

pastelle PRO



The Best Solution for Tattoo & Pigmentation Removal

Q-switched Nd:YAG Laser

1064nm, 532nm

Epidermal & Dermal Pigmentations

Melasma

Tattoo Removal

Skin Rejuvenation

1064nm · 532nm · Genesis · PTP · Triple · 2xPTP

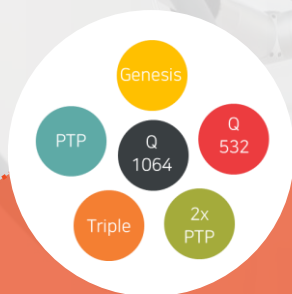
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7. Txモード-複数 (PTP)
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WHY PASTELPRO

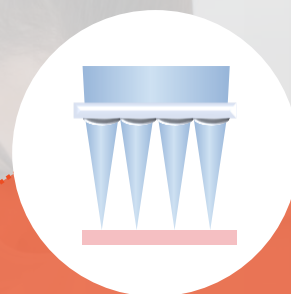


“ **pastelle PRO** performs faster and safer treatment and ensures the excellent efficacy by its multiple wavelengths, treatment modes and handpieces ”



複数の Tx モード

Qスイッチからジェネシス
およびマルチPTP
(PTP、複数、2xPTP)



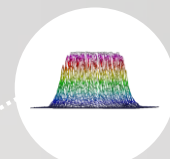
HEXA MLA

肌の若返りと毛穴や傷跡の治療
フラクショナルMLA
ハンドピース付き



複数の波長

複数の波長による
さまざまなアプリケーション
1064、532、595、660nm



高出力の品質

トップハットビームプロファイル
と
自動キャリブレーション

		pastelle PRO		
レーザーの種類		Q-switched Nd:YAG Laser		
波長		1064nm & 532nm		
照射モード		1064, 532, Genesis, PTP, Triple ^{NEW} , 2xPTP ^{NEW}		
最大エネルギー	シングル	1064nm	532nm	Genesis
		1.5J	500mJ	5J
	マルチ	PTP	Triple ^{NEW}	2xPTP ^{NEW}
		2J	2.4J	3.2J
パルス持続時間		1064 & 532nm	Genesis	PTP/Triple/2xPTP
		6-20ns	300us	6-20ns
反復率		1-10Hz		
ハンドピース		Zoom, Collimated, Fractional(MLA) ^{NEW} , Dye		
ダイハンドピース		595nm, 660nm		



2 複数のハンドピース

pastelle PRO



ズーム
(2-10mm)

ノーマルハンドピース

1064nm, 532nm

色素沈着、タトゥー、
トーニング、
およびジェネシス



MLA-S



MLA-R

NEW

HEXA MLA
(3-10mm)

フラクショナルハンドピース

キャビテーションの形成

肌表面を守りながら
表皮と真皮で

毛穴、傷、
スキンリジュビネーション



コリメート
(7mm)

コリメートハンドピース

扱いやすい

トーニング、ソフトピーリ
ングとジェネシス



ダイ
(3mm)

オプションハンドピース

595, 660nm

入れ墨、表皮の色素沈着、
赤み



03 適応性

pastelle PRO



色素性病変

- 表皮色素沈着
- 真皮の色素沈着



マルチカラータトゥー

- 黒, 暗い色
- 赤, オレンジ
- 青, パープル
- 緑



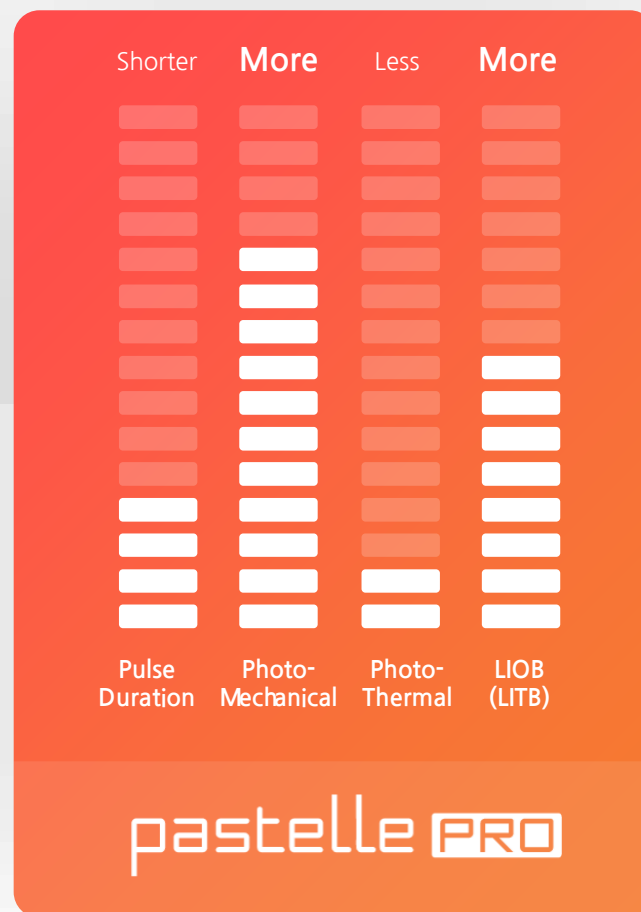
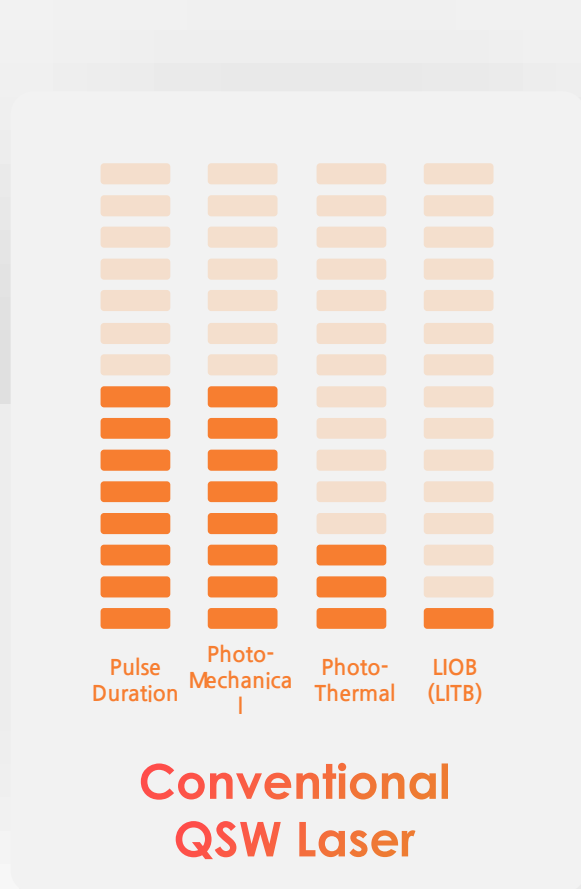
傷/ 毛穴改善 & 肌全体の リジュビネーション

