International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Lifting without Knife: Comparative Study of HIFU and MNRF For Anti-Ageing

Dr. Manali Padhye

I2CAN Institute

Abstract: ***With the growing demand for non-surgical aesthetic procedures, energy-based devices such as High-Intensity Focused Ultrasound (HIFU) and Micro-needling Radio Frequency (MNRF) have gained prominence for facial rejuvenation and skin tightening. These technologies offer minimally invasive solutions to improve skin laxity, texture, and overall dermal quality, without the downtime associated with surgical interventions.***

Keywords: Anti-ageing, Non-invasive treatment, MNRF, HIFU

1. Introduction

The growing emphasis on youthful skin and minimally invasive cosmetic procedures has led to the widespread adoption of energy-based technologies in dermatological practice. Among them, High-Intensity Focused Ultrasound (HIFU) and Micro-needling Radio-Frequency (MNRF) have emerged as two of the most sought-after modalities for non-surgical facial rejuvenation. These treatments provide alternatives to traditional surgical facelifts by promoting collagen remodelling, improving skin texture, reducing wrinkles, and enhancing skin tightness—all with minimal downtime.

MNRF, or Micro-needling Radio-Frequency,
is a skin rejuvenation treatment that combines the benefits of micro-needling and radio-frequency energy. It's used to address various skin concerns like wrinkles, scars, and uneven texture by stimulating collagen and elastin production, leading to firmer and smoother skin.

a) **Micro-needling:** Tiny needles create micro-injuries in the skin, triggering the body's natural healing response and promoting collagen production.
b) **Radio-Frequency (RF):** RF energy is delivered to the deeper layers of the skin, further enhancing collagen production and tightening the skin.
c) **Combined Benefits:** The combination of micro-needling and RF provides a more comprehensive and effective skin rejuvenation treatment.
d) **Treats Various Skin Concerns:** MNRF can help improve the appearance of wrinkles, fine lines, acne scars, and uneven skin tone.
e) **Minimally Invasive and Effective:** MNRF is considered a minimally invasive procedure with good results and minimal downtime.

HIFU (High-Intensity Focused Ultrasound) therapy
is a non-invasive medical treatment that uses focused ultrasound waves to target specific areas of the body for various purposes, including anti-ageing, tumour treatment, and more. It works by delivering heat to the targeted tissue, which can cause thermal ablation, stimulate collagen production, or increase blood flow, depending on the desired outcome.

How it works:
a) **Focused Ultrasound:** HIFU uses ultrasound waves that are focused to a specific point within the body, allowing for precise targeting without affecting surrounding tissues.
b) **Heat Generation:** The focused ultrasound energy generates heat, which can be used to kill cancer cells, destroy tumours, or stimulate tissue regeneration.
c) **Collagen Stimulation:** In aesthetic applications, HIFU can stimulate collagen production, leading to skin tightening and reduced wrinkles.

2. Applications

a) **Anti-ageing:** HIFU is commonly used for facial rejuvenation, skin tightening, and reducing wrinkles.
b) **Tumour Treatment:** HIFU can be used to destroy tumours in various organs, including the prostate, liver, and uterus, often as an alternative to surgery.
c) **Other Uses:** HIFU has also been explored for treating uterine fibroids, essential tremors, and metastatic bone pain, among other conditions.

3. Benefits

- **Non-invasive:** HIFU is a non-invasive procedure, meaning it doesn't require incisions or surgery.
- **Safe and Effective:** When performed by qualified professionals, HIFU is generally considered safe and effective.
- **Minimal Downtime:** HIFU treatments often have minimal downtime, allowing patients to return to their regular activities soon after the procedure.
- **Targeted Treatment:** HIFU allows for precise targeting of specific areas, minimising damage to surrounding healthy tissue.

