clinical hemorrhagic tendencies. The levels of prothrombin as determined by the Russell viper venom modification of Quick's method cannot at all times be correlated with the clinical state of the patient and the dicoumarol therapy. The control of dicoumarol therapy by the Russell viper venom method for prothrombin determination is a dangerous procedure. The results may be interpreted as being in a safe therapeutic level of prothrombin when actually the patient may be in a critical potential or actual hemorrhagic condition, this state being determined both by the Quick method and clinical observations.

16007

Electrocardiogram-Electroencephalogram Relations in Cardiac Arrhythmias.

S. J. WEINBERG.

*From the Department of Medicine, Veteran's Administration Center, Wadsworth General Hospital, Los Angeles, Calif.**

The initiating relationship of the brain, and in particular of the hypothalamus, to cardiac arrhythmias has been established on both experimental[1-4] and clinical[5-10] grounds. Although a proportion and probably a majority[11,12] of the arrhythmias may find their prime origin in intracardiac derangements, numerous cases of various cardiac arrhythmias are on record[13,14,15] in which the heart is normal. This study contains electroencephalographic data in cases of arrhythmic patients.

The electroencephalograms (EEG) were taken using the hypothalamic lead. Confirmatory electrocardiograms (EKG) were taken in each instance, except one, prior to the EEG. The EEG classification of Gibbs was used in determination of normalcy.† The results are summarized in the table, and tracings in Case 1-1a are reproduced in Fig. 1.

Interpretation. These cases may be divided

* Published with permission of the Chief Medical Director, Department of Medicine and Surgery, Veteran's Administration, who assumes no responsibility for opinions expressed or conclusions drawn by the author.

1 Beattie, J., Brow, G. R., and Long, C. N. H., *Res. Publ. Assn. Nerv. Ment. Dis.*, 1930, **9**, 249, 295.

2 Allen, W., *Am. J. Physiol.*, 1931, **98**, 344.

3 Dikshit, B. B., *J. Physiol.*, 1934, **81**, 382.

4 Korth, C., Marx, H., and Weinberg, S. J., *Arch. f. Exp. Path.*, 1937, **185**, 42.

5 Penfield, W. G., *Arch. Neurol. Psychiatr.*, 1929, **22**, 358.

6 Bernuth, F., and Steinen, R. D., *Z. Kinderh.*, 1930, **48**, 687.

7 Lucke, H., *Deutsch. Arch. f. Klin. Med.*, 1937, **180**, 40.

8 Grabe, E., *Z. Ges. Neurol. n. Psychiat.*, 1930, **128**, 615.

9 Ask-Upmark, E., *The Carotid Sinus*, Lund, 1935, 339.

10 Korth, C., *Ann. Int. Med.*, 1937, **11**, 492.

11 Parkinson, J., and Bedford, D. E., *Quart. J. Med.*, 1927, **21**, 21.

12 Parkinson, J., and Campbell, M., *Quart. J. Med.*, 1928, **22**, 281.

13 Orgain, C., Wolff, H. G., and White, P., *Arch. Int. Med.*, 1937, **26**, 769.

14 Stein, M. H., and Driscoll, R. E., *Ann. Int. Med.*, 1947, **26**, 769.

15 Clark, R. J., *N. Eng. J. M.*, 1938, **219**, 389.

† The writer wishes to acknowledge the electroencephalographic interpretations kindly furnished by David R. Talbot.

TABLE I.

Patient No.	Sex	Age	Other diagnosis	Arrhythmia by EKG	Preliminary EEG	Medication for conversion to normal rhythm	EEG with normal rhythm	EKG with normal rhythm
1.	♂	32	None	Paroxysmal auricular fibrillation-flutter	Abnormal Much fast 12-20 C/S	Quinidine	Normal	Normal
1a.	♂	32	None (Readmission)	Same	Same	,,	,,	,,
2.	♂	50	None	Paroxysmal auricular flutter	,,	,,	,,	,,
3.	♂	50	,,	Paroxysmal auricular fibrillation-flutter	None taken	,,	,,	,,
4.	♀	58	,,	History of parox. tachycardia, 30 years	—	—	Abnormal 4-9 C/S, High ampl. Alpha	Questionable evidence of myocardial damage
5.	♂	50	,,	History of parox. auric. fibrillation-flutter, 12 years	—	—	Borderline, Mixed frequency 8-22 C/S	Normal
6.	♂	50	Arteriosclerosis; cardiac hypertrophy	Auricular fibrillation	Normal	None attempted	—	—
7.	♂	63	Buerger's disease; amputations of 4 extremities	Extrasystoles, multiple foci. (Evidence of old myocardial infarction.)	,,	,, ,,	—	—
8.	♂	55	History of rheumatic fever	Auricular fibrillation	,,	Quinidine	Normal	—

