

Photodynamic Therapy

Victorian Cosmetic Institute

Quick facts

- Photodynamic therapy is a relatively new procedure used for the treatment of acne, pre-cancerous skin lesions, some cancerous skin lesions (not melanoma), and psoriasis.
- ALA is a substrate for the production of porphyrins which are produced by certain cells such as those which cause acne/skin cancers/psoriasis. The application of ALA produces large amounts of porphyrins in these areas.
- An LED or laser light source is used to activate these porphyrins causing the production of oxygen free radicals which then specifically destroy those surrounding cells.
- Recovery time is approximately 7-14 days from this treatment and usually 1-3 sessions are required.

What is photodynamic therapy (PDT)?

Photodynamic therapy (PDT) utilises a chemical reaction activated by light energy (LED light or laser) to selectively treat specific skin conditions such as acne, psoriasis, various skin cancers and pre-skin cancers such as solar keratosis, squamous cell carcinoma, and basal cell carcinoma. It cannot be used for the treatment of melanoma.

It works on the principle that those certain cells that cause the above problems are metabolically more active and produce large amounts of a substance called porphyrin. These porphyrins are sensitive to certain types of light, and when exposed to light can produce toxic oxygen free radicals which destroy cells in the very nearby vicinity. Because these oxygen free radicals do not actually traverse far, they are very specific to the cells that create the porphyrins, hence it is possible to specifically target the problem cells without damaging normal ones.

To stimulate cells to produce more porphyrins, a substrate called 5-aminolevulinic acid (ALA) which is a precursor to the porphyrins, is applied to the skin. The cells that take up the ALA are generally those which are more active, for example sebaceous glands, the bacterial that cause acne (p.acnes) or more rapidly dividing skin cancer or pre-cancerous cells. Therefore PDT can help reduce; acne, psoriatic plaques, solar or actinic keratosis, reduce superficial basal cell carcinomas (skin lesions caused by sun-exposure/damage) by targeting the cells that cause these problems.

PDT can be used on any part of the face or body e.g for back acne or for solar keratosis on the hands.

There is some evidence to suggest that photodynamic therapy also enhances the usual photo-rejuvenating effect of lasers on skin ie. reducing pigmentation, capillaries and improving skin texture (see article at bottom of page). In summary, ALA selectively targets the cells that cause acne, and particular skin cancers like solar keratosis, and then is activated by LED light or laser which selectively destroys these cells.

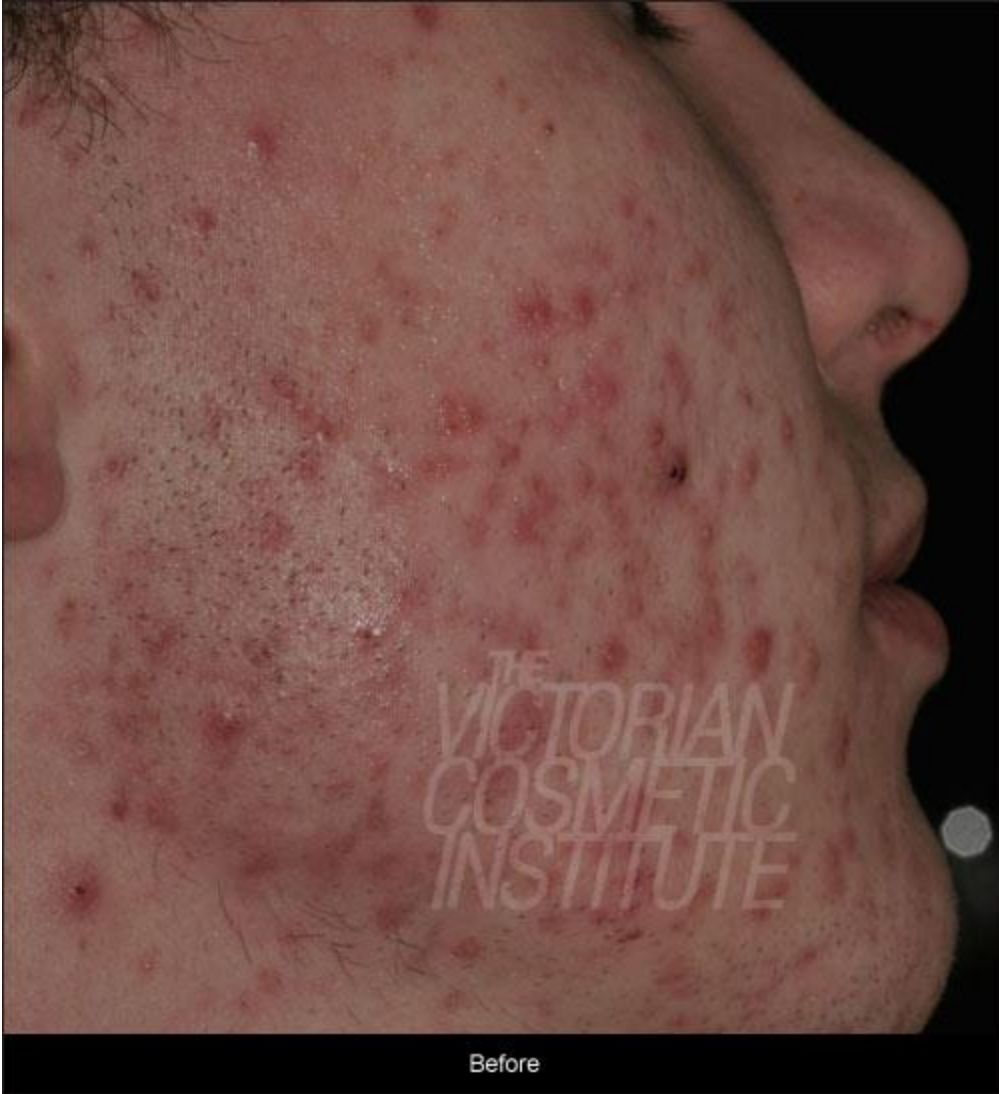
What does photodynamic therapy involve?