- 傷跡
- 肌の若返り
(毛穴、小じわ、肌のトーン、質感)
- 肌に活力を与える

04 比較

pastelle PRO

“ **PASTELLE PRO** は従来のQスイッチレーザーより優れた光機械的効果とLIOBの形成をもたらします（毛穴と瘢痕の追加治療を可能にします） ”





MLA (Micro-lens Array)

肌の表面を傷めることなく、強力なエネルギーを肌の中に集中させることができます
(LIOB (LITB) の形成)



毛穴、傷、スキンリジュビネーション

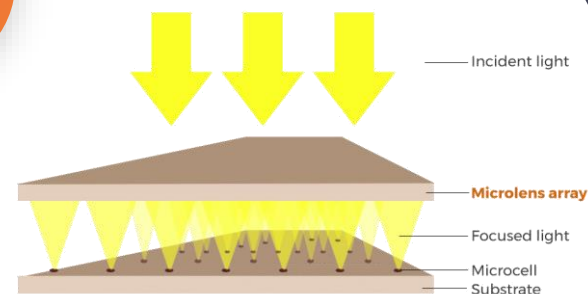
幅広いスポットサイズで、毛穴や傷跡などの小さな病変から顔全体のリジュビネーション治療が可能 (3-10mm)



少ない痛み & 短いダウンタイム

従来のフラクショナルレーザーよりも、痛みやダウンタイムが少なく、治療が穏やかで回数も少ない

傷



治療の可能性
が広がる！

毛穴

スキン
リジュビネーション

MLA Fractional Handpieces

pastelle PRO

Fractional(MLA) handpiece

1064 & 532nm

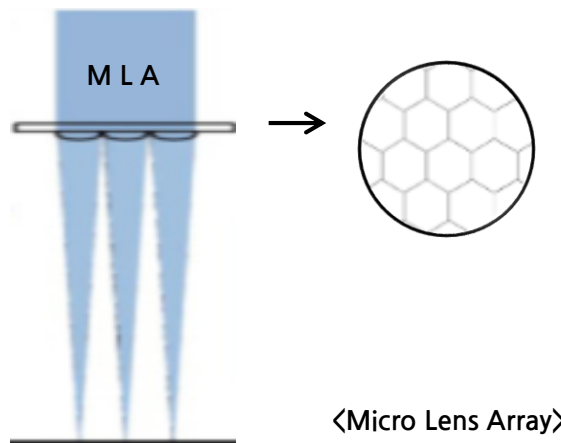


MLA-S

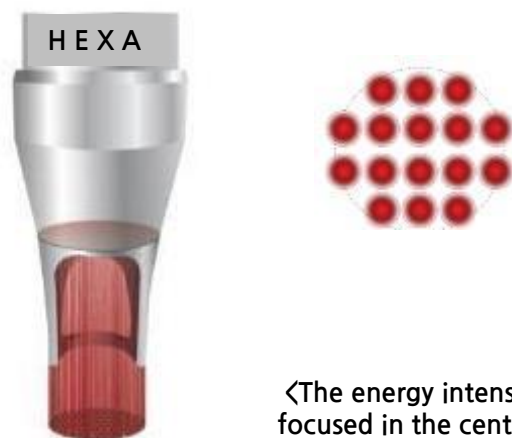
MLA-R

3-5mm

6-10mm



〈Micro Lens Array〉



〈The energy intensity focused in the center〉

- **HEXA MLA(Micro-lens array)**
複数の集束レンズが組み合わせられ、レーザーエネルギーを各マイクロドットの中心に集中的に集束させます。
- 通常のズームハンドピースの**約8~9倍のエネルギー**を生成できます
- 瞬間的な高エネルギーによる皮膚のキャビテーションにより**毛穴、瘢痕、若返り**を治療する事が可能

