of an old posterior wall infarction, shows again a clockwise direction of its main portion, as well as a very pronounced lateral direction of its long axis. It is succeeded by a short swing in the opposite, namely counterclockwise, direction. The amplitude of both tracings (Fig. 3 and 4) appears larger than normal.

Discussion. The high viscosity of the fluid within the container produces a considerable damping effect, so that the relatively slow respiratory motion of the anterior chest wall does not produce any direct alteration of the configuration of the flash as caused by the forceful cardiac impulse. It produces, however, indirect alterations which can be interpreted as respiratory variations. The damping characteristics of the fluid are also responsible for the failure to register vibrations coincident with heart sounds or murmurs.

The mechanism of the ballistoscope seems to reside in the formation of a sloping reflecting surface during the ballistic movement of the underlying surface, such as the anterior chest wall. The degree of slope depends upon the magnitude of the cardiac impulse. Since the excursion of the reflex increases with the degree of slope, it will necessarily indicate the magnitude of the cardiac impulse provided the distance between object and mirror, in this case the distance between otoscope bulb and fluid surface within the container, is constant. If the distance between the bulb and fluid surface is increased, the excursion of the image will also increase.

Whereas the ballistocardiograph, in its usual form, is an instrument with one degree of freedom(2), namely, in a longitudinal direction only, the ballistoscope, as presented in this study, indicates movements in both longitudinal and lateral, as well as any other intermediate direction. It therefore can be considered an instrument with freedom in a two-dimensional plane, providing both factors of a vector, *i.e.*, direction and amplitude.

It has been pointed out that lateral ballistic movements may be of considerable importance (3,4). In view of its mechanical simplicity, the ballistoscope should lend itself particularly well for determining at a glance whether the main ballistic motion is longitudinal or lateral, and also furnish an idea about the amplitude. It can serve as a screening instrument at the bedside for further ballistocardiographic investigation.

Summary. An instrument called ballistoscope is described, which registers any motion of the underlying surface in a two-dimensional plane. Placed upon the sternum it reveals ballistic patterns which are constant and characteristic in normal individuals as well as in patients with various types of heart disease.

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Received July 24, 1952. P.S.E.B.M., 1952, v81.

Effect of Ethylenediamine upon Glycosuria of the Partially Depancreatized Rat. (19760)

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Ethylenediamine has been found to cause an increase in the amount of glucose excreted by the partially depancreatized rat during the period of its administration.

Methods. Male rats of the Sprague-Dawley strain were maintained on Archer Dog Pellets until they were partially depancreatized(1) at a weight of 275 to 280 g. After diabetes was established all of the rats were placed in metabolism cages and force-fed a medium carbohydrate diet(2) by stomach tube each morning (8:30 to 9:15 A.M.) and afternoon (4:15 to 5:00 P.M.). The technics and diet were modifications of those described by

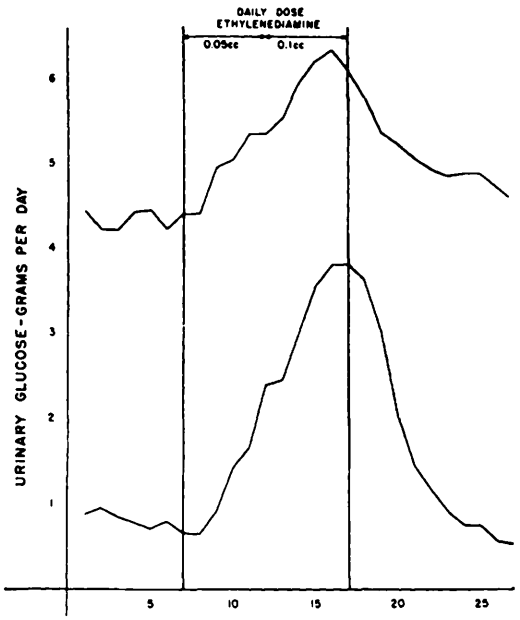

FIG. 1. Effect of ethylenediamine upon level of urinary glucose in partially depancreatized rats. Averages for 5 rats per group. Abscissa in days.

Reinecke, Ball and Samuels(3).

The animals were kept at a temperature of 74 to 78°F. Twenty-four hour samples of urine were collected at the same hour (8:00 to 8:30 A.M.) and were preserved with toluene. Urine glucose was determined by the method of Shaffer and Williams(4). Ethylenediamine, a liquid, was administered by subcutaneous injection.

Experiments and results. Five mildly diabetic rats and 5 moderately diabetic rats were each given 0.05 cc of ethylenediamine once daily for 5 days whereupon 0.1 cc was given daily in divided injections for 5 days. Each animal was observed for 10 days after the injections were stopped. As shown in Fig. 1, the glycosuria was intensified during the administration of ethylenediamine and then decreased to the preinjection level when the injections were stopped. This pattern of response was shown by each individual animal. Ethylenediamine caused a considerable amount of necrosis at the site of injection.

Discussion. Ethylenediamine is a toxic compound which is corrosive to tissue. It imposes a stress on the animal and was selected for study as a part of our research program on the metabolic consequences of various forms of stress. Other toxic agents causing skin damage, such as dilute solutions of formaldehyde(5), do not cause exacerbation of diabetes in the partially depancreatized rat. Apparently the diabetogenic effect of ethylenediamine is not characteristic of non-specific damaging agents. This effect is reversed when the compound is withdrawn. The mechanism of its action is not known to us.

Summary. The subcutaneous injection of ethylenediamine in 10 partially depancreatized rats caused exacerbation of diabetes in each animal but the glycosuria returned to the preinjection level when the administration of the compound was stopped.

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