In every instance the donee experienced a heightened vitality, and in the absence of serious organic disease the patient became buoyant, even jocose. Some had chills during transfusion or soon after, and a majority showed some febrile reaction later.

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A preliminary report on the direct transfusion of blood in animals given excessive doses of diphtheria toxins.

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Technique.—The dog was given *subcutaneously* the dose noted. After waiting a certain time an anastomosis was made between one of his vessels (usually, for convenience, the external jugular) and an artery (carotid) of a donor, of equal or usually larger size. When this was perfect, the toxic dog was bled, usually from a femoral artery, as rapidly as possible, to complete exsanguination, and the transfusion was in no case started till cessation of respiration gave warning of the limit's being reached. When this occurred the blood was allowed to flow, under control, until the pulse returned in every case to a better quantity than before. The time taken in transfusing was usually about 15 minutes. (The venous anastomosis was made because more blood went into the donee by it.)

Weight of the donee.[1] kg.	Dose.[2] c.c.	Time of bleeding after dosage. hrs.	Result.[3]
3.13	0.025	24	Died in 84 hours.
4.8	0.025	20	Died in 120 hours.
2.8	0.015	17½	Died in 120 hours.
7.3	0.015	3	Died in 84 hours.
4.5	0.015	1½	Died in 10 days.

[1] Not essential as the donee bled completely and the transfused amount could only be estimated.

[2] The toxin used was a fresh supply (1906). It was not so definite in its effect as regards time as the first. Four control dogs, with 0.015 c.c. each, died in 3, 5, 7 and 8 days respectively; one with 0.02 c.c. died in 3 days and one with 0.025 c.c., in 2 days.

[3] Autopsies were performed on all these dogs, in which the findings were the same as in the controls, *i. e.*, varying degrees of hemorrhagic enteritis, focal hemorrhages in the kidneys and marked cloudy swelling of the liver and kidney, with jaundice. In some, focal necroses of liver and kidney were apparently present. The microscopic part has not yet been worked up.

The experiments were next varied in this way; instead of treating a toxic dog with normal blood, an exsanguinated normal dog was transfused from one which had been given the toxin subcutaneously some time previous, as noted below. To be sure of an excess of toxin the dose was doubled. The technique was the same, under ether with careful asepsis. The vascular anastomosis was made before the normal dog was bled. The time is calculated from when the dose was given till the transfusion was started. In the fourth experiment one donor (St. Bernard dog weighing 40 k.) supplied three small dogs one after another with sufficient blood.

SUMMARY OF EFFECTS ON DONEES.

	Elapsed time between dosage and transfusion.	Dose given donor. c.c.	Result.
1.	6 hours	0.015	Lived 3 weeks under observation; entirely healthy.
2.	4 hours	0.030	Same.
3.	3 hours, 50 minutes	0.030	Same.
4.	*A.* 1 hour, 5 minutes	0.025	Developed paralysis of both hind legs in 10 days.
	B. 3 hours, 10 minutes	0.025	Died in 15 days. Widespread broncho-pneumonia (accidental infection, no other lesion).
	C. 5 hours, 10 minutes	0.025	No ill effects.

No further observations of these dogs were made. The paralyzed dog is certainly suggestive of diphtheritic paralysis. The dog lived for over a month in this paralyzed state, but when he died I was not informed and the body was buried.

INTRAVENOUS INOCULATION.

Elapsed time between dosage and transfusion.	Dose given donor. c.c.	Result.
24 minutes	0.03	Died in 6 days (usual postmortem appearance).

I. SUMMARY OF THE EXPERIMENTS ON THE TREATMENT OF DIPHTHERIC TOXEMIA BY BLEEDING ALONE.

Dose per kg. c.c.[1]	Elapsed time between dosage and bleeding. hrs.	Approximate amount of blood removed.	Result. (In hours after dosage.)
0.015	18	1/3	Died in 36 hours.
0.015	19	1/4	" within 60 "
0.015	7	1/4	" " 45 "
0.015	7	1/5	" " 45 "
0.010	3	1/5	" " 48 "
0.010	3	1/5	" " 100 "

[1] 0.015 c.c. of the toxin per kg. killed control dogs in two days, while 0.01 c.c. averaged somewhat over three days in causing death.

II. BLEEDING FOLLOWED BY IMMEDIATE TRANSFUSION OF SALINE.

Weight of dog. kg.	Dose per kg. c.c.	Amount bled. c.c.	Per cent. of blood removed (approximately).	Elapsed time between dosage and bleeding. hrs.	Result. (In hours after dosage.)
7.3	0.010	200	35	22	Died within 60 hours.
3.6	"	115	50	3½	"
4.8	"	120	33	3	"
4.5	"	110	33	4	"
9.0	"	175	25	3	"

All the inoculations in the last two series were made subcutaneously.

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The effect on the normal dog heart of expressed tissue juice from hearts of dogs poisoned with diphtheria toxin.

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The injection of moderately large doses of diphtheria toxins into animals is followed by no change in arterial blood pressure until after the elapse of a certain latent period, varying from 24 hours in the rabbit to 2–4 days in the dog, when it begins to fall. The fall in blood pressure, having once occurred, rapidly proceeds, so that within a very short time the animal is dead (30 minutes in the rabbit). Both vasomotor paralysis and cardiac failure are responsible for the fall, although it is evident that the cardiac failure is the more important as the immediate cause of death, since mere isolation of the vasomotor center — as after spinal transection — is not followed by such rapid cardiac failure. The vasomotor paralysis of course accelerates the cardiac failure.[1]

Rolly further found that isolation by Hering's method of the heart of a rabbit just dying as a result of diphtheria inoculation and its perfusion with blood from a healthy animal did not in the slightest degree delay the failure.

Although a certain amount of histological change seems always to be present in the myocardium after death from the inoculation of diphtheria toxins, yet it has been considered by Rolly and others as scarcely of sufficient intensity to account for

[1] Rolly: *Archiv für experimentelle Pathologie und Pharmakologie* (1899), xlii; Romberg, Paessler, *et al.*: *Deutsches Archiv für klinische Medizin*, lxiv.