



State of the Art and Comparison of four Photoepilation Devices

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Introduction – State of the Art:

Removal of unwanted hair remains a therapeutic challenge. Photoepilation devices allow a good management of dark and coarse hair according the extended theory of photothermolysis. But all lasers have their subspeciality.

Study devices

Laser	Wavelength	Speciality
Ruby	694 nm	Dark, coarse hair in fair skin
Alexandrite	755 nm	Dark, coarse hair as well as brown, thinner hair in fair skin, backs
Diode	800, 810 nm	Dark, coarse hair, bikini line in fair skin
Nd:YAG	1,064 nm	Darker skin types, fair hair
IPL	600 – 1,200 nm	Dark, coarse hair in fair skin

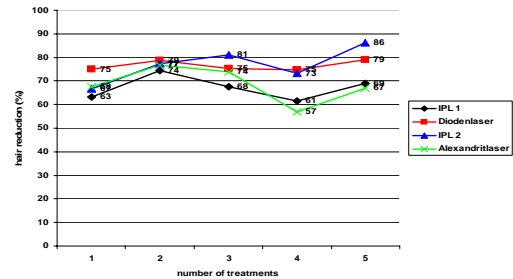
Laser	Wavelength	Pulse duration	delay	Energy density	Spot diameter
IPL 1	645 nm cut off filter 695 nm cut off filter	2 – 3 x 3.2 – 6.9 msec	10 – 80 msec	30 – 40 J/cm ²	
Diode laser	800 nm	30 msec		15 – 40 J/cm ²	
IPL 2	695 nm cut off filter	4 – 8 x 1.5 msec	5 msec	12 – 22 J/cm ²	
Alexandrite laser	755 nm	10 . 38 msec		15 – 25 J/cm ²	7 – 10 mm

Methods:

30 volunteers (20 female, 10 male) were recruited for the investigation with the diagnosis hypertrichosis. 12 of them completed the study being satisfied with the result or having hair counts with less than ten hair per test area, 9 are treated further on, 7 volunteers quitted participation because of lack of effect and 2 quitted because of severe illness. Results are described only for the 12 volunteers that completed the study. They had an average of 4.5 treatments (range 3 – 6) and an average age of 32.2 years (28 – 40 years). Hair counts were performed in defined areas before the first and before every following treatment. Hair counts were calculated to a number per cm². Treatments were performed in 4 – 6 week intervals at the arm, belly, bikini line, back and legs. Treatments were performed with two different IPL devices, an alexandrite laser and a diode laser. The above illustrated treatment parameters were used. Follow up was performed after 3 and 6 months without treatment. Volunteers were allowed to shave only during this period. 8 volunteers joined the first follow up, 6 the second. Statistical evaluation was performed with non parametric Friedman Test for several pared groups. In case p<0.01 the Wilcoxon-rank-test was additionally performed.

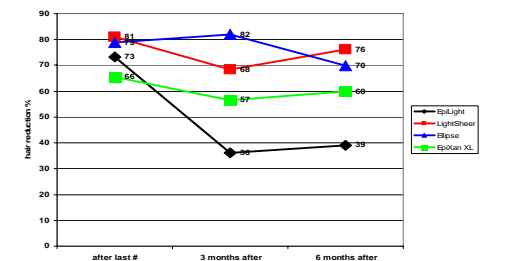
Results:

No. of treatment	No. of patients	female	male	P (Friedman-Test)	Hair reduction in %			
					IPL 1	Diode laser	IPL 2	Alexandrite laser
1st	12	10	2	0.296	63	75	67	68
2nd	12	10	2	0.423	74	79	77	77
3rd	8	7	1	0.440	68	75	81	74
4th	7	6	1	0.034	61	75	73	57
5th	3	2	1	0.532	69	79	86	67



Follow up after 3 and 6 months:

	End of therapy	1st follow up (after 3 months)	2nd follow up (after 6 months)
Number of volunteers	8	8	6
Female	7	7	5
Male	1	1	1
P (Friedman Test)	0.522	0.027	0.087
Hair reduction (%)	IPL 1	72	64
	Diode laser	77	86
	IPL 2	80	83
	Alexandrite laser	77	78



Summary:

Trying to compare apples and oranges as Chess (1) titles his study comparing IPL sources and rubylaser was performed as well in this study. There were no statistical significant differences between the investigated devices. Therefore all photoepilation devices are suitable to achieve a good hair reduction. The use of one of the devices depends on the needs of patients, means the skin type, hair type and colour. Not to forget the comfort of the performing person. Large areas as legs always should be treated with lasers that offer a high repetition rate with large spot diameter or scanners. Pain, discomfort and treatment duration influences the decision of patients which laser or IPL system is their favourite one. There are many publications that demonstrate the satisfying hair reduction of all mentioned photoepilation devices. The efficacy of the alexandrite laser is shown in a publication of Raulin (2). In this investigation a hair reduction of 75% was observed in the face after 8 treatments. The efficacy regarding long term results is discussed in an investigation of Laughlin (3). A stable hair reduction referring to the hair growth cycle in the anatomic area was observed in the follow up. There is also a follow up investigation by Lloyd (4). Patients were treated 5 times in 5 weekly intervals in the bikini line. Hair reduction was 78% one year after the last treatment. Very good results in epilation treatments with the diode laser are mentioned in an investigation by Anderson (5). After one treatment using 40 J/cm² the hair reduction was 70% and after the second 73% on average. One year after one single treatment there is still a hair reduction of 26.6% in an investigation by Dierickx (6). Comparison investigations between different lasers had been performed as well: Handrick (7) compares an alexandrite laser and a diode laser. The statistical performance did not show any significant differences between the two devices. Another comparison of an alexandrite laser and a diode laser was performed by Eremia (8). Both lasers achieve almost 80% hair reduction in the axilla performing four treatments.

Literature:

1. Chess C.: IPL sources and ruby lasers for hair reduction- trying to compare apples and oranges. J Cutaneous Laser Therapy 2 (3): 161(2000)
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4. Lloyd J. R., Mirkov M.: Long-term Evaluation of the Long-Pulsed Alexandrite Laser for the Removal of Bikini Hair at Shortened Treatment Intervals. Dermatologic Surgery 26 (7): 633-637
5. Anderson R. R.: Clinical Use Of The LightSheer™ Diode Laser System. Publication of Coherent Medical Group
6. Dierickx C. C., Anderson R. R., Campos V. B., Grossman M. C.: Effective, Permanent Hair Reduction Using a Pulsed, High-Power Diode Laser. Summary provided by Coherent Medical Inc.
7. Handrick C., Alster T. S.: comparison of Long-Pulsed Diode and Long-Pulsed Alexandrite Lasers for Hair Removal: A Long-Term Clinical and Histological Study. Dermatologic Surgery 27 (7): 622-626 (2001)
8. Eremia S., Li C., Newman N.: Laser hair removal with alexandrite versus diode laser using four treatment sessions: 1-year results. Dermatologic Surgery 27 (11): 925-9, discussion 929-30. (2001)



Red: area that is difficult to get good results in
Yellow: area that allows good results
Green: area that is excellent to treat