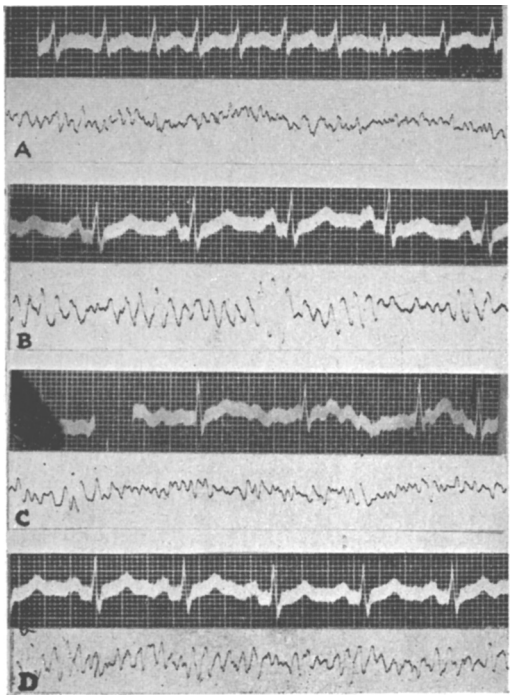

FIG. 1.
Electroencephalograms and electrocardiograms in a case of paroxysmal auricular fibrillation-flutter.
A. 3-20-47. C. 6-20-47 (Readmission).
B. and D. After conversion to normal cardiac and encephalic rhythm, using quinidine.
B. 5-8-47. D. 7-16-47.
EKG—Lead II. EEG—Left.

into 2 general groups: Those in which there is EKG history and physical evidence of myocardial damage, and those without such evidence. Cases 1, 2, 3, 4, and 5 fall within the second category. Reverse cerebral excitation is not supported by findings in cases 6, 7 and 8. EEG abnormality in a case with a history of long-standing paroxysmal arrhythmia without definite evidence of myocardial damage (Cases 4, 5) may or may not be pertinent to the cardiac arrhythmia. Experimental[4] and clinical[13] demonstration of the variety of possible neurogenic cardiac arrhythmias does not make feasible any separation at this time on the basis of type of arrhythmia. Factors not associated with the arrhythmia may cause an abnormal EEG and therefore the indication that an abnormal EEG may accompany a central excitation causing the cardiac arrhythmia is gained only from Cases 1-1a, and 2. Even here it will be necessary to investigate the possibility of cerebral circulatory insufficiency secondary to the cardiac arrhythmia.

Summary. Evidence is presented to indicate that electroencephalographic abnormality coincident with neurogenic cardiac arrhythmia may disappear with restoration of normal cardiac rhythm.

16008 P

Pressure Stimulation of Peripheral Nerves.

ROBERT B. AIRD* AND CARL PFAFFMANN.† (Introduced by D. W. Bronk.)

From the Eldridge Reeves Johnson Foundation for Medical Physics, University of Pennsylvania.

Clinical experience suggests that pressure upon peripheral nerves or nerve roots is accompanied by pain, as well as by alterations in sensation and other neurological changes. The radicular pains caused by neoplasms of the spinal canal, the root pains arising from herniations of the intervertebral discs and the pain caused by pressure on the brachial plexus of cervical ribs or thickened scalenus muscles are common examples. Pain occurs early and persists throughout the course of these conditions and has been attributed to the stimulating effect of the steady pressure against the nerve.

On the other hand, experimental physiological studies have repeatedly demonstrated that nerve fibers are relatively inexcitable to steady or even slowly changing stimuli. The classical studies on electrical stimulation of

* University of California Medical School, San Francisco.

† Department of Psychology, Brown University.