVB for MF


• Review of 18 studies involving 435 pts
• NB-UVB is effective for early stage (IA, IB) MF.
• Extend of skin lesions did not affect the efficacy
• Short duration of remission (ave: 14 mo; range: 3-28.8 mo)
NB-UVB vs PUVA for MF


• Systematic review. Early MF (stages IA, IB, IIA)
• All published studies to March 30, 2018
• Seven studies of 778 patients:
  – PUVA: 527 pts; NB-UVB: 251 pts.
NB-UVB vs PUVA for MF


<table>
<thead>
<tr>
<th></th>
<th>PUVA</th>
<th>NB-UVB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any response</td>
<td>91%</td>
<td>88%</td>
</tr>
<tr>
<td>Complete response</td>
<td>74%</td>
<td>62%</td>
</tr>
</tbody>
</table>

**Conclusion of authors:** PUVA is an alternative to NB-UVB
## Phototherapy in Vitiligo


<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mild (≥ 25% repigm)</th>
<th>Marked (≥ 75% repigm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NB-UVB</strong></td>
<td>62% in 3 mo (130 pts) 74% in 6 mo (232 pts) 75% in 12 mo (512 pts)</td>
<td>13% in 3 mo (106 pts) 19% in 6 mo (266 pts) 36% in 12 mo (540 pts)</td>
</tr>
<tr>
<td><strong>PUVA</strong></td>
<td>51% in 6 mo (103 pts) 62% in 12 mo (72 pts)</td>
<td>--</td>
</tr>
</tbody>
</table>

Long term therapy is necessary
NB-UVB: PMLE Desensitization
(I. Man, Photodermatol Photoimmunol Photomed 1999; 15: 96)

- 3x / wk for 5 wks
- 63% good response
  26% mod. response
- Comparable to PUVA
NB-UVB: Other Indications

- Urticaria
- Morphea
- Other:
  - Lichen planus
  - Pityriasis rosea
  - Pityriasis lichenoides chronica
  - Lymphomatoid papulosis
  - Generalized granuloma annulare
**Guidelines for NB-UVB for Psoriasis, MF, and Pruritus**

- **Frequency:** 2-3x/week

<table>
<thead>
<tr>
<th>Skin Type</th>
<th>Starting Dose (mJ/cm²)</th>
<th>Dose Escalation per Treatment (mJ/cm²)</th>
<th>Maximum Dose (mJ/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>300</td>
<td>20%*</td>
<td>2000 (Face: 1000)</td>
</tr>
<tr>
<td>II</td>
<td>300</td>
<td>20%*</td>
<td>2000 (Face: 1000)</td>
</tr>
<tr>
<td>III</td>
<td>500</td>
<td>20%*</td>
<td>3000 (Face: 1000)</td>
</tr>
<tr>
<td>IV</td>
<td>500</td>
<td>20%*</td>
<td>3000 (Face: 1000)</td>
</tr>
<tr>
<td>V</td>
<td>800</td>
<td>20%*</td>
<td>5000 (Face: 1000)</td>
</tr>
<tr>
<td>VI</td>
<td>800</td>
<td>20%*</td>
<td>5000 (Face: 1000)</td>
</tr>
</tbody>
</table>

*as tolerated by patient

Home Phototherapy


- Basic model: $2500-$500
- Convenient for pts

Limitations:
- Insurance coverage
- Patient compliance
- Maintenance vs clearing
NB-UVB: Psoriasis

- 4865 pts with psoriasis. 1985-2002:
  - No increase in BCC, SCC or melanoma
  - Hearn, RMR... Ferguson, J, Dawe, RS. BJD 10/08; 159:931. Dundee

- 22,891 pts with psoriasis. 2000-2012:
  - No difference in the cumulative incidence of skin cancers
NB-UVB for Vitiligo


• 48 pts with vitiligo treated with NB-UVB
• Mean: 211 tx (100 to >650 tx)
• Mean follow up: 52.4 mo (range: 12-134 mo)
• None developed skin cancer
UV-based Therapy