MLA Fractional Handpieces

pastelle PRO

Fractional(MLA) H/P

1064 & 532nm



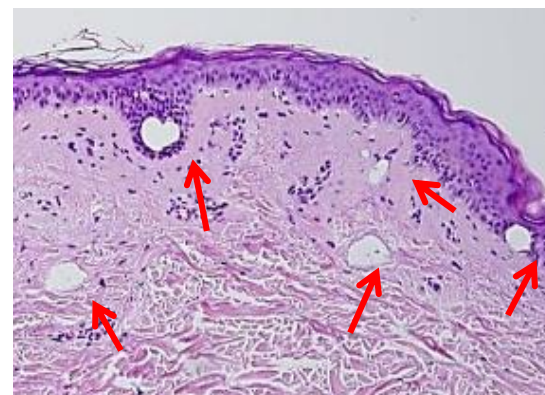
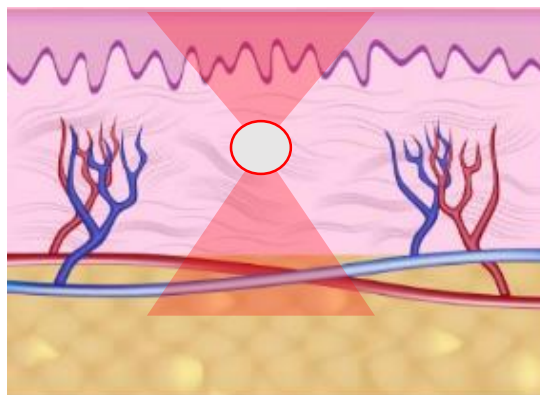
3-5mm

6-10mm

- **MLAは、LIOB（レーザー誘起光学破壊）の原理を使用しています**

真皮または表皮にキャビテーションが形成されることにより、**新しいコラーゲンと弾性繊維の生産**を促進するだけでなく創傷治癒過程を誘発する。

肌の表面をそのままにしておくことで、**痛みやダウンタイムを減らし、毛穴、傷跡、若返りのための1回の治療**で満足のいく結果をもたらします。



MLA フラクショナルハンドピース *pastelle PRO*

Fractional(MLA) H/P

1064 & 532nm

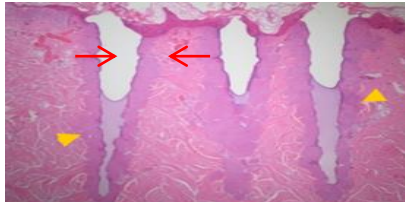
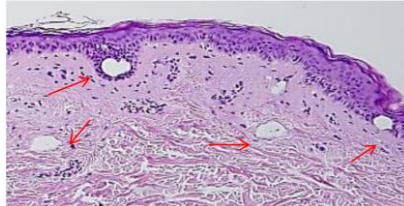


MLA-S

MLA-R

3-5mm

6-10mm

	Fractional Ablative Treatment	HEXA MLA Treatment
メカニズム	<ul style="list-style-type: none"> 熱アブレーション(Thermal Ablation) 組織に沿って残留熱損傷 	<ul style="list-style-type: none"> LIOB(Laser Induced Optical Break down) 残留熱損傷がない
前処理	<ul style="list-style-type: none"> 局所麻酔クリームが必要 手順時間1時間以上 	<ul style="list-style-type: none"> 局所麻酔クリームは、必要に応じて塗布 所要時間最大1時間
ダウンタイム	<ul style="list-style-type: none"> かさぶたの形成には最大2週間かかります 激しい痛みとダウンタイム 副作用の発生率が高い (例: PIH) 	<ul style="list-style-type: none"> 治療後、最大7日まで微粉砕作用起きる 耐えられる程度の痛み PIHのような副作用の可能性が少ない
結果	<ul style="list-style-type: none"> 細かいシワ、開いた毛穴、ニキビ痕(浅い)部分に良い結果が得られた。数回のフラクショナルレーザーレーザー施術で肌質が向上 	<ul style="list-style-type: none"> 細かいシワ、開いた毛穴、ニキビ痕(深さに関わらず)良い結果が得られた。 1度のHEXA MLA施術で肌質が向上
組織学的データ		

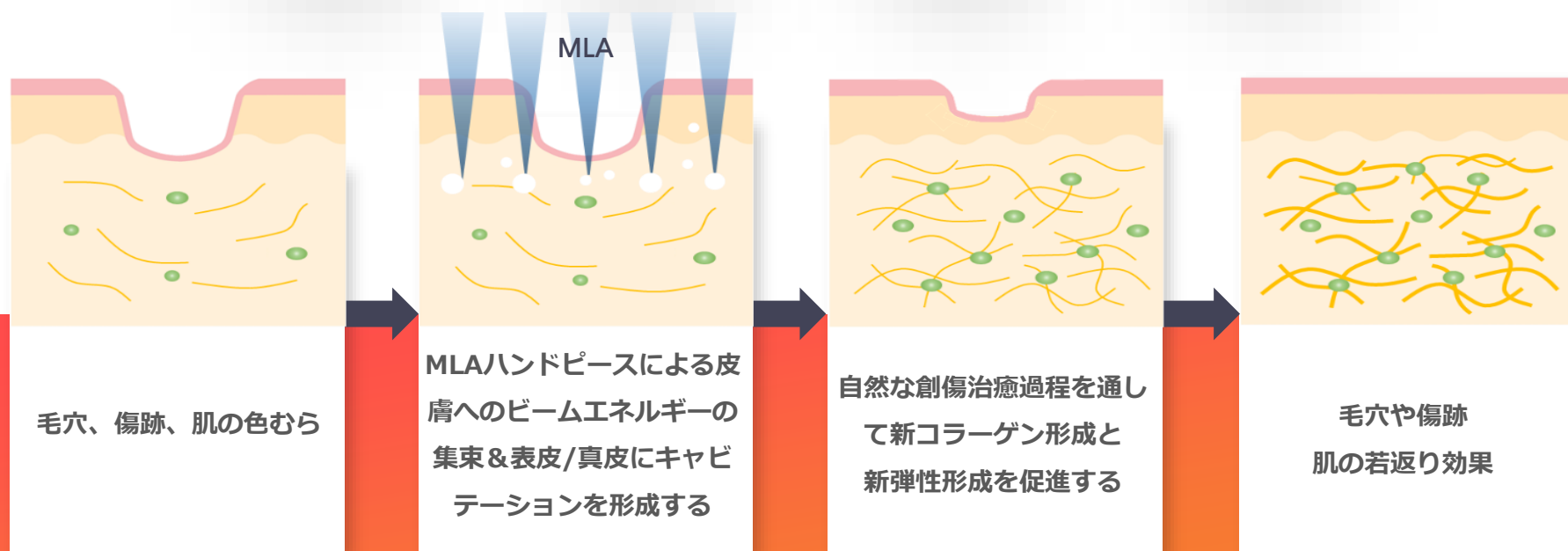
HEXA MLAは、レーザーエネルギーを各マイクロドットの中心に集中的に集中させ、皮膚の下に一時的なキャビテーションを発生させます。自然な創傷治癒過程を通じて、損傷した領域で新コラーゲン形成と皮膚のリモデリングが起こり、毛穴、瘢痕、細い線、皮膚の若返りが改善されます。

