MESOTHERAPY: AN OVERVIEW

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ABSTRACT

Mesotherapy involves various intradermal or subcutaneous injections of a cumulation of compounds in diminutive doses utilizing fine gauge needles to treat local and cosmetic conditions. The intended mechanism of action of mesotherapy is that solutions that are injected intracutaneously remain in the area longer than they would if distributed via deeper injection; as they are cleared more gradually by the general circulation. This study includes all the material and techniques used during the therapy. Mesotherapy is used for several cosmetic conditions such as aging skin and body contouring. It is also used in management of hair loss. Study also includes the lipolytic potential of solution used in the practice of cosmetic mesotherapy to stimulate lipolysis causing local fat reduction. This technique is useful when other therapies for above mentioned condition are ineffective. Mesotherapy require less time for treatment hence it is preferred over therapies. It is primarily used for the cosmetical purpose but it has found its way in the pharmacological field as well.

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INTRODUCTION
Mesotherapy is a medical technique developed in 1952 by the noted French medico, Dr. Michael Pistor for the management of pain and vascular disorders.[1,] He was privileged with the highest award to persons considered as national heroes with consequential achievement in France[2].

It all commenced when Pistor injected procaine intravenously to treat an asthmatic, and found that though the pristine condition did not ameliorate, the patient's impaired auricularly discerning did. With an intent to reinforce the effect, Pistor injected minuscule doses of procaine 3 to 5 mm deep around the target area i.e. the auditory perceiver itself. However, it was famous that other associated conditions like eczema of the auditory canal and tinnitus were to subsidiary[3]

Mesotherapy does not denote a treatment of any condition in particular; it simply describes a method of drug delivery.[4] The utilization of mesotherapy solutions to induce local lipolysis is primarily predicated on empirical observations and long-term clinical use, including the incorporation of local anaesthetics like lidocaine or procaine in these mesotherapy solutions. This study evaluates the lipolytic potential of several compounds commonly used discretely and together in cosmetic mesotherapy solutions utilizing a human fat cell assay with the generation of glycerol as the measure of lipolysis.[5]

DEFINITION OF MESOTHERAPY:
MESOTHERAPY’ which involves multiple intradermal or subcutaneous injections of a coalescence of compounds (plant extracts, homeopathic agents) in minute doses, utilizing very fine gauge needles, to treat medical (mainly local) and cosmetic conditions. The term 'meso' withal betokens 'middle' and 'mean', hence variably expounded with reference to the injection route and the meandose of the medication used (dose in between allopathy and homeopathy).[6]

MECHANISM OF ACTION:
The skin acts as a natural time-release system when drugs are injected by mesotherapy. The mechanism of action of mesotherapy is that the solutions that are injected intracutaneously remain in the area for long time than they would if distributed via deeper injection. In addition, it is found that these apparently injected solutions continue to penetrate into the deeper tissues. The more facile the injections, the longer the time solution remained in the area. [7]

ACTIVE SUBSTANCES:
Lots of compounds have been used in treatment of mesotherapy. These preparations contain vitamins, trace elements,enzymes,anti oxidant,amino acid and other active substances affecting the quality of skin.Absorbed by skin, These substances stimulate the collagen and elasatin production, reconstructing the internal structure of skin ,smoothing wrinkles, restoring the skin tone and elasticity, returning the healthy glowing appearance. The first effect of mesotherapy is rejuvenated, fresher face and the second – mesolifting, increase skin firmness and even kind of stretch. Example of these preparations are [8]

