

For a proper appreciation of what happens in true diabetes mellitus, or in a temporary glycosuria, a brief statement of our present conception of carbohydrate metabolism in the normal individual is necessary. Although Pavy and others deny Claude Bernard's glycogenic function of the liver, until more convincing evidence is brought forward we must accept this theory, and still accord to this organ the important duty it is believed to perform in the disposal of the carbohydrates taken in the food and those metabolized from the ingested proteids. According to most physiologists, the carbohydrates eventually reach the liver by way of the portal vein, largely in the form of glucose, or grape sugar, and are there converted by the liver cells into glycogen. The glycogenic function of the muscles is also generally accepted, and it is believed that the whole muscular system contains an amount of this polysaccharia equivalent in weight to that contained in the liver. The muscles, therefore, constitute a second great reservoir for the storing up of a supply of carbohydrates. When the system demands more fuel to produce energy and heat, the liver reconverts the glycogen back into glucose by the action of a special enzyme produced in the liver cells, and this glucose reaches the systemic circulation by way of the hepatic veins.

In the normal individual it has been shown that at all hours of the day the glucose in the circulating blood ranges within narrow limits, variously stated as being between 0.1 and 0.15 per cent. and 0.1 and 0.2 per cent. Why is it that after a meal rich in carbohydrates this normal glycaemia is still present? It is due to the fact that the surplus of glucose is stored up in the liver and muscles as glycogen, and is only slowly reconverted again into glucose and given up to the system as the latter demands it. It has been supposed that the ultimate combustion and disposition of the carbohydrates takes place in the muscles. The actual means by which this is brought about has been the subject of innumerable investigations by physiologists for years. We shall see later whether a satisfactory explanation has been found. Whenever, for any reason, the percentage of glucose in the circulating blood reaches more than 0.2 per cent. we get a condition of hyperglycaemia, and the excess passes over into the urine and produces either a transitory glycosuria or a permanent glycosuria, as in diabetes mellitus. In marked cases of the latter disease the percentage of glucose in the circulating blood may reach as high as 0.5 to 0.7 per cent. One can conceive of such a hyperglycaemia occurring chiefly in one or two ways—either as a result of overproduction or, what is much more likely, a deficient combustion of glucose. The problem as to how this hyperglycaemia occurs is the one that has for so long occupied, and still occupies, the attention of those who have made a special study of the etiology of diabetes. We shall endeavor to see whether the study of the functions of the ductless glands has thrown any light upon this puzzling question.