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**TITLE**

PHYSIOLOGICAL TESTS WITH "S" AND SOME ANALOGUES OF "S" \ (A\ ) A COMPARISON OF THE EFFICIENCY OF SOME A.G. OINTMENTS AS ANTIDOTES FOR "S" \ (B\ ) VESICANT PROPERTIES O

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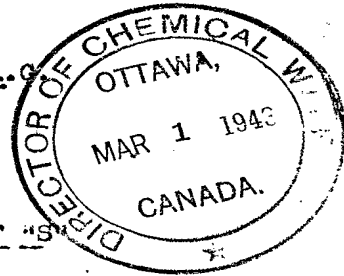
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PHYSIOLOGICAL TESTS WITH "S" AND SOME ANALOGUES OF "S"

- (A) A COMPARISON OF THE EFFICIENCY OF SOME A.G. OINTMENTS AS ANTIDOTES FOR "S"
- (B) VESICANT PROPERTIES OF SOME ANALOGUES OF "S"



(A) A COMPARISON OF THE EFFICIENCY OF SOME A.G. OINTMENTS AS ANTIDOTES FOR "S"

Procedure

One two mm. drop of S was placed on the skin of the flexor surface of both forearms of a volunteer, equal distances from the wrists. One drop was used as a control, and after two minutes or five minutes the drop on the other arm was treated with an anti-gas ointment in the prescribed manner. The anti-gas ointments so examined were A.G.2, A.G.3, A.G. 3A, and A.G.5.

When three two mm. drops were used, the two treated drops were placed equal distances above the wrists, while the control was placed higher on one arm.

When the effectiveness of A.G. 5 against H and S was compared, unfortunately drops of unequal size were used. The control and treated drops of H or S were placed equal distances from the wrists on each arm.

To calculate the results some assumptions had to be made. The areas of erythema (E) and of vesication (V) were measured. The area, for E was obtained by multiplying the length by the breadth; for E+, 50% of the calculated area was added, while for E-, 2/3 of the calculated value was taken to represent the area. The area of V was obtained by multiplying the length by the breadth. When pinpoint vesicles occurred, 0.1 sq. cm. was allotted for each tiny vesicle.

These results were subjected to statistical analysis applying Student's test.

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Results.

A table of the results obtained under the conditions of these experiments is shown in Appendix A.

- (a) Treatment of the S contaminated area with A.G. 2, two or five minutes after contamination produced no reduction in erythema or vesication. (There is a reduction in vesication in the second test which is just significant).
- (b) Treatment of the S contaminated area with A.G. 3 two or five minutes after contamination resulted in a significant decrease in erythema and vesication.
- (c) Treatment of the S contaminated area with A.G. 3A two minutes after contamination produced a significant decrease in erythema, but no definite change in vesication. Treatment after 5 minutes contamination yielded no significant reduction in either erythema or vesication.
- (d) Treatment of the S contaminated area with A.G. 5 two minutes after contamination produced a significant decrease in erythema and vesication while treatment after five minutes contamination gave a significant decrease in vesication but none in erythema.
- (e) Treatment of S contaminated areas with A.G. 3 or A.G. 5 ten minutes after contamination lead to a significant reduction in erythema and vesication in the case of A.G. 3 but none in the case of A.G. 5. (This series is small and in a larger series there might be a significant reduction in erythema with A.G. 5 treatment).
- (f) Treatment of the S contaminated area with a mixture of A.G. 3 and Sulphanilamide five minutes after contamination led to a significant reduction in erythema and vesication.
- (g) Treatment with A.G. 5 of areas contaminated five minutes previously, with S in two mm. drops and H in one mm. drops gave significant reduction in erythema and vesication. The degree of reduction of the lesions being similar for the H. and S contaminated areas.

Conclusion

Under the conditions of these experiments A.G. 3 appears to be the most efficient A.G. ointment of those examined for decontamination of S. on skin.