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Description</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monomethyltrisilanol salicylate</td>
<td>conjonctyl in F, silicortoskani</td>
<td>Organic silicon is found here in a polymeric of silicic acid. Silicon is most important natural semi-conductor in the body’s tissues, it act as a nanospacer and catalyst in variety of reactions.</td>
<td>Stimulation of collagen synthesis, tightening and regeneration of skin, etc.</td>
</tr>
<tr>
<td>Sodium pyruvate</td>
<td>Cocktail anti-aging Toskani</td>
<td>This α-keto derivative of lactic acid encourages amino acid and dermal collagen synthesis. It is an antioxidant and stimulates cell metabolism.</td>
<td>Particularly for sun damaged skin, smoker’s skin, etc.</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Ascorbic acid 200mg/ml</td>
<td>Stimulate collagen synthesis, promotes wound healing and skin regeneration, protects from light.</td>
<td>Mesoglow, melisma, prevention of sun aging, etc</td>
</tr>
<tr>
<td>Vitamin B</td>
<td>Panthothenic acid, dexpanthenol</td>
<td>Involved in the acetylation of proteins and peptides promotes glutathione synthesis is essential for the hair roots and skin protects from oxidatives stress and UV- radiation has antiviral and anti-inflammatory effects.</td>
<td>Stretch marks.</td>
</tr>
<tr>
<td>Taurine</td>
<td>Tauricol Toskari</td>
<td>2-aminoethane sulfone acid is semi-essential amino acid containing sulfur. It has antioxidant, anti-inflammatory and vasoprotective effect.</td>
<td>Anti aging and energy carrier, etc.</td>
</tr>
<tr>
<td>Polidocanol</td>
<td>-</td>
<td>Its sclerosing effect is used for connective tissue firming, potent skin tightening, treatment of fresh stretch marks.</td>
<td>Microsclerotherapy with DHE(dihydroergotamine), treatment of spider burst veins, couperose, small hemangiomas, etc.</td>
</tr>
</tbody>
</table>
Fig 1. Different types of syringes for drug delivery.

Table no 2: MESOTHERAPY NEEDLES AND THEIR USES-[8].

<table>
<thead>
<tr>
<th>Needles</th>
<th>Uses</th>
<th>Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microlance BD</td>
<td>Cellulite, lipolysis, hair loss</td>
<td>Point by point technique, linear tunnel technique, manual epidermal technique, one by one injection technique infiltration.</td>
</tr>
<tr>
<td>0.3×13mm</td>
<td></td>
<td>Nappage and epidermal technique.</td>
</tr>
<tr>
<td>Mesoram 0.3×4mm</td>
<td>Mesolift, hair loss, cellulite mesobotox.</td>
<td></td>
</tr>
<tr>
<td>Mesojet 0.29×4mm</td>
<td>For cellulite with venous and or connective tissue weakness in patients with increase susceptibility to hematomas or bleeding.</td>
<td>-</td>
</tr>
<tr>
<td>Mesorelle 0.26×4mm</td>
<td>Hand feet.</td>
<td>The point by point and epidermal technique.</td>
</tr>
<tr>
<td>Sterican or Terumo no-20</td>
<td>Lipolysis for bigger fat pads and larger syringe volumes for subcutaneous</td>
<td>-</td>
</tr>
<tr>
<td>0.3×20mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig 2. Different types of needles for drug delivery.

INJECTORS: [8]

Mesotherapy injector also called as mesogun or mesopistol, in an indispensable tool for a practice specializing be esthetics. It enables injections to be delivered in a standardized and reproducible way and it prevents unwanted effects caused by a manual injections technique which may be rather short of perfect. The main advantage to the patient is that the injections are less painful. The reason for this is their skin tension maintained by the skin stabilizer. This is more important in fine areas, Moreover it is essential to avoid scratches on the face in particular. The general is that the luxury of an injector gun should always be offered to private payers. The cocktails used in esthetics are expensive and wastage of material should be kept as low as possible. Injectors are also superior to the manual technique in this respect. The only useable material required for each treatment is single sterile disposable skin stabilizer. Several compressor devices are available for large scale use these are capable of injecting even undiluted, non-cross-linked HA, especially in lipolysis.
Injection techniques in mesotherapy differ from other techniques. The injections are given either manually or with injector guns. The angle of entry of needle determines the penetration depth.[9]

**INTRA-DERMAL – Nappage**

This way of doing mixed in trouble more not deep (2 mm deep) injections with a 4mm needle, covering an astronomically very great area. Injections are given at a 45 degree angle from the skin while putting touse light, unchanging positive pressure on the plunger, the expert rapidly flicks the join of hand and arm. At each building land, a drop of answer is introduced as given view in (fig 5). This is a more in an unhappy conditions way to the persons getting care.[10]
Point by point
Described by Dr. Pistor, involves injection of 0.02 ml to 0.05 ml of drug solution perpendicular to the skin (4 mm deep), given 1 cm to 2 cm apart. [10]

![Image](image.png)

