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

92nd Report.

Effect of Yakriton on Epilepsy in Children;* also, Effect
of Prominal on it.

By

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Yakriton, the detoxicating hormone of the liver, has been used for the treatment of epilepsy in our Dispensary for these several years, but so far we have made no report on it, because there was no outstanding criterion of the real effect by which the result could be impartially judged, especially in cases with only occasional attacks. Recently it was reported by Krüger,¹⁾ Schönmehl,²⁾ and Langelüddeck³⁾ that an intravenous injection of cardiazol[†] will produce epileptic convulsions. Especially Schönmehl²⁾ reported that it is able to provoke convulsions of epilepsy by using so small an amount of cardiazol as to be insufficient to provoke convulsions in the case of any other disease of the nervous system, and that the remedy may thus be used to establish the diagnosis of epilepsy. On the other hand Duensing⁴⁾ and Schilling⁵⁾ stated that the use of cardiazol is not suitable for establishing the diagnosis of epilepsy, because it shows, they stated, a provocative effect not only in the case of epilepsy but also in some

* Part of Paper, Read at the Pediatric Session of the 42nd General Meeting of the Japanese Medical Society, April 4th 1937.

† Pentamethylenetetrazol.

1) L. Krüger, Psychiatrisch-Neurologische Wschr., 1938, **38**, 135.

2) Schönmehl, Münch. med. Wschr., 1936, **83**, 721.

3) A. Langelüddeck Dtsch. med. Wschr., 1936, **62**, 1588.

4) F. Duensing, Münch. med. Wschr., 1937, **84**, 1011.

5) E. Schilling, Münch. med. Wschr., 1936, **83**, 1890.

other diseases. Since 1936 we have had an opportunity of provoking epileptic attacks in the treatment of ten children suffering from so-called idiopathic epilepsy by the intravenous injection of cardiazol, and found that epileptic convulsions were provoked by means of this method without fail. In a control experiment we tried this method using cardiazol in an infant afflicted with congenital syphilis, and a tuberculous child, but no convulsions were produced.

Thus we have at least a fairly reliable method of producing an epileptic attack on the spot. Then we started to study the effect of yakriton on epileptic attacks, systematically using the cardiazol test in each case. We thought that, if yakriton should show a real effect on epileptic attacks, the seizures would not only become much less frequent, but also the cardiazol test would become negative. The present paper is the result of our investigation.

Provocation of epileptic attacks with cardiazol.

A number of methods to provoke an epileptic attack have already been suggested, such as by the injection of cocain or adrenalin,⁶⁾ by the use of thujone, $C_{10}H_{16}O$,⁷⁾ a drug which will cause convulsions, by hyperventilation,⁸⁾ and by freezing the radial artery with chlorethyl.⁹⁾ But these methods seem to be inconstant in results.

As already stated, Krüger,¹⁾ Schönmehl²⁾ and Langelüdeck³⁾ reported that epileptic attacks are produced by means of an intravenous injection of cardiazol in an amount of 2 c. c. in the case of an adult. According to their method, we treated 10 patients suffering from epileptic attacks with ages of from one to 15 years, with cardiazol, to see if epileptic attacks would be produced by this cardiazol method. And we found it to be an unfailing method for producing epileptic convulsions. In our trial, "grand mal" attacks were produced in 8 cases, and "petit mal" attacks in the remaining 2 cases, so that it did not fail to provoke the seizure even in a single instance out of the 10 cases. The result is shown in Table 1.

In case No. 1, aged 9 years, suffering from fits intermittently since 7 years of age, "major attack" was produced 10 seconds after the intravenous injection of cardiazol in an amount of 1 c. c.. The onset was

6) Y. Amamiya, Tozai Igaku Taikan, 1930, 6, 169.

7) H. Haddow and M. B. Keith, Amer. Journ. of Diseases. Child., 1931, 41, 532.

