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Dermatological and Cosmetic Research

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CLINICAL RESEARCH REPORT

PROJECT NAME: Moisturization with PENTAVITIN®

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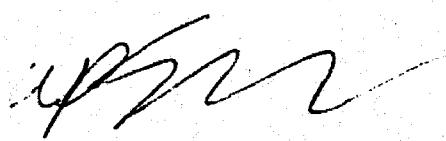
CLIENT: Pentapharm LTD

STUDY NO.: CC-001

STUDY SITE: Dermac Laboratory
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COMPLETION DATE: June 14, 2000

APPROVED BY: Walter Smith, Dermac



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I. SUMMARY

Six women applied similar test creams (O/W emulsions) containing either 5% PENTAVITIN® or 5% Glycerin for 14 days. The creams were applied twice daily on the calf and on the volar forearm each morning and evening of the test period. The PENTAVITIN®-containing cream was applied on the one side and a glycerin-containing cream on the other side on a randomized basis to eliminate bias. The calf is considered an especially dry skin area and the volar forearm side a "normally" moist skin area. This provided the opportunity to examine the effect of the test creams with regard to skin sites of different moisture content. This static skin hydration levels were determined with the NOVA Meter at the study start and after two weeks usage of the test products. Dynamic hydration measurements were additionally performed (sorption - desorption test (SDT) plus a moisture accumulation test (MAT)) in which the dynamic behavior of skin previously submitted to an external stimulation was investigated. These types of studies provide specific information on the skin properties modified by the application of cosmetics. The NOVA Meter was also used for these dynamic measurements.

A summary of test results is as follows : With respect to skin hydration with repeated use, PENTAVITIN® was superior to Glycerin. After two weeks PENTAVITIN® showed improvements of 32% for hydration on forearm and 40% on calf, respectively. This compares to 22% on forearm and 28% on calf for Glycerin. After two weeks of treatment PENTAVITIN® also was superior to Glycerin with respect to desorption kinetics. Finally after two weeks of treatment PENTAVITIN® was superior to Glycerin with respect to the MAT. PENTAVITIN® showed a slower rate of moisture accumulation, signifying an improved barrier.

II. PROTOCOL

Test Materials: Two test emulsions were supplied by PENTAPHARM LTD, Basel including a 5% PENTAVITIN[®] material (lot AWT 1625/3) and a 5% Glycerin material (lot AWT 1625/4). The lot number identified the materials. The study was run double blind with test materials referred to the corresponding lot numbers only.

Subjects: Six (6) female subjects age 35-55 having dry skin were used in this study to evaluate the ability of the two test materials.

Test site: The volar forearm (left and right) and lower leg (left and right calf) were the test sites thus providing 4 sites per subject. Subjects treated their most of the lower leg and forearm (area near the ankle and the bend of the elbow remained untreated). For testing a defined area, midway between the wrist and elbow (for the forearm) and midway between the ankle and knee (for the low leg) were where test measurements are made to minimize variations. Where appropriate untreated control sites were sites on the lower leg or forearm near the ankle and at the bend of the elbow.

Pre-conditioning of subjects: Subjects were instructed not to use moisturizers on any of the test sites for at least 1 week prior to the study start.

Product application: Products were applied twice a day to the test sites at a dose of about 3 mg/cm². On the morning of the test, no applications were made. Products were randomized on a left right basis and site, forearm/ leg, among the subjects.

Evaluations: Skin hydration with the NOVA Meter at t0, and 2 weeks on all test sites. Moisture accumulation data were taken with the NOVA Meter also on all test sites. For the sorption / desorption study skin was hydrated with moist gauze for 5 minutes, the gauze was removed, and desorption was be monitored with the Nova Meter.

Skin moisture can be measured a number of ways, however changes in skin impedance have long been recognized as a direct measurement of skin hydration at the surface. We use the DPM value from the Nova Meter as an assessment of skin hydration. Prior to testing, subjects equilibrate at defined RH (39 - 44%) and temperature (68-72°F) for 60 minutes prior to testing in an isolated room. Normally test emulsions are not applied during the morning of the test (usually in the laboratory at a defined dose, by the clinician) and any cleansing is completed at least two hours prior to the test, but this can change as per protocol directions. Tested sites are all exposed to the air with no clothes covering them. After calibration of the probe as per manufacturer instructions, the probe is applied lightly to the skin surface and measurements are recorded for 5 seconds. The unit is set to record the signal after a 5 second reading. The signal (a millivolt output) is either recorded by the technician or captured via an RS232 interface and stored on floppy disc in a data storage program. Three readings are made at each test site and averaged; if variance with any one reading is more than 10%, the measurement is discarded and repeated.

III. RESULTS

1. Chronic Moisturization (NOVA Meter)

A considerably improved hydration as compared to the initial value was observed after the 14-day application of the two test creams on all test areas (Tables 1 and 2). In all cases, the skin hydration produced was proportionally higher in dry skin areas than in normally humid ones. On both test areas, PENTAVITIN[®] showed a statistically significantly better moisturizing effect than glycerin (+43% on the calf and +42% on the forearm inner side, respectively, $p < 0.05$).