毛穴

傷跡

スキンリ
ジュビネーション

肌質、
色むら改善



Dye Handpieces (595 & 660nm)

pastelle PRO

ダイハンドピース



595nm

660nm

3mm



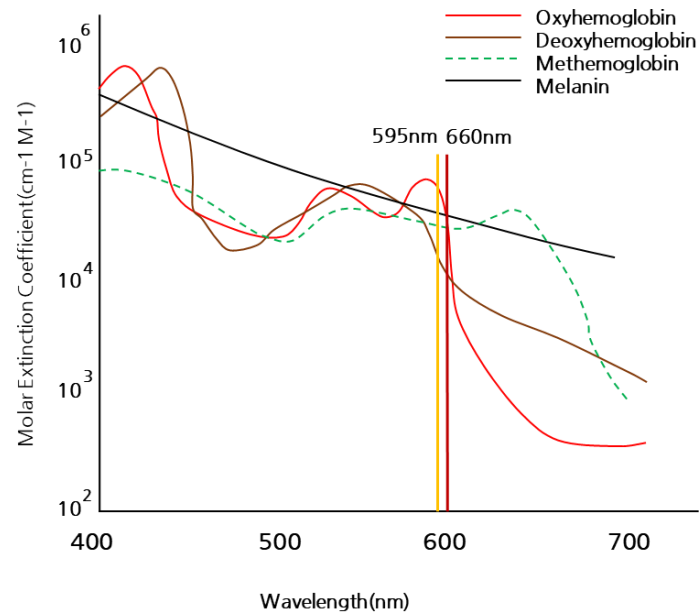
595nm

「595nmダイハンドピースは、ヘモグロビンの吸収率が高く、特に赤みやニキビ跡、青いタトゥーなどの治療に効果的です」



660nm

「660nmダイハンドピースは、メラニンの吸収率が高く、そばかす、傷、緑の入れ墨などの治療に効果的です。」



Dye Handpieces (595 & 660nm)

pastelle PRO

ダイハンドピース



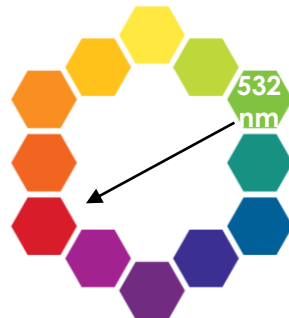
595nm

660nm

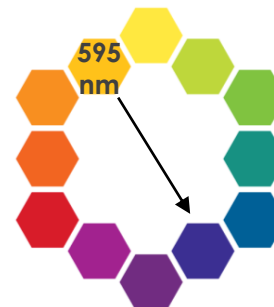
3mm

Possible to **remove multiple-color of tattoos** using dye

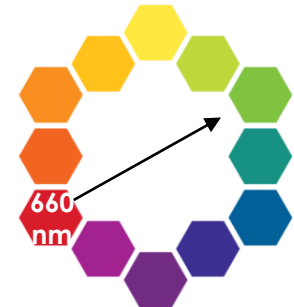
handpiece



532nm = Green Light
Treat: Red, Orange



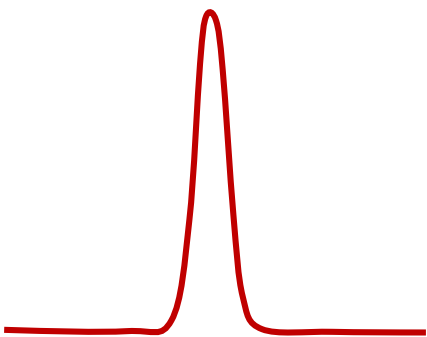
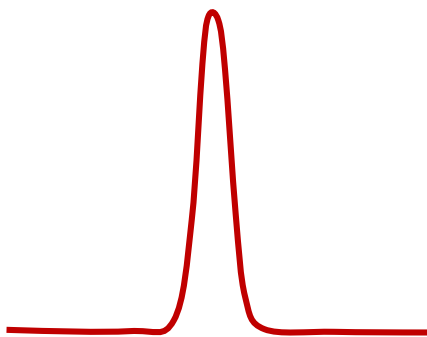
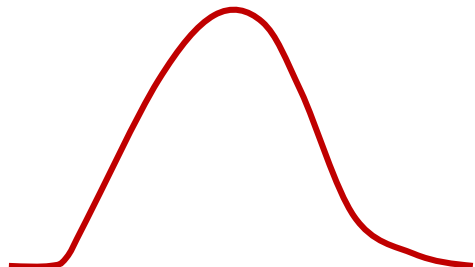
595nm = Gold Light
Treat: Blue, Purple