8) O. Foerster, Dtsch. Ztschr. f. Nervenheilk., 1925, 83, 347.

9) O. Muck, Münch. med. Wschr., 1935, 82, 2040.

TABLE 1.

Cases of epileptic convulsions caused by the intravenous injection of cardiazol.

No. of experiment	Age and Sex	Diagnosis	Epileptic attacks caused with cardiazol			
			Types of attacks	Latent time after injection of cardiazol	Duration of convulsions	Symptomes
No. 1	9 years ♂	Idiopathic epilepsy	Grand mal	10 seconds	2 minutes	Tonic and clonic convulsions. Loss of consciousness, dilated pupils, cyanosis. Babinski's phenomenon.
No. 2	1 year ♂	"	"	5 "	2 "	As above
No. 3	6 years and 9 months ♂	"	"	5 "	1½ "	" "
No. 4	7 years ♂	"	"	3 "	10 "	" "
No. 5	3 years ♂	"	"	5 "	2 "	" "
No. 6	13 years ♀	"	"	5 "	2 "	" "
No. 7	2 years ♂	"	"	10 "	5 "	" "
No. 8	9 years ♂	"	"	5 "	1½ "	" "
No. 9	6 years and 5 months ♂	"	Petit	30 "	1 "	A fixed stare, dulness of consciousness. Pale. No sleep after the attack.
No. 10	2 years and 5 months ♂	"	"	2 minutes	10 seconds	A fixed stare, loss of consciousness, contractions of the arms.
*	6 years	"Equivalent"	Headache	3 "	30 minutes	Heavy headache, a bad temper, a dilation of pupils.

sudden. At the beginning of the seizure, the face became pale, the pupils widely dilated, the eyes rolled sidewise and fixed. Of course there was a quick loss of consciousness. Simultaneously with these symptoms, violent tonic muscular spasms occurred momentarily and passed almost at once into the stage of clonic convulsions. The duration of the tonic spasm was about 10 seconds. In the stage of clonic spasm frothing at the mouth and cyanosis were seen. After the clonic spasm had continued for 2 minutes, the muscular contractions became

less and less frequent and finally ceased. In three minutes the patient regained consciousness, and passed then into a deep sleep. During the convulsions the dilatation of the pupils and Babinski's sign were seen.

In the cases from No. 2 to No. 8, "grand mal" was observed as in the case of No. 1 caused by an intravenous injection of cardiazol in an amount of 1 c. c.. Cases of No. 9 and No. 10 showed "petit mal" at the test; in the former case there was a loss of consciousness, a fixed stare, a few contractions of the arms for only one minute. After such a mild attack the patient regained consciousness. As above stated, both "grand mal" and "petit mal" can be produced immediately by the intravenous injection of cardiazol.

We tried this cardiazol method also in a case of epileptic equivalent. The patient was a boy aged 6 years, and he had been suffering from uncontrollable fits of severe headache for 6 months. The interval between the attacks was about four weeks; they would continue for about 2 hours, and after them he would pass into a deep sleep. In the case of this patient, no other organic disease was found. Under the possible diagnosis that this headache might be a case of epileptic equivalent, we put him to the test, and to our great interest a severe attack occurred 3 minutes after the intravenous injection of cardiazol in an amount of 1 c. c. His mother, who saw the attack, said that it was exactly the same attack of headache as he had had hitherto. The headache lasted half-an-hour and then he was ill-humored for about one and half-an-hours. Following that, he fell into a deep sleep lasting 6 hours. During this attack a dilatation of the pupils in a light degree was observed. As to the provocation of epileptic "equivalent" by cardiazol injection, this is within our knowledge the first case yet reported. In control test we tried, as already stated, the cardiazol test in a 5 months' old infant with congenital syphilis, and a tuberculous child aged 3 years. The amount of the drug used intravenously was 1 c. c. In both cases, however, no attacks occurred in spite of this relatively large dose; they remained unchanged. This trial will show that the cardiazol test is an excellent method of provoking epileptic attacks in epileptic patients, even if it may not be quite a specific method.