Photodynamic therapy involves;

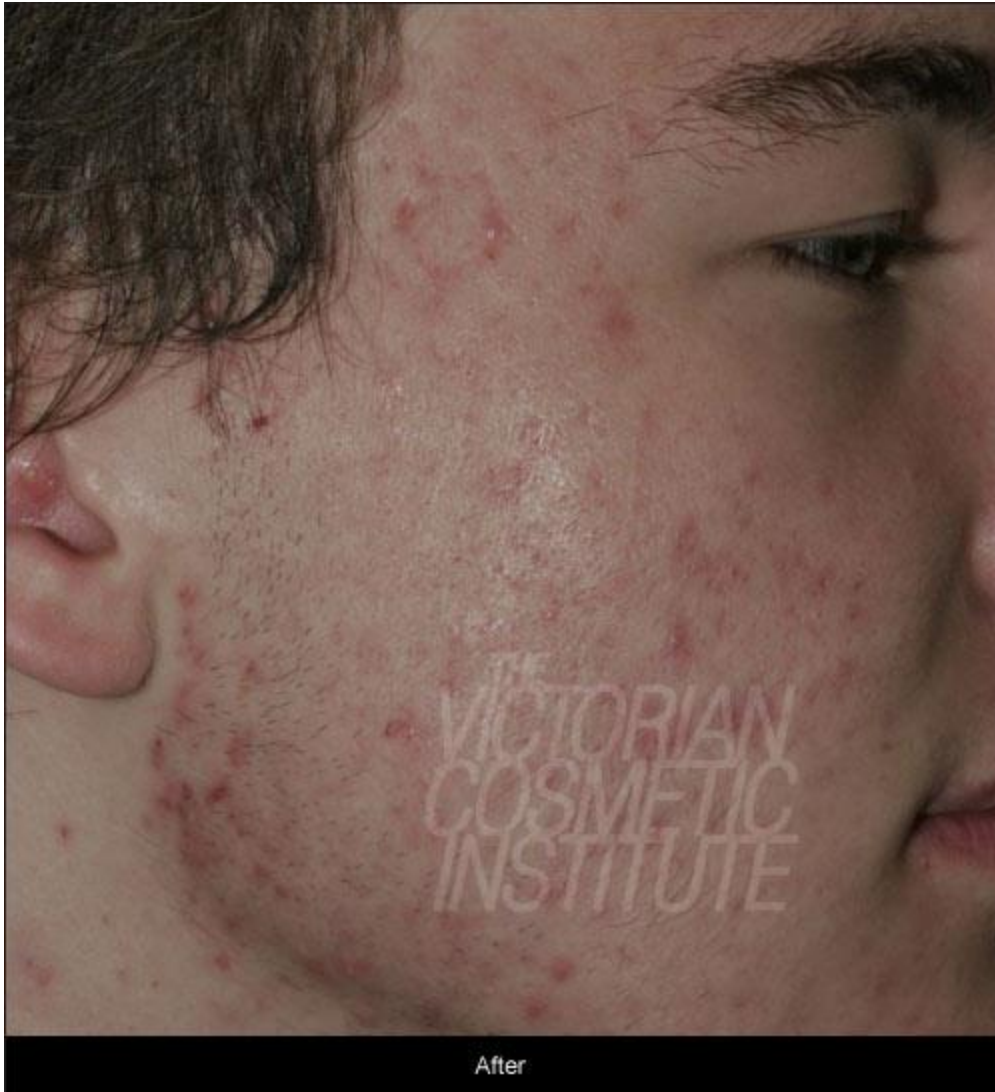
- Pretreating the skin with microdermabrasion for at about 30 minutes to help remove the top layer of skin cells and allow the process to work more effectively.
- The skin is then degreased with acetone.
- 20% ALA is then placed on the face from 30 minutes to 3 hours.
- The skin is then exposed to a LED or laser light. Either a blue/red LED light, [pulsed dye laser](#), or [Gemini laser](#) is used to activate the ALA.
- Sun avoidance for 48 hours

Photodynamic therapy case study 1

This male patient has had numerous treatments for acne before. This included a series of antibiotics, and an uncompleted course of Roaccutane (non-compliance was due to side effects unacceptable to the patient such as dry lips/skin). This is after 2 treatments of photodynamic therapy one month apart. ALA was placed on his skin for 30 minutes each time and activated by the LED light. His acne has cleared significantly, with much of the inflammation and redness disappearing.



