



Analytical Report

Apogee Elite CYNOSURE INC.

By David M. Cauger, Contributing Editor

Over the next several months I will be investigating new light-based aesthetic devices from a variety of manufacturers, on-site at their facilities. These reviews will examine both the strengths and weaknesses of these new products from a purely objective position.

I will be using testing meters and asking hard questions about these devices. I will report my findings, both positive and negative, in a language that is hopefully straightforward and easy to understand. All manufacturers that agree to these reviews will be informed in advance of the methods and approach. The goal of these reviews is to provide the physician an unbiased look at new light-based devices and what they may or may not offer in terms of expanded treatment options and improved treatment outcomes.

I have no financial interest nor do I receive any compensation from the companies reviewed in this series of articles or Aesthetic Trends & Technologies. These reviews do not necessarily reflect the opinion of Aesthetic Trends & Technologies. ATnT is in no way responsible for the outcome of any individual or entity, whether positive or negative, if they choose to purchase one of the products reviewed in these reports. The objective of this series is to report on products currently offered in the aesthetic medical community and to provide an avenue of understanding for those who have an interest in these devices for their practice.

Cynosure, Inc. revealed the Apogee Elite at the Annual Meeting of American Academy of Dermatology in Washington, D.C., in March of this year. On June 10th I visited Cynosure at their headquarters in Chelmsford, MA, to examine the dual wavelength laser. The Elite is a high-powered variable pulse 1064nm Nd:YAG, and proven variable pulse 755nm Alexandrite in one single unit. This is, without question, the best designed marriage of two long pulse wavelengths in the emerging trend of multi-wavelength aesthetic lasers.

While several companies do offer a 1064/755nm laser, they are lacking in the required fluences on the 1064nm side as well as other critical specifications. The Elite does not share these problems and delivers an

impressive 80 J/cm² with a 10mm spot with the its 1064nm Nd:YAG. The Elite has spot sizes of 3, 5, 7, 10, 12 and 15mm, pulse durations between 0.4ms to 300ms, and repetition rates of up to 5 shots per second. These specifications provide incredible versatility.

For example, it will allow a hair removal treatment of a skin type II patient with a 755nm mode; and in less than 30 seconds, it can be treating reticular leg veins with a 1064nm mode. This is but one scenario which distinguishes the Elite as a first choice laser for those offices that do not currently own a high-powered Nd:YAG or an Alexandrite.

There has never been, nor will there ever be, a single wavelength which can treat the same cosmetic conditions on all skin types. If I could

**FDA-Cleared Treatments,
Apogee Elite**

755 nm Alexandrite	1064 nm ND:YAG
Hair Removal, Lighter Skin Types	Hair Removal, Darker Skin Types
Pigmented Lesions	Telangiectasias and Cherry Angiomas
	Leg Veins
	Non-Ablative Wrinkle Reduction

pick only two wavelengths for a cosmetic practice, it would be a 755nm Alexandrite and a variable pulse high powered 1064nm Nd:YAG. Having both of these wavelengths in one single unit with the Elite's superior power specifications sets a new standard for all aesthetic laser companies.

I spent five hours reviewing the clinical uses and design with Marina Kamenakis, V.P. of Marketing; Evan Sherr, Director, Clinical Research;

The Elite has a straightforward touchpad interface with a monochrome LCD display.

Rafael Sierra, Ph.D., Chief Technical Officer; and James Boll, Director, New Product Development. All the above personnel were very candid and did not hesitate to answer some of the tougher questions I had prepared. I was allowed a full internal inspection of the laser as well as the production facilities for all of Cynosure's products.



Apogee Elite by Cynosure, Inc.

Both the laser and the facilities were well designed and orderly. The Cynosure staff allowed me to test the controls, and I was given complete instruction in the use and operation of the laser. After this session, three solar lentigos of approximately 3mm in diameter on my upper back were successfully treated.

ELITE OPERATION

The Elite can be ready in

Nd:YAG mode within 7 seconds of turning it on. The Alexandrite crystal takes only about ten minutes to be ready for operation. After this point one can switch seamlessly between both wavelengths without having to reboot the laser. Handpieces are very light and ergonomic.

