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Conclusion. Viosterol does not exert a favorable influence on dogs with complete biliary fistulae.

7550 P

Influence of Variations of O₂ and CO₂ Tension in Inspired Air Upon Hearing.

ERNST GELLHORN AND IRWIN SPIESMAN.

From the Department of Physiology, College of Medicine, University of Illinois.

Although tests made on aviators and other observations at high altitudes indicate that O₂-lack causes sensory disturbances,¹ particularly in vision, no systematic study seems to have been made in which the influence of various O₂- and CO₂-tensions was investigated in regard to sensory functions. Such a study seems to be of particular interest since the importance of these factors for various reflexes is well known. The present paper is based upon 96 audiometer experiments carried out on 6 thoroughly trained subjects. The administration of various O₂-, N₂- and CO₂-air mixtures, which were inhaled from several large Douglas bags, was preceded and followed by control periods in which the threshold for a certain sound was determined in intervals varying between 1 and 4 minutes. Long control series extending over several hours were also carried out in order to determine the spontaneously occurring variations in threshold. The observation room was nearly sound proof.

In 37 experiments the influence of breathing CO₂-air mixtures (2%-8.4%) during 5-22 minutes was studied upon the threshold of C 128, C 2048, and C 4096 cycles per second. It was found that a distinct hearing loss occurred during CO₂ breathing at and above 3% CO₂. Depending on the CO₂ concentration and the duration of the breathing period, the recovery after the end of the CO₂-period varies somewhat, but in general it was found that in less than 15 minutes the threshold was the same as before the experiment.

Contrary to expectation, similar losses in auditory acuity were obtained in 26 experiments in which the CO₂ tension of the blood was lowered by means of voluntary hyperpnea which was carried out for 3-6 minutes. The threshold determined immediately after the hyperpnea period during which apnea obtained was considerably

¹ McFarland, R. A., *Arch. Psychol.*, 1932, 145, 1.

higher and a gradual return to normal was observed during the next 10-15 minutes.

In a third group of 33 experiments 7.5%-15.8% O₂ was inhaled for 8-30 minutes. Here again it was found that during the period of O₂-lack a decrease in hearing occurred. The recovery period, after readmission of air, depended greatly upon the degree of O₂-lack produced during the experimental period. If 10% or less O₂ was inhaled for 15-30 minutes a decrease in hearing persisted for considerable periods of time, in some cases for several hours. During this time no other symptoms were present. The administration of high O₂ mixtures (50-60% O₂) for 5-10 minutes does not seem to influence the course of the recovery period. These observations seem to indicate that a diminished O₂-supply for relatively short periods of time produces changes in the nervous mechanism involved in hearing which are only slowly reversible. Furthermore, they indicate that O₂-lack, CO₂-excess, and CO₂-lack influences hearing in the same fashion, although the effect of O₂-lack is most severe. Another interesting phenomenon was observed in all 3 groups of experiments. The readmission of air leads in some cases to a considerable temporary improvement in hearing. Our observations agree with those of Schubert,² who found that after O₂-lack upon readmission of air an improved visual discrimination is observed, as well as motor hyperexcitability. But in our experiments it is shown that such a temporary supernormal phase is not a specific reaction to O₂-lack but also occurs after CO₂-inhalation and voluntary hyperpnea.

7551 P

Influence of Variations of O₂ and CO₂ Tension in Inspired Air Upon After-Images.

ERNST GELLHORN, IRWIN SPIESMAN AND LESTER F. M. STORM.

From the Department of Physiology, College of Medicine, University of Illinois.

It was our objective to study the influence of variations of O₂ and CO₂ tension upon a simple and quantitatively measurable visual process in man. We chose the latent period of a negative after-image. The experimental subject fixated with both eyes the center of a yellow square on a grey background at a distance of 60 cm. The eyes were closed for one minute prior to each experiment.

² Schubert, G., *Pflüger's Arch.*, 1933, **231**, 1.