massive doses of insulin are a result of the decreased metabolic rate and the subsequent decreased demand for foodstuffs by the vital centers of the brain.

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Choline Esterase Activity in Various Portions of the Rabbit Heart.

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The concentration of acetylcholine in the auricle is approximately 10 times that in the ventricle.[1-3] Gaddum has pointed out that tissues rich in acetylcholine contain greater quantities of choline esterase.[4] It was considered of interest to determine whether the latter relationship also holds for various portions of the heart, in which case credence would be lent to the possibility that this enzyme plays the rôle of a defense mechanism in the vagus regulation of the heart.

Twelve normal rabbits weighing between 1500 and 2200 g were utilized for these experiments. The animals were sacrificed by injecting air into the marginal ear vein; the chest was then opened, and the heart immediately extirpated. The individual auricles and ventricles and the interventricular septum were dissected out. The interauricular septum was included with the right auricle as was also the mouth of the superior vena cava. The valves and their attachments were discarded. The membranous septum was included with the interventricular septum. The tissue was freed from superficial blood, weighed, and then macerated in a mortar with purified and ignited sand. Bicarbonate-Ringer solution was added in the proportion of 10 cc per gram of tissue. The mixture was centrifuged and choline esterase measurements were made with ½ cc of the supernatant fluid and 1½ cc of substrate solution (acetylcholine chloride dissolved in bicarbonate-Ringer, 5 mg/cc). The enzyme activity was determined by the manometric method using the War-

1 Witanowski, W. R., *Arch. ges. Physiol.*, 1925, **208**, 694.

2 Plattner, F., *Ibid.*, 1926, **214**, 112.

3 Engelhart, E., *Ibid.*, 1930, **225**, 721.

4 Gaddum, J. H., *Gefässerweiternde Stoffe der Gewebe*, 1936, 75, George Thieme, Leipzig.

TABLE I.

Date	No.	Left Auricle		Right Auricle		Left Ventricle		Right Ventricle		Septum	
		Wt, mg	Enz. activity*	Wt, mg	Enz. activity*	Wt, mg	Enz. activity*	Wt, mg	Enz. activity*	Wt, mg	Enz. activity*
9-20-38	1	372	58	225	58	907	12	430	22	340	25
9-22	2	245	134	175	67	1590	16	675	30	1240	26
9-23	3	270	94	315	85	1415	32	510	17	1263	28
9-27	4	174	88	168	74	1038	31	535	32	1195	18
10-13	5	234	63	248	62	1525	13	735	46	1690	23
2-23-39	6	242	60	273	64	1290	27	445	39	925	42
4-18	7	360	60	226	80	1485	—	725	9	1737	—
4-25	8	384	60	180	75	513	11	883	31	1132	34
7-7	9	190	103	147	87	996	6	465	25	990	6
7-10	10	352	49	132	52	1015	8	494	18	1105	6
7-13	11	147	99	287	50	1102	—	486	22	1212	—
7-19	12	353	102	271	90	1188	15	621	19	1214	8
Avg			81		70		17		26		22

* Enzyme activity expressed in mm^3 CO_2 liberated in 1 hour at 30°C.

burg Apparatus at 30° in the same manner as previously employed.[5] The results of the measurements are given in the table. From this it can be seen that the auricles consistently contained a higher concentration of choline esterase than the ventricles. From the averages, it is apparent that the choline esterase activities fall in the following order: left auricle > right auricle > right ventricle > septum and left ventricle. Little difference exists between the latter 3, but the ventricular group is distinctly lower than the auricular. The enzyme concentration of the auricle was found to be 2 to 10 times that of the ventricle in the same heart. The average enzyme concentration in the whole auricle was about 3.5 times that of the entire ventricle including the interventricular septum.

The aforementioned investigations show that the auricle of the rabbit, which is rich in vagus nerve supply, contains a relatively high choline esterase concentration. Engelhart[3] found, biologically, that the rate of destruction of acetylcholine is faster in the auricle than in the ventricle. Plattner[2] showed that the auricle contains considerably more acetylcholine than the ventricle, a finding which was confirmed by Engelhart. The latter further showed that after stimulating the vagus nerve to the heart, there was a marked augmentation of the acetylcholine content in the auricle, but not in the ventricle. These results were even more exaggerated after physostigmine. From the data presented, it is apparent that a certain parallelism exists between acetylcholine and choline esterase concentrations. In view of this, and since the auricle has been found to be more sensitive to acetylcholine than the ventricle,[6, 7] the possibility may be considered that the choline esterase acts as a defense mechanism by destroying excess acetylcholine. In this manner exaggerated vagus effects due to the liberation of great quantities of "vagusstoff" would be obviated.

Summary. 1. The choline esterase concentration in the auricles of the rabbit heart was found to be considerably greater than that in the ventricles. 2. These data may be interpreted as supporting the viewpoint that there is an enzyme protective mechanism operating in the vagus system.

5 Glick, D., Lewin, A., and Antopol, W., PROC. SOC. EXP. BIOL. AND MED., 1939, **40**, 28.

6 Lanczos, A., *Arch. ges. Physiol.*, 1930, **225**, 710.

7 Anitschkow, S. V., *Arch. Exp. Path. Pharm.*, 1935, **177**, 260.