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DERMAL SENSITIZATION STUDY OF
5% FORMALDEHYDE SOLUTION
IN GUINEA PIGS

FINAL REPORT

IITRI Project No. L8100
Study No. 647
Test Article No. 100

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IIT RESEARCH INSTITUTE

DERMAL SENSITIZATION STUDY OF
5% FORMALDEHYDE SOLUTION IN GUINEA PIGS
Study No. 647
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SUMMARY

A 5% SOLUTION OF FORMALDEHYDE in water was applied in 0.5 ml doses to the shaved backs of ten guinea pigs once per week during an induction period of 3 weeks. Two and three weeks following the induction period, the treated guinea pigs along with ten control guinea pigs received a challenge dose of 0.5 ml of the dosage formulation at a different site on the back. All guinea pigs were scored for edema and erythema 24 and 48 hours following application of each challenge dose.

Neither positive erythema reactions nor edema were observed in any guinea pig following the two challenges. However, very slight erythema was noted in one treated guinea pig 24 and 48 hours following the 2nd challenge.

STUDY PARTICIPANTS:

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DERMAL SENSITIZATION STUDY OF 5% FORMALDEHYDE SOLUTION IN GUINEA PIGS

I. INTRODUCTION

The purpose of this study was to determine the dermal sensitizing capability of 5% FORMALDEHYDE SOLUTION in guinea pigs following repeated skin application.

II. MATERIALS AND METHODS

a. Test Article: FORMALDEHYDE SOLUTION, 37% (Sargent-Welch Scientific Co., lot no. KJKH) was received April 14, 1981. The test article was a clear liquid with a viscosity similar to water. It was received in a glass bottle and stored at room temperature (approximately 22°C).

b. Dosage Formulation: A 5% solution of FORMALDEHYDE was prepared by diluting the 37% FORMALDEHYDE SOLUTION with NANOpure water. This concentration was intended to produce a Draize erythema score of 1 or less in the control guinea pigs.

c. Animals: Adult male Hartley Guinea Pigs weighing approximately 325 g were purchased from Charles River Breeding Labs, Portage, MI, for use in this study. Upon arrival (6/15/83), the guinea pigs were held in quarantine for approximately 2 weeks and examined carefully to insure their health and suitability as test subjects. Guinea pigs selected for the study were identified by a unique numbered metal tag inserted through the pinna of the right ear and by a cage card.

d. Food and Water: Guinea Pig Chow 5025 (Ralston Purina Co., St. Louis, MO) and water supplied from a reverse-osmosis purifier by an automatic watering system were available **ad libitum**.

e. Environment: The guinea pigs were housed individually in stainless steel cages measuring 25.0 x 17.8 x 41.2 cm. Alfalfa pellets (Research Industries, Monee, IL) were placed in the pan below the stainless steel mesh floor of each animal cage to absorb liquids. Air conditioned animal rooms were maintained at approximately 22°C and 40% relative humidity. Fluorescent lighting was provided for 12 hours followed by 12 hours of darkness.

f. Method:

1. Animals: Guinea pigs selected for testing were assigned at random to two groups of ten males each.

2. Skin Preparation: Approximately 24 hours prior to test article application the backs of the treated guinea pigs were clipped free of hair. The upper left quadrant was clipped for the induction applications and the lower left quadrant was clipped for the challenge applications. Hair from the lower left quadrant was clipped from the backs of the control guinea pigs 24 hours prior to the challenge applications.

3. Dosing:

a) Induction: A 0.5 ml quantity of the dosage formulation was applied to the upper left quadrant of ten guinea pigs once/week for a period of 3 weeks, beginning on June 28, 1983. The test article was covered by a 1" x 1" patch (Webril^{R} Appli-Pad, the Kendall Co., Boston, MA), held in place with impermeable plastic tape (Blenderm^{R}, 3 M Company, St. Paul, MN) and elastic adhesive bandage (Elastoplast^{R}, Beiersdorf Inc., S. Norwalk, CN). All wrapping materials were removed 6 hours after each application.

b) Challenge: Two weeks following the application of the last induction phase dose (7/26/83), a 0.5 ml quantity of the dosage formulation was applied to the lower left quadrant of the backs of the ten treated and ten control guinea pigs. The test article was applied as described in Section 3a. All wrapping materials were removed 6 hours after each application. A second challenge dose was applied in an identical manner 1 week later (8/2/83).

4. Skin Examination: Twenty-four and 48 hours after removal of each challenge patch, the test sites were scored for edema and erythema according to the method of Draize (Appendix I). Guinea pigs were clipped, if necessary, prior to scoring.

5. Observations: All guinea pigs were observed daily for mortality and morbidity.

6. Body Weights: Body weights were not measured.

7. Animal Disposition: After the final observation (8/4/83), the guinea pigs were sacrificed by carbon dioxide asphyxiation and discarded without necropsy.

g. Evaluation: A reaction with a Draize erythema score of 2 or greater in the treated animals is considered a positive response. The concentration of test article used was intended to produce a Draize erythema reaction of 1 or less in the control animals.

No statistical analysis was performed on the data obtained due to the lack of positive erythema reactions.

III. RESULTS

a. Mortality: No deaths were observed during the study.

b. Skin Effects: A summary of the individual scores is presented in Table I. Positive erythema reactions and edema were not observed in any guinea pig following the two challenges. However, one treated guinea pig exhibited very slight erythema 24 and 48 hours following the 2nd challenge.

IV. QUALITY ASSURANCE

Laboratory operations were inspected on June 28, July 5, and July 29, 1983 by Josephine M. Reed. The final draft report was audited on September 13, 1983 by Josephine M. Reed. All operations were found to be in compliance with Life Sciences Quality Assurance criteria. Original data generated during the course of the study are retained in the IITRI Life Sciences Archives as specified by standard operating procedures.

V. TABLE

TABLE 1

SUMMATION* OF INDIVIDUAL DERMAL SENSITIZATION SCORES

Study Number: 647 Test Article Number: 100
Test Article Name: 5% FORMALDEHYDE SOLUTION

		CHALLENGE							
		FIRST				SECOND			
HOURS FOLLOWING CHALLENGE:		24		48		24		48	
SKIN REACTIONS:		Erythema	Edema	Erythema	Edema	Erythema	Edema	Erythema	Edema
STUDY GROUP	SCORES								
CONTROL	0	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10
	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
TREATED	0	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10
	1	0	0	0	0	1/10	0	1/10	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0

*Number of guinea pigs showing a given response/
number of animals per group.

VI. APPENDIX

APPENDIX 1

SCALE FOR SCORING SKIN LESIONS*

Evaluation of Skin Reactions

Erythema and eschar formation:

No erythema	0
Very slight erythema (barely perceptible)	1
Well defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Edema formation:

No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well defined by definite raising)	2
Moderate edema (raised approximately 1.0 mm)	3
Severe edema (raised more than 1.0 mm extending beyond the area of exposure)	4

*Draize, J.H., Appraisal of the Safety of Chemicals in Foods, Drugs, and Cosmetics, Assoc. Food and Drug Officials of the U.S., Austin, Texas, 1959.