REVIEW | OPEN ACCESS

**Medical Science**

**To Cite:**
Ważniewicz S, Anioła A, Jonkisz A, Saniuk J. Selective photothermolysis of sebaceous glands- 1726 nm laser in the treatment of acne vulgaris. *Medical Science* 2025; 29: e20ms3525
doi: https://doi.org/10.54905/disssi.v29i155.e20ms3525

**Authors' Affiliation:**
[1]University Clinical Hospital in Poznań, Przybyszewskiego 49, 60-355 Poznań, Poland
[2]Voivodeship Hospital in Poznań, Juraszów 7/19, 60-479 Poznań, Poland

[*]**Corresponding Author**
University Clinical Hospital in Poznań, Przybyszewskiego 49, 60-355 Poznań,
Poland
Email: sandrawazniewicz@gmail.com

**Peer-Review History**
Received: 28 August 2024
Reviewed & Revised: 31/August/2024 to 18/January/2025
Accepted: 22 January 2025
Published: 27 January 2025

**Peer-review Method**
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367



DISCOVERY
SCIENTIFIC SOCIETY

# Selective photothermolysis of sebaceous glands- 1726 nm laser in the treatment of acne vulgaris

**Sandra Ważniewicz[1*], Aleksandra Anioła[1], Aleksandra Jonkisz[1], Jagoda Saniuk[2]**

## ABSTRACT

Acne vulgaris is an inflammatory skin disease commonly seen in a significant part of the population, most commonly in teenagers and young adults. It can lead to pigmented lesions and scarring; standard systemic treatment can be associated with several side effects. Energy-based treatments (EBD), including the 1726 nm laser, are also used to treat acne. Significant roles in the pathophysiology of acne include overactive sebaceous glands and increased sebum production. The 1726 nm laser is an effective method of treating acne as it selectively damages the sebaceous glands. It is FDA-approved for the treatment of mild to severe acne vulgaris. Studies show that it is a safe and effective therapeutic option and that adverse effects are mild and transient. The following article provides an overview of 1726 nm wavelength lasers for treating acne.

**Keywords:** Acne vulgaris, 1726 nm laser, selective photothermolysis, sebaceous glands, acne laser

## 1. INTRODUCTION

Acne vulgaris remains among the most common inflammatory skin conditions (Vasam et al., 2023). It usually occurs in the second and third decades of life, with an estimated prevalence of over 90% in adolescents (Sutaria et al., 2023; Santer et al., 2023). In the pathophysiology of acne, an essential role plays the overproduction of sebum, excessive keratinization of hair follicles, hyperproliferation of propionibacterium acnes (P. acnes), and the inflammatory response. The clinical picture distinguishes between non-inflammatory lesions (comedones) and inflammatory lesions (papules, pustules, cysts, and nodules) (Vasam et al., 2023).

The lesions tend to localize on the face and trunk. Acne can have a long-term course, leading to pigment changes and scarring (Santer et al., 2023). In addition, it significantly affects mental health, contributing to depression, anxiety, and reduced self-esteem (Sutaria et al., 2023). Standard acne treatment includes topical and systemic medications, often associated with several side effects

(Scopelliti et al., 2022). Recently, energy-based methods (EBD), which act on sebaceous glands, Cutibacterium acnes (C. acnes), and inflammation, have been found to be used to treat acne (Jaalouk et al., 2024).

**Objective**

This paper aims to present the available data on a novel treatment for acne vulgaris - the 1726 nm laser.

## 2. METHODOLOGY

This paper summarizes the available literature on the 1726 nm laser in treating acne vulgaris. To write this review article, we utilized databases such as PubMed and Google Scholar, using search terms such as "acne vulgaris treatment", "laser 1726", and "selective photo thermolysis". We cited eleven selected papers. The review covers studies from January 2021 to June 2024 and a single paper from 2009.

## 3. RESULTS AND DISCUSSION

**Mechanism of action**

The 1726 nm laser has been used for acne therapy due to the selective photothermolysis of the sebaceous glands. The laser damages sebocytes, which causes a reduction in sebum production and inhibits the proliferation of C. acnes bacteria, reducing inflammation. (Jaalouk et al., 2024; Scopelliti et al., 2024). Investigated that at a wavelength of 1726 nm, sebum has 1.2 times more excellent optical absorption than water, allowing selective destruction of sebaceous glands without damage to the epidermis (Bittar et al., 2024). Furthermore, the 1726 nm laser causes fewer side effects than other EBDs (Jaalouk et al., 2024). The Accure Laser System has an infrared camera to monitor epidermal temperature continuously.