• NB-UVB
• Targeted phototherapy
Targeted Phototherapy

• Psoriasis
• Vitiligo
Targeted Phototherapy

• Psoriasis
Excimer Laser: Psoriasis

After 1 tx
Targeted Phototherapy: Psoriasis

- Ideal for those with <10% BSA
- Residual resistant lesions following other forms of tx
- Hyperkeratotic lesions on palms and soles
- Scalp lesions
Targeted Phototherapy: Limitations

• Perilesional hyperpigmentation
  — Problematic for face
• Travel time to phototherapy unit
• Insurance coverage/expense
Targeted Phototherapy

- Psoriasis
- Vitiligo
308-nm Excimer Laser: Vitiligo

(Spencer JM, JAAD 5/02; 46:727)

- 18 pts w/ 29 patches of vitiligo
- 3x per wk, max 12 tx

<table>
<thead>
<tr>
<th>% Repigm.</th>
<th>&gt;=6 tx</th>
<th>12 tx</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>43%</td>
<td>18%</td>
</tr>
<tr>
<td>&lt;75%</td>
<td>48%</td>
<td>63%</td>
</tr>
<tr>
<td>&gt;75%</td>
<td>9%</td>
<td>18%</td>
</tr>
</tbody>
</table>
Excimer Laser

6 treatments

32 treatments
UV-based Therapy

• NB-UVB
• Targeted phototherapy
• Tips during pandemic
Phototherapy during COVID pandemic
(Lim, Feldman, van Voorhees, Gelfand. JAAD 2020 Jul;83(1):287)

- Consensus opinion of members of the dermatology expert committee of the Light Treatment Effectiveness (LITE) study, a PCORI-funded pragmatic trial of home versus office narrowband UVB phototherapy in 1,050 patients at approximately 30 sites across the US
Phototherapy during COVID pandemic
(Lim, Feldman, van Voorhees, Gelfand. JAAD 2020 Jul;83(1):287)

General principles:

• To follow local public health recommendations
• To consult with infection control for medical center-based units
• To balance risks and benefits for patients and to optimize safety for staff.
Phototherapy during COVID pandemic
(Lim, Feldman, van Voorhees, Gelfand. JAAD. In press. 2020)

General principles:

• To consider other options:
  • Home phototherapy:
    • Stand up NB-UVB
    • Hand-held NB-UVB
    • Hand-held LED UVB (300 to 320 nm; peak 309 nm)
General principles:

• To consider other options:
  • Home phototherapy:
    • Stand up NB-UVB
    • Hand-held NB-UVB
    • Hand-held LED UVB (300 to 320 nm; peak 309 nm)
  • Judicious exposure to sunlight
Recommendations for patients:

• Be screened for symptoms (those with symptoms might be denied treatment);
• Attend session alone (for minor, one guardian is allowed);
• Wear mask, except during the total body phototherapy treatment;
Phototherapy during COVID pandemic

(Lim, Feldman, van Voorhees, Gelfand. JAAD 2020 Jul;83(1):287)

Recommendations for patients:

• Apply hand sanitizer;

• Be provided with individualized goggles; the patient should clean the goggles thoroughly with disinfecting wipes before putting it to a bag and storing it in the unit;
Phototherapy during COVID pandemic

(Lim, Feldman, van Voorhees, Gelfand. JAAD 2020 Jul;83(1):287)

Recommendations for patients:

• Be given a bag to store their clothes when they disrobe, and bag is discarded at end of treatment;

• Practice social distancing.
Phototherapy during COVID pandemic

(Lim, Feldman, van Voorhees, Gelfand. JAAD 2020 Jul;83(1):287)

Recommendations for staff:

• Schedule patients not more than every 30 min;
  – May be more frequent depending on the comfort level of staff
• Arrange waiting area with seats 6 feet apart;
• Wear mask and eye protection;
• Apply hand sanitizer;
Phototherapy during COVID pandemic
(Lim, Feldman, van Voorhees, Gelfand. JAAD 2020 Jul;83(1):287)

Recommendations for staff:

• Avoid turning on the fan of the phototherapy unit (if need be, treatment can be fractionated to avoid excessive heat build-up in the unit);

• Disinfect high-touch surfaces in the changing area and of the phototherapy equipment in between patients.
Targeted phototherapy (excimer laser or light):

- For the safety of the staff, treatment of facial lesions should be minimized, or if possible, avoided.
Virucidal Effect of UV

(Virucidal Effect of UV

(Horton, L, Torres, ... Lim, HW. Photochem Photobiol Sci 2020 Aug 19. Epub.)