660nm = Red Light
Treat: Green, Teal

06 Tx Modes - Single

pastelle PRO

	Single		
	1064nm	532nm	Genesis
パルスイメージ			
パルス持続時間	6-20ns		300us
最大エネルギー	1.5J	500mJ	5J
特徴	<ul style="list-style-type: none">• 皮膚の色素沈着• 黒のタトゥー• トーニング	<ul style="list-style-type: none">• 表皮色素沈着• タトゥー(赤)	<ul style="list-style-type: none">• バルク加熱• 微小血管治療• コラーゲンの生成と肌のリジュビネーション

Principles of treatment using Q 1064nm

pastelle PRO

1064nmの波長の深い浸透特性により、
色素性病変、入れ墨、トーニングに適しています。

太田母斑

青あざ

ABNOM

タトゥー

1064nm

色素性病変

Q1064nm照射

色素の断片化
&
マクロファージの活性化

色素性病変の除去

Principles of treatment using Q 532nm **pastelle PRO**

532nmの波長はメラニンとヘモグロビンの吸収率が高く、
浸透が浅いため、色素性病変に適しています。

レンチゴ

ソバカス

カフェオレ斑

シミ

扁平母斑

ベッカー
母斑

532nm

表皮色素性病変

Q532nm照射

かさぶた形成
色素によるかさぶたの剥離

色素性病変の除去

Principles of treatment using Genesis

pastelle PRO

ジェネシスモードは、300 μ の長パルスで1064nmの波長。

これにより、色素沈着とレーザー調色を組み合わせた施術が可能になります。

[色素沈着と組合せ] Maximize **pigmented lesion removal effect** with **chromophore pre-heating**

[トーニングと組合せ] Maximize **collagen production & skin revitalization effects** and **toning effect**

蓄熱

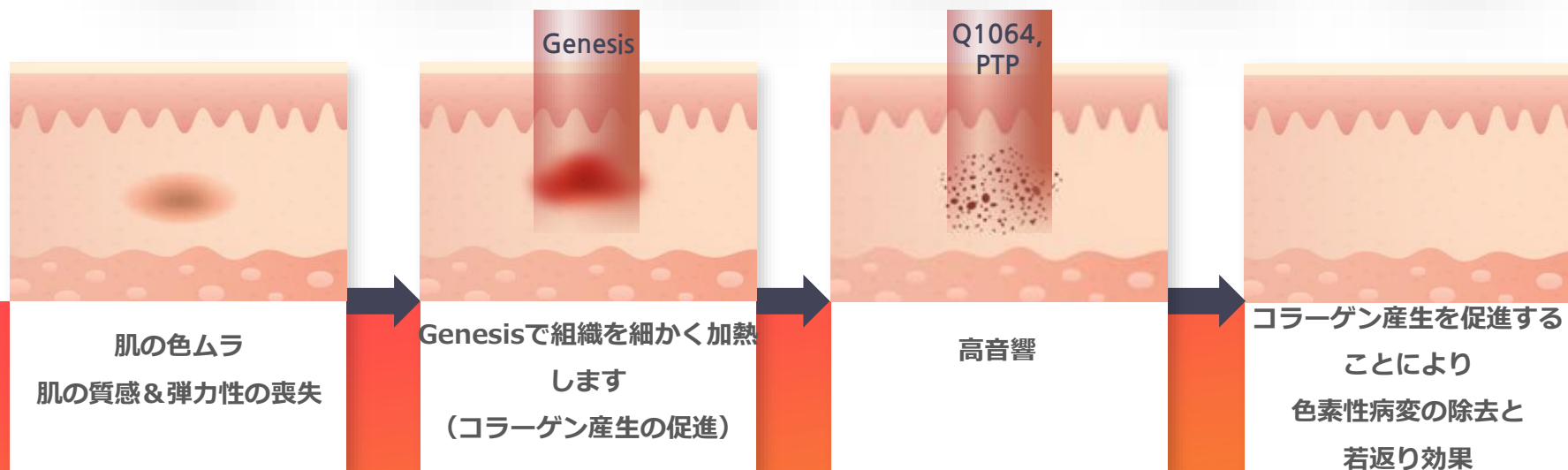
毛穴

小じわ

肌の色ムラ

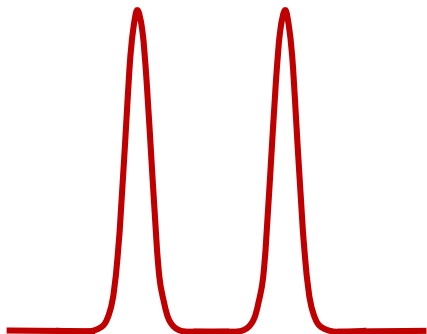
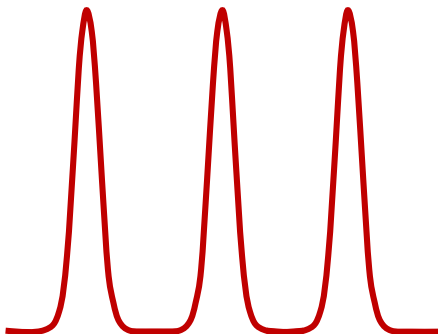
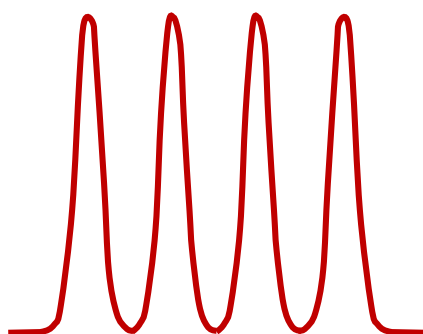
肌の
弛緩
防止