The spot sizes cannot be "dialed in" to various sizes, and some may

view this as a downside. However, this approach allows for lighter handpieces as well as assurance that if a lens on one handpiece requires replacement, which is common to all lasers, one can simply substitute another size, thus keeping the laser in operation. Changing spots sizes is very simple and easy. I did it successfully on my very first try. Simply remove the handpiece from the end of the cable, snap on a new one and place it in the calibration port in the top of the machine.

The Elite automatically senses the spot size, and you are ready to select parameters and treat. If you are switching between 755nm and 1064 modes, the Elite will remember your previous settings or you have the option to override. The handpiece connects to a SmartCool™ (Cryo 5 Zimmer) chiller. This is an elegant and quiet stand-alone refrigeration unit which will bring surface skin temperature down near freezing in about 30 seconds.

The SmartCool provides a good epidermal cooling strategy and can also be incorporated into many other treatments not related to those of the Elite. Examples of this would be chemical peels or Erbium YAG resurfacing. The Elite has a straightforward touchpad interface with a monochrome LCD display.



APOGEE ELITE SPECIFICATIONS

Wavelength	755nm Alexandrite	1064nm Nd:YAG
Pulse Duration	0.5 – 300 milliseconds	0.4 – 300 milliseconds
Maximum Fluence per Spot Size Independent of Pulse Duration	15 mm 25 J/cm ²	15 mm 35 J/cm ²
	12 mm 35 J/cm ²	12 mm 50 J/cm ²
	10 mm 50 J/cm ²	10 mm 80 J/cm ²
	7 mm 100 J/cm ²	7 mm 160 J/cm ²
	5 mm 125 J/cm ²	5 mm 240 J/cm ²
	3 mm N/A	3 mm 300 J/cm ²
Max. Speed	2 Shots per Sec.	5 Shots per Sec.
Aiming Beam	Blue/Green	
Skin Cooling	Cold Air or Integrated Cooling	
Electrical	200/220 with 30Amp	
Size	41" high x 15" wide x 25" deep	
Weight	180 lbs	

ELITE SPECIFICATIONS

I am very pleased to see that Cynosure provides transparency in their product specifications. For once I did not have to re-construct or calculate maximum fluences because they are stated clearly on the back of the brochure.

When purchasing a laser, first decide what you wish to treat, know the predominant skin types of your patient base, and check the reputation of the company. After that, buy on specifications.

Specifications ultimately will determine treatment outcomes. Do not waste your time reading sponsored clinical studies or physician testimonials. Buy on specifications. The key specifications are

maximum fluences at the available spot sizes at a given pulse duration, and also the speed a laser can deliver in 1 second. This is its repetition rate. Finally, available pulse durations and epidermal cooling.

It is important to note that aesthetic lasers rarely need to have pulse widths greater than 65 milliseconds so don't bother to consider anything beyond that as a benefit. If any company's specification states "up to" 300 J/cm², ask them with what spot size and pulse duration do they achieve that fluence. It is best to ask them the maximum fluences with each spot size and whether or not it is independent of pulse duration.

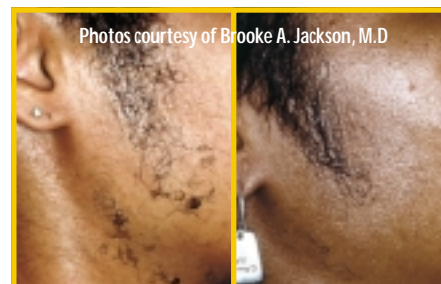
The chart above shows basic but critical specifications of the Apogee

Elite. These specifications are formatted almost exactly as they appear on the back of the brochure. All manufacturers should provide specifications in this format.

