seems likely that, with this high blood cholesterol, the animals fed choline would shortly have developed more extensive atherosclerosis. Further work is needed to clarify this point.

Summary. The feeding of soya lecithin to rabbits receiving cholesterol restricts hypercholesterolemia and diminishes the incidence of experimental arteriosclerosis.

13468 P

Nerve Concussion.

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Recent observations[1] indicate that typical cerebral concussion is best reproduced in unconscious animals by subjecting the head to a sufficiently high rate of change in velocity. The response is an immediate muscle "start reflex" followed at once by relaxation and abolition of reflexes (but with continuing discharge from reflex centers) lasting up to 60 seconds; recovery (or death) may occur within a period of 5 minutes.

In the present experiments a short segment of the sciatic nerve of the green frog is compressed by a blast from an air pistol. The segment exposed to the blast lies on a solid foundation at the bottom of a pit 3.6 mm wide and about 4 mm deep into which the air is shot. "Maximal" induction shocks delivered to the nerve centrad to the compressed segment test the degree of the resulting conduction block, either in terms of contraction height, when the muscle (gastrocnemius) remains attached, or in terms of area of the monophasic action potential when the nerve responses are recorded with the cathode ray oscillograph. "Maximal" shocks delivered to the nerve distad to the compressed locus control the condition of the nerve beyond the pit, and of the muscle.

A blast that blocks, either partially or completely, may elicit a maximal twitch of the muscle due to the mechanical stimulation of the nerve. Testing shocks applied immediately thereafter reveal a reduction, it may be to zero, in the height of the contraction or of the spike. The test contractions or spikes then almost immediately

[1] Denny-Brown, D., and Russell, W. R., *Brain*, 1941, **64**, 93.

increase in height and this progresses steadily through periods that have lasted up to 10 minutes, but usually not longer than 3 to 5 minutes. We have not yet found a blow that permits of complete recovery from a complete block. With the muscle as the index, the best recovery thus far obtained has been to 80% of the original height from a reduction by the blast to 45% of the original height. A maximum *A* action potential, though, has been reduced by the blast to 24% of its original area and at maximum recovery, attained in 4.3 minutes, had 89% of the original. Failure to obtain complete recovery from complete block possibly is referable to the manner of exposure of the nerve to the blast: it is driven against the foundation it rests on and the fibers therefore are not all compressed equally; possibly it is referable also to a difference in the susceptibility to blast of fibers of different sizes. The gradualness of the recovery is the expression of differences in the rate of recovery of the individual component fibers from block.

Compression block must be, in effect, a stretch block, since localized compression deforms that locus, narrowing and therefore stretching it, whereas uniform compression does not annul excitability.[2] Denny-Brown and Russell are not definite regarding "the mechanism by which the neurones are damaged in acceleration concussion," though they do say that "the demonstration of a threshold for the necessary acceleration indicates that a fixed uniform physical change" is concerned. Again, they attribute the paralytic phenomena to "direct generalized physical injury to neurones" which causes immediate, but reversible, loss of function, and state that the hemorrhagic lesions which occur in very severe injuries indicate distortion or stress, but not necessarily identical with that which causes concussion, and that petechial hemorrhages, when they occur, probably are produced by "direct squashing or stretching."

The fact that the events of nerve and cerebral concussion run approximately the same time course suggests that the mechanism and the structures involved are the same in both. But how, then, can the combination of continued activity of nerve centers with concomitant paralysis of reflexes be accounted for? It might be due (a) to a fundamental difference in the reaction of cell and fiber to stretch; or (b) to a more protected position of the centers or to differences in the lengths exposed to stretch, fibers being long and cells short, with the additional proviso that cells respond with repetitive discharges to stretches of less than blocking intensity; or (c) to

[2] Cattell, McK., and Edwards, D. J., *Science*, 1930, **71**, 17.

an association with neurone block of repetitive discharges from the injured, the blocked, locus.

In favor of this last possibility is the observation we have made twice now, that fibers that have been blasted continue to develop spikes after the one initiated by the blast. But if this happens in experimental cerebral concussion, one would expect the initiating "start reflex" to be followed by some evidences of motor activity. As a matter of fact, Denny-Brown and Russell state that the start reflex is followed by a delayed spasm and then by the loss of postural tone. Concussion would be accounted for, on this basis, by stretch blocks of neurones plus excitation at the distorted loci, when there are evidences of excitation.

Summary. An adequate blast from an air pistol applied to a short segment of nerve causes the fibers to discharge once but immediately blocks the transmission of impulses. Fibers thus blocked may initiate repetitive spikes. Within the course of 3 to 5 minutes, as a rule, conductivity returns spontaneously in all fibers that have not been irreparably damaged. The possible relation of these results to cerebral concussion is discussed.

13469 P

Carbohydrate Metabolism and Staphylococcus Infection in Rabbits.

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A previous communication from these laboratories[1] showed that spreading necrotising staphylococcal skin infections and subcutaneous injections of necrosing doses of staphylococcus toxin produced temporary but definite glucose intolerance in rabbits. It was thought that it would be of interest to observe the effect of repeated subcutaneous injections of *Staphylococcus aureus* and of staphylococcus toxin. The following communication gives the results of some preliminary experiments of this type.

Experimental Procedure. The methods of analysis and injection were the same as described previously. Twelve rabbits were used.

[1] Jackson, S. H., Nicholson, T. F., and Holman, W. L., *J. Path. and Bact.*, 1940, **50**, 1.