肌の活性化



07 Tx Modes – Multiple (PTP)

pastelle PRO

	Multiple		
	PTP	Triple <small>NEW</small>	2xPTP <small>NEW</small>
パルスイメージ			
パルス持続時間	6-20ns		
最大エネルギー	2J	2.4J	3.2J
特徴	<ul style="list-style-type: none">• Melasma• PIH		

08 Multiple PTP Mode

pastelle PRO



Multiple PTP* (Triple, 2xPTP)

1つのレーザーパルスを短い間隔で複数のパルス（2～4パルス）に分割することによる照射方法



Safer and More Effective

穏やかにレーザーを与えながら、病変により多くのエネルギーを効率的に供給します



Ideal for Melasma & PIH

肝斑やPIHなどの治療には非常に穏やかなアプローチが大切です。

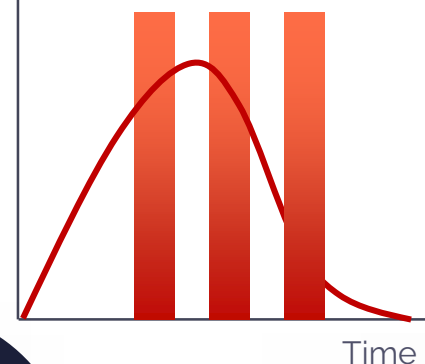


PTP Mode with NET

PTPモードを搭載し、New Excellence Technology（NET）として認定されています
+トリプル、ダブルPTPモードを搭載

Safer

Energy Intensity



Time

More Effective

Faster

Low Recurrence Rate

* PTP: Photoacoustic Twin Pulse

Kim, J. Y et al. (2016). Treatment of melasma with the photoacoustic twin pulse mode of low-fluence 1,064 nm Q-switched Nd: YAG laser. *Annals of dermatology*, 28(3), 290-296.

Yoo, M. G. et al.(2015). Influence of pulse type on subcellular selective photothermolysis of melanosomes in adult zebrafish skin following 1,064-nm, Q-switched, Nd: YAG laser irradiation: a pilot study. *Annals of Dermatology*, 27(2), 230-232.

Multiple PTP vs. Conventional Toning

pastelle PRO

	Conventional Toning	Multiple PTP Toning
照射	<ul style="list-style-type: none"> 1パルス照射する 	<ul style="list-style-type: none"> 短い間隔と低エネルギーで1つのパルスで分割された、複数のパルスで照射
皮膚刺激性		
臨床効果	<ul style="list-style-type: none"> より多くのショットが必要 効果的 	<ul style="list-style-type: none"> 必要なショット数を減らす さらに効果的 皮膚の炎症を最小限に抑えることによる低再発
有害な影響	<ul style="list-style-type: none"> 少々 	<ul style="list-style-type: none"> ほとんどなし
不快感	<ul style="list-style-type: none"> 適度 	<ul style="list-style-type: none"> やや
施術時間	<ul style="list-style-type: none"> 10-20 分 	<ul style="list-style-type: none"> 10 分

Principles of treatment using Multiple PTP **pastelle PRO**

痛みや皮膚の損傷を最小限に抑えることで、肝斑やPIHなどの敏感で複雑な色素沈着を
効果的に治療することが可能

肝斑

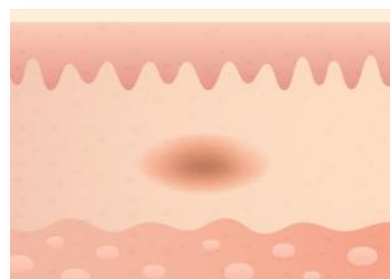
PIH

肌の美白

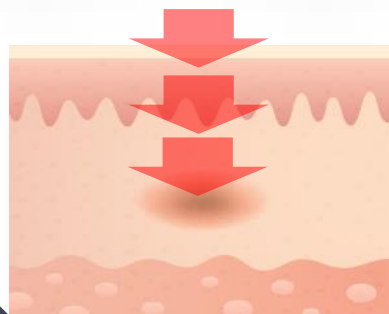
色素斑

ニキビ炎症

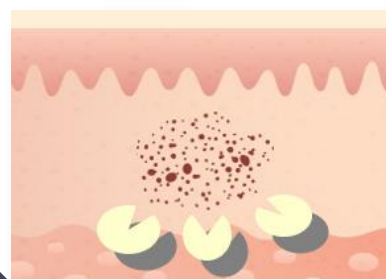
傷



敏感な病変肝斑、PIH



複数のPTPを使用し
分割された低エネルギーによる照射



皮膚の炎症を最小限に抑え、
色素の断片化とマクロファージの活性化を誘発する



肝斑 & PIH 改善



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ORIGINAL ARTICLE

Treatment of Melasma with the Photoacoustic Twin Pulse Mode of Low-Fluence 1,064 nm Q-Switched Nd:YAG Laser

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Department of Dermatology, Dankook University College of Medicine, Cheonan, Korea

Recently, new Q-switched Nd:YAG lasers which are capable of utilizing the photoacoustic twin pulse (PTP) mode, such as RevLite® (HOYA ConBio, Fremont, CA, USA) and Pastelle® (Won Technology Co., Ltd, Daejeon, Korea), have been developed for high-efficiency laser toning. PTP is the latest technology in which successive two beams are emitted at very short intervals (100~130 μ sec) and then synergistically produce higher peak power than those produced by a single beam from the current Nd:YAG lasers. Although there were some previous reports regarding low-fluence Nd:YAG laser therapy for melasma, little information exists about the efficacy and safety of laser toning with PTP mode. In this study, we performed an open-label controlled clinical experiment to evaluate the degree of improvement and side effects of PTP mode 1,064 nm Q-switched Nd:YAG laser toning in Asian women with moderate-to-severe melasma. Using the results from previous studies as historical controls, this study was aimed to investigate the efficacy and safety of laser toning with PTP mode.

treatment. Subjects were advised to avoid direct sun exposure and to apply broad-spectrum sunscreen during and after the treatment.