Virus inactivation dose

UVC 254 nm

UVC

UVB

UVA
UV-based Therapy

• NB-UVB
• Targeted phototherapy
• Tips during pandemic
• UVA1
UVA1 (340 – 400 nm)

• *Doses:*
  
  High (130 J/cm$^2$)
  
  **Medium** (50 J/cm$^2$)
  
  Low (20 J/cm$^2$)
UVA1: Indications

(Gambichler T. Clin Dermatol 2013 July-Aug; 31: 438. Bochum, Germany;
Zandi, .. Lui, H. Skin Therapy Lett 1/12; 17:1. Vancouver, Canada

• Morphea
• Systemic sclerosis
• Scleredema
• Urticaria pigmentosa
• Solar urticaria
Effects of UVA1

(Zandi, .. Lui, H. Skin Therapy Lett 1/12; 17:1. Vancouver, Canada)

- Induction of collagenase (matrix metalloproteinase 1) protein and mRNA
  - Morphea, systemic sclerosis scleredema, chronic graft vs. host
Effects of UVA1
(Zandi, Lui, H. Skin Therapy Lett 1/12; 17:1. Vancouver, Canada)

• Induction of collagenase (matrix metalloproteinase 1) protein and mRNA
  – Morphea, systemic sclerosis scleredema, chronic graft vs. host

• Apoptosis
  – Atopic dermatitis, CTCL, mastocytosis, inflammatory morphea, solar urticaria
UVA1: Protocol

- Start at 20 J/cm\(^2\), then increase by 10 J/cm\(^2\) till 50 J/cm\(^2\)
- 2-3 x per week for 30-40 tx
- Stop without tapering the frequency of treatment
UVA1 - LIMITATIONS

- Cost (high dose unit)
- Treatment time:
  - 50 J/cm²: 12-15 min.
- Generates heat – ventilation
  - Limiting factor in the era of COVID-19
- Long term side effects: ??
UV-based Therapy

- NB-UVB
- Targeted phototherapy
- Tips during pandemic
- UVA1
- PUVA
PUVA: Common Indications

- Cutaneous T-cell lymphoma
- Psoriasis
- Vitiligo
- Atopic dermatitis
PUVA Protocol

- Oxsoralen Ultra (liquid formulation of 8-MOP) 0.4-0.6 mg/kg; 1 hour prior to UVA (5-MOP: 1.2 mg/kg)
- Maximum: 70 mg
- Three times or twice per week
<table>
<thead>
<tr>
<th>Skin Type</th>
<th>Initial Dose ($J/cm^2$)</th>
<th>Increments ($J/cm^2$)</th>
<th>Max ($J/cm^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.5</td>
<td>0.5</td>
<td>8</td>
</tr>
<tr>
<td>II</td>
<td>1.0</td>
<td>0.5</td>
<td>8</td>
</tr>
<tr>
<td>III</td>
<td>1.5</td>
<td>1.0</td>
<td>12</td>
</tr>
<tr>
<td>IV</td>
<td>2.0</td>
<td>1.0</td>
<td>12</td>
</tr>
<tr>
<td>V</td>
<td>2.5</td>
<td>1.5</td>
<td>20</td>
</tr>
<tr>
<td>VI</td>
<td>3.0</td>
<td>1.5</td>
<td>20</td>
</tr>
</tbody>
</table>
PUVA and NMSC

(Nijsten TEC, JID 8/03; 121:252. Boston)

- Prospective study: incidence of skin cancer in 1380 pts tx w/ PUVA
- First 15 yrs: no increase
- After 25 yrs:
  - $\leq 200$ tx: 7% of pts had SCC
  - $\geq 400$ tx: 50% had SCC
  - $\geq 200$ tx: 33% had BCC
UV-based Therapy

- NB-UVB
- Targeted phototherapy
- Tips during pandemic
- UVA1
- PUVA
Thank you!