A Single-Center Trial to Evaluate the Efficacy and Tolerability of SkinPen® on Male and Female Subjects' Acne Scars on the Face

CLINICAL STUDY SUMMARY

A clinical study was conducted to support the safety and effectiveness of the SkinPen Precision System for the treatment of acne scars on the face. The study was conducted at a single center and included treatments on day 1, day 30, and day 60, with follow-up visits at 1 month and 6 months after the final (day 60) treatment. Treatments were conducted by a trained aesthetician (skin care specialist). The face was cleaned and numbed prior to treatment. A thin layer of Skinfuse Lift HG was applied prior to treatment to protect against abrasion and friction during the procedure. The aestheticians were instructed to start at the lower depth setting and gradually increase the depth until erythema was observed, with a maximum depth of 1.5mm. The instructions included a precaution that microneedling was used around but not within the orbital rim. The face was divided into quadrants for treatment to ensure that all acne scars were treated. Following treatment, Skinfuse lift HG was applied to prevent the skin from drying out post procedure.

A total of 41 subjects completed the study. Twenty subjects were treated with the SkinPen Precision System. The other 21 subjects were treated with a prototype device. There are technological differences betweeen the SkinPen Precision System and the prototype device, including a greater number of needles in the SkinPen Precision cartridge and faster motor speed in the SkinPen Precision device, which may affect the device effectiveness results. Therefore, the safety assessments collected for both treatment groups are included in the summary below. However, for the effectiveness results, only the data for the SkinPen Precision group was considered.

Subjects enrolled in the study included both men (31.7%) and women (68.3%) over the age of 21. The study included 11/41 subjects with Fitzpatrick Skin Type (FST) V and VI.

	SkinPen Precision System		All Subjects	
N	20		41	
Age (years)				
Mean (standard deviation)	43.8 (12.7)		44 (11.9)	
Minimum, Median, Maximum	23, 48, 60		21, 46, 60	
Sex				
Male	7	35	13	31.7
Female	13	65	28	68.3
Ethnicity				
Hispanic or Latino	6	30	13	31.7
Not Hispanic or Latino	14	70	28	68.3
Race				
America Indian or ALaska Native	1	5	2	4.9
Asian	3	15	9	22.0
Black or African American	6	30	10	24.4
White	10	50	20	48.8
Fitzpatrick Skin Type				
II	2	10	3	7.3
III	4	20	10	24.4
IV	7	35	17	41.5
V	4	20	7	17.1
VI	3	15	4	9.8

At each clinical visit, digital images were taken of each subject's facial acne scars. On day 1, day 30, and day 60, imaging was performed prior to treatment. A total of 3 full-face images were collected. Images were also collected at the 1 month and 6 month follow-up visit. These images were graded by two separate Board Certified Dermatologists after completion of the study using the following assessment tools and timepoints [Table 4]. Details of each of these assessment tools are provided below in Tables 5-7. The results of the study are provided in Tables 8-12.

Table 2: Study Endpoints

Primary effectiveness endpoints	Acne Scar Assessment Scale graded by two blinded dermatologists using photographs taken at baseline, day 30, day 60, 1-month post-treatment, and 6-months post-treatment
	Clinician's Global Aesthetic Improvement Assessment graded by two blinded dermatologists using photographs taken at 1-month post-treatment, and 6-months post-treatment
Secondary effectiveness endpoints	Self-assessed Scar Improvement Scale completed by subjects at baseline, 1-month post-treatment, and 6-months post-treatment
	Subject Global Aesthetic Improvement Scale completed by subjects at baseline, 1-month post-treatment, and 6-months post-treatment
	Patient Satisfaction Questionnaire completed by subjects at 1-month post-treatment and 6-months post-treatment
Safety Endpoint	Subject safety diaries provided to the subject at each treatment visit (day 1, 30, and 60) and completed for 30 days to record treatment responses
	Adverse event monitoring at each visit; baseline, day 30, day 60, 1-month post-treatment, and 6-months post-treatment

The photo grading included the following effectiveness assessments:

Table 5: Acne Scar Assessment Scale[1]

Grade	Term	Description
0	**Clear**	No depressions are seen in the treatment area. Macular discoloration may be seen.
1	**Very Mild**	A single depression is easily noticeable with direct lighting (deep). Most or all of the depressions seen are only readily apparent with tangential lighting (shallow).
2	**Mild**	A few to several, but less than half of all the depressions are easily noticeable with direct lighting (deep). Most of the depressions seen are only readily apparent with tangential lighting (shallow).
3	**Moderate**	More than half of the depressions are apparent with direct lighting (deep).
4	**Severe**	All or almost all the lesions can be seen with direct lighting (deep).