Effect of yakriton in the treatment of epilepsy.

The reports that seizures can usually be prevented in epileptic children by fasting,¹⁰⁾ by a diet relatively low in carbohydrate and high

10) G. Guelpa and A. Marie, cited by I. Meguarrie, Amer. Journ. of Diseases. Child., 1929, 38, 451.

in fat¹¹⁾ or by the strict limitation of fluid¹²⁾ are interesting, but they are scarcely practical, especially in pediatric practice.

A mamiya¹³⁾ tried yakriton in epileptic cases and experienced that in treated patients only a larger amount of cardiazol was able to produce shock. He made use of this effect of yakriton to detoxicate cardiazol and wanted to continue the treatment with yakriton thereafter.

We have to inject a definite amount (or number of units) of yakriton subcutaneously daily or once in a few days. And the patient need only lead a life as he has hitherto been leading; no strict regimen. But the criterion that a certain remedy has a beneficial action upon such a chronic disease as epilepsy ought to be based on more reliable observation than on what may be stated in the dispensary by parents etc. Now, as we have an excellent basis of criticizing the effect of an antiepileptic remedy—the cardiazol test—we can judge the result of the present experiment fairly well.

1. Cases put to the cardiazol test.

a. *Method of experiment.* After history was taken of convulsions in each epileptic child, especially of the frequency and the severity of such attacks, each case was put to the cardiazol test. When epileptic convulsions occurred or the cardiazol test was positive, only then yakriton was administered. The hormone was injected subcutaneously in an amount of 1/2 R. A. U. 3 times or 2 times a week according to cases. In most cases satisfactory results were obtained. Where epileptic attacks ceased for a rather long time after the treatment with yakriton, the cardiazol test was resumed to see if the result was a permanent improvement.

In some cases of this series, prominal* was used with yakriton or by itself at a certain period in the course of the treatment. As to the effect of prominal on epileptic attacks, Hamburger¹⁴⁾ stated that it shows not only a most effective action on epileptic convulsions, but that it does not show any collateral effects which luminal or bromide may show. S. Saka and K. Kato¹⁵⁾ and K. Kubo¹⁶⁾ also tried clinical experiments on epilepsy and reported of an excellent effect of prominal on epileptic attacks. In our experiments, prominal showed also an excellent effect on epileptic attacks, especially when it was used with yakriton, as verified in the next paragraph.

* N-methylethylphenylmalonylurea.

11) M. G. Peterman, J. A. M. A., 1925, 84, 1979.

12) I. Mcquarrie, Amer. Journ. of Diseas. Child., 1929, 38, 451.

13) Y. Amamiya, Nippon Iji Shinpo, 1938, No. 880, 65.

14) F. Hamburger, Med. Klinik., 1936, 32, 415.

15) S. Saka and K. Kato, Chiryō oyobi Shohō, 1935, No. 185, 1328.

16) K. Kubo, Tokyo Iji Shinshi, 1935, No. 2912, 95.

b. *Result of experiment.* After such a treatment, in 7 cases of all the 8 cases a favourable result was obtained, as shown in Table 2.

In Case No. 1, the patient, aged 6 years and 9 months, had been suffering from epileptic attacks twice a month for 15 months. We treated him for 7 months with yakriton in an amount of $1/2$ R. A. U. every other day. The course in this case was favorably influenced by this treatment, and spontaneous attacks not only disappeared during 9 months after the beginning of the treatment, but also the convulsions did not occur even by the intravenous injection of cardiazol in an amount of 1 c. c. in the 2nd and the 4th month of the treatment. In cases No. 2 and No. 3 the effect of treatment was strikingly rapid, and this yakriton-treatment led to a disappearance of the fits during 10 months after the beginning of this treatment. And in both cases no convulsions were provoked even by cardiazol test in the 3rd and the 5th month. In all these three cases above stated, no attacks have since occurred up to the time of writing*. They are still under observation.

