Studies on the Detoxicating Hormone of the Liver (Yakriton).

99th Report.

Effect of Vitamin B₁ Alone in a Single Dose and Vitamin B₁ in Combination with Yakriton in a Single Dose in a Far Advanced Stage of Avitaminosis B₁.

Part 2.

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In Part 1 of this treatise Tables 2~5 were omitted by mistake, which will be published in the present paper (Part 2). All the text was already printed in Part 1, so in the present paper only an outline of the work will be given to illustrate the tables briefly.

Yakriton, the detoxicating hormone of the liver, will act to intensify vitamin B₁, though it has no vitamin effect in itself.

Throughout the present experiment, body weight, symptoms, survival and prolongation of the shortest peroxidase stain-time of blood leucocytes were made criteria of the grade of avitaminosis B₁ resp. of the effect of vitamin B₁ on B₁-avitaminotic fed rats.

The first experiment.

The data were given in Table 1 (Cf. Part 1 of the present Paper¹⁾).

The second experiment.

Almost the same experiment as the first was performed. The result was also almost the same, showing that the effect of 0.001 mgrm. of vitamin B₁ with combined use of yakriton was similar to that of 0.01 mgrm. (0.001 mgrm. $\times$ 10) of that vitamin alone (Cf. Table 2).

1) A. Sato and H. Namekawa, Tohoku J. Exp. Med., 1943, 46, 241.

TABLE 2.

Experiment 2.

B.w. = Body weight.

Time = the shortest peroxidase stain-time.

Rat No. 1.				Rat No. 2.				
Day of exp. (Date)	B.w. (grms.)	Time	Remarks	Day of exp. (Date)	B.w. (grms.)	Time	Remarks	
(15. I 1940)	33		During this period basal diet	(15. I 1940)	30		During this period basal diet	
(17. ")	45			(17. ")	37			
(19. ")	51			(19. ")	42			
Days of B ₁ -avitaminotic feeding	2	57	4"	Days of B ₁ -avitaminotic feeding	2 (21. I)	47	4"	
	4	61	B ₁ -avitaminotic diet began 20. I		4	52	B ₁ -avitaminotic diet began 20. I	
	6	66			6	59		
	8	68			8	62		
	10	70			10	68		
	12	84			12	71		
	14	89			14	72		
	16	87			4"	16		81
	18	92				18		80
	20	91				20		86
	22	89				22		80
	24	84	5"		24	75	Paresis	
	26	78			26	72		
	28	76			28	71		
	30	72			30	67		
	32	68	5"		32	62	6"	Injection of Oryzanin 0.001 mgrm. Death
	34	63	6"		34	57	7"	
	35	58	7"		36	50	7"	
36	57	7"	37	48	8"			
37								

Experiment 2.

Rat No. 3.

Day of exp. (Date)	B.w. (grms.)	Time	Remarks
(15. I 1940)	33		During this period basal diet
(17. ")	42		
(19. ")	48		

Days of B ₁ -avitaminotic feeding	2 (21. I)	55	4"	B ₁ -avitaminotic diet began 20. I
	4	62		
	6	65		
	8	67		
	10	74		
	12	83		
	14	86		
	16	88		
	18	85		
	20	84	5"	
	22	79		Paresis
	24	76		
	26	72		
	28	66	6"	
	30	62		
	32	59	7"	
	34	56	7"	
	36	51	8"	
	37	52	7"	
	38	48	8"	
	39	47	8"	Death
	40			

Rat No. 4.

Day of exp. (Date)	B.w. (grms.)	Time	Remarks
(15. I 1940)	36		During this period basal diet
(17. ")	39		
(19. ")	44		

Days of B ₁ -avitaminotic feeding	2 (21. I)	52	4"	B ₁ -avitaminotic diet began 20. I
	4	58		
	6	63		
	8	66		
	10	72		
	12	77		
	14	79		
	16	82		
	18	81		
	20	78	5"	
	22	73		Paresis
	24	74		
	26	69		
	28	67	7"	
	30	60		
	32	59	7"	
	33	53	8"	
	34	59	7"	
	35	58	7"	
	36	55	7"	
	37	52	8"	Death
	38			

Experiment 2.

Rat No. 5.