In addition, forced air cooling is used to protect the skin additionally. Peak epidermal temperature (PET) to selectively damage the sebaceous glands is around 40-46 degrees Celsius, depending on the location of the acne. The device has two modes: Standard mode with injectable anesthesia and Boost mode with topical anesthesia. Acne therapy with the AviClear laser uses a target fluence to damage sebocytes. The maximum fluence reaches 30 J/cm2 in single pulse mode and, in double pulse mode, 20 J/cm2 (Goldberg et al., 2023a). This device also has a cold sapphire plate (0°C to 5°C) to prevent thermal damage to the epidermis. The duration of one treatment for the AviClear laser is approximately 30 minutes, while for the Accure laser, it is approximately 45 minutes (Bittar et al., 2024).

**Efficacy of 1726 nm laser therapy**

The FDA has approved two devices with a wavelength of 1726 nm for treating mild to severe forms of acne vulgaris: AviClear Laser System (Cutera, Inc.) and Accure Laser System (Accure Acne Inc.). Both devices are suitable for use regardless of skin type. A study with the AviClear laser by Scopelliti et al., (2024) revealed complete necrosis of the sebaceous gland without damage to the epidermis and follicular epithelium (Bittar et al., 2024). A clinical trial by Alexiades et al., (2023) assessed the effectiveness and safety of the 1726 nm laser in treating acne vulgaris. The study included 104 patients, 57% of whom were female and 43% were male. They examined patients between 16 and 40 years old, with mild (n=1), moderate (n=81), and severe (n=22) acne and skin phototype II-VI, according to Fitzpatrick.

During the study, patients had three 30-minute laser treatments performed 2 to 5 weeks apart. The study aimed to evaluate a ≥50% reduction in active acne lesions. Patients were assessed on the Investigator's Global Assessment (IGA) scale (Table 1) before, at 4, 12, and 26 weeks after treatment. 32.6% of patients achieved a ≥50% reduction in inflammatory lesions after 4 weeks. After 12 weeks, there was an increase in this percentage to 79.8%, while after 26 weeks, the rate increased to 87.3%. The rate of patients with 0 or 1 on the IGA scale was 0% at the beginning of the study, increased to 9% after 4 weeks, 36.0% after 12 weeks, and an increase to 41.8% reported after 26 weeks.

In addition, after 12 weeks, a 1-grade IGA improvement was observed in 87% of patients and a 2-grade IGA improvement in 47% of patients (Alexiades et al., 2023; Goldberg et al., 2023a). Published an open-label, single-center study in which 17 patients aged 18-36 years with acne vulgaris with an IGA score of 2-4 received treatment with a 1726 nm laser (AviClear, Cutera, Inc.). They applied up to three treatments up to seven weeks apart. Follow-up visits occurred 4- and 12 weeks after the last laser treatment and optionally after

two years. The study assessed treatment efficacy by comparing baseline IGA and inflammatory lesion count (ILC) with IGA and ILC scores at 4 and 12 weeks after treatment.

The above study showed a statistically significant improvement in the patient's skin condition, with ILC decreasing by more than 52% after one month and more than 56% after 3 months. In addition, they reported a 97% decrease in ILC in follow-up patients after 24 months (Goldberg et al., 2023a). Preliminary results of another 1726 nm laser (Accure Acne Inc.) study show a 100% response rate, defined as a 50% reduction in active inflammatory lesions at four follow-up points (weeks 4, 8, 12 and 24) after four monthly treatments. At 12 weeks post-treatment, the researchers observed an 82% reduction in the percentage of inflammatory lesions and a 90% reduction at 12 months (Bittar et al., 2024).

**Table 1** Investigator's Global Assessment Scale for Acne Vulgaris

| Score | Acne Severity Scale | Morphological Description |
|---|---|---|
| 0 | Clear | Clear skin, residual hyperpigmentation, or erythema, without inflammatory lesions |
| 1 | Almost clear | Rare inflammatory lesions, a few small papules or comedones, minor hyperpigmentation, minor erythema |
| 2 | Mild | Less than half of the face is involved, few papules/ comedones, mild hyperpigmentation, mild erythema |
| 3 | Moderate | Occupied more than 50% of the facial skin, comedones/ pustules, ≤ nodule, medium hyperpigmentation, moderate erythema |
| 4 | Severe | The whole face is involved: papules/ comedones/ pustules, nodules, and cysts, severe hyperpigmentation, severe erythema |

**Safety and adverse events**

In a Goldberg et al., (2023b) study using the AviClear device, researchers reported no severe adverse reactions within 52 weeks of treatment ending. All patients experienced mild erythema. There is also a reported occurrence of edema; however, both of these symptoms were expected and specific to laser therapy. Both erythema and edema resolved within a few hours or days after the procedure. In addition, other observations included blistering, hyperpigmentation, scarring, tingling, drying of the skin, or worsening of acne. However, all the symptoms mentioned were mild and transient. All patients tolerated the procedures well, with no local anesthesia used. In addition, there was no interruption to any of the sessions (Goldberg et al., 2023b; Pulumati et al., 2024). The most common side effects of the Accure laser are postoperative erythema or swelling and acne exacerbation (Scopelliti et al., 2024).