In Cases No. 4 and No. 5, favourable results were also shown by this treatment. After 4 weeks of the treatment the attacks were reduced in number from 2 or 3 to one in a month in each case. Case No. 6, a boy, aged 8 years and 9 months was brought to the Dispensary because of epileptic attacks which would occur from 5 to 10 times daily. In the 1st month we treated him with prominal in an amount of from 0.2 to 0.3 grms., and 4 weeks after this medication the attacks decreased in frequency from 40 to 10 in a week. During the 2nd month of treatment, yakriton therapy was begun and it was injected 3 times a week in an amount of $1/2$ R. A. U. The attacks decreased to 3 times in a week. And then during the 2 months—from the 3rd to the 4th month of the treatment, yakriton was injected in an amount of $1/2$ R. A. U. and prominal was tried per os again in the dose of from 0.2 to 0.3 grms. Then a further improvement followed as the attack decreased in severity and number until they were reduced to one a week. Case No. 7, a girl aged 15 had been suffering from major attacks once every 10 days for 6 months. This girl had been treated by a number of physicians with different drugs—phenobarbital, bromides and other remedies but with no success. In the 1st and 2nd month of the treatment in our Dispensary, yakriton was administered subcutaneously in an amount of $1/2$ R. A. U. twice a week. Four weeks after

* VII, 1937.

TABLE
Influence of yakriton on the attacks of epilepsy.

No. of experiment	Age and Sex	Yakriton		Before treatment	
		Amount of yakriton (1 c.c. 1 R.A.U.)	Injection	Frequency of attacks	Attacks caused with cardiazol
No. 1	6 years and 9 months ♂	$\frac{1}{2}$ R.A.U.	Once every two days (7 months)	Twice every month	Grand mal
No. 2	11 years ♂	$\frac{1}{2}$ R.A.U.	Once every two days (7 months)	2 to 5 times every month	" "
No. 3	7 years and 10 months ♂	$\frac{1}{2}$ R.A.U.	Once every two days (3 months)	Once every 2 months	" "
No. 4	1 year and 7 months ♂	$\frac{1}{2}$ R.A.U.	Two times every week (3 months)	Twice every month	" "
No. 5	8 years and 2 months ♂	$\frac{1}{2}$ R.A.U.	Two times every week (3 months)	3 times every month	" "
No. 6	8 years and 9 months ♂	Prominal (1st month), $\frac{1}{2}$ R.A.U. (2nd month), $\frac{1}{2}$ R.A.U. (from 3rd to 12 month)	Once every two days (12 months)	5 to 10 times daily	Petit mal
No. 7	15 years ♂	$\frac{1}{2}$ R.A.U. (1st and 2nd month), prominal (3rd month), $\frac{1}{2}$ R.A.U. (4th and 5th month)	Two times every week (10 months)	3 times every months	Grand mal
No. 8	3 years ♂	$\frac{1}{2}$ R.A.U. (1st month), prominal (2nd month), $\frac{1}{2}$ R.A.U. (3rd and 4th month)	Once every two days (4 months)	3 times every month	" "

such a treatment the attacks decreased in frequency from 3 to 1 in a month. And only then prominal was given perorally in an amount of from 0.2 to 0.4 grms. besides yakriton injection. The treatment with both yakriton and prominal in this case produced good

results and then only one attack occurred during 2 months. In Case No. 8, the treatment with yakriton, with prominal, or with both yakri-

Fig. 1. Case No. 1 in Table 2, a boy, 6 years and 9 month old.

2.

(The cases in which the cardiazol test was tried).