(B) VESICANT PROPERTIES OF T 773 (TRIS (2-CHLOROETHYL) AMINE;  
THE ISOPROPYL ANALOGUE OF T 773 (TRIS (2-CHLOROROISOPROPYL)  
AMINE; BIS (2-CHLOROETHYL) BUTYLAMINE; AND BIS (2-CHLOROETHYL)  
ETHYLAMINE: WITH A COMPARISON OF THE VESICANT PROPERTIES OF "S"  
AND "H".

Procedure

The vesicant properties of these compounds, prepared by Dr. N. Miller of the Chemistry Section, were estimated on the bare skin of the flexor surface of the forearm of volunteers. The drops of material were applied to the skin, one to each arm, an equal distance from the wrist. In the case of the four compounds 2mm. drops were used and as a control a 2 mm. drop of S was applied to the opposite arm. Ten observers were used in each case.

When S and H were compared, a 2 mm. drop of the former and a 1mm. drop of the latter were used in each of the twelve cases.

Decontamination was not carried out, and the results were subjected to statistical analysis, calculations being carried out as reported before. (See section A).

Results - A Table of the results is given in Appendix B.

- (a) There was a significantly greater erythema produced by T 773 than by S, but the difference in areas of vesication was not significant. It is interesting that in the case of T 773 the vesication consisted of patches of pin point and pin head vesicles. The areas affected by T 773 were quite tender.
- (b) The vesicant and erythema producing capacity of the isopropyl analogue of T 773 was minimal in nature.
- (c) S and Bis (2-chlorethyl) butylamine both produced about the same degree of erythema, but S gave rise to a significantly greater degree of vesication.
- (d) Bis (2-chloroethyl) ethylamine is definitely inferior to S in the production of erythema and vesication.
- (e) In the case of H and S it was found that 2 mm. drop of S gave about the same degree of erythema as a 1 mm. drop of H. This amount of S produced somewhat greater vesication.

As a 2mm. drop is approximately equivalent to eight 1 mm. drops, it would appear that the erythema producing capacity of H is some eight times greater than that of S, while the vesicant power is somewhat less than eight times that of S.

This work was carried out and the report written by Surg. Lt. <sup>X</sup>D.D. Bonnycastle R.C.N.V.R. and Major <sup>X</sup>Walter Somerville R.A.M.C.

*E.L.L. Davies*  
 (E.L.L. Davies)  
 Chief Superintendent.

Results of Decontamination of 2 mm. drops of S 10 min. after contamination with A.G.3 and A.G.5.

No. Cases	"S" Control		Treated with A.G.3		Treated with A.G.5	
	Erythema	Vesication	Erythema	Vesication	Erythema	Vesication
6	11.6 (9.3-13.5)	2.6 (0.3-4.6)	7.2 (3.8-12.0)	1.1 (0.3-2.3)	9.4 (7.0-11.3)	1.8 (0.0-4.2)

Comparison of Erythema of Control and A.G.3 P = <.01: Difference Significant  
 Comparison of Vesication of Control and A.G.3 P = .05-.01: Difference Significant

Comparison of Erythema of Control and A.G.5 P = .1-.05: Difference Not Significant  
 Comparison of Vesication of Control and A.G.5 P = .4-.3: Difference Not Significant

Comparison of the Decontamination of a 2 mm. Drop of "S" and a 1 mm. Drop of "H" with A.G. 5 Five Minutes after Contamination.

No. Cases	"S"		"H"		"H"	
	Control Erythema	Treated Vesication	Control Erythema	Treated Vesication	Control Erythema	Treated Vesication
12	17.2 (6.6-45.0)	4.4 (0.3-8.4)	8.5 (0.6-33.0)	0.7 (0.0-3.0)	5.9 (1.6-12.5)	2.3 (0.6-4.3)

"S" Comparison of Erythema of Control and treated area's P = <.01: Difference Significant  
 "S" Comparison of Vesication of Control and treated area's P = <.01: Difference Significant

"H" Comparison of Erythema of Control and treated area's P = .05-.02: Difference Significant  
 "H" Comparison of Vesication of Control and treated area's P = <.01: Difference Significant

APPENDIX A

This Table Presents the Average Values for Erythema and Vesication (also the Range) of the Control and Treated Areas. A 2 mm. drop of "S" was used as Control and a Similar Drop was Treated with Various A.G. Ointments. Some of the Results of Statistical Analysis are also Shown.

