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Biochemical Research Laboratory

The Dow Chemical Company

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T3.5-6-12

BLOOD BROMIDE LEVELS OF RABBITS RECEIVING
REPEATED 7-HOUR DAILY EXPOSURES TO 25 PPM
ETHYLENE DIBROMIDE

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Rept. By T. R. Torkelson

Signed

T. R. Torkelson Jan 25, 1960

Checked

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PROBLEM

A maximum concentration of 25 ppm is considered acceptable for repeated 7-8 hour daily exposures of workmen handling ethylene dibromide. Using laboratory animals, it was desired to know what blood bromide (inorganic) concentrations are attained when repeated exposure to 25 ppm of ethylene dibromide in air occurs. It is also important to know how fast the blood concentration is established, how does it fluctuate when exposures are missed, such as over weekend, and how rapidly does the level return to normal when exposures cease.

CONCLUSIONS

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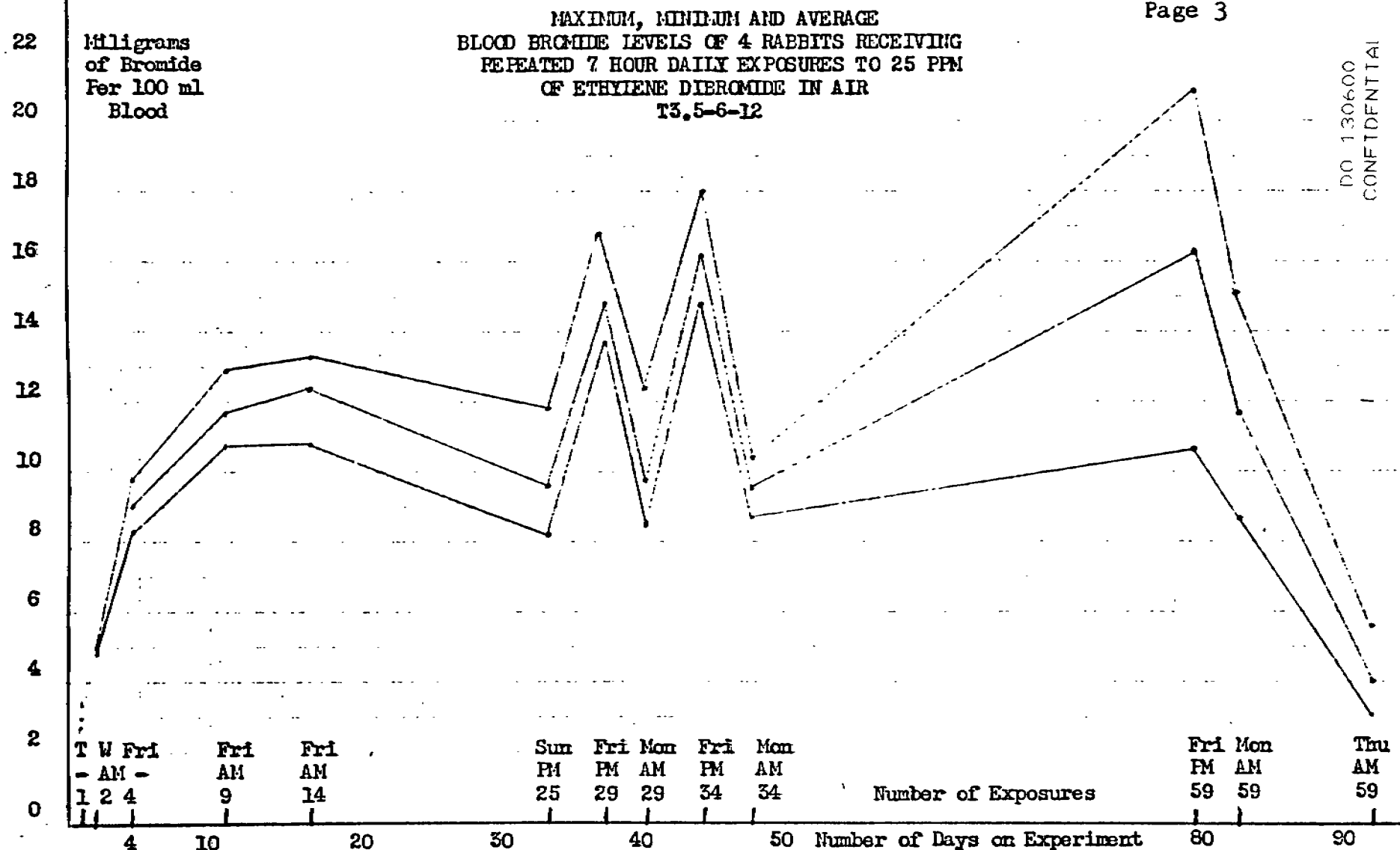
- 1) An average maximum level of 14-16 milligrams of bromide per 100 ml. of blood (14-16 mg. %) was attained after 3 months of repeated 7-hour daily exposures 5 days per week. Blood serum levels would probably be about 25 to 35% higher than this or 20-25 mg. %.
- 2) The blood concentration apparently had reached a maximum after 1 1/2 months of exposure.
- 3) Blood bromide levels before exposure (Monday morning) were about 2/3 to 1/2 the concentrations immediately after the 5th successive exposure. (Friday afternoon).
- 4) The blood bromide levels were still significantly high 13 days after the last exposure.

