

2. The pancreas and chromaffin system mutually retard the action of one another.
3. The thyroid and the chromaffin system mutually increase the action of one another.

#### THE ADRENALS AND CARBOHYDRATE METABOLISM.

Although clinical experience has given us little or no evidence from which we could draw the conclusion that the adrenals materially influence carbohydrate metabolism, yet laboratory experiments have adduced ample testimony that they do. In 1901 Blum reported that the subcutaneous injection of an aqueous extract of adrenalin produced glycosuria in 22 out of 25 animals experimented upon. Herter, in the following year, published the results of a series of instructive experiments, in which he showed that the subcutaneous, intravenous, and intraperitoneal injection of adrenalin chloride solution into dogs was almost invariably followed by glycosuria. He demonstrated that marked glycosuria followed the application of small quantities of adrenalin directly to the pancreas—quantities which when applied locally to other parts of the body either gave rise to no excretion of sugar or to a trivial glycosuria.

Zuelzer has shown that an antagonistic action exists between the adrenal secretion and the so-called internal secretion of the pancreas. He found that when normal blood was allowed to flow through the liver of a dog whose pancreas had been extirpated the sugar in the urine increased from 50 to 70 per cent., but this percentage was decidedly increased when the liver used was from a dog in whom suprarenal diabetes had been previously induced. He thinks that the internal secretions of the pancreas and adrenals react upon each other within the liver in such a way as to maintain the normal sugar elimination. When the pancreatic secretion is wanting, as in pancreatic diabetes, the unhindered adrenalin produces an increase in the sugar. When the function of both the pancreas and the adrenals was destroyed, glycosuria failed to occur. After the pancreas was removed and the suprarenal veins were ligated there was again an absence of diabetes. Zuelzer has experimented upon a very large number of pancreatectomized animals, and, except when the suprarenal veins were also tied off, glycosuria always followed. He is convinced that one of the most important functions of adrenalin is its effect on sugar metabolism in the liver. The adrenal and pancreatic secretions seem to be antagonistic in their action so far as carbohydrate metabolism is concerned.

Lépine, in working on a method of estimating the functional activity of the pancreas, in regard to both its internal and external secretions, has made some interesting observations, which have a bearing on this