Day of exp. (Date)	B.w. (grms.)	Time	Remarks
(15. I 1940)	35		During this period basal diet
(17. ")	42		
(19. ")	52		
2 (21. I)	56	4"	B ₁ -avitaminotic diet began 20. I
4	58		
6	60		
8	67		
10	70		
12	74		
14	77		
16	79		
18	77		
20	71	5"	
22	70		
24	68		
26	64		
28	65	6"	
30	63		Paresis
32	57	7"	
34	56	8"	Injection of Oryzanin 0.01 mgrm.
35	64	6"	Paresis recovered
36	65	6"	
37	64		
38	64	6"	
39	61		
40	59	7"	Paresis appeared again
41	56	8"	
42	50	9"	Death

Days of B₁-avitaminotic feeding

Rat No. 6.

Day of exp. (Date)	B.w. (grms.)	Time	Remarks
(15. I 1940)	35		During this period basal diet
(17. ")	44		
(19. ")	50		
2 (21. I)	52	4"	B ₁ -avitaminotic diet began 20. I
4	55		
6	65		
8	68		
10	75		
12	80		
14	85		
16	91		
18	93		
20	87	5"	
22	85		
24	79		
26	73		
28	71	6"	
30	67		
32	65	7"	
34	61		Paresis
36	55	8"	
37	49	8"	Injection of Oryzanin 1 mgrm.
38	62	5"	Paresis recovered
39	63	5"	
40	60		

After injection of Oryzanin 1 mgrm. rat had been alive 35 days.

Days of B₁-avitaminotic feeding

The third experiment.

The third experiment was different from the second in the amount of vitamin B₁ used. In the third 0.01 mgrm. was used instead of 0.001 mgrm. The result of the combined use of vitamin B₁ and Yakriton was rather better than the single use of the vitamin in tenfold amount (Cf. Table 3; Table 1, No. 7 and Table 2, No. 5).

TABLE 3.
Experiment 3.

B.w. = Body weight.

Time = the shortest peroxidase stain-time.

Rat No. 1.				Rat No. 2.				
Day of exp. (Date)	B.w. (grms.)	Time	Remarks	Day of exp. (Date)	B.w. (grms.)	Time	Remarks	
(1. III 1940)	30		During this period basal diet	(1. III 1940)	32		During this period basal diet	
(3. ")	35			(3. ")	38			
(5. ")	38			(5. ")	46			
Days of B ₁ -avitaminotic feeding	2 (7.III)	45	4"	B ₁ -avitaminotic diet began 6. III	2 (7. III)	51	4"	B ₁ -avitaminotic diet began 6. II
	4	50			4	56		
	6	57			6	58		
	8	61			8	60		
	10	65			10	65		
	12	73			12	65		
	14	77			14	72		
	16	79			16	75		
	18	76			20	71	5"	
	20	76	5"		22	71		
	22	73			24	68		
	24	70			26	66		
	26	64			28	63	6"	
	28	60	6"		30	62		Paresis
	30	61			32	57	7"	
	32	59	7"		33	53	7"	Injection of Oryzanin 0.01 mgrm.
	34	56	7"	Paresis	34	55	7"	
	36	52	8"	Injection of Oryzanin 0.01 mgrm.	35	56		
	37	54	7"	Paresis slightly recovered	36	54	7"	
	38	52	8"		37	51		
	39	43	9"	Paresis increased gait impossible	38	42	8"	Death
	40			Death				

Experiment 3.

Rat No. 3.

Day of exp. (Date)	B.w. (grms.)	Time	Remarks
(1. III 1940)	30		B ₁ -avitaminotic diet began
(3. ")	38		
(5. ")	43		
2 (7. III)	49	4"	B ₁ -avitaminotic diet began 6. III
4	52		
6	54		
8	58		
10	62		
12	68		
14	70		
16	75		
18	74		
20	75	5"	
22	73		
24	73		
26	69		
28	68	6"	
30	65		
32	61	7"	
34	58	7"	
36	54	7"	Paresis
37	51	8"	Injection of Oryzanin 0.01 mgrm. + yakriton 0.05 c.c. per 10 grms. of body weight
38	58	7"	Paresis slightly recovered
39	59	7"	
40	58		
41	57		
42	56		
43	50	8"	Paresis increased again
44	48		
45			

Days of B₁-avitaminotic feeding

Rat No. 4.