ELITE HAIR REMOVAL: 755NM ALEXANDRITE & 1064NM ND:YAG

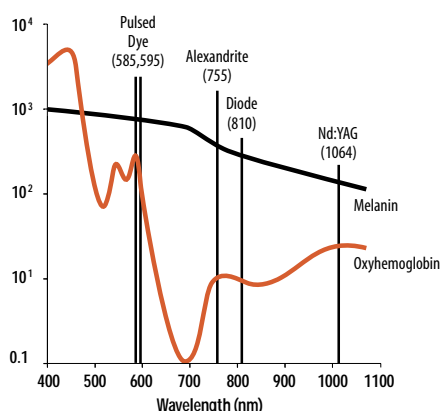
Experienced practitioners who own both a high-powered 1064nm Nd:YAG and a good 755nm Alexandrite will report very similar approaches to hair removal. For Fitzpatrick types I-III that are not tanned, they always choose the 755nm Alexandrite. If the patient is a Fitzpatrick type IV-VI, they almost always first choose the 1064 Nd:YAG. The only variance of choice is with type IV where, depending upon the anatomical area, some choose to pre-treat with tyrosinase inhibitors and then treat with Alexandrite. The reason for this is that the 755nm has a higher coefficient to the target chromophore melanin than does the Nd:YAG.

If the Alexandrite is of good quality, in good working condition and appropriate parameters are used, it will in almost all cases produce a significantly higher rate of follicular destruction than even a high-powered Nd:YAG. This is even



Photos courtesy of Brooke A. Jackson, M.D.
Before (left) and After (right)
9 months post 7 treatments with the Elite

ABSORPTION COEFFICIENT



truer with hair which has less mass or is light brown. Furthermore, hairs often become miniaturized after several treatments and therefore present less of a target. Very simply, an Nd:YAG requires a greater target than does the Alexandrite. The Nd:YAG also has an affinity for the chromophores of both oxyhemoglobin and water.

While this characteristic gives the 1064nm Nd:YAG its great versatility, it also means it requires higher fluences to overcome the competing chromophores and its relatively weak attraction to melanin.

On the other hand, the downside of any Alexandrite is the risk of adverse reactions when treating skin types IV-VI or tanned patients. Fluences have to be lowered to avoid risks of hyperpigmentation, hypopigmentation and burns. These lower fluences may result in delayed regrowth, but the odds in permanent follicular death drop dramatically in proportion to these lowered fluences. The Absorption Coefficient chart, above, will provide a visual reference of these realities.

SUGGESTED PARAMETERS, HAIR REMOVAL

Skin Type	755 nm Alexandrite		1064 nm ND:YAG	
	10 mm J/cm ²	Pulse Duration	10 mm J/cm ²	Pulse Duration
I & II	20-35	5-20 ms	N/A	N/A
III	18-30	10-20 ms	N/A	N/A
IV	15-25	30-40 ms	40-60	20-40 ms
V	N/A	N/A	30-55	30-40 ms
VI	N/A	N/A	25-45	40 ms

Skin Type	12 mm J/cm ²		12 mm J/cm ²	
	12 mm J/cm ²	Pulse Duration	12 mm J/cm ²	Pulse Duration
I & II	20-35	5-20 ms	N/A	N/A
III	18-30	10-20 ms	N/A	N/A
IV	15-25	30-40 ms	35-50	30-40 ms
V	N/A	N/A	30-50	40 ms
VI	N/A	N/A	25-45	40 ms

Skin Type	15 mm J/cm ²		15 mm J/cm ²	
	15 mm J/cm ²	Pulse Duration	15 mm J/cm ²	Pulse Duration
I & II	20-35	5-20 ms	N/A	N/A
III	18-30	10-20 ms	N/A	N/A
IV	15-25	30-40 ms	30-40	30-40 ms
V	N/A	N/A	25-35	40 ms
VI	N/A	N/A	20-35	40 ms

NOTE: The variances in fluences, pulse durations and spot sizes are determined by individual examination, test spots, and the anatomical region to be treated. It is always best to use the highest fluences which are safe and tolerable to the patient. Larger spot sizes are preferable when large areas need to be treated and hair is of larger diameter and deeper seated.

Asian skin would be but one example of how the tandem use of the Elite's 755/ 1064nm wavelengths could be creatively used. In lighter Asians skin types the practitioner may test the patient with 755nm at 15 J/cm² @ 40ms with a 12 mm spot. If perifollicular edema is achieved and no pigment changes occur in the skin, then it is common to increase the fluences by 1 Joule intervals. If no unwanted side effects are observed, then that is the fluence which should be used for that anatomical location.

