PHYSIOLOGY.
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ADRENALIN DIABETES.

Recently the opinion has been widely expressed that the glycosuria which sets in after pancreas extirpation is due to the removal of an organ which exercises an antagonistic influence on the glycosuric action of adrenalin.

The grounds for this hypothesis are the following:—If pancreas extract be injected prior to, or during the period of, adrenalin injection, the glycosuric effect of the latter is neutralised. And again, if suprarenals and pancreas be removed at the same time, the dog does not become diabetic.

The modus operandi of adrenalin is, however, still a subject for discussion.

Pollak, in his experimental studies of adrenalin diabetes (Arch. f. Exp. Path. u. Pharmakol., Bd. lxi. S. 149), has tried to clear up a number of obscure points relating to this subject. In the first place, he investigated the action of adrenalin on the storage of glycogen in the liver. It is well known that in pancreatic diabetes the glycogen formed from levulose may be stored in the liver, while that from glucose cannot be so retained. Pollak therefore studied the action of adrenalin on the hepatic glycogen stored after glucose and levulose respectively had been given. The experiments of earlier investigators have gone to show that glycogen is easily removed from the liver by large doses of adrenalin, but if the adrenalin be given in very small but gradually increasing doses, the effect upon the hepatic glycogen is very slightly marked. The action of adrenalin upon glycogen formed from levulose had not been investigated until Pollak took the subject up. The results of his experiments dealing with the subject may be briefly summarised as follows:—When large doses of adrenalin are given, glycogen, whether formed from glucose or levulose, is easily removed. If small doses, however, are given, the glycogen formed from levulose is found to be much more resistant than that obtained from glucose.

The author has brought forward a number of extremely interesting facts concerning the relationship of hyperglycaemia to glycosuria. These may be briefly summarised as follows:—

1. When one small subcutaneous injection of adrenalin is given to an animal which possesses an abundant store of glycogen, glycosuria is readily set up. If, on the other hand, a single dose of adrenalin, however large (say 0·01 to 1 mgm.), dissolved in a small amount of fluid be injected intravenously into a rabbit, glycosuria is never produced.

The intravenous injection leads to a hyperglycaemia, but this is not
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sufficiently marked to produce a glycosuria, owing to the small quantity of urine which is passed. If diuresis be produced at the same time, glycosuria always puts in an appearance. The single subcutaneous injection produces a hyperglycæmia sufficiently marked to result in glycosuria without any increase in diuresis. In rabbits, more than 0.15 per cent. and less than 0.25 per cent. glucose in the blood, if there be at the same time marked diuresis, leads to glycosuria. Examples of this condition are caffeine glycosuria, and the glycosuria with diuresis produced by an intravenous injection of adrenalin. Without diuresis this percentage of sugar in the blood will not, as a rule, produce glycosuria. Examples: hyperglycæmia after laparotomy, and hyperglycæmia after intravenous injection of adrenalin when no diuresis has been produced.

A percentage of sugar in the blood higher than 0.25 per cent. leads to glycosuria, even when no diuresis has been produced. Example: subcutaneous adrenalin injection.

2. If a high percentage of glucose in the blood be kept up for some time, the kidneys will finally no longer excrete glucose. This is regularly to be observed after frequent subcutaneous adrenalin injections.

3. Conversely in certain cases glycosuria may occur with the sugar percentage of the blood scarcely, if at all, above normal. Cases of this kind are noticed after certain renal poisons have been given, e.g. cantharidin, mercuric chloride, uranium salts, &c.

In his latest studies concerning adrenalin diabetes, Pollak draws attention to a most interesting fact. In rabbits, which have been rendered glycogen-free by starvation or by the action of strychnine, adrenalin, when given in increasing doses, produces such a storage of glycogen in the liver as is usually only to be observed after prolonged carbohydrate feeding, although the muscles remain practically free from glycogen. Nishi, working in the same laboratory as Pollak, investigated the nature of the hyperglycæmia produced by withdrawal of blood. He found that the hyperglycæmia so produced was not affected either by section of the splanchnic nerves on both sides or by removal of the suprarenals. He therefore concludes that it is due to a direct action on the liver.

The Nitrogen Excretion under Different Diets.

Karl Thomas (Arch. f. Anat. u. Physiol., S. 219, 1909) gives a number of most interesting results obtained in an investigation dealing with the value of different diets in maintaining nitrogenous equilibrium. When a diet was taken consisting almost entirely of potatoes, with the addition of fat in the form of butter or salad oil, the nitrogen excretion in the urine amounted only to 5.525 grms. During this time the person remained in nitrogenous equilibrium. It is interesting to notice that Richter (Deutsche med. Wochenschr., No. 49, 1908) and
Hedinger (Deutsche Arch. f. klin. Med., Bd. xcvi., S. 339, 1909) have strongly recommended a potato dietary as leading to a loss of fat and water, while maintaining the nitrogen content of the body constant. When cow's milk was taken the results were of quite a different nature, the proteins of the milk being used evidently largely for dynamogenic purposes. Thus, for example, on such a diet the nitrogen metabolism amounted approximately to 18 grms. This may be markedly lowered by adding to the diet a sufficient amount of carbohydrates and fats to cover the energy requirements of the individual. But even if the nitrogenous constituents are protected from being used as sources of energy, the nitrogen minimum excretion remains higher than on the potato diet. The author courageously investigated the action of a pure carbohydrate diet upon the excretion of nitrogen. He then carefully studied the effects produced by the addition of various nitrogenous food-stuffs to this diet. He stated his results in terms of the biological value of each of these nitrogenous food-stuffs. The "biological value" was arrived at by the following calculation:

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\text{Urinary Nitrogen on a N-free diet} + \text{Balance on addition of a nitrogenous food-stuff} - \text{Nitrogen absorbed.}
\]

The biological values (approximate) so attained for various food-stuffs may be quoted here:

| Food     | Biological Value |
|----------|------------------|
| Beef     | 105              |
| Milk     | 99               |
| Rice     | 85               |
| Crabs    | 73               |
| Casein   | 66               |
| Nutrose  | 63               |
| Spinach  | 64               |
| Peas     | 50               |
| Maize    | 12-24            |

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**PATHOLOGY.**

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**THE WASSERMANN REACTION IN SYPHILIS.**

During the past two years the results of several researches have been published, the object of which has been to show that the serum of syphilitic patients possesses special and specific properties. The importance of such investigations, especially from the standpoint of the diagnosis of this protean disease in its obscure manifestations, is at once apparent, and it is not surprising that widespread interest has