**Fig 6. Diagram of point by point introduction of active substances.**

**Epidermic:**
Then most not deep (1 mm deep) of all the expert ways of art and so on. In this the basal level of skin is not got into. The needle size of 27 to 31 measures of value is used with the round edge adjustment to events away from the skin and moved in company with light, positive pressure applied to the plunger. This is done in a network good example at 1 cm intervals over the complete acted-on area. Number times another injections of small amount of medical substance given of medical substances, in detailed places, in a single being seated are highly put as important to the therapist. To overcome this trouble, many experts in Europe and South America use an apparatus called 'mesogun'. The better chances of mesogun join quicker injections, right in details amount of medical substance given way of using voice, in harmony distance down of getting-into and more comfort for the physician and person getting care. Some experts use a special way of doing. [12]

![Image](image.png)

**Fig 7. Epidermal active substances delivery.**

**PROCEDURE:**[13]
The way of mesotherapy may join first the person getting care put value, history and observation. Then work out areas for treatment. Set the goals and have a discussion process map and amount of sessions and intervals with patients. Fill the give details to give agreement form from patients. Give teachings to persons getting care such as come with a clean skin, free of make-up and creams or liquid for rubbing on skin, keep from blood thinning medical substance where possible for 48 hours before to process. Map the area to be gave attention to in each session. Clean area with anti-septic answer Chlorhexidine send in name for the process while the person getting care is placed on down. Position the person getting care to present the best angle for use, which must always be at right angles to the skin. Introduce the narcotic smoothly with a regular space (times) between each amount of medical substance given.

**PRE-TREATMENT INSTRUCTION:** [14]
- Person getting care must have great number before to treatment, using an antibacterial soap.
- Keep from any usage of vitamin E and ginkobiloba 1 week before the therapy.
- Keep from prophylactic usage of aspirin 1 week before to treatment.
- Person must getting supervision to sign a detailed give agreement treatment.
POST-TREATMENT INSTRUCTION:[14]

- If person getting care experience discomfort, use only non-inflammatory by mouth analgesics.
- Do not apply any ice or anti-inflammatory agent person acting for to gave attention to area.
- Person getting care is to hope for some burning and/or discomfort for 20mins after treatment.
- Person getting care should hope for some bruising to the gave attention to area.

APPLICATIONS:

Mesotherapy is now widely practised for many cosmetic as well as pharmaceutical applications. These applications include-

Applications in dermatology:

Fat deposition and Cellulite [15]

Mesotherapy is an exciting term in the cosmeceutical world for “melting fat” and cellulite treatment. It is also a form of “injection lipolysis”. Cellulite is a stage where collections of fat push against the connective tissue causing cosmetically unacceptable lumpy, dimpled appearance of skin resembling cottage cheese. Fat removal and cellulite treatment is done in stages. Stages are as follows:

Reducing lipoedema
- Use benzopirone plus procaine

Restoring efficient microcirculation
- Use derivatives of the flavonoids, which offer a mostly beneficial vasculo-protective effect
- Pentoxifylline
- Vitamin C is important for neutralizing the effects of free radicals generated in the newly oxygenated tissue
- Procaine

Lipolysis
- Use Theophylline + Caffeine + L-Carnitine + Yohimbine+ Procaine

Restructuring and protecting the connective tissue
- Silicium (Conjonctyl) stimulates the regeneration of connective tissue.
- For cellulite treatment and localized fat reduction, practitioners use compounds that efficiently abstract fat from cells and move this fat into the general circulation, to be burned during metabolism or excreted.
- Phosphatidlycholine, or lecithin is widely used.
- Caffeine, L-carnitine and the asthma drug aminophylline are another compounds utilized for fat reduction.
- Natural compounds such as artichoke stimulate lymphatic flow to remove fat.
- Glycolic acid exfoliates the skin (peels). Vitamin A regulates cell turnover of skin and keratinization.
- Vitamin C increases the combination of collagen and it decreases hyperpigmentation as it obstruct melanin engenderment.
- Vitamin E, an antioxidant, help in anti-aging of the skin.
- Vitamin K affects coagulating mechanisms and thus manage the microcirculation of the skin.

Fig 8- Diagram of structure of targeting adipose tissue.
Mesotherapy in treatment of alopecia:[16]

In this application, a new milestone is achieved. After injecting a range of ingredients into the scalp (e.g., minoxidil, finasteride, vitamins) for many years with no results, we now have a protocol effective for treating male pattern baldness (MPB). In one study, dutasteride, the only 5α-convertase inhibitor specific to both receptor 1 and receptor 2 (prostate), has been clinically proven to regrow hair, with significant results in MPB. Dutasteride may block up to 90% of the activity of this enzyme, whereas finasteride, specific only to receptor type 2 (prostate), at best can block 70%. By injecting dutasteride directly into the scalp at a depth of 2 to 3 mm, we were able to reverse MPB and avoid any side effects because most of the medicine stays local and the injected dosage is lower than the oral dosage. Initial treatment is given anywhere from once a week to once every 4 weeks. Dutasteride has a very long half-life (5 weeks). Other substances which are used for the treatment of alopecia include finasteride, biotin, zinc, etc.