If miniaturization occurs, it would be wise to shorten the pulse duration. If treating anatomical locations where hairs are deeper seated such as the pubic region, it is wise to use the 15mm spot with slightly longer pulse durations. These rules are set forth in Cynosure's clinical guidelines, and the 10mm spot should be used only in areas where it is not practical to use the 12mm spot.

However when treating darker Asian types, typically classified as a skin types 4 or 5, it is best to start with the Nd:YAG, performing a test

spot at 40 J/cm² @ 20ms with a 10mm spot. If no side effect is observed, move up in fluence in increments of 5 J/cm² to a maximum of 60 J/cm². After the 3rd treatment you may notice that the hairs have less diameter but are still a cosmetic concern to the patient. In this case it may be wise to prescribe a tyrosinase inhibitor such a hydroquinone to lighten the skin as well as a sunblock.

When it is observed that the patient has complied with the prescriptions, you may now employ the 755nm Alexandrite for 2-5 more sessions starting with 18 J/cm² to finish off these miniaturized hairs. This strategy works fine for areas which are not large such as men's backs where applications of the prescriptions are not practical. In those cases where tyrosinase inhibitors cannot be used in order to safely use the 755nm wavelength, it is best to shorten up the pulse durations of the Nd:YAG in proportion to hair diameter.

It is best to advise patients that up to 6-8 treatments may be required to achieve an acceptable result. In any event, the strategy of using the alexandrite and high-powered Nd:YAG in tandem for hair removal is something advanced practitioners have been doing successfully for several years. Having both of these options in one device allows the most comprehensive approach to hair removal and subsequent patient satisfaction.

The chart on the previous page contains my basic suggested parameters for hair removal with Apogee Elite.

ELITE VASCULAR TREATMENTS: 1064NM ND:YAG

The specifications of the Apogee Elite will allow it to successfully treat telangiectasias of the face and legs, cherry angiomas, and leg veins up to 2.0mm in diameter.

With vessels over 2.0mm it is my firm conviction that sclerotherapy be the first treat-ment modality followed by the Nd:YAG to remove any matting which may occur post treatment.

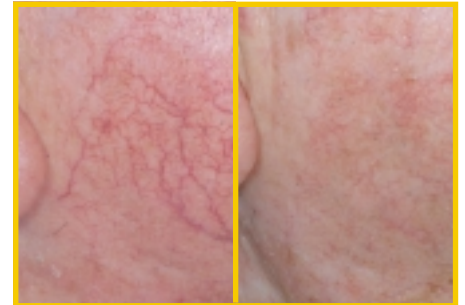
Leg veins over 1mm are challenging to treat. Be sure to receive thorough training before offering this service.

When treating vessels it is recommended that a coating of cold ultrasonic gel or substantial equivalent be used in conjunction with the SmartCool system designed to provide epidermal cooling during treatment.

SUGGESTED PARAMETERS, VASCULAR TREATMENTS

Area	Spot Size	Pulse Duration	J/cm ²	Pulse Rate (sec.)
Facial Telangiectasias	3 mm	10 – 20 ms	125 – 140	1 – 1.5
Facial Telangiectasias < 0.5 mm	3 mm	10 ms	110 – 150	1 – 2
Spider Veins Superficial > 0.5 mm – 1 mm	3 mm	20 ms	110 – 180	1 – 2
Spider Veins Reticular 1 mm – 2.0 mm	5 mm	20 – 40 ms	120 – 180	1 – 2
Leg Veins 1 mm – 2.0 mm	7 mm	40 – 60 ms	150 – 170	1 – 2

NOTE: The variances in fluences, pulse durations and spot sizes are determined by individual examination, test spots, and type of vessel. The above settings are for Fitzpatrick types I-III. Use cold packs immediately after treatment followed by an antibiotic ointment or occlusive to prevent dryness and crusting. Avoid sun exposure and exercise for 1 week following treatment of leg veins.



Before (left) and After (right)
130 J/cm², 20ms, 3mm spot

With telangiectasias it is best to start at the end of the vessel and work toward the feeder using a 10% overlap with each pulse.

Appropriate topical anesthesia may be required. The table on the left contains suggested treatment parameters using the Elite's 1064 wavelength.