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PROCEDURE

Four healthy young rabbits about 3 1/2 months old were exposed 7 hours/day, 5 days/week for a total of 59 exposures during 93 days. The animals were exposed in a cubical 160 liter glass and Monel chamber to a calculated concentration of 25 ppm ethylene dibromide in air. (21.4-25.9 by analysis). Blood samples were taken by cardiac puncture before the first exposure so that each rabbit could serve as it's own control. Subsequent blood samples were taken as indicated in Figure 1 and Table I. Three ml. of blood were drawn for bromide determinations except on two occasions when larger volumes were drawn to allow determination of serum glutamic oxalacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), Blood-Urea-Nitrogen (BUN), and extra blood bromide determinations. The routine bromide determinations were made by E. T. Wagoner using Analytical Method MLS 54.6, May 13, 1954. The transaminase, BUN and one set of bromide determinations were made by Ralph Langner and are reported in Table II. The findings from the transaminase and BUN determinations were not considered to be significant.

With the exception of rabbit #968, all the rabbits lived, gained weight, and appeared to be normal during the entire experiment. Rabbit #968 died as the result of the third heart puncture and was replaced by rabbit #970. Except for the first two samples, rabbit #970 was assumed to have had the same number of exposures as the three original rabbits and the values obtained for this animal are average in with the rest.



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Figure 1

TABLE I

Summary of Inorganic Blood Bromide in Rabbits
Exposed to Vapors of Ethylene Dibromide

<u>Number Exposures</u>	<u>No. Days</u>	<u>Day</u>	<u>Time</u>	<u>Blood Bromide mg. %</u>					
				<u>Rabbit Number</u>					
				<u>965</u>	<u>966</u>	<u>967</u>	<u>970</u>	<u>968</u>	<u>Ave.</u>
0	0	Mon.	A.M.	0.52	0.39	0.53	-	0.53	0.49
1	1	Tues.	A.M.	3.29	2.75	2.78	3.17	3.00	3.00
2	2	Wed.	A.M.	5.00	4.83	4.91	-		4.91
4	4	Fri.	A.M.	8.30	9.15	9.77	-		9.07
9	11	Fri.	A.M.	12.4	12.9	10.7	11.0		11.7
14	18	Fri.	A.M.	13.3	12.6	10.8	13.0		12.4
25	34	Sun.	P.M.	8.3	8.2	11.8	10.2		9.6
29	38	Fri.	P.M.	14.1	13.7	14.5	16.8		14.8
29	41	Mon.	A.M.	8.5	9.1	9.2	12.4		9.8
34	45	Fri.	P.M.	16.1	15.8	14.8	18.0		16.2
34	48	Mon.	A.M.	8.7	9.5	-	10.4		9.5
59	80	Fri.	P.M.	20.9	15.6	10.6	18.1		16.3
59	83	Mon.	A.M.	15.1	10.2	8.7	12.7		11.7
59	93	Thurs.	P.M.	4.1	3.1	5.6	3.2		4.0

TABLE II

Summary of Transaminase, BUN and Blood Bromide
Determinations by Ralph Langner, Texas Division

25 Exposures in 34 Days

<u>Rabbit Number</u>	<u>SGOT</u>	<u>SGPT</u>	<u>BUN</u>	<u>Serum Bromide</u>
965	24	43	16.2	19.5
966	21	21	15.5	21.4
967	30	19	32.9	24.0
970	-	-	16.3	-

