

The coefficients of variation compare favorably with that in the previous study, which was 6.5.

The authors conclude that the fasting blood sugar in any normal individual varies from day to day as much as it does in a large group of normal individuals taken at random.

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Peripheral and Central Chemical Control of Pulmonary Ventilation.

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Until the recent work of Heymans there has been little evidence for reflex chemical control of pulmonary ventilation. The demonstration of increased respiratory movements from perfusion of the carotid sinus with carbonated and deoxygenated blood calls for a study of the relative values of peripheral and central chemical control.¹ Several procedures were used.

The effects of injection of sodium cyanide, sodium sulphide, sodium carbonate and sodium bicarbonate into the carotid arteries after occlusion of the vertebral and external carotid arteries and denervation of one carotid sinus were noted. Injection of sodium cyanide on the side on which the innervation of the carotid sinus was intact invariably produced increased ventilation. Injection on the denervated side produced relatively small or no increase in ventilation followed by depression. In general the effects of intra-arterial injection of sodium sulphide were similar to those produced by cyanide. Painting the innervated sinus with sodium cyanide or sulphide elicited increased ventilation. This response was demonstrated to be due to local action. Intravenous injection of sodium cyanide or sulphide after double vagotomy and double sinus denervation was relatively ineffective or entirely ineffective in augmenting ventilation. Late depression of ventilation was not uncommon. Similar results were obtained if the common carotid arteries and the internal occipital arteries were occluded as a substitute for denervation. Injection of cyanide into the 4th ventricle was found to produce immediate excitation or depression without initial excita-

¹ Bouckaert, Dautrebande and Heymans, *J. Physiol.*, 1931, **71**, 5.

tion. It was concluded that this action was local. In several experiments in which sodium sulphide was injected into the fourth ventricle, immediate, well sustained and marked augmentation of ventilation invariably occurred.

Sodium carbonate produced marked apnea when injected into the carotid arteries on both the denervated and innervated side. Injection of sodium bicarbonate on either side produced the typical augmentation of ventilation. After double vagotomy and double carotid sinus denervation, intravenous injection of sodium carbonate produced apnea. Administration of carbon dioxide in a 30% oxygen mixture after double vagotomy and occlusion of the carotid sinuses elicited strong stimulation of the respiratory muscles. Exterior flooding of the carotid sinus with bicarbonate or carbonate solutions appeared to have no effect on pulmonary ventilation.

The relatively small increase in ventilation produced by intravenous injection of cyanide and sulphide after vagotomy and double carotid sinus denervation agrees with the small increase in ventilation under similar conditions on administration of nitrogen as noted by Bouckaert, Dautrebande and Heymans.¹

Our findings that denervation had relatively little effect on the action of sodium carbonate, sodium bicarbonate and carbon dioxide call for special consideration of a dual mechanism of control of ventilation by oxygen lack and carbon dioxide excess in addition to a possible common mechanism of control.²

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Electrocardiographic Study of Movements of the Heart with Change of Posture.

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The human electrocardiogram, as recorded, leading off from points on the surface of the body, is influenced by extracardiac factors, particularly by the effects of the tissues about the heart and

² Since this report has been in press our attention has been called to similar experiments in which sodium cyanide and sodium sulphide were injected into both common carotid arteries with denervation of the carotid sinus on one side. Heymans, Bouckaert and Dautrebande. *Archives Internationales de Pharmacodynamie et de Therapie*, 1931, **40**, 54.