2. Sorption - Desorption Test (SDT)

A test site on the forearm inner side was covered for 5 minutes with a gauze saturated with water which brought the the skin surface to maximal hydration (sorption). The gauze was then removed and the water evaporation (desorption) and moisture-binding capacity, respectively, recorded over a period of 30 minutes. The lower the desorption, the higher the moisture-binding capacity. Table 3 represents the moisture-binding capacity of the test areas over time in comparison with the control. The control for this portion of the study was skin not treated with test cream, but covered with gauze.

Skin treated with the PENTAVITIN[®] containing formulation was found to have a clearly greater capacity to bind moisture from the outside as compared with skin treated with the glycerin containing formulation. Thirty minutes after removal of the gauze, the test area treated with the PENTAVITIN[®]-containing cream showed a 45% higher moisture content than the control area. The test area treated with the glycerin-containing cream showed a 16% increase. PENTAVITIN[®] was shown to bind 2.8 times more moisture in the skin than glycerin after 30 minutes.

3. Moisture Accumulation Test (MAT)

The measuring probe was left in contact with the skin (volar forearm) over a period of 3 minutes for the Moisture Accumulation Test (MAT). This occlusive treatment results in unbound water and water diffusing through the skin to accumulate on the skin surface. This technique provides information about the moisture retention capacity of skin. A flatter moisture accumulation curve means greater moisture-retaining capacity. Tables 4 and 4a, respectively, show that the moisture accumulation was considerably slower in the PENTAVITIN[®]-treated skin than in the glycerin-treated one. At the end of the study, however, the moisture accumulation amounted to 62% for PENTAVITIN[®] as compared to the control area (control was skin not treated with test cream). It is important to note that the test area treated with the glycerin containing product was similar to the value of the control area at the study end. This result supports that PENTAVITIN[®] has superior moisture retention capacity than glycerin.

IV. CONCLUSION

The test results herein suggest that both tested products were effective moisturizers improving the water holding ability and intrinsic water levels of the skin after two weeks use. The directionality in all test systems confirms the superior effects of PENTAVITIN®. Both PENTAVITIN® and glycerin should be effective moisturizers providing both short term and longer-term benefits.

The test results also suggests that a combination of glycerine and PENTAVITIN® would be attractive in formulations where the more rapid initial hydration profile of glycerin containing formulations would be synergistic with the moisture retaining superiority of PENTAVITIN®.

TEST REPORT DATA

TABLE 1 : Chronic Effect of Glycerin

Subject	Forearm	Forearm	Calf	Calf
	t ₀	2 weeks	t ₀	2 weeks
1	109	132	90	117
2	112	128	95	119
3	109	133	90	114
4	98	122	94	110
5	96	126	90	122
6	110	134	92	124
Average	105.7	129.2	91.8	117.7
SD	6.2	4.3	2.0	4.7
% Change		+22.2%		+28.2%

TABLE 2 : Chronic Effect of PENTAVITIN®

Subject	Forearm	Forearm	Calf	Calf
	t ₀	2 weeks	t ₀	2 weeks
1	113	143	104	137
2	112	145	98	132
3	113	146	90	137
4	111	145	98	132
5	109	145	90	132
6	98	139	90	130
Average	109.3	143.8	95.0	133.3
SD	5.2	2.3	5.4	2.7
% Change		+31.6%		+40.3%

TABLE 3 : Sorption – Desorption Test (NOVA Meter Readings)

Time	Control	PENTAVITIN®	% of Control	Glycerin	% of Control
Sorption					
0min	103.4	136.3	+32%	128.8	+25%
5min	745.4	788.4	+ 6%	766.5	+ 3%
Desorption					
5min	322.3	405.6	+26%	356.5	+11%
10min	203.2	325.5	+60%	267.8	+32%
15min	156.4	223.2	+43%	201.1	+29%
20min	122.1	167.6	+37%	135.5	+11%
30min	107.3	155.6	+45%	124.4	+16%

TABLE 4 : Moisture Accumulation Test (NOVA Meter Readings)

Time	Control	PENTAVITIN®	Glycerin
0s	103.4	144.2	129.9
10s	155.5	155.9	144.4
20s	192.0	189.8	177.3
30s	245.5	203.5	204.4
45s	279.9	233.4	245.6
1min	337.7	255.4	302.2
2min	388.4	277.2	355.4
3min	415.5	337.5	423.3

TABLE 4a : Moisture Accumulation Test (NOVA Meter Readings)
(Level t0 values at 0)

Time	Control	PENTAVITIN®	% of Control	Glycerin	% of Control
0s	0.0	0.0	---	0.0	---
10s	52.1	11.7	22%	14.5	28%
20s	88.6	45.6	51%	47.4	53%
30s	142.1	59.3	42%	74.5	52%
45s	176.5	89.2	51%	115.7	66%
1min	234.3	111.2	47%	172.3	74%
2min	285.0	133.0	47%	225.5	79%
3min	312.1	193.3	62%	293.4	94%