Psoriasis and phototherapy

A positive approach to psoriasis and psoriatic arthritis
What are the aims of this leaflet?

The aim of this leaflet is to explain what phototherapy is, what treatments are available and where these treatments take place.

What is psoriasis?

Psoriasis (sor-i’ah-sis) is a long-term (chronic) scaling disease of the skin, which affects 2%-3% of the UK population. There are several types of psoriasis although it most commonly appears as red, raised, scaly patches known as plaques. Any part of the skin may be involved but the plaques commonly appear on the elbows, knees and scalp, while the face is usually spared. It can also affect the palms of the hands, the soles of the feet and the nails. It can be itchy but is not usually painful. Nail changes, including pitting and ridging, are present in 40% to 50% of people with psoriasis. 10% to 20% of people with psoriasis will develop psoriatic arthritis. There does not seem to be any link between the severity of the psoriasis affecting the skin and the severity of psoriatic arthritis.

What happens in psoriasis?

Normally a skin cell matures in 21-28 days and during this time skin cells move to the skin surface, where they are lost in a constant, invisible shedding of dead cells. In patches of psoriasis the turnover of skin cells is much faster, around 4-7 days. This means that these cells do not undergo the normal changes in their structure during this time and at the surface they are still stuck to the surrounding cells. This results in a build-up of large skin flakes, causing the raised plaques of psoriasis. The extent of psoriasis and how it affects an individual varies from person to person. Some may be mildly affected with small patches hidden away which does not bother them, while others may have large, visible areas of skin involved that significantly affect daily life and relationships. Psoriasis is not contagious, therefore you cannot catch it from another person. It is thought that psoriasis is caused by an oversensitive skin immune system mistakenly regarding normal skin cells as ‘foreign’ and
setting up an inflammatory response which leads to the symptoms of psoriasis. This process is not fully understood, for example it is not known why psoriasis plaques appear in one place but not in the adjacent skin. For more detailed information on psoriasis see our leaflet *What is Psoriasis?*

**What is ultraviolet phototherapy?**

Light therapy, also known as phototherapy, is the use of ultraviolet light to treat certain skin conditions and other medical and psychiatric disorders. When used to treat psoriasis, either ultraviolet A or ultraviolet B light waves are applied to the affected skin.

**What are ultraviolet (UV) rays?**

The energy in sunlight ranges in wavelength from about 2500nm (1nm is one millionth of a millimetre) to 280nm. Visible light lies between about 400nm in the violet to 700nm in the deep red. Wavelengths shorter than 400nm are known as ultraviolet. Our atmosphere protects us from wavelengths shorter than 280nm, so we are naturally exposed to ultraviolet wavelengths from 280-400nm. This region of sunlight is split into long-wave ultraviolet A (UVA) from 315nm – 400nm and short-wave ultraviolet B (UVB) from 280-315nm.

UVB is a short wavelength of light that only penetrates the superficial layers of the skin. Although it is much less abundant than UVA in sunlight it is the main cause of sunburn. We are all at risk of sunburn, but those of us with very fair (type I) skin are most at risk.

UVA is long wavelength UV and is the predominant part of the sun’s UV spectrum. It causes tanning more than sunburn. It penetrates the skin deeper than UVB and can also penetrate window glass, including car windows.

**How is phototherapy used to treat psoriasis?**

Phototherapy cannot cure psoriasis; in some cases it will completely clear the skin, in others improve but not eliminate the plaques. Phototherapy is a second-line treatment, used in dermatology departments when first-line topical treatments have failed to deal with severe or widespread plaques or particularly troublesome flare-ups.

Both UVB and UVA can be used to treat psoriasis. UVB is used on its own but UVA requires that the skin be sensitised.
by a plant-derived chemical called psoralen before it is effective. The treatment combining psoralen and UVA is termed PUVA.

Both forms of phototherapy are given as a course of treatment over many weeks, where the time of exposure to the UV is gradually increased to prevent burning the skin and to allow the skin to acclimatise to the treatment. After a course of phototherapy the treatment is stopped; in some cases improvements last for more than a year while in other cases the psoriasis may start to recur after a few months or even weeks. Further courses of treatment may be given. It is not possible to predict how individuals will respond, or how long their response will last after the phototherapy course ends. Psoriasis is the skin condition that responds best to phototherapy and in most phototherapy units 60-70% of the people attending are being treated for psoriasis.