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MAXIMUM, MINIMUM AND AVERAGE
BLOOD BROMIDE LEVELS OF 4 RABBITS RECEIVING
REPEATED 7 HOUR DAILY EXPOSURES TO 25 PPM
OF ETHYLENE DIBROMIDE IN AIR
73.5-6-12

Miligrams
of Bromide
Per 100 ml.
Blood

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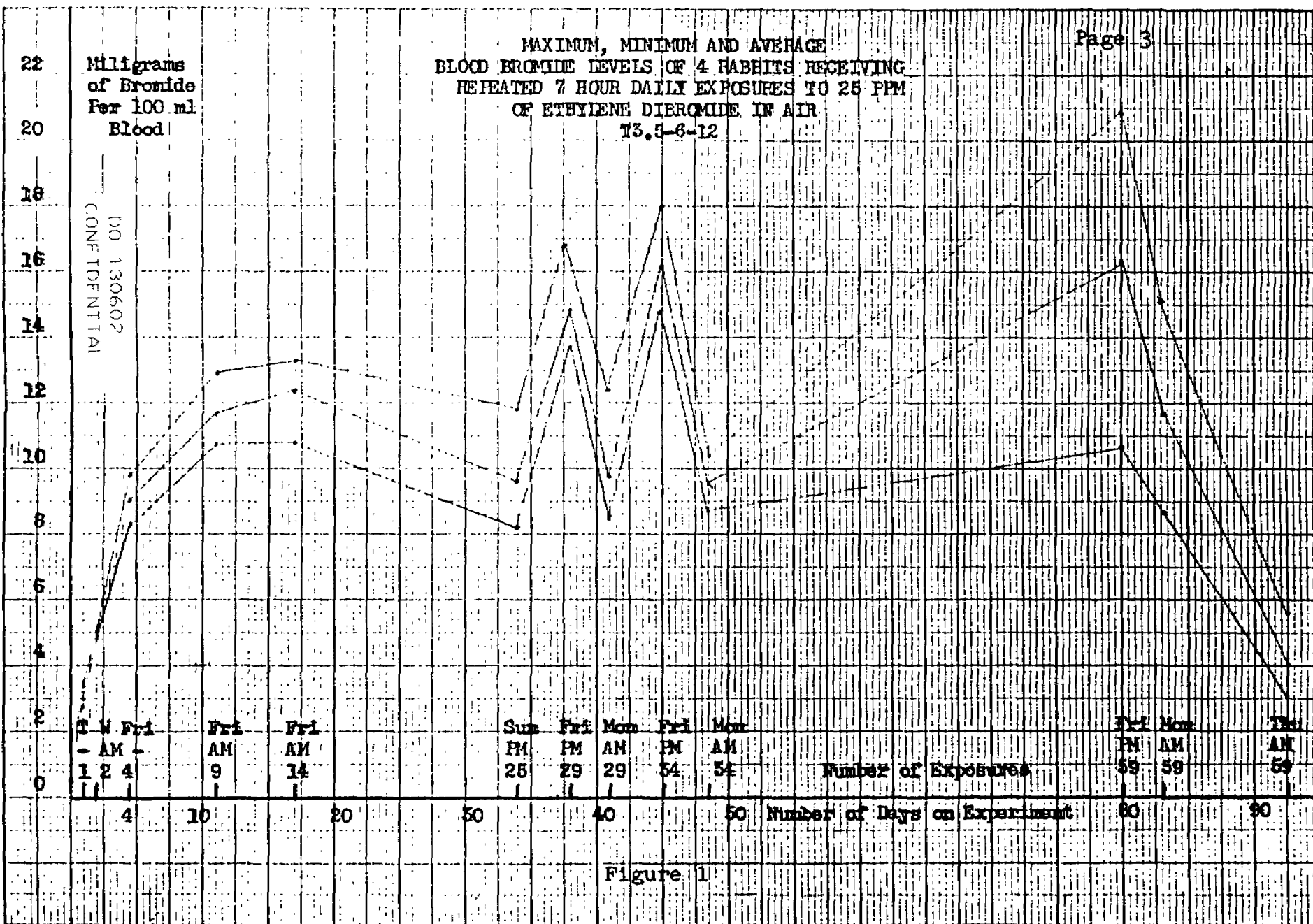


Figure 1