After treatment		Other drugs	Comment
Frequency of attacks	Attacks caused with cardiazol		
None for 9 months	No attack	None	Entirely free for 10 months, and now under observation
None for 10 months	" "	"	Entirely free for 10 months, and now under observation
None for 10 months	" "	"	Entirely free for 10 months, and now under observation
Once every months	Grand mal	"	Improved. Attack lighter
Once every months	" "	"	Improved. Attack lighter
10 times every week (1st month), 3 times every week (2nd month), once a every week (after 3rd month)	Petit mal	Prominal (1st, and 4th month)	Improved
Once every month (1st 2nd month), once in a month (3rd month), once in two months (after 4th month)	Grand mal	Prominal (2nd, 3rd and 4th month)	Improved
Once every week (1st month), twice every week (2nd month), once or twice every week (after 3rd month)	" "	Prominal (2nd, 3rd and 4th month)	Not improved

Fig. 2. In the case of No. 6 in Table II.
8 years and 9 months ♂

ton and prominal, did not mitigate the attacks, but these increased in frequency and severity. The results in Cases No. 1 and No. 6 are shown in Fig. 1 and Fig. 2 as follows.

As to the effect of prominal on epileptic attacks, it showed an excellent effect, as already stated in Cases No. 6

TABLE
Influence of yakriton on the epileptic attacks.

No. of experiments	Age and Sex	Yakriton		Before
		Amount of yakriton (1 c.c. 1 R.A.U.)	Injection	Frequency of attacks
No. 1	4 years and 11 months	$\frac{1}{8}$ R.A.U.	Twice every week (4 weeks)	5 or 6 times daily
No. 2	7 years	$\frac{1}{2}$ "	" (6 ") "	2 or 3 " "
No. 3	7 years and 7 months	$\frac{1}{5}$ "	" (8 ") "	3 or 4 " "
No. 4	6 years	$\frac{1}{5}$ "	Daily (5 ") "	Once every 2 days
No. 5	8 years	$\frac{1}{2}$ "	3 times every week (4 ")	" " month
No. 6	10 months	$\frac{1}{2}$ "	3 " (6 ") "	" daily
No. 7	3 years	$\frac{1}{2}$ "	3 " (20 ") "	5 times daily
No. 8	2 years	$\frac{1}{5}$ "	3 " (4 ") "	3 to 5 times daily
No. 9	3 years and 9 months	$\frac{1}{2}$ "	3 " (2 ") "	Once every 2 days
No. 10	3 years and 4 months	$\frac{1}{2}$ "	3 " (3 ") "	3 to 5 times daily
No. 11	2 years and 7 months	$\frac{1}{2}$ "	3 " (2 ") "	3 times every month

and No. 7, especially when it was used with yakriton.

2. In the cases with no cardiazol test.

This group consists of cases in which yakriton was used, but in which cardiazol test was not used, because all these cases were treated before the introduction of the test into our Clinic. Among all these 70 cases of epilepsy with yakriton treatment we have only 11 cases in which it was used more than 5 times. And the major attacks in these 11 cases varied in frequency from one a month to 5 or 6 in a day according to cases. The amount of yakriton used in this series was of $\frac{1}{5}$ or $\frac{1}{2}$ R. A. U. according to cases; in some of the cases other drugs—phenobarbitul or bromide—were used. The injection of yakriton in such an amount produced an antiepileptic effect in 7 (64%) of the 11 patients (Table 3).

In Case No. 1, a boy, aged 4 years and 11 months, had from 5 to 6 attacks daily before the treatment, but the attacks were markedly reduced in number due to the treatment, and after 4 weeks of this treatment, the patient was free from attacks for 2 months. The further course is unknown. In Case No. 2 the attacks were also controlled by

3.