How does phototherapy work?

The exact cause of psoriasis is not fully understood and the effects of UV on the skin are complicated, so a precise explanation of how phototherapy works is not possible. PUVA and UVB phototherapy may also work in slightly different ways. However, a simplified description of the mechanisms of phototherapy will help to explain some of the side effects and restrictions of phototherapy.

Taking a simplified model of psoriasis as an example, the too-sensitive skin immune system causes inflammation and the overproduction of skin cells, causing the visible plaques. Phototherapy stops the overproduction of skin cells by either damaging their DNA (UVB phototherapy) or by preventing the cells from dividing by ‘locking’ the DNA (PUVA phototherapy). It also suppresses the skin immune system to stop the ‘psoriasis process’. The twin processes of interfering with DNA and suppressing the immune system in the skin are also what can cause skin cancer, so phototherapy can increase cancer risk.

Phototherapy is administered in hospital-based phototherapy units, usually within a dermatology department but sometimes in a physiotherapy department.
To treat the whole body a phototherapy cabin is used. This consists of a stand-in cabinet with 6-foot (1.8m) fluorescent tubes all around. These tubes give out the UV needed for phototherapy. Some people dislike the rather claustrophobic feeling of being inside the cabinet, but most get used to it. Some elderly people may find it difficult and uncomfortable to stand up for the required time. Fans are built into the cabinet for ventilation and temperature control. Smaller UV units are used for treating small areas of the skin, such as the hands or feet.

During treatment goggles must be worn to protect the eyes and most people also wear a clear UV-blocking visor to protect the skin of the face (which usually has no psoriasis plaques present). Men wear genital protection.

**UVB phototherapy**

There are two types of UVB treatments: broadband and narrowband. Broadband phototherapy generates a wide range of UV wavelengths, with peak output in the UVB. Some of these wavelengths are ineffective for treating psoriasis, but still have risks and side effects. Narrowband UVB (TL01) generates a narrow range of UVB wavelengths that have been shown to be the most effective at clearing psoriasis, with almost no other redundant wavelengths present. Narrowband UVB has almost completely replaced broadband UVB in the UK and elsewhere. The following information refers to narrowband UVB phototherapy.

UVB is the ‘first-line’ phototherapy treatment, since, for the type of psoriasis for which it is suitable, it can be as effective as PUVA but has fewer immediate side effects and is very much safer in the long term. It is entirely safe in pregnancy and is the preferred phototherapy for children. UVB does not penetrate the skin as deeply as the UVA in PUVA phototherapy; it is used to treat psoriasis plaques that are not too thick or white.

**How is UVB phototherapy administered?**

There is no nationally agreed way to give a course of UVB phototherapy and different centres may use slightly different treatment plans. However, most usually UVB phototherapy is given three times a week for 6-8 weeks or until the psoriasis has cleared to an acceptable amount. Many centres will check the sensitivity of the person’s skin to UVB by applying a range of 6-10 different doses of UVB.
to small (1cm) areas of normally unexposed skin. The next
day, some of these areas will have developed a redness (like
sunburn), while others will be unaffected. The lowest dose to
produce just perceptible redness is known as the minimal
erithemal dose or MED. This is used to check for any
unusual sensitivity to UVB and to determine the UVB
exposure dose (time in the cabin) for the first treatment. From
this short exposure on the first visit, subsequent visits will
feature increasing amounts of UVB. This allows the skin to
become used to the UVB, in a similar way that one may
gradually increase time in the sun on holiday to avoid
immediate sunburn.

Other centres may start phototherapy based on how each
individual recalls their skin reacting to sun exposure. This
allows the person receiving treatment to be assigned a
phototype. The phototype ranges from type I, pale-skinned
individuals who burn easily and do not tan, through type IV,
darker-skinned individuals who rarely burn and tan easily and
darkly, to type VI, black skin. Some centres use tabulated
dose increase schedules, designed to increase the dose as
quickly as possible, taking no account of the UV sensitivity
of the individual. All of these methods result in effective
treatment of psoriasis.

