mental period. In contrast to the curves obtained after orange juice, banana, or banana and cream, previously published, and bread, oatmeal and potato, there is absolutely no compensatory drop in blood sugar level. Curves 1 and 2 are representative examples of this series of experiments with their controls.

The application of this principle to the problem of protamine zinc insulin therapy has eliminated nocturnal hypoglycemia. Patients are instructed to take 50% or more of the daily protein allowance at the evening meal, in order to buffer the tendency toward decreasing blood sugar concentration during the night.

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Syndromes Secondary to Prolonged Hypoglycemia.*

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In an attempt to study the effects of prolonged hypoglycemia dogs and cats were injected with insulin and subjected to coma for varying periods. The duration of the coma was frequently extended as long as possible compatible with life. The symptomatology, which subsequently developed, occurred despite a blood sugar raised to normal levels or higher by the administration of sugar. The post hypoglycemic syndromes are characterized by their variability. For example, dog No. 4, which received insulin for 4 days and was intermittently in coma for approximately one-half of that time, became totally blind in his left eye and retained only light perception in his right one. He was continually moving about and in his aimless restlessness would bump into any object that might confront him. When food was placed in his mouth he showed no inclination to swallow it, but kept it there indefinitely. Another animal, cat No. 2, remained in a fixed position, an awkward one, standing on his hind legs and leaning upright against the side of the cage for at least 12 hours, though the blood sugar was raised to normal levels throughout this period.

Cat No. 6 displayed the crossed extensor reflex and spasticity of the posterior extremities. In cats the temperature regulation is frequently impaired after prolonged hypoglycemia. Cat No. 3 became

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to a great extent poikilothermic. After recovery from a 7-hour period of hypoglycemia his temperature was only 36.6° despite torrid weather. The next morning his temperature was 38.7°, but after remaining in the ice room for 15 minutes his temperature fell to 38° and 20 minutes later to 36.3° with no shivering. Four hours after removal from the ice room the animal's temperature rose to 39° and his response to temperature was not tested again. Throughout this period and for several days thereafter the animal remained somnolent, did not respond to stimuli, nor did he swallow the food which was placed in his mouth. Such a preparation is termed "vegetable". Bradycardia is a frequent occurrence during hypoglycemia and this bradycardia in many instances continues for several hours after the administration of sugar. If the survival can be prolonged for several days, partial or complete recovery may be observed. Sudden death may also occur.

Marked hypoglycemia depresses the metabolism of the brain.[1, 2, 3] These preliminary experiments reveal that if this depression of cerebral metabolism is too prolonged in many instances irreversible cerebral changes occur. These changes are not restricted to any given area but may affect the various parts of the brain. This has also been disclosed in histological studies. Somnolence and temperature regulation have been localized as functions of the hypothalamus. Bradycardia, too, may be due to a release of parasympathetic centers in that region. The restlessness which developed in dog No. 4 resembled that of a decorticate animal, while the spasticity and crossed extensor reflex is like that of a decerebrate cat (No. 6). The catatonia, too, may be related to the disturbance in the functions in the brain. Blindness as well as these other changes may also result from nitrous oxide anesthesia, thus emphasizing the similarity between the effects of anoxia and those of glucose deprivation.[4, 5, 6] In view of results such as desribed above it is important to note that patients receiving the insulin treatment for schizophrenia should not be subjected to too prolonged hypoglycemia.[7]

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