[1]Jwala Karnik, Leslie Baumann, Suzanne Bruce, Valerie Callender, Steven Cohen, Pearl Grimes, John Joseph, Ava Shamban, James Spencer, Ruth Tedaldi, William Philip Werschler, Stacy R. Smith, "A double-blind, randomized, multicenter, controlled trial of suspended polymethylmethacrylate microspheres for the correction of atrophic facial acne scars" Journal of the American Academy of Dermatology 71(1):77-83 (2014).

In addition to the clinician graded effectiveness measures, the following patient-reported measures were recorded throughout the study:

Table 6: Self-assessed Scar improvement Scale

Rating	Description
-1	Exacerbation of Acne Scars
0	No change in appearance of acne scars
1	1% - 25% improvement in appearance of acne scars
2	25% - 50% improvement in appearance of acne scars
3	50% - 75% improvement in appearance of acne scars
4	75% - 99% improvement in appearance of acne scars

Table 7: Subject Global Aesthetic Improvement Scale

Rating	Description
1	**Very Much Improved:** Optimal cosmetic result
2	**Much Improved:** Marked improvement in appearance from the initial condition, but not completely optimal.
3	**Improved:** Obvious improvement in appearance from initial condition.
4	**No Change:** The appearance is essentially the same as the original condition.
5	**Worse:** The appearance is worse than the original condition.

• Patient Satisfaction Questionnaire

Three questions were asked to the subjects in the study regarding their level of satisfaction with the treatment. It was included as a secondary endpoint in the study. See individual questions and results in the section below.Safety information was collected throughout the study using subject safety diaries. Safety diaries were provided to the subject at each treatment visit (day 1, 30, and 60). The subject was instructed to record any observations related to treatment including common treatment responses. Common treatment responses are side effects that result from treatment which resolve on the order of days. Common treatment responses that persist may be categorized as adverse events when assessed by the investigator at the next visit. Subjects were informed of the

following potential common treatment responses in the informed consent process: skin will be red and flushed similar to a moderate sunburn, skin tightness and mild sensitivity to the touch, redness, burning, tingling, stinging, itching, and/or scaling/dryness, edema (swelling), tenderness/discomfort, a possibility of developing an infection (an increase in redness, warmth, itching, or pus formation). The diaries included space for daily recording of observations for the 30 days in between treatment visits. Adverse events were assessed by the investigator at each subsequent visit.

Results:

Safety:

At the 6-month post-treatment visit, no adverse events persisted.

The following common treatment responses were reported in the subject safety diaries which were sent home with the subject:

- Dryness in 5/41 (12%) subjects lasting from 1-6 days
  These responses were reported by 3 subjects with FST III, 1 subject with FST VI, and 1 subject with FST V
- Rough Skin in 3/41 (7%) of subjects lasting from 1-2 days
  These responses were reported by 1 subject with FST III, and 2 subjects with FST V
- Tightness in 2/41 (4%) of subjects lasting from 1-2 days
  These responses were reported by 2 subjects with FST VI
- Redness, Itching, Peeling Discomfort and Tenderness in 13/41 (31%) of subjects lasting 1-3 days
  These responses were reported by 6 subjects with FST III, 2 subjects with FST VI, 3 sub - jects with FST V, and 2 subjects with FST V
- Burning in 4/41 (9%) of subjects lasting 1-3 days
  These responses were reported by 1 subject with FST III, 1 subject with FST VI, and 2 subjects with FST V

Over the course of the study, 1 subject reported an arthropod bite on the inner right thigh that was determined to be moderate and unlikely related to SkinPen prototype device. 1 subject (1/41, 2.4%) experienced an AE (skin striae [linear marks, ridges, or grooves] on the forehead and both sides of the face) that was determined to be mild and possibly related to use of the SkinPen Precision System. This AE was thought to be due to subject exposure to excess sunlight soon after treatment which was against study instructions, yet resolved without any additional complications.

Effectiveness:

Acne Scar Assessment Scale:

Results of photo grading using the Acne Scar Assessment Scale demonstrated that at baseline the mean population score was mild at 2.80. Following the three treatments and

6 months of follow-up, the mean population score was reported as mild at 2.35. The evaluation by the blinded assessors indicated that seven subjects (7/20, 35%) had a 1-grade reduction in the Acne Scar Assessment Scale at 6-months post-treatment compared to baseline. The seven subjects reporting a 1-grade reduction included 1 subject with FST II, 2 subjects with FST III, 1 subject with FST IV, 2 subjects with FST V, and 1 subject with FST VI. In addition, 4 subjects (20%) showed an improvement greater than 0 but less than 1 on the Acne Scar Assessment Scale, giving a total of 55% (11/20) of subjects showing improvement at 6-months post-treatment when compared with baseline. At 6-months post-treatment, the remaining 9 subjects (45%) reported no change in score when compared to baseline. The visual improvements seen in the photo grading results were considered to be clinically meaningful.