(The cases in which the cardiazol test was not tried).

treatment	After treatment		Other drugs	Comment
Types of attacks	Frequency of attacks	Attacks		
Petit mal	None for 2 months		None	Improved (No report since)
" "	Once every 4 months	Lighter	"	Improved
" "	" " " "	"	Luminal	"
Grand mal	" " " "	"	"	"
" "	" " 3 "	"	"	"
" "	None for 7 weeks	"	"	" (No report since)
Petit mal	Once every week	"	Bromides	"
" "	3 to 4 times daily	"	"	
Grand mal	Once every 10 days	"	None	
Petit mal	3 to 5 times daily	"	Luminal	
Grand mal	3 times every month	"	None	

yakriton in an amount of $1/2$ R. A. U., and after 3 weeks of such a treatment only one attack occurred in 4 months. And in the other 5 cases Nos. 3, 4, 5, 6 and 7, the attacks were controlled, though in some of this group other drugs were used as stated above, besides yakriton injection. In Cases Nos. 8, 9, 10 and 11, yakriton by itself or with other drugs was administered; the treatment continued from 2 weeks to 4 weeks according to cases. But an improvement was not seen, perhaps owing to too short a duration of the treatment in these cases. These results are given in Table 3.

Comment.

A total of 19 patients were treated with yakriton. Of these, 3 improved and became free from attacks, and 11 others showed a definite improvement. In only 5 patients there was no improvement. These results were obtained during a short period of 10 months, and it is quite safe to say that yakriton had a definite effect in the treatment of epilepsy, especially when it was used with prominal. But what was the

cause of improvement? If, as stated above, a patient suffering from so called idiopathic epilepsy has been freed from attacks by means of yakriton injection, and if, after such an improvement he does not show any convulsion in spite of the intravenous administration of cardiazol, he may well be called definitely recovered or cured.

In 3 cases of our epileptic patients, spontaneous attacks ceased to occur due to yakriton treatment. In these cases even the cardiazol test turned out to be negative. We think we shall be right in assuming that these patients were cured. And this result led us to speculate as to the cause.

As to the etiology of epilepsy, an innumerable number of causes have been suggested, such as heredity, the influence of alcoholism in the parent, congenital abnormalities, cerebral hemorrhage or injury, hydrocephalus, disorders of metabolism, etc. Further, the occurrence of epileptic syndromes in connexion with endocrine disorders were reported by many authors. Bisgaard¹⁷⁾ reported an epilepsy which had the origin in the disturbance of the accessory thyroid. Krylowa¹⁸⁾ reported an epilepsy associated with Basedow's symptom, which he called "endocrine epilepsy." Bolten¹⁹⁾ reported that a patient suffering from myxedema, had epileptic attacks. Poisoning is also considered by some authors as a factor to produce epileptic convulsions. Kowalewsky²⁰⁾ believed the existence of a certain chemical substance to cause epileptic convulsions. Staemmler²¹⁾ reported a patient suffering from lead poisoning associated with epileptic convulsions. Korvin²²⁾ reported that a patient, aged 21, suffering from benzene poisoning, showed "grand mal" epilepsy in periods of from 6 to 8 weeks duration. A diabetic associated with epileptic attacks was reported by Jordan²³⁾. As to the relation of epilepsy to syphilis, it is far less conspicuous than may be expected. Patterson²⁴⁾ performed a large number of experiments on epilepsy and found that only 41 cases of all 2,240, or about 1.8 per cent, showed a strong reaction, stating that syphilis was much more frequent as an incidental moment than as a causal factor in the group of syphilitic epileptic patients. As to the

17) A. Bisgaard, ref. Kongresszbl. f. ges. inn. Med., 1926, 40, 129.

18) E. N. Krylowa, Ztschr. Neur., 1929, 121, 521.

19) G. C. Bolten, ref. Kongresszbl. f. ges. inn. Med., 1932, 65, 757.

20) P. Kowalewsky, Berl. klin. Wschr., 1894, 31, 76.

21) M. Staemmler, Klin. Wschr., 1929, 8, 1210.

22) E. Korvin, Dtsch. med. Wschr., 1933, 59, 816.

23) W. R. Jordan, Arch. Int. Med., 1933, 52, 664.