Fig 9- Diagram of mesotherapy in treatment of alopecia.

Mesotherapy in treatment of skin rejuvenation:

Mesotherapy, when utilized for skin rejuvenation, permeate the dermis with strong vitamins and anti-oxidants to rejuvenate and revitalize the skin. The results are skin that is firm, radiant, and glowing. Mundane removal a series of 2-4 treatments are done a week apart. Results are continued by twice a year touch-up period. When the right cocktail is used and injected into the dermis it is an efficacious skin strenghtener. The vitamins activate collagen and hyaluronic acid stimulates incipient cell magnification. Simply by transfixing the skins surface blood magnification factors are relinquished which stimulate incipient cell formation. The fat beneath the skin melts and shrinks the fat cells in the Scarpa’s fascia layer. The fat disperse and is excreted by the kidneys. A series of treatments is given, spaced one week apart. Results are considered sempiternal as long as the patient adheres to a felicitous pabulum and exercise regimen. Infrequent touch-ups may be required [17]

The patients who improve unevenness,lumps after undertaking liposuction find that these areas can be prosperously treated with Mesotherapy. The scar tissue that composes under the skin after liposuction is directly targeted and dissolved. Doctors are even combining Mesotherapy with Endermologie to maximise the results. Most of the conditions treated such as cellulite and wrinkles have multifactorial causes and due to this it is necessary to use multiple ingredients to treat the condition successfully. For mesolifts using mesotherapy, number of drugs are available for injection under facial skin to amend skin tone and decrease the appearance of wrinkles .

- Estrogen derivatives such as 17 B-estradiol stimulate incipient collagen formation.
- Glycosaminoglycans are a natural compound that composes linkages between collagen fibers.
- Naturally occurring alpha hydroxy acids such as glycolic acid are additionally utilized for mesolifts.
- The drugs found to be very effective in the elimination of skin rejuvenation include phosphatidylcholine (PC), L-carnitine, aminophylline, hyalurunidase, collagenase. [19]
Application in health care:

Pain management:

Severe pains can be reduced by intra-articular injection with mesotherapy. Several reports are prepared where mesotherapy is used for pain management. Active substances used are hyaluronic acid, lidocaine, piroxicam, thiocolchicoside, etc.

ADVANTAGES OF MESOTHERAPY: [20]

- It is a safe technique. The solution is placed straight into the target area thus reducing effects, allergies.
- It is also used as another technique for the treatment of cellulite, localized fat deposits, and alopecia.
- Mesotherapy is painless treatment, and requires no post-operative recovery time, it also not requires heavy bandages, and no anesthesia.

SIDE EFFECTS: [21,22,23]

- The mesotherapy is not proven to decrease the size or number of fat cells.
- Weight loss as a result of mesotherapy will not be permanent.
- As an alternative therapy, many providers use injections not approved by the FDA.
- Bacterial infection may result from mesotherapy injections.
- The pigmentation problems include post-inflammatory hyperpigmentation which may retain for many months.
- The common side effects include sickness, vomiting, diarrhea, mild pain etc.
- The other side effects are hypersensitivity reactions like immediate or delayed, pruritic, maculopapular rash distant from the treated area have also been reported.

The adverse effects due to faulty techniques which include localized infections, scars and subcutaneous nodules.

CONCLUSION

Mesotherapy is a new, effective and safer technique for treatment of conditions like alopecia, skin rejuvenation, hyperpigmentation and pain management. This technique is useful when other therapies for above mentioned condition are ineffective. Mesotherapy require less time for treatment hence it is preferred over therapies. It is primarily used for the cosmetical purpose but it has found its way in the pharmacological field as well. It is further going to be used in the treatment of other disease condition than just to limiting it for pain management. The future of mesotherapy whether it can become part of Dermatology, Plastic Surgery, Internal Medicine, Physical Medicine residency program, any or all of them.

REFERENCES


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