Table 8: Results of Photo Grading of Acne Scar Assessment Scale for SkinPen Precision System

Time Point	N	Mean	Standard Deviation	Minimum	Median	Maximum
Baseline	20	2.80	0.52	2.00	3.00	4.00
Day 30	20	2.78	0.57	2.00	2.75	4.00
Day 60	20	2.70	0.55	2.00	2.50	4.00
1-Month Post-Treatment	20	2.68	0.49	2.00	2.50	4.00
6-Months Post-Treatment	20	2.35	0.69	2.00	2.50	4.00

Table 9: Change from Baseline for Photo Grading of Acne Scar Assessment Scale for SkinPen Precision System

Time Point	N	Subject Improved (%)	Subject Worsened (%)	Mean Change	Standard Deviation for Change	Mean Change (%)
Day 30	20	30.0	20.0	-0.03	0.50	-0.9
Day 60	20	35.0	20.0	-0.10	0.50	-3.6
1-Month Post-Treatment	20	40.0	20.0	-0.13	0.58	-4.5
6-Months Post-Treatment	20	55.0	0	-0.45	0.46	-16.1

Self-assessed Scar Improvement Scale:

Treatment with SkinPen Precision produced an improvement in SASIS scores at 1 month post-treatment and 6-months post-treatment. At 1-month post-treatment, 17 (85%) subjects reported some percentage of improvement in the appearance of their acne scars, with 3 (15%) subjects reporting no change. At 6-months post-treatment, 18 (90%) subjects reported some percentage of improvement in the appearance of their acne scars, with 2 (10%) subjects reporting no change. The mean value for the population was = 1.65 and 1.70, at 1-month post-treatment and 6-months post-treatment respectively (1%-25% improvement in appearance of acne scars) when compared with a score of 0 (no change in appearance of acne scars). No subjects reported a negative score (i.e., exacerbation of acne scars) at either post-treatment timepoint.

Subject Global Aesthetic Improvement Scale:

Treatment with SkinPen Precision produced an improvement in SGAIS scores at 1 month post-treatment and 6 months post-treatment. At 1-month post-treatment, 7 (35%) subjects reported much improved, 9 (45%) subjects reported improved, and 4 (20%) subjects reported no change. At 6-months post-treatment, 2 (10%) subjects reported very much improved, 8 (40%) subjects reported much improved, 8 (40%) subjects reported improved, and 2 (10%) subjects reported no change. The mean value for the population was = 2.85 and 2.50, at 1-month post-treatment and 6-months post-treatment respectively (improved) when compared with a score of 4 (no change). No subjects reported a score of 5 (worse) at either post treatment timepoint.

Patient Satisfaction Questionnaire:

The results of the patient satisfaction questionnaire for all subjects indicated that a greater proportion of subjects selected favorable responses regarding treatments at 1 month and 6 months post-treatment for the following inquiries:

• **Question 1:** Do you notice any improvement in how your acne scars look in the treated area?

Table 10: Results of Patient Satisfaction Questionnaire - Question 1

Time Point	Yes [N %]	No [N, %]
1-Month Post-Treatment	16 (80.0)	4 (20.0)
6-Month Post-Treatment	18 (90.0)	2 (10.0)

• **Question 2:** How would you characterize your satisfaction with the treatment?

Table 11: Results of Patient Satisfaction Questionnaire – Question 2

Time Point	Extremely Satisfied [N (%)]	Satisfied [N (%)]	Slightly Satisfied [N (%)]	Neither Satisfied nor Dissatisfied [N (%)]	Slightly Dissatisfied [N (%)]	Dissatisfied [N (%)]	Very Dissatisfied [N (%)]
1-Month Post Treatment	3 (15.0)	9 (45.0)	5 (25.0)	3 (15.0)	0 (0.0)	0 (0.0)	0 (0.0)
6-Month Post Treatment	3 (15.0)	9 (45.0)	5 (25.0)	1 (5.0)	1 (5.0)	1 (5.0)	0 (0.0)

• **Question 3:** Would you recommend this treatment to your friends and family members?

Table 12: Results of Patient Satisfaction Questionnaire – Question 3

Time Point	Yes [N %]	No [N, %]
1-Month Post-Treatment	18 (90.0)	2 (10.0)
6-Month Post-Treatment	18 (90.0)	2 (10.0)

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