Prevention of Cobalt-Induced Polycythemia in Rats by Calcium Ethylene Diamine Tetra Acetic Acid. (21996)

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Polycythemia results from oral or parenteral administration of cobalt(1-5). It is known that this hematopoietic action of cobalt can be prevented by simultaneous feeding of sodium salt of ethylene diamine tetra acetic acid(6,7) and it is probable that under these circumstances cobalt is chelated in the gastro-intestinal tract preventing its absorption. As EDTA administered either as sodium or calcium salt rapidly combines with cobalt to form non-ionizable complexes, it is believed that administration of either of these compounds by the same route as cobalt does not effectively measure prevention of a polycythemic response to cobalt(8,9). It was of interest in this study to determine if EDTA administered as calcium salt prevents production of polycythemia when administered by a different parenteral route than cobalt.

Materials and methods. Six normal female rats of the Long-Evans strain, weighing 225 to 270 g, received daily intraperitoneal injections of 0.5 ml of a 1% saline solution containing 0.125 mg of cobalt as cobaltous sulfate. The injected solution also contained 0.200 mg of iron as ferric chloride to prevent iron shortage due to increased synthesis of hemoglobin under the influence of cobalt(10). Another group of 6 rats received daily 50.0 mg of CaEDTA subcutaneously in addition to the intraperitoneally administered cobaltous sulfate and ferric chloride. Red cell counts, hemoglobin, and hematocrit determinations were made after 34 days, and injections were continued for a total of 74 days, at which time red cell volumes were also determined. Six rats were retained without treatment to serve as controls. Blood samples were withdrawn under ether anesthesia from the external jugular vein into heparinized syringes. Hemoglobin concentrations were determined by the Turner method(11). Hematocrits were determined by Van Allen or Wintrobe tubes after centrifugation at 3,000 r.p.m. for 30 minutes. Blood volumes were determined by the Fe^{59}-labeled red cell method(12).

Results. Rats receiving cobalt showed significant increases in red cell count, hematocrit, hemoglobin, and total red cell volume, whereas no increase was found in rats injected with both cobalt and CaEDTA (Table I).

This experiment confirms the effectiveness of the amounts of cobalt and iron previously reported as capable of producing polycythemia in the rat(13). CaEDTA even when administered by a different parenteral route than cobalt still prevented the development of polycythemia by the cobalt.

Preliminary experiments, in which radioactive cobalt (Co^{60}) was used to determine the rate of excretion, showed that cobalt was excreted at a more rapid rate when CaEDTA was administered simultaneously.

Summary. Cobalt injected intraperiton-

TABLE I. Haematological Data in Rats Injected with Cobalt, Alone or in Combination with CaEDTA. Six rats in each series.

Treatment	Days inj.	Body wt, g	Hemoglobin, g/100 ml	Hemoglobin, g/100 g body wt	Hematocrit, %	Red blood cells $\times 10^6$/mm^3	Red blood cell vol/100 g body wt, ml
Cobalt	0	252	—	—	—	7.6 ± .3	—
	34	255	16.9 ± .8	—	64.3 ± 4.9	10.7 ± .6	—
	74	278	16.0 ± .5	.831 ± .033	63.0 ± 4.1	—	3.25 ± .20
Cobalt + CaEDTA	0	248	—	—	—	7.6 ± .1	—
	34	258	14.7 ± .7	—	47.6 ± 1.7	8.2 ± .4	—
	74	273	13.9 ± .3	.632 ± .018	50.0 ± 1.6	—	2.27 ± .09
Control	34	225	15.0 ± .1	—	48.8 ± .8	8.4 ± .4	—
	74	276	13.0 ± .5	.592 ± .027	48.0 ± 1.1	—	2.25 ± .09

eally into rats receiving calcium ethylene diamine tetra acetic acid subcutaneously did not produce the usual polycythemic response.

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Total Cardiac By-pass Utilizing Continuous Perfusion from Reservoir of Oxygenated Blood.* (21997)

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The goal of our cardiac research efforts has been the development of simple, safe, and effective technics for direct vision intracardiac surgical procedures. The demonstration that total cardiac by-pass with right ventricular cardiotomy and septal suture can be successfully performed even in seriously ill patients by utilizing controlled cross circulation(1-4) doubtless will stimulate further rapid developments in this field.

This experimental study has been carried out on dogs to evaluate a method of substituting arterial and venous reservoirs of blood for the donor in the cross circulation set-up. By such a plan, it would be possible to perform intracardiac operations in a dry heart without the need of a donor in the operating room. Such a scheme immediately poses problems of procurement and storage of blood to supply the arterial reservoir. In this present experimental study intended to develop a feasible technic for total cardiac by-pass utilizing the reservoir method of perfusion, the arterial blood was obtained prior to the intended perfusion from a donor used as an oxygenator entirely independent of the perfusion set-up. The use of arterialized venous blood to supply the arterial reservoir has been described elsewhere(5).

Method. Collection. Ordinary 1,000 cc plasma vac§ bottles were used as reservoirs. These containers were readied for use by instilling in each 100 cc 5% dextrose and water solution containing heparin (25 to 32 mg) and at the same time exhausting the vacuum completely. Arterial blood was collected into these bottles (while in the inverted position) by gravity using a commercially available plastic collection set§ connected to a plastic cannula‖

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