

A Comparative Analysis of Electric and Radiofrequency Microneedling Devices on the Market

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INTRODUCTION

Microneedling was first described in 1995 by Orentreich and Orentreich for the treatment of atrophic scars and wrinkles.¹ The local injury induced by dermal penetration of microneedling causes release of growth factors such as transforming growth factor (TGF)- α , TGF- β , and platelet-derived growth factor (PDGF). This stimulates collagen and elastin fiber production as well as capillary formation, ultimately leading to tissue remodeling.² Since its initial description in the literature, microneedling has been expanded to effectively treat a variety of cosmetic and dermatological conditions, including rhytides, scars, dyspigmentation, and hair pathology.² It should be noted that several of these studies were split face in nature. However, none directly compared microneedling devices to each other. A benefit of microneedling is that an intact epidermis is maintained, leading to minimal side effects, most commonly erythema and pinpoint bleeding. Tram-track scarring³ and granuloma formation when used in conjunction with topical applications⁴ have been observed rarely. Since its inception, microneedling technology has evolved from manual roller devices to automated devices, some of which have radiofrequency technology. Here, we aim to provide a brief review of the cost and technology, particularly of the newer microneedling electric and RF pen devices. No comparisons of efficacy are possible with current published research.

DISCUSSION

There are currently multiple microneedling devices being utilized in clinical practice. Three broad categories include the traditional manual rollers (eg, Dermaroller[®], Cynergy[®]), automated pens, and automated pens with combined RF technology. The Dermaroller is a hand-held device with 192 needles of fixed length, varying in depth from 0.5-3 mm with a diameter of 0.1-0.25 mm, loaded on a cylindrical roller. The ultimate penetration depth achieved with a Dermaroller is variable and dependent on pressure application by the user. In contrast, automated pens utilize a disposable tip with varying numbers of needles hidden inside a guide, which can be set to cycle at different frequencies. The guide allows for safer application and disposable needles allow for pen reusability. An advantage of automated pens is that needle lengths are adjustable and the depth of penetration is not user-dependent. The relatively small tip size allows for treatment of anatomically challenging areas,

such as the nose and skin adjacent to the lips and eyes.² The addition of radiofrequency technology to automated pens has the advantage of utilizing insulated needles to deliver thermal energy localized to a targeted depth. These devices are believed to be safer in darker skin types as there is minimal to no damage to the epidermis.²

Commercially available automated microneedling device brands include Réjuvapen[™] (Refine USA, LLC), InnoPen[™] (Clinical Resolution Laboratory, Inc.), Collagen P.I.N.[™] (Induction Therapies[™]), and Eclipse MicroPen[®] (Salient Medical Solutions). Considerations when choosing a brand include cost of the pen and needle replacements, number of needles per device tip, and range of depths and speeds available (Table 1). The Réjuvapen, retailing at \$2,495, is a corded device containing a tip with 3, 5, or 9 needles, varying in depth from 0.2-2.5 mm and functioning at four different speeds of up to 11,000 RPM. The InnoPen is also a corded device, similarly priced at \$2,499, and contains a 13-needled tip with depth variation between 0-2 mm and five speed settings. The Collagen P.I.N., priced at \$2,995, can function as a cordless device with a single speed setting or while corded with seven speeds up to 23,750 RPM, and is available with either 12 or 36 needles in depths varying between 0-3 mm. The Eclipse MicroPen, retailing at \$3,500, is a cordless device that utilizes 12 needles functioning at a set speed of 6,900 RPM with fixed depth of 2 mm. It is worthwhile noting that while needle penetration up to 1mm is accurate, actual achieved depths past this threshold can be more variable.⁵

Radiofrequency microneedling devices are more costly than traditional electric microneedling pens. Currently available devices include the Infini[™] (Lutronic), which has 49 bipolar needles functioning at depths of 1-3.5 mm and three separate intensities. The Infini retails for \$60,000, a cost that includes 10 needles, with a price of \$95 per needle tip replacement. The Profound[®] (Syneron Medical Ltd.) is the most expensive device at \$114,900 and is the only one to combine fractionated radiofrequency with traditional microneedling. It includes two separate sets of bipolar needles for both dermal and sub-cutaneous penetration. To target the dermis, the device uses 5 pairs of needles at a depth range of 1-2 mm, with a cost \$2,100 for a set of 6. For sub-cutaneous penetration, the device utilizes a set

TABLE 1.

