LETTER TO THE EDITOR

Effects of the Spleen Cardio-active Factor on Thyrotoxic Heart Damage

SIR,—One of the effects of experimentally-induced thyrotoxicosis on the heart is the depletion of heart concentrations of adenosine nucleotides, and of creatine and glycogen[1], a depletion which may be partially prevented by treatment with adenosine triphosphate[1,2]. As the capacity of the heart to accomplish its work depends on the efficiency of the chemical reactions which lead to the final contraction process, any change that may occur in the concentration of the substances mentioned and the resulting effect on contractile efficiency must be of importance.

We therefore investigated whether the cardio-active factor present in the spleen[3,4], the pharmacological properties of which have recently been studied[5], exerted any influence on concentrations of heart components in rats poisoned by DL-thyroxine.

The thyroxine was given by intramuscular injection, in doses of 0·2 mg./kg./day for ten days into rats of 120 to 150 g. Over the same period some of these animals also received intraperitoneal injections of freeze-dried acetonic spleen extract, while others were treated with a cardiotonic factor extractable from the liver, also known as "Zuelzer's hormone"[6]. Lastly a group of animals received intraperitoneal injections of a heart extract of almost identical composition and pharmacological effects as those recently reported by Conway[7].

At the end of the test period, the animals were killed and their hearts assayed for adenosine nucleotides[8], creatine[9], and glycogen[10], soluble and insoluble in trichloroacetic acid.

TABLE I

EFFECTS EXERTED BY SPLEEN AND OTHER EXTRACTS ON HEART COMPOSITION (AVERAGE VALUES ± STANDARD ERROR)

No. of Rats	Treatment and dose (mg./kg.)	P_{APP+} (μg./g.)	Glycogen (mg./100 g.)		Creatine (mg./g.)
			TCA^{++}–Sol.	TCA–Insol.	
10	Normal	349 ± 12	155·2 ± 7·0	172·9 ± 8·4	4·26 ± 0·19
10	Control	133 ± 7	118·6 ± 5·8	81·4 ± 3·9	2·71 ± 0·12
10	Spleen Principle, 2·5 ..	286 ± 11	149·0 ± 7·5	142·1 ± 8·2	3·88 ± 0·19
8	Liver Principle, 2·5 ..	162 ± 9	137·5 ± 6·6	104·7 ± 5·2	3·19 ± 0·14
8	Heart Extract, 2·5	257 ± 11	152·9 ± 8·1	129·5 ± 7·6	3·64 ± 0·16

(+) P adenosine polyphosphates. (++) Trichloroacetic acid.

Findings, set out in Table I, demonstrate the considerable protective efficiency of spleen extract, the effect of which appears to be slightly stronger than that exerted by heart extract. But the cardio-active liver extract under these experimental conditions, appears to possess a very mild protective effect.

As the nature of the factor (or factors) present in the spleen and heart is unknown, it is impossible to specify the mechanism of the effect they exert; however, in the light of the first findings of work still in hand, it is reasonable to suppose that spleen extract effect is exerted, at least partially, through a greater retention in heart tissues of Mg^{++} the heavy consumption of which in thyroxine poisoning is well known.

E. MASCITELLI-CORIANDOLI.
C. CITTERIO.

Research Laboratory,
Farmavigor S.p.A.,
Milan, Italy.
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