24) H. A. Patterson, J. A. M. A., 1928, 90, 1249.

frequency of syphilis among epileptic patients, Kraepelin²⁵⁾ stated that from 4 to 5 per cent of epilepsy may have resulted from congenital syphilis. Amamiya²⁶⁾ also reported that positive Wassermann's reaction was seen in as small a percentage as 4% of 793 epileptics. In our own experiment, there were only two cases of all the 19 cases with positive Wassermann's reaction. It will be seen that epilepsy due to syphilis is rather rare. The real etiology of idiopathic epilepsy remains thus still in obscurity. But it seems that the local changes in the brain have relatively nothing to do with the cause of epilepsy, but, as many authors state, epileptic phenomenon may arise from deficient blood supply to the brain, caused by spasm of the cerebral vessels. And what is the cause of the angiospasm? Amamiya²⁷⁾ says that epileptic attacks may be produced by an unknown poison causing the spasm of the cerebral vessels. This is, as stated above, what many authors have believed and what will be believed. If we speculate on the mode of action as to how yakriton can effect epileptic attacks, we shall, with the above cited opinion in view, be able to mention here two effects of yakriton. Yakriton may prevent epileptic attacks from occurring, because that unknown poison will be detoxicated. It has been known to detoxicate not only such endogenous poisons as ammonia, phenol, or urea, but also exogenous poisons as phosphorus, chloroform, for instance.

The other effect of yakriton which may bear upon epileptic attacks is the improvement of blood circulation. This effect of the hormone has not yet been systematically investigated. But those who have some experience with animal experiments have seen that blood can be taken more easily from rabbits when yakriton has been used than from the controls in the case of a certain experimental poisoning. Prof. Sato²⁸⁾ touched upon this point in his lecture on "A new treatment for paralysis". The above described angiospasm of the brain in an epileptic may thus be prevented.

It is probable from what has been stated, that yakriton effects epileptic favourably, not because it acts as a sedativum like prominal, but because it either detoxicates that "unknown" poison or poisons, or

25) E. Kraepelin, *Psychiatrie III.*, Leipzig 1923, 1115.

26) Y. Amamiya, "Tenkan to Tenkanyo-Shôjo no Shindan oyobi Chiryô", "Diagnosis and Treatment of Epilepsy and Epileptoid Symptoms," 1st Edition, Tokyo 1933, 114.

27) Y. Amamiya, *Nippon Iji Shinpo*, 1937, No. 750, 431.

28) A. Sato, *Tohoku Igaku Zasshi*, 1932, 15, 9.

it contracts the angiospasm of the brain which might otherwise be produced by that poison.

Summary.

In all, 19 patients with essential epilepsy have been treated with yakriton in two series of clinical experiments. In one series, 8 cases with positive cardiazol test before the treatment were treated for a period from 3 to 12 months with yakriton alone, or with yakriton and prominal respectively. In the other series, 11 cases with no cardiazol test were treated with yakriton, yakriton with luminal or yakriton with another sedative, for a period of from 2 to 20 weeks. In the former case, three patients remained free from convulsions during 10 months since the commencement of this treatment, and did not produce an attack even when injected with cardiazol intravenously. The other cases improved. In the latter group, 7 of 11 patients improved by yakriton treatment; the 4 others did not improve, perhaps owing to too short a duration of the treatment.

Conclusions.

On the basis of cardiazol test, yakriton has a curative effect on some cases of epilepsy by itself. In some other cases it exerts a favourable influence in combination with prominal.

If this clinical experience of Takamatsu and Sato be read with the preceding paper of Kuribayashi (91st Report on Yakriton), some coincidence will be recognized. The latter paper had in view nothing to do with convulsions whatever, to say nothing of epilepsy. But the result—it was only accidental—showed that convulsions had much to do with liver power, with ammonia-detoxicating power of the liver. Takamatsu and Sato's clinical result is therefore the more interesting.

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