4. Considerations

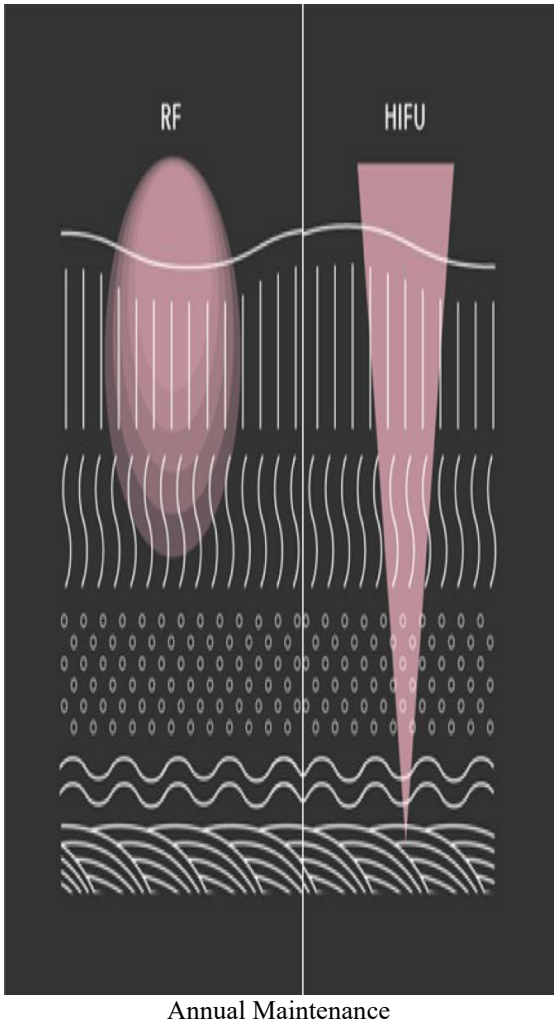
Side Effects:
While generally safe, HIFU can cause temporary side effects like redness, swelling, or numbness, which usually subside quickly.

Consultation:
It's essential to consult with a qualified healthcare professional to determine if HIFU is appropriate for your specific needs and to discuss potential risks and benefits.

Both RF Micro-needling (RFM) and High-Intensity Focused Ultrasound (HIFU) are non-invasive skin tightening treatments, but they differ in their technology, depth of penetration, and target areas. RFM uses radio-frequency energy delivered through tiny needles to stimulate collagen production in the upper dermis, while HIFU uses focused ultrasound waves to heat the deeper SMAS layer for more significant skin tightening and lifting.

- **Technology**: Uses tiny needles to deliver radio-frequency energy into the skin.
- **Depth**: Primarily targets the upper dermis.
- **Target Areas:** Effective for addressing various skin concerns like acne scars, rosacea, and fine lines.
- **Benefits**: Improves skin texture, reduces scars, and stimulates collagen production.
- **Downtime**: Minimal, with some redness and sensitivity possible, according to The Secret Garden Skin Clinic.

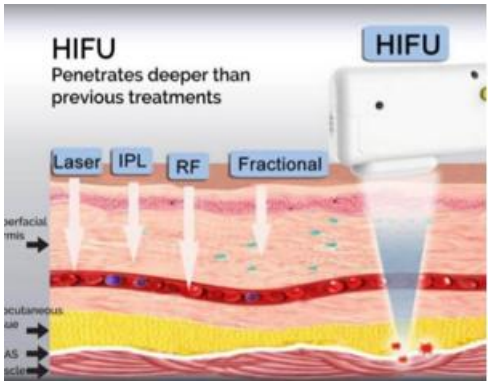
Results
Visible improvements typically seen within 3 sessions, lasting up to two years with



Annual Maintenance

HIFU:

- **Technology**: Uses high-intensity focused ultrasound waves.
- **Depth**: Targets the deeper reticular dermis and the superficial aponeurotic system layer (SMAS).
- **Target Areas**: Ideal for non-surgical facelifts, tightening sagging skin, and reducing jowls.
- **Benefits**: Provides a lifting effect, improves skin laxity, and stimulates collagen production.
- **Downtime**: Minimal, with some redness and mild discomfort possible.



Results
Results are seen immediately and become more pronounced after a few weeks, lasting up to a year.

Aspect	MNRF (Micro-needling Radio-frequency)	HIFU (High-Intensity Focused Ultrasound)
Mechanism	Combination of mechanical micro-needling and delivery of radio-frequency energy into the dermis. Creates controlled micro-injuries and heats tissues.	Uses focused ultrasound energy to generate heat at specific depths, causing tissue coagulation and stimulating col- lagen production without damaging the skin surface.
Primary Target	Dermis (especially superficial and mid-dermis); can be adjusted for deeper or shallower penetration.	Deep dermis, SMAS (Superficial Musculo-aponeurotic System), and sometimes subcutaneous tissues.
Depth of Penetration	Typically 0.5 mm to 4.0 mm (adjustable with needle length).	1.5 mm, 3.0 mm, 4.5 mm (depending on transducer used); deeper levels than MNRF.
Indications	• Fine lines and wrinkles • Acne scars • Skin laxity • Enlarged pores • Stretch marks • Hyperhidrosis (off-label)	• Skin tightening (especially jaw- line, neck, brows) • Lifting sagging skin • Mild to moderate skin laxity • Wrinkle re-duction
Effect on Skin Surface	Minor- slight redness and pinprick bleeding immediately post-procedure.	None- surface remains intact; redness may occur post-treatment but no visible injury.
Pain Level	Mild to moderate discomfort; numbing cream typically used.	Moderate to significant discomfort during treatment; often requires topical anesthetic or oral analgesics.