Efficacy assessment

Clinical and photographic evaluations for improvement (a decrease in the appearance of melasma) were conducted at baseline and at the last follow-up visit (2 weeks after the last treatment). High-quality digital photographs were taken from the front and sides under the same lighting conditions using a digital camera (D400; Nikon, Tokyo, Japan). Responses to treatments were evaluated at the last follow-up visit by using MASI scoring, colorimeter measurement, and the investigators' and patients' overall assessments. The MASI values were determined to quantify changes in pigmentation, as previously described^{12,13}. In addition, objective measurement of skin color was conducted at the darkest spot with a colorimeter (CR-400; Minolta, Tokyo, Japan). Measurement of brightness (L* value) were obtained three times, and the average value

DISCUSSION

Q-switched Nd:YAG lasers emit a beam at the level of nanoseconds pulse width to selectively destroy melanosomes without affecting surrounding tissue. Especially, the collimated 1,064 nm Q-switched Nd:YAG laser which delivers laser beam evenly throughout the dermis is able to treat a pigmented lesion located deep within the dermis. For achieving stable treatment results in melasma, it is important to minimize the unwanted side effects such as inflammation or skin irritation. Laser toning with 1,064 nm Q-switched Nd:YAG laser was devised as a way to reduce rebound aggravation of melasma or post-inflammatory hyperpigmentation due to such secondary stimulations which can be caused by other existing treatment modalities. The mechanism of laser toning has been proposed to be due to the fragmentation of subcellular-specific organelle melanin granules in the dendrites and subsequent dispersion into the cytoplasm without cellular destruction by repetitive doses of laser energy with a sub-photothermolytic fluence (<5 J/cm²) over a large spot size, the so called "subcellular selective photothermolysis"^{14,15}.

PTP is a unique laser emitting mode in which double pulses are delivered within one Q-switching cycle. Each pulse has relatively weak energy compared to the standard single Q-switched beam, but they can transfer higher peak energy (up to 60% more) to the target melanosome than a single beam because double beams are successively irradiated at very short intervals (100~130 μ sec) and their energy can be accumulated. As a result, the high peak energy instantly increases the temperature of the chromophore, leading to pressure changes and vibration, which then effectively destroys the chromophore through the form of a shock wave (photoacoustic effect).

Q-switching engineering in this study produces a pulse width of 20 ns on single Q-switching. The pulse width between the first and the second Q-switching in the double Q-switching PTP mode is about 100 μ s. The instant peak energy of the singly Q-switched beam is 1.3 J, whereas the energy of doubly Q-switched beams (each beam energy is about 0.8 J) in the PTP mode is 1.6 J, and as a result, the instant peak energy is increased up to 123% (<http://www.wtlaser.com/kr/products/pastelle.asp>). PTP can

months to obtain satisfactory clinical improvement^{5,11}. When compared with the results of other studies using low fluence Q-switched Nd:YAG treatments, even after considering methodological variability, about 60% of the subjects in our study had 'significantly improved', whereas previous publications showed an improvement range of 50%~90%^{2,4,5,10,16}. Therefore, the degree of improvement of global assessment in our study was not likely to be superior. However, it should be considered that five sessions of laser toning monotherapy were conducted in this study and it is a fewer treatment session than those of other previous studies, which conducted 5 to 15 times of mono- or combined-laser therapies. Moreover, the objective colorimeter L* value increased by 1.3 point in our study, and this showed better improvement as compared to an increase of 1.1 point after laser toning therapy of 10 times weekly in the same ethnic group¹⁷.

Similar to this study, a prospective single arm clinical study was recently conducted in which 50 Korean women with melasma were treated with 15 weeks of weekly treatments, using another PTP mode Q-switched Nd:YAG laser at 1,064 nm with a fluence of 2.8 J/cm², and an 8-mm spot size⁴. They reported that both patients and investigators rated the treatment outcome as "good improvement" on average with improvement rate of $\geq 50\%$ and <75% without any serious side effects. Considering the fewer treatment sessions, the more increased level of skin brightness value by using objective colorimeter after laser monotherapy, the efficacy of PTP laser toning in our study is thought to be of a significant level. It can be presumed that further increasing the number of treatment sessions may show a better effect.

Interestingly, the overall global assessment of patients revealed more improvement than that of the investigators, and this can be assumed to be due to the low incidence of discomfort or side effects and the feeling that the skin is generally clearer after the treatment. In fact, a large number of subjects were pleased with the results and noted their facial hue became brighter through the treatments (data not shown). When assessing the MASI score at the final visit, the improvement of dark color was more prominent than the degree of regression of melasma area (data not shown). As the treatment progressed, eventually, the

Irradiation by the beams dividing one pulse to two within 100-130 μ s produces higher energy than with the generally used pulse

As a result, the instant peak energy at PTP mode can be transferred to skin up to 60% more than at the standard mode, which then is more successful to destroy the chromophore

제조사가 바라본 의료 기기 이야기 29

짧고 강한 두 개의 펄스 PTP

원텍 사명석 연구소장이 제조사의 입장에서 바라본 의료 기기 이야기를 소개한다. 피부과 성형외과에서 의료 기기를 구입할 때 알아두어야 할 사항, 자주 접했지만 자세히 알지 못했던 것들 레이저를 비롯한 의료 기기 제조와 유통에 관련된 내용이다.