Before



Photodynamic therapy case study 2

This man presented to The Victorian Cosmetic Institute with a large number of solar keratosis (evident as red and scaly lesions on the skin) as a result of many years of accumulated UV exposure. He underwent PDT with a 3 hour ALA incubation period and activation with the red LED light for 12 minutes. He also had Medlite laser treatments for brown spots at the same time. There is also a photo showing the progress of his recovery at 7 days. The after photo shows significant improvement in skin texture, colour and the absence of solar keratosis.



before

after



after 7 days



What can be achieved with photodynamic therapy?

The number of dystrophic or sun-damaged cells are decreased leading to an improvement in the texture of the skin and a reduction in the probability that these cells will become cancerous.

It also is very effective in helping to reduce the number of sebaceous glands along with the bacteria, propionobacterium acnes, that causes acne. Hence, dramatic improvements

in the number of active acne lesions are seen. Particular improvements are seen in those people who have cystic or inflammatory type acne. Benefits are gained not only from the activation of ALA by laser, but also from the laser itself rejuvenating the skin.

Photodynamic therapy can also be combined with laser treatment for brown spots or facial capillaries.

Am I a suitable candidate for photodynamic therapy?

Yes, those with;

- Active, cystic, or inflammatory acne are suitable for the treatment. It is especially suitable for people who want to avoid Roaccutane use and its side effects.
- Those who have solar keratosis (pre-cancerous skin lesions)/squamous cell carcinoma/basal cell carcinoma removed with minimal effect on normal skin and the least chance of scarring in comparison to other treatments such as cryotherapy (liquid nitrogen) therapy which tends to leave white areas on the skin, or surgery which tends to leave scars
- Those with psoriasis and resistant psoriatic plaques that have not responded well to other treatments

It is not suitable for people who;

- are breast feeding or pregnant
- have a history of keloid scarring
- have had Roaccutane in the past 6 months.
- have a history of porphyria

How many sessions are needed?

Best results are achieved by two to four sessions at intervals between 10 and 30 days for the treatment of acne. Treatment of solar keratosis, basal cell carcinomas, psoriasis and skin rejuvenation generally requires less treatments (one to two) at intervals of 4 to 6 weeks.

What are the side effects of photodynamic therapy?

Immediately post treatment, the skin appears red and sun-burnt. This can persist for up to one week. The skin may flake, crust or peel during this time. You may also experience approximately 2 days of mild swelling in the face if this is the treated area. Strict sun avoidance is required for 36 hours. There also may be some heat, discomfort, and itch felt in the treated areas for a couple of days. Generally speaking, the downtime is from 5 to 10 days, and the side effects are significant during this time if larger areas of the face are treated.

What is the cost of photodynamic therapy?

For acne on face. 30-60 minute ALA incubation. LED activation.	950
For acne on back/shoulders. 30-60 minute ALA incubation. LED activation.	1200
For acne on chest. 30-60 minute ALA incubation. LED activation	950
For acne on chest/back/shoulders. 30-60 minute ALA incubation. LED activation	1650
For treatment of skin cancers, skin cancer pre-cursors on face. 3 hour ALA incubation. LED activation and laser treatment to full face for pigmentation/capillaries	2500 (may be associated with Medicare item numbers 30192)

Prices include all aspects of the treatment, including microdermabrasion, application of the ALA, and activation with the laser. The whole treatment time can take around 2 or more hours.

In some cases, there may be an associated Medicare rebate, but this depends on the condition treated. If a rebate applies then the Medicare Safety Net will also help in reducing the cost of the treatment e.g if safety net level is assumed to be \$1000, then; Photodynamic therapy (PDT) involves the use of a topical photosensitizer (20% solution of 5-aminolevulinic acid) and a light source to activate the photosensitizer. Once activated by light, the 5-aminolevulinic acid is transformed into protoporphyrin IX. Protoporphyrin IX is absorbed into sun damaged skin cells and sebaceous glands (oil glands of the face).

Photodynamic Therapy

PDT can be used for the treatment of:

- Actinic keratoses
- Photorejuvenation
- Acne
- Disseminated actinic porokeratosis

What to expect:

- The 5-aminolevulinic acid is applied to the treated area and allowed to incubate.
- After the incubation the light treatment will be applied.
- Once the treatment is completed, the area treated will be red and irritated.
- After treatment, it is critical to avoid sun exposure for 48 hours and apply a sunscreen with a minimum of SPF 30.