

much higher dose (200.0  $\mu$ gm.), the muscle reacted with irregular fibrillary twitches, instead of normal contraction, to the stimulation of the nerve, and after a while it became quite unresponsive. Such an extreme potency of  $\gamma$ -aminobutyrylcholine on the mammalian neuromuscular transmission is noteworthy. Besides, this property is dissimilar from that of the inhibitory factor of McLennan, which is reported not to affect this preparation<sup>3</sup>. Glycyl-, propionyl-, and butyryl-choline were also inactive at doses of 0.4, 4.0, and 40.0  $\mu$ gm., except that 40.0  $\mu$ gm. of propionylcholine caused temporary fall of the size of contraction.

Thus,  $\gamma$ -aminobutyrylcholine exerts a definite inhibition on various activities. A part of it may be due to its anticholinergic activity already reported<sup>1</sup>. However, since it has other properties such as anti-histaminic action in addition, its inhibitory activity should not be ascribed solely to competition at the acetylcholine receptor. Further studies are necessary for understanding the mechanism of its inhibitory actions.

M. ASANO\*  
T. NORO  
K. KURIAKI

Department of Pharmacology,  
Nippon Medical School,  
59 Sendagicho, Bunkyo-ku, Tokyo.

\* Present address: Department of Physiological Hygiene, Institute of Public Health, Shiba Sirogane Daimachi, Minato-ku, Tokyo.

<sup>1</sup> Kuriaki, K., Yakushiji, T., Noro, T., Shimizu, T., and Saji, Sh., *Nature*, **181**, 1336 (1958).

<sup>2</sup> Takahashi, H., Nagashima, A., and Koshino, Ch., *Nature*, **182**, 1443 (1958).

<sup>3</sup> McLennan, H., *J. Physiol.*, **146**, 258 (1959).

<sup>4</sup> Kewitz, H., *Naturwiss.*, **46**, 495 (1959).

<sup>5</sup> Yoshihara, H., and Kuriaki, K., *C.R. Soc. Biol.*, **151**, 1462 (1957).

<sup>6</sup> Florey, E., *Canad. J. Biochem. and Physiol.*, **34**, 669 (1956).

<sup>7</sup> Florey, E., and McLennan, H., *J. Physiol.*, **129**, 334 (1955).

### Fracture Healing by Vitamin K

THE aim of this short communication is to report on the pronounced effect of vitamin K in speeding up the rate of bone healing. Some clinical observations (Bouckaert, A., and Hart Kliniek, H., personal communication) and preliminary experiments (Bouckaert, J. H., and Oyaert, W., personal communication) indicated that vitamin K had a real effect on all collagen tissues and especially bone tissue.

Adult male and female rabbits and rats were used in this study. Complete transverse fractures of the left tibia were produced by an open operation under ether anaesthesia. In the case of rabbits intramedullary pins were used to fix the fractured ends of the bone. In rats the fractures were supported by maintaining the fibulae intact. The operation wound, which was thereafter closed with catgut, healed uneventfully in nearly all cases. All animals were kept under the same dietary conditions on a well-balanced ration, fed and watered *ad libitum*. Various groups of animals received vitamin K while others served as controls.

Fig. 1a is a radiomicrograph of a fractured rabbit tibia after treatment with vitamin K. It shows a well-developed periosteal callus and the interfragmentary space woven with primary bone in a comparatively high degree of mineralization. Fig. 1b is a radiomicrograph of a control animal which received no medicaments. Here the periosteal callus is not

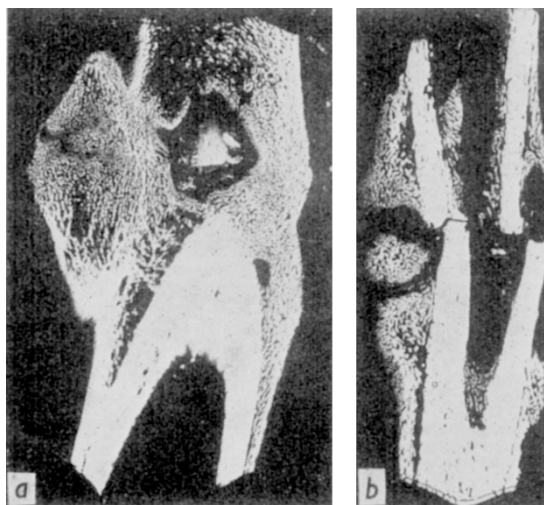


Fig. 1. Radiomicrographs from fractured tibiae of a, an animal receiving vitamin K; b, a control animal

complete. The space between the fractured ends is occupied with tissues devoid of any mineral deposition. Ordinary radiographs showed a complete continuity of the fractured bone of the treated animal in contrast to persistence of the fracture site in the control.

Full details about the further steps in our study with vitamin K singly or combined with other therapeutics as well as its exact mode of action will appear elsewhere.

J. H. BOUCKAERT

Clinic of Large Animals,  
State University,  
Ghent.

A. H. SAID\*

Surgery Department,  
Veterinary College,  
Cairo University,  
Egypt.

\* Delegated to Ghent University.

### Effect of Foetal Hypophysectomy on the Foetal Liver Fat in the Rabbit

ANGEVINE<sup>1</sup>, in his study of the pituitary and adrenals of 20 human anencephalic foetuses, noted that in practically every case the subcutaneous pannus of fat was unusually thick especially over the shoulders and thorax. This observation has been confirmed in a number of full-term or near full-term anencephalics which are now being studied. Jost<sup>2</sup> has recently shown that foetal thyroidectomy in the rabbit results in an increase in total fat (determined by ether-alcohol extraction), which does not occur if thyroxine is injected into the foetus at the time of the thyroidectomy. This raises the possibility that the increase in fat in the human abnormality is due to a foetal hormonal disturbance, and this view is supported by the knowledge that the pituitary of anencephalics is reduced in size and that secondary to this the adrenals are extremely small<sup>1</sup>. It is therefore possible that the hypofunction of the pituitary either directly, or indirectly by affecting other endocrine glands, determines the increase in fat found in the human anencephalic monster.

To study this aspect of anencephaly further it was decided to investigate the effect of removing the