

57 (666)

The inhibitory action of adrenalin in muscle-pancreas mixtures.By **ALWIN M. PAPPENHEIMER, M.D.**

[From the Department of Pathology, College of Physicians and Surgeons, New York City.]

Much evidence has accumulated since Blum's discovery of adrenalin glycosuria in 1901, to indicate an antagonistic action between the adrenal and the pancreas in carbohydrate metabolism. The more intimate nature of this antagonism is still obscure. Bayer in a recent article has suggested three possible modes of interaction:

1. The action of the internal secretion of the pancreas may be directly inhibited by the adrenalin, or
2. The secretion of the pancreatic hormone may be prevented, either directly or through reflex nervous influence, or
3. The adrenalin, through its vaso-constrictory action, may close up the channels of exit through which the internal secretion of the pancreas reaches the circulation.

At the suggestion of Professor MacCallum, the attempt was made to demonstrate this antagonistic action between adrenal and pancreas in vitro, where the problem is simplified by the exclusion of secretory or vaso-motor influences. The technique used was, with slight modifications, that described by Cohnheim in 1906 for the demonstration of the activating effect of pancreas extract upon the glycolytic ferment of muscle. The finely hashed muscle of cats was extracted in iced sodium oxalate solution, the excess of oxalate precipitated with calcium chloride, and glucose added in known amount. Duplicate flasks of muscle extract alone, of muscle extract plus pancreas, and of muscle extract plus pancreas plus adrenal gland extract or adrenalin in varying dilutions up to 1 in 110,000, were incubated overnight at 37° under toluol. Sugar determinations were made with Benedict's solution from samples taken before and after incubation.

It was found that the addition of adrenalin to muscle-pancreas mixtures prepared in this way, gave a higher sugar content than the controls. This effect was obtained definitely in 9 out of 10

experiments. In 6 of the 10 positive experiments, there was an actual increase in the amount of reducing substance during the course of the experiment.

The results may be summarized as follows:

Mixture.	Average Loss of Reducing Substance.
Muscle-extract alone	- 0.096 gm. in 100 c.c.
Muscle-pancreas	- 0.225 gm. in 100 c.c.
Muscle-pancreas-adrenalin	+ 0.01 gm. in 100 c.c.

These experiments then show that the antagonistic action between adrenalin and pancreas, as schematized by Falta, Eppinger and Rudinger, may be demonstrated in vitro independently of any possible nervous influence. King in 1910 showed that a similar retarding influence upon the disappearance of reducing substance in muscle pancreas mixtures was exerted by thyroid extract.

The question as to whether there occurs in this reaction, a true glycolysis, or as Levene and Meyer hold, merely a condensation of the sugar molecule, is left untouched by these experiments. The antagonistic action of adrenalin and pancreas in regard to the disappearance of reducing substance in muscle extracts seems to be clearly demonstrated.

58 (667)

The characteristic course of the rise of blood pressure caused by an intraspinal injection of adrenalin.

By **J. AUER** and **S. J. MELTZER.**

[From the Department of Physiology and Pharmacology of the Rockefeller Institute.]

An intravenous injection of adrenalin causes a rapid steep rise of the blood pressure with a gradual fall. An intramuscular injection produces a similar effect. A subcutaneous injection either produces practically no effect or it causes a very slow rise which rarely exceeds fifteen millimeters. In recent years adrenalin was injected into the spinal canal in conjunction with some local anesthetic. The question as to the nature of the effect of these injections upon the blood pressure has to our knowledge never yet been investigated. On the basis of the generally accepted assumption that the absorption from the spinal canal into the circulation