Specifications of Traditional Electric and RF Pen Microneedling Devices

Brand	Price	Warranty	Needle Cost	Needle Number	Range of Depths	Speeds/ Frequency	Other	Anti-suctin	Return Policy
Traditional Electric MN Pens									
Réjuvapen™	\$2,495	1 year with no need to fill out any forms	\$250 for a box of 10 needles	Available with 3, 5, or 9 needles	0.2-2.5 mm	Four total speeds (11,000 RPM max)	Representative will demonstrate the device	No information available	Sales are final
InnoPen™	\$2,499	Lifetime (must pay for shipping and handling), must fill out warranty form	\$480 for a box of 24 open tips (faster) or closed tips (decreased risk of PIH, safer)	13 needles	0-2 mm by 0.1 mm increments	Five speeds with half-notch intervals in between	Made in USA with ease of supply delivery	Yes	30-day return policy
Collagen P.I.N.™	\$2,995	Lifetime with no need to fill out any forms	\$672 for a box of 24 needles for the 12 pin tip; \$768 for a box of 24 needles for the 36 pin tip	Available with 12 or 36 needles	0-3 mm, by 0.25 mm increments	Single speed with battery; Seven speeds corded (10,250 – 23,750 RPM)	Available as cordless or corded. Training available and representative can demonstrate.	Yes	Can return product in original packaging with 10 day notification within 21 days of purchase
Eclipse MicroPen®	\$3,500 (includes 24 tips)	Lifetime with purchase of two boxes of tips per quarter, otherwise 1 year; must fill out warranty form	\$876.60 for 24 treatment kits or \$487 for 12 kits (one treatment kit includes needle cartridges, numbing product, Hyaluronic Acid serum, and needle protective sheath)	12 needles	2.0 mm	One speed (6900 RPM); available as cordless only (two batteries provided)	Representative will demonstrate	Yes	Can return product though restocking fee of 15-20% may apply and requires approval

TABLE 1. (CONTINUED)

Specifications of Traditional Electric and RF Pen Microneedling Devices

Brand	Price	Warranty	Needle Cost	Needle Number	Range of Depths	Speeds/Frequency	Other	Anti-suctin	Return Policy
Radiofrequency MN Devices									
Infini™	\$60,000	One year warranty included with purchase with option of purchasing extended warranty	\$95 per tip (10 tips included with initial purchase)	49 bipolar needles in a 7x7 array	1-3.5 mm	3 different intensities (low, medium, high)	A day of training for providers is included in the device price	No information available	Sales are final
Vivace™	\$95,500	One year warranty included with purchase; additional years can be purchased at \$5,000 per year	\$75 per needle (ten micro-needling kits included with purchase)	36 needles available as insulated and non-insulated	0.5-3.5 mm	Variable pulse durations (100 ms-800 ms)	In-service training included with device purchase Blue and red LED lights included with purchase	No information available	Sales are final
Profound®	\$114,900	Three year warranty included with purchase	\$2,100 for pack of 6 dermal single cartridges \$2,700 for pack of 6 sub-cutaneous cartridges	5 pairs of bipolar needles for dermal depth; 7 pairs for sub-cutaneous depth	1-2 mm for dermal needles 2.9-5.8 mm for sub-cutaneous needles	460 KHz +/- 5 KHz	Device specialist available Evidence of elastin production with device use Only device on market to currently combine fractionated RF with micro-needling	No information available	Sales are final

TABLE 1. (CONTINUED)**Specifications of Traditional Electric and RF Pen Microneedling Devices**

Brand	Price	Warranty	Needle Cost	Needle Number	Range of Depths	Speeds/Frequency	Other	Anti-suctin	Return Policy
Radiofrequency MN Devices									
Fractora™	No information available	No information available	No information available	24 or 60 needles if tips are uncoated; 24 needles if tips are coated	0.6-3 mm	1MHz	No information available	No information available	No information available
INTRAcet™	\$75,000	1 year or multi-year depending on contract	Needle cost is dependent on the contract	49 insulated needles	0-4 mm	1MHz	Both bipolar and monopolar modes available; unique active impedance monitoring system to optimize energy delivered	No information available	Return possible if device does not meet specifications

*All device pricing is up to date at time of writing of this article in December 2017.

of 7 needles at a target depth range of 2.9-5.8 mm, with needle replacement cost at \$2,700 for a set of 6. The device delivers energy at a frequency of 460 KHz +/- 5 KHz. The INTRAcet™ device (Perigree™), retailing for \$75,000, utilizes 49 insulated needles that can function as either a unipolar or bipolar device. Cost of needle replacement is variable based on the contract. The INTRAcet functions at a frequency of 1 MHz and utilizes a unique impedance monitoring system to optimize energy delivery. The Vivace™ (Aesthetics Biomedical, Inc.), retailing for \$95,500, a cost that includes 10 needle kits, utilizes a 36 needle at a depth range of 0.5-3.5 mm. The needles can be purchased as insulated or non-insulated and replacement cost is \$75 per needle. Other devices, such as the Fractora™ (InMode Aesthetic Solutions), are also currently available on the market, though limited information is available with regards to device specification and cost without scheduling an in-person representative visit. Information regarding warranty, return policy, and demonstration are also important when making a decision on which device to purchase (Table 1).

CONCLUSION

Evidence for the effectiveness of microneedling in treating various dermatologic conditions is rapidly expanding and its use is increasing. Technological advances in the form of automated

and combined RF pens have allowed for devices that are safer and more effective.

DISCLOSURES

None of the authors have any financial disclosures.

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