Ointment Used for Decontamination	Time of Decontamination	No. of Cases	Control Erythema (Range)	Treated Erythema (Range)	F	Significance of Difference	Control Vesication (Range)	Treated Vesication (Range)	F	Significance of Difference
A.G. 2	2 min.	12	7.2 (2.1-20.1)	9.8 (0.0-36.0)	.1	Not Signif.	1.8 (0.0-12.5)	0.1 (0.0-1.3)	.1-.05	Not significant
A.G. 2	5 min.	12	8.5 (4.4-13.1)	16.7 (1.5-61.2)	.2- .1	Not signif	2.9 (0.3-8.0)	1.9 (0.0-7.7)	.05	Significant
A.G. 3	2 min.	12	6.5 (1.5-19.4)	1.8 (0.2-4.8)	<.01	Significant	1.8 (0.0-8.4)	0.0 (0.0-0.3)	.05- .01	Significant
A.G. 5	5 min.	12	10.0 (4.3-16.6)	6.4 (1.2-13.5)	<.01	Significant	2.8 (0.0-5.9)	0.6 (0.0-3.6)	<.01	Significant
A.G. 3A	2 min.	12	6.3 (0.8-12.6)	2.8 (0.0-9.4)	.02- .01	Significant	0.7 (0.0-4.0)	0.1 (0.0-0.6)	.1-.05	Not significant
A.G. 3A	5 min.	12	9.1 (4.4-13.1)	9.4 (3.8-16.8)	.8- .7	Not signif.	2.8 (0.3-8.0)	2.0 (0.3-6.0)	.3-.2	Not significant.
A.G. 5	2 min.	12	7.1 (0.8-13.1)	2.8 (0.0-22.0)	.05- .02	Significant	1.3 (0.0-3.8)	0.0 (0.0-0.3)	<.01	Significant
A.G. 5	5 min.	12	9.7 (4.4-15.6)	7.9 (2.0-19.3)	.3- .2	Not signif.	3.1 (0.0-8.0)	0.5 (0.0-1.3)	<.01	Significant
Sulfanilimide AG3 (1.3)	5 min	12	10.5 (4.4-16.7)	5.4 (0.5-14.9)	<.01	Significant	3.1 (0.0-8.0)	0.6 (0.0-3.7)	.02- .01	Significant

APPENDIX "B"

A Comparison of the Erythema and Vesication Produced by Some Analogues of "S" with that Produced by "S".  
The Average Values are Given and the Results of Application of Student's Test.

Compound compared with "S"	No. of cases	Erythema of S Control and Range.	Erythema of Analogue and Range	P	Significance of Difference.	Vesication of S Control and Range.	Vesication of Analogue and Range.	P	Significance of Difference.
1.773	10	15.6 (10.8 - 23.1)	66.9 (12.6 - 192.0)	.01	Significant	4.0 (0.0 - 10.3)	5.1 (0.0 - 16.0)	.5 - .4	Not Significant
I:is (2 chloroisopropylamine)	10	13.9 (6.0-26.3)	1.4 (0.0-4.2)	.01	Significant	2.1 (0.0-8.1)	0.0 (0.0-0.0)	.01	Significant
bis (2 chloroethylbutylamine)	10	12.7 (7.2 17.6)	13.2 (8.4 18.0)	.9 - .8	Not Significant	3.7 (0.3 - 6.5)	0.7 (0.0 - 3.6)	.01	Significant
bis(2-chloroethyl-ethylamine)	10	14.0 (11.6-18.9)	9.4 (4.0-14.9)	.05 - .01	Significant	2.8 (0.0-7.7)	0.8 (0.0-6.0)	.01	Significant
H	12	12.2 (8.1-18.2)	9.5 (1.7-33.8)	.5 - .4	Not Significant	3.6 (0.0-8.3)	2.5 (0.5-5.0)	.05 - .02	Significant.



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