UVB can be used as a single treatment or in combination
with other topical or systemic medications as recommended
by a doctor or healthcare professional.

What are the side effects of UVB
treatment?

The most common immediate side effect of UVB
phototherapy is a mild sunburn reaction. This may be more
likely if the person being treated has been using other
medications or herbal supplements which can cause
sensitivity to light. It is important before
starting any course of any
treatment to inform the
healthcare professional or
doctor of any products
being taken. This sunburn
reaction is usually not
serious and the
phototherapist will adjust the
dose of the next treatment or
postpone treatments until the
redness has settled. Some people
report itchiness in the early stages of treatment, but this should soon settle.

The long-term effects of phototherapy (both UVB and PUVA) include increased ageing (photoageing) of the skin and an increased risk of certain skin cancers. In the 25+ years of narrowband UVB phototherapy, increased skin cancer has not been reported. UVB causes very little photoageing. Nevertheless, if someone has had 500 or more UVB treatments it is recommended that the risks and benefits of further UVB are re-evaluated and their skin checked for signs of skin cancer.

**PUVA phototherapy**

PUVA stands for psoralen and ultraviolet A. Psolaren makes the skin more sensitive to light and increases the effect of UVA. PUVA is the ‘second-line’ phototherapy and is used when UVB is not suitable.

**Psoralen**

Psoralens are chemicals which are found in more than 30 plants, including lime, lemon, celery, parsley, fig and clove. Psoralen-rich plants and sunlight were used by the Egyptians and Indians for hundreds of years in the treatment of vitiligo (a condition in which areas of the skin lose their colour and become white). In PUVA therapy the psoralen is taken by mouth, or applied directly to the skin by soaking in a bath solution or applied to the skin as a gel, emulsion or paint, and the skin is then exposed to UVA.

In PUVA two types of psoralen are used: 8-methoxypsoralen or 5-methoxypsoralen (8-MOP or 5-MOP).

Systemic, or tablet-based, PUVA requires taking psoralen tablets (usually 8-MOP) 2-2½ hours before exposure to UVA. The liver normally eliminates psoralen, so the dose is calculated to ‘flood’ the liver and allow some psoralen to enter the blood and be transported to the skin. The absorption and liver metabolism of psoralen can vary, resulting in uncertain skin sensitisation, so it is important to take the tablets with a light meal, in a consistent manner. Systemic PUVA can be most effective at treating the thickest plaque psoriasis.

Most PUVA is administered as bath PUVA, where the individual is immersed in a warm bath containing 8-MOP for 10-15 minutes before exposure to UVA. This sensitises the skin directly, so there are no side effects of nausea or eye
protection requirements, unlike with systemic PUVA. The sensitisation of the skin is, however, greater with bath rather than systemic PUVA, so less time in the phototherapy cabin is needed.

How is PUVA treatment administered?

Like UVB treatment, PUVA is administered in hospital phototherapy or physiotherapy units. As with UVB phototherapy, there are different methods for deciding on a starting dose of UVA and how to increase the dose to a therapeutically effective level. Some centres measure the sensitivity of the individual’s skin to PUVA by applying test doses to small areas of skin, in a similar way to the MED test described previously. Because PUVA involves sensitising the skin with psoralen, the sensitivity test is called the minimal photosensitivity dose (MPD) test. Other centres may use phototype-base treatment schedules or a tabulated scheme.

Treatment times for bath PUVA are shorter than for systemic PUVA and may range from less than a minute up to 5-8 minutes, depending on the output of the PUVA cabin and the dose scheme used. Systemic PUVA times may extend to 15 minutes or more. If any session produces a sunburn reaction, or if any other symptoms are reported, the next dose and subsequent dose increases may be altered.

There is no nationally agreed way to give a course of PUVA phototherapy and different centres may use slightly different treatment plans. However, bath PUVA phototherapy is usually given twice a week or three times every fortnight and systemic PUVA is usually given twice a week for 15-25 treatment sessions or until the psoriasis has cleared to an acceptable amount.