## 4. CONCLUSION

The 1726 nm laser is a novel option for treating mild to severe acne vulgaris. Its action consists of the selective destruction of the sebaceous glands. Several studies showed statistically significant treatment effectiveness based on improved IGA score and reduced active inflammatory lesions. Among the most common adverse effects are mild and transient erythema and edema. The 1726 nm laser is an effective and safe therapeutic option. More studies with larger groups of patients, comparisons with other treatments, and long-term observation of effects are still needed.

**Authors' Contribution**

Sandra Ważniewicz: Conceptualization, writing- rough preparation, investigation, methodology, project administration, writing - review and editing

Aleksandra Anioła: Formal analysis, supervision, visualization, data curation, writing- rough preparation, writing - review and editing

Aleksandra Jonkisz: Conceptualization, data curation, formal analysis

Jagoda Saniuk: Methodology, data curation, resources
All authors have read and agreed to the published version of the manuscript.

**Acknowledgments**
No acknowledgments.

**Ethical approval**
Not applicable.

**Informed consent**
Not applicable.

**Funding**
This study has not received any external funding.

**Conflict of interest**
The authors declare that there is no conflict of interests.

**Data and materials availability**
All data sets collected during this study are available upon reasonable request from the corresponding author.

## REFERENCES

1. Alexiades M, Kothare A, Goldberg D, Dover JS. Novel 1726 nm laser demonstrates durable therapeutic outcomes and tolerability for moderate-to-severe acne across skin types. J Am Acad Dermatol 2023; 89(4):703-710. doi: 10.1016/j.jaad.2023.05.085
2. Bittar J, Hooper P, Dover JS. 1726 nm Lasers for the Treatment of Acne Vulgaris. Skin Therapy Lett 2024; 29(1):5-7.
3. Goldberg D, Kothare A, Doucette M, Kaur A, Ronan S, Fromowitz J, Hamidi-Sakr A. Selective photothermolysis with a novel 1726 nm laser beam: A safe and effective solution for acne vulgaris. J Cosmet Dermatol 2023a; 22(2):486-496. doi: 10.1111/jocd.15602
4. Goldberg DJ, Andriessen A, Bhatia AC, Gold MH, Lewis AB, Lolis MS, Miller JH, Ros A. Treatment of mild to severe acne with 1726 nm laser: A safe alternative to traditional acne therapies. J Cosmet Dermatol 2023b; 22(11):3026-3032. doi: 10.1111/jocd.15964
5. Jaalouk D, Pulumati A, Algarin YA, Humeda J, Goldberg DJ. The impact of energy-based devices on sebum in acne vulgaris: A systematic review. J Cosmet Dermatol 2024; 23(10):3066-3077. doi: 10.1111/jocd.16466
6. Pulumati A, Jaalouk D, Algarin YA, Kasheri E, Issa NT, Nouri K. Targeting sebaceous glands: a review of selective photothermolysis for Acne Vulgaris treatment. Arch Dermatol Res 2024; 316(7):356. doi: 10.1007/s00403-024-02979-1
7. Santer M, Burden-Teh E, Ravenscroft J. Managing acne vulgaris: an update. Drug Ther Bull 2023; 62(1):6-10. doi: 10.1136/dtb.2023.000051
8. Scopelliti MG, Hamidi-Sakr A, Möller S, Karavitis M, Kothare A. Selective photothermolysis in acne treatment: The impact of laser power. J Cosmet Dermatol 2024; 23(2):457-463. doi: 10.1111/jocd.16020
9. Scopelliti MG, Kothare A, Karavitis M. A novel 1726-nm laser system for safe and effective treatment of acne vulgaris. Lasers Med Sci 2022; 37(9):3639-3647. doi: 10.1007/s10103-022-03645-6
10. Sutaria AH, Masood S, Saleh HM, Schlessinger J. Acne Vulgaris. In: StatPearls. Treasure Island (FL): StatPearls Publishing; August 17, 2023.
11. Vasam M, Korutla S, Bohara RA. Acne vulgaris: A review of the pathophysiology, treatment, and recent nanotechnology-based advances. Biochem Biophys Rep 2023; 36:101578. doi: 10.1016/j.bbrep.2023.101578