ELITE PIGMENTED LESIONS TREATMENTS: 755NM ALEXANDRITE

The Apogee Elite uses short pulse durations with a 5mm spot to remove simple and solar lentigos. During my visit to Cynosure's offices I had four solar lentigos on my upper back treated. I am pleased to report that three are now completely absent and one would require another treatment at a higher fluence. No adverse reactions occurred. The table on the next page contains suggested parameters for Fitzpatrick types I-III.

ELITE NON ABLATIVE TREATMENTS: 1064NM ND:YAG

The non-ablative skin rejuvenation treatment of the Apogee Elite will generate new collagen synthesis in select patients and improve the appearance of some rosacea subtypes and superficial telangiectasias.

The objective in achieving collagen synthesis is to heat the upper papillary dermis by absorption of laser energy by water and diffusion of heat from the microvasculature to a temperature between 45°C and 50°C.

The face is treated in sections of approximately 20-25 square centimeters. The tip of the 5mm spot is held about 1-2 centimeters from the skin surface. This will defocus the beam to about 8mm. Move the handpiece across the area in a relatively fast motion back and forth over the treatment area in a left to right and top to bottom. Once the first pass is complete, repeat the same pattern at the original starting location and then move to the next area. In general, patients in their 30's to early 50's with mild rhytides respond best to this treatment. Non-dynamic rhytides also respond better so it is a

treatment which lends itself to the conjunctive use of BOTOX™ and dermal fillers.

SUGGESTED PARAMETERS, NON-ABLATIVE TREATMENTS

Area	Spot Size	Pulse Duration	Fluence	Shots per Sec. (Hz)
Face	5 mm	0.4 ms	13 – 18 J/cm ²	5

PRICE, KEY FEATURES, AND WARRANTIES

System Price. The list price of the Apogee Elite is \$115,000. This includes 6 spot sizes and a SmartCool™ for epidermal cooling.

This is a hefty price tag but for the office which does not own a high-powered Nd:YAG or an Alexandrite, it is a bargain. You also save by paying only one warranty and have to deal with only one company for service. In addition, the SmartCool™

may be used for other purposes.

Spot Sizes. 3, 5, 7, 10, 12 & 15mm. Changing spot sizes is fast and easy. The ability to switch wavelengths with these fluences is a major break-through and can allow several different treatments in one session.


Warranties. The Elite carries a full 1 year warranty: After 1 year the service plan is \$6,900 annually.

Consumable Cost. None, except the usual lens or fiber from time to time.

CONCLUDING COMMENTS

This is my third analytical product review, and some of the faithful ATnT readers are perhaps wondering why each device has received high marks. The reason is that all of my assignments have been with the very latest product offerings from the top tier companies. It goes without saying that I will not be reviewing sub-par devices in the near future, and there are many sub-par devices on the market.

There are many products I wouldn't buy as paperweights and some which obviously are superior to others. I can say with the fullest confidence and without reservation that the Apogee Elite is a superior laser. If you do not already own a good Alexandrite or one of the few high-powered Nd:YAG's on the market, this is the best option currently available. The tandem use of these wave-lengths is well established, and you will invariably find them employed in most experienced cosmetic practices.

Cynosure has quite a number of excellent products, having been a top tier company for many years. However, the Elite is clearly its most advanced product to date. In addition, for its outstanding specifications with both its 755nm and 1064nm wavelengths, the Apogee Elite currently stands without an equal in the aesthetic laser industry. 

The ability to switch wavelengths with these fluences is a major breakthrough and can allow several different treatments in one session.

SUGGESTED PARAMETERS, PIGMENTED LESIONS

Skin Type	Spot Size	Pulse Duration	Fluence
I & II	5mm	0.5 ms	20 – 30 J/cm ²
III	5mm	0.5 ms	18 – 25 J/cm ²

NOTE: It is important that a qualified physician examine all lesions prior to treatment. Grey or white appearance post treatment indicates too high fluence. Darkening of the lesion is the preferred end-point in most cases. It is best to treat two to three lesions on a non-obvious location before commencing treatments in obvious locations. Epidermal cooling is not recommended. For ocular regions, eye shields are recommended. Patients should apply the newer titanium dioxide/zinc oxide sunblocks to treated areas which will be exposed to sun.

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