Psoriasis usually clears after 15-25 treatments, which takes 7-12 weeks when following a twice-a-week schedule or 10-16 weeks for a twice-a-fortnight schedule. It is not possible to predict how long the improvement achieved by a course of phototherapy will last. For some people, remission of longer than a year is possible, for others their psoriasis remains clear for some months before beginning to return.

What are the side effects of PUVA?

The phototherapist will carefully explain all of the possible side effects of phototherapy before a course begins. The most common immediate side effect of PUVA phototherapy is a mild sunburn reaction. This may be more likely if the
individual has been using other medications or herbal supplements which can cause sensitivity to light, so it is important to tell the phototherapist of anything being taken. This sunburn reaction is usually not serious, and the phototherapist will adjust the dose of the next treatment or postpone treatments until the redness has settled. Some people report some itchiness in the early stages of treatment, but this should soon settle. People on systemic PUVA may experience a feeling of nausea after taking the psoralen tablets. This may be only a mild inconvenience but if it is intolerable, using 5-MOP psoralen rather than 8-MOP may help. Taking psoralen tablets will sensitize the eyes to UVA and exposure to the sun may increase the risk of cataract formation, so eyes must be protected from sunlight or other sources of UV for 12 hours. On the day of treatment, anyone undergoing PUVA treatment should wear sunglasses or other UV protective eyewear, or avoid exposure to sunlight altogether.

The long-term effects of phototherapy (both UVB and PUVA) include increased ageing (photoageing) of the skin and an increased risk of certain skin cancers. PUVA is more risky than UVB, and a long-term follow-up study of PUVA has identified that the risk of skin cancer increases with increasing number of PUVA treatments. PUVA is also more damaging to the structure of the skin and causes more photoageing. Currently the recommended maximum number of PUVA treatments in a lifetime is 150-200. For men, there is an extra risk of skin cancer of the genital skin. For this reason it is very important to protect the genitals from PUVA exposure. Although UVB has not had a similar long-term study, it is assumed that the risk to genital skin from UVB exposure is similar to PUVA, so similar precautions should be taken.

**Recommendations for people undergoing UVB or PUVA phototherapy**

- Courses of phototherapy are much more effective if administered without interruption. So, attend every appointment and avoid going on holiday while having phototherapy.
Phototherapy dosing schedules aim to apply the maximum amount of UV that the skin can tolerate, in order to maximise the therapeutic effect. So it is important that all other exposure to UV is avoided. This means absolutely never using sunbeds while on phototherapy and avoiding sunbathing or other sun exposure. People having PUVA will have extra photosensitisation of their skin immediately and for some hours after each session, so should be especially careful about exposing their skin on the day of treatment.

Please inform your phototherapist nurse if you have been started on any new medication as some medicines make you more sensitive to UV light.

Dry, itchy skin can be treated by creams such as aqueous cream or emollients; these are available on prescription and over the counter. It is advisable not to use bubble baths as these can dry out the skin. Instead, add prescribed bath oils or emollient to the bath water and soak in the bath for 10-15 minutes.

Women of childbearing age should not become pregnant while using psoralens, but previous use of PUVA does not affect subsequent pregnancies.

Do not wear deodorants, perfume or aftershave during treatment. Some of them contain oils which sensitise the skin to UV light and may result in a sunburn reaction.

References


Koek M, Buskins E, van Weelden H, Steegmans P, Bruijnzeel-Koemen C, Sigurdsson V. Home versus outpatient ultraviolet B phototherapy for mild to severe psoriasis; pragmatic multicentre randomized controlled non-inferiority trial (PLUTO study) British Medical Journal 2009;338:b1542 doi:10.1136/bmj.b1542
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The charity for people with psoriasis and psoriatic arthritis

PAPAA, the single identity of the Psoriatic Arthropathy Alliance and the Psoriasis Support Trust.

The organisation is independently funded and is a principal source of information and educational material for people with psoriasis and psoriatic arthritis in the UK.

PAPAA supports both patients and professionals by providing material that can be trusted (evidence-based), which has been approved and contains no bias or agendas.

PAPAA provides positive advice that enables people to be involved, as they move through their healthcare journey, in an informed way which is appropriate for their needs and any changing circumstances.

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