Aspect	MNRF (Micro-needling Radio-frequency)	HIFU (High-Intensity Focused Ultrasound)
Downtime	1–3 days (redness, swelling, possible pinpoint scabbing).	Minimal to none; mild swelling or redness for a few hours to a day.
Treatment Sessions	Usually 3–4 sessions spaced 4–6 weeks apart.	Often 1–2 sessions per year; effects gradually improve over 2–3 months.
Onset of Results	Gradual — noticeable improvement after 4–6 weeks, continues to improve for up to 6 months.	Gradual — lifting and tightening start over 2–3 months, peak at 6 months.
Longevity of Results	About 12–18 months; maintenance sessions may be needed.	12–24 months depending on skin condition and ageing process.
Best for	Improving skin texture, scars, pores, mild laxity.	Lifting and tightening deeper layers; defining jawline, cheeks, and brow area.
Suitability for Skin Types	Suitable for all skin types, including darker skin (lower risk of pigmentation changes).	Generally safe across skin types, but caution in darker skin due to rare risk of post-inflammatory hyperpigmentation (PIH).
Complications / Side Effects	• Erythema • Edema • PIH (rare) • Infection (rare)	• Temporary numbness • Swelling • Redness • Rare risk of burns or fat atrophy if improperly done
Cost	Moderate to high (multiple sessions needed).	High (fewer sessions needed but device is expensive).

5. Conclusion

MNRF and **HIFU** are both highly effective, but they serve different needs in skin aesthetics.

MNRF is ideal for improving **skin texture, scars, pores**, and **fine lines**, offering surface-level rejuvenation with controlled downtime.

HIFU targets **deep tissues** for **lifting and tightening**, making it the choice for **sagging skin and contour enhancement** with minimal surface disruption. **Choosing the right treatment** depends on the patient's primary concern, tolerance for downtime, and depth of skin ageing.

Combination therapy (HIFU + MNRF) provides a **comprehensive anti-ageing solution**, addressing both deep structural support and surface refinement for superior, long-lasting results.

"For optimal skin rejuvenation, tailor the treatment to the depth of the problem — surface concerns Favour MNRF, deep laxity demands HIFU

Takeaway message:
"MNRF refines the surface, HIFU lifts from within — together, they transform skin at every level."

References

[1] Singh A, Yadav S. Micro-needling: Advances and Widening Horizons. Indian Dermatol Online J. 2016 Jul-Aug;7(4):244-54. [PMC free article] [PubMed]
[2] Ryu H.W, Kim S.A, Jung H.R, Ryoo Y.W, Lee K.S, Cho J.W. Clinical improvement of striae distensae in Korean patients using a combination of fractionated microneedle radio-frequency and fractional carbon dioxide laser. Dermatol Surg. 2013
[3] Ayatola A, Golán J, Saber M, et al. Systematic review and meta-analysis of safety and efficacy of high-intensity focused ultrasound (HIFU) for face and neck rejuvenation. Lasers Med Sci. 2020;35(5):1007–1024. Doi: 10.1007/s10103-020-02957-9.
[4] Day D. Micro focused ultrasound for facial rejuvenation: current perspectives. Res Rep Focused Ultrasound. 2014; 2:13–17. Doi: 10.2147/RRFU.S49900.

Author Profile

Dr. Manali Padhye is a practising Dermo-Homeopath for 3 decades. She has done BHMS in 1993 from Marathwada University and MD from Mumbai University in 2007. She has done her Certificate Course in Modern Pharmacology from B.J. Medical College, Pune in 2019. She is a practising Aesthetic Physician from 2004, done her PGD in Cosmetology from Tulip International Academy. She is working as a Senior Faculty in I2CAN Institute, Mumbai branch.