백설공주처럼 하얗고 맑은 피부는 모든 여성의 꿈이다. 그래서 많은 여성들이 피부 미백에 관심이 많다. 그런데 하얀 피부의 적이 있다. 바로 기미와 같은 색소 병변이다. 기미의 원인으로는 자외선·임신·경구 피임약의 복용·유전인자·약제·영양부족·폐경 등 다양하다. 원인이 다양한 만큼 기미는 완치가 어렵고 치료 시 호전되는 양상을 보이다가도 다시 악화되는 등 치료하기 까다로운 난치성 색소 병변이다. 여러 치료 방법이 있지만 레이저 토닝(toning) 기법이 가장 좋은 효과를 보이고 있다. 원텍은 보진신기술(NET) 제68호 'Flash lamp형 여기방식의 차이를 이용한 double pulse(1064nm) 발생기술로 레이저 치료 효과를 극대화하고 부작용을 최소화하였다.

레이저 토닝을 이용한 피부 개선

최근에는 기미를 효과적으로 치료하는데 Nd:YAG Laser를 이용한 레이저 토닝이 널리 쓰이고 있다. 레이저 토닝은 1064nm 파장의 낮은 출력 에너지로 색소 병변 및 얼굴 전체에 고루 조사하는 방법으로, 피부

조직에 손상 없이 표피층과 진피층의 색소병변을 선택적으로 파괴하는 시술법이다. 피부 마취가 필요 없으며 치료 반응이 일정하게 나타나 신뢰할 만한 치료법으로 시술 직후 화상을 해도 될 정도로 일상생활에 지장을 주지 않는다.

레이저 토닝은 보통 1~2주 간격으로 10회 치료를 권장하며, 1~3회 정도까지는 호전되는 정도를 알 수 없는 경우가 대부분이지만 5~10회 정도 시술 받을 경우 40~80% 정도 눈에 띄는 효과를 얻을 수 있다. 그러나 레이저 토닝 역시 과다최소침착 등의 부작용을 간과할 수 없고 기미가 더 진행되거나 일시적인 개선을 보이다가 다시 진행되는 경우도 드물지 않게 발생할 수 있다.

PTP를 이용한 효과적인 레이저 토닝

원텍은 이러한 기존의 레이저 토닝 구현 방식에 대한 한계를 극복하기 위해서 피부에 자극 없이 에너지를 전달하는 'Flash lamp형 여기방식의 차이를 이용한 double pulse(1064nm) 발생기술', 간단히 줄여

PTP(Photoacoustic Technology Pulse) 기술을 도입했다. PTP 기술의 핵심은 아주 짧은 시간 내에 두 번의 강한 에너지를 조사함으로써 치료 효과를 높이는 것이다. 즉 수십 나노초(nanoseconds, ns) 사이의 짧은 순간에 고출력의 펄스 에너지를 피부에 조사하여 색소를 1차로 파괴한 뒤, 잔류하고 있는 열을 이용하여 똑같은 출력의 고출력 레이저 펄스를 아주 짧은 순간에 2차로 조사한다. 이때 생긴 순간 압력으로 색소 병변을 충격파 형태로 파괴해 완전히 제거해주는 것이다.

원텍은 PTP 기술을 파스텔(Pastelle) 기기에 적용하여 레이저 토닝 시 발생 가능한 다양한 부작용을 경감했다. 레이저를 두 번에 걸쳐 조사하기 때문에 기존에 한번 조사하는 것보다 치료 효과는 높아지고 기미 재발률은 낮아졌으며 강한 에너지를 짧은 순간에 조사하여 통증을 완화시켰다. 또한 PTP 기술을 활용하면 기미 치료뿐만 아니라 진피 및 표피성 색소에도 뛰어난 효과를 발휘한다.

PTP 기술을 적용한 파스텔은 피부의 기미·주근깨·문신·검버섯 등의 색소 병변을 치료하는 레이저 수술기로 식품의약품안전처의 제조품목허가 MFDS와 유럽 의료기기 인증 CE 뿐만 아니라 까다롭기로 유명한 해진 중국 CFDA 허가를 획득하여 국내뿐만 아니라 해외 여러 나라에 수출하고 있다. 또한 미국 FDA 허가 그 제품과 안전성을 국제적으로 인정받아 글로벌 기업으로 성장할 수 있는 발판을 마련했다.

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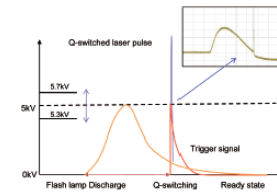


그림 1. Q-switching 이이디터와 실에 펄스의 측정 결과

특히, 국내 특허 출원/등록 및 PCT 출원을 통한 기술 보호로 국내뿐만 아니라 해외 시장 진출의 장벽을 허물었으며, PTP 기술에 의한 임상적 결과를 안정받아 보건복지부로부터 신기술(NET) 인증을 받았고, 디자인과 관련해서는 한국디자인진흥원의 Good Design(GD) 마크를 획득하여 기기의 우수성을 인정 받았다.

원텍은 레이저와 조음파 관련 의료기기를 자체적으로 연구·개발·생산, 그리고 A/S에 이르기까지 모든 과정을 책임지고 있으며 차별화된 독창적 기술로 명품을 추구하는 기업이다. 체계적 시스템과 확실한 제품, 고객을 우선으로 생각하는 연구개발로 20여 종의 제품을 개발 생산하고 있다.

W pastelle PRO

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