Day of exp. (Date)	B.w. (grms.)	Time	Remarks
(1. III 1940)	31		During this period basal diet
(3. ")	36		
(5. ")	42		
2 (7. III)	46	4"	B ₁ -avitaminotic diet began 6. III
4	50		
6	57		
8	61		
10	65		
12	94		
14	69		
18	70		
20	70	4"	
22	68		
24	65		
26	60		
28	61	6"	
30	54		
32	52	7"	Paresis
34	49	8"	Injection of Oryzanin 0.01 mgrm. + yakriton 0.05 c.c. per 10 grms. of body weight
35	58	6"	Paresis recovered
36	57		
37	55	6"	
38	56		
39	53	7"	Paresis appeared again
40	49		
41	50	7"	
42	48		Paresis increased
43	42	8"	Gait impossible
44	40	9"	
45			Death

Days of B₁-avitaminotic feeding

Summary.

As is shown in Tables 4 and 5, the combined use of yakriton in B₁-avitaminotic feeding fortifies the effect of vitamin B₁ as much as about 10 times, so that yakriton has the effect of mobilizing or saving vitamin B₁ to a large extent.

TABLE 4.

The days of survival of rats after B₁-avitaminotic diet began and after injection of vitamin B with and without yakriton.

A = after B₁-avitaminotic diet began.

B = after injection.

Experiment 1.

No. of rat	S (days)		B ₁ (mgrms.)	Yakriton
	A	B		
1	38	1	0.001	No use
2	37	2	0.001	"
3	41	5	0.001	Used
4	42	5	0.001	"
5	39	4	0.001	"
6	42	6	0.01	No use
7	42	6	0.01	"
8	76	41	1.0	"

Experiment 2.

No. of rat	S (days)		B ₁ (mgrms.)	Yakriton
	A	B		
1	37	2	0.001	No use
2	37	1	0.001	"
3	40	4	0.001	Used
4	38	5	0.001	"
5	42	8	0.01	No use
6	72	35	1.0	"

Experiment 3.

No. of rat	S (days)		B ₁ (mgrms.)	Yakriton
	A	B		
1	40	4	0.01	No use
2	38	5	0.01	"
3	45	8	0.01	Used
4	45	11	0.01	"

TABLE 5.

The body weight and the shortest peroxidase stain-time before and after vitamin B injection with and without yakriton.

B.w. = Body weight.

B. = Before Injection.

A. = After injection.

Time = the shortest peroxidase stain-time.

Experiment 1.

No of rat	B.w. (grms.)		Time		B ₁ (mgrms.)	Yakriton
	B	A (increase)	B	A		
1	58		8"		0.001	No use
2	65	63(-2)	8"	8"	0.001	"
3	49	52(+3)	8"	7"	0.001	Used
4	66	68(+2)	7"	7"	0.001	"
5	50	55(+5)	8"	7"	0.001	"
6	55	63(+8)	8"	6"	0.01	No use
7	62	69(+7)	8"	7"	0.01	"
8	54	70(+16)	8"	5"	1.0	"

Experiment 2.

No. of rat	B.w. (grms.)		Time		B ₁ (mgrms.)	Yakriton
	B	A (increase)	B	A		
1	58	57(-1)	7"	7"	0.001	No use
2	50	48(-2)	7"	8"	0.001	"
3	51	52(+1)	8"	7"	0.001	Used
4	53	59(+6)	8"	7"	0.001	"
5	56	64(+8)	8"	6"	0.01	No use
6	49	62(+13)	8"	5"	1.0	"

Experiment 3.

No. of rat	B.w. (grms.)		Time		B ₁ (mgrms.)	Yakriton
	B	A (increase)	B	A		
1	52	54(-2)	8"	7"	0.01	No use
2	53	55(-2)	7"	7"	0.01	"
3	51	58(-7)	8"	7"	0.01	Used
4	49	58(-9)	8"	6"	0.01	"

Remarks.

It is not the aim of the present work to try to rescue rats in a far advanced stage of B₁-avitaminosis; it is quite easy to do it with the repeated and combined use of vitamin B₁ and yakriton. The present work was undertaken to show that 0.001 mgrm. of vitamin B₁, for instance, could manifest the effect of about 0.01 mgrm. of it if used in combination with yakriton.

Conclusion.

Yakriton, the detoxicating hormone of the liver, which in itself has no vitamin effect, will act to intensify vitamin B₁, as if the latter were used in several times as large as an amount.