after operation (Fig. 1). It continued until the pressure had dropped to normal. It has remained normal for 130 days in the dog which was first to undergo operation. One animal behaved differently in that the pressure fell only part of the way to normal; from a pre-operative level of 240 to 290 mm. of Hg to 160 to 200 mm. of Hg. In the 2 dogs in which both renal vessels were clamped, and after a control period of 90 days hypophysectomy performed, arterial pressure also fell to normal.

We have been less successful in keeping the hypophysectomized animals alive when the clamps were applied after hypophysectomy. Removal of the gland appears to make the animal unusually susceptible to anesthesia. Often they did not recover from the operation of clamping, a circumstance rarely occurring with normal animals or those with hypertension. Application of the clamp was usually followed by a rise in pressure (4 animals) but it may be transient. In one dog, after applying the second clamp it rose to 280 mm. The animal died 7 days after the latter operation.

Conclusions. Hypophysectomy in dogs with hypertension produced by renal ischemia (method of Goldblatt, Lynch, Hanzal and Summerville) reduces arterial pressure to about normal levels. It appears to reduce slightly the blood pressure of normal dogs. Preliminary hypophysectomy does not prevent the rise in blood pressure established by renal ischemia, but the rise tends to be transient.

8583 C

A Summary of Studies on the Effect of Ferric Chloride on Tuberculous Rabbits.*

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The object of this brief report is to describe further experiments on the effect of ferric chloride on the progress of tuberculosis in rabbits previously immunized with a strain of BCG (Bacillus Calmette-Guerin) and subsequently reinfected with a virulent bovine strain of tubercle bacilli (Ravenel). Previous studies have demonstrated that concomitantly with the accumulation of iron in tuber-

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TABLE I.
Effect of Isotonic Ferric Chloride Injections on Tuberculous Rabbits.

Control Animals							Experimental Animals			
Non-vaccinated group			Vaccinated group (B.C.G.)				Vaccinated group (B.C.G.) injected with $FeCl_3$			
Rabbit No.	Wt. at beginning of exp.	Survival time after inoculation with virulent tubercle bacilli	Rabbit No.	Wt. at beginning of exp.	Amt. of saline injected	Survival time after inoculation with virulent tubercle bacilli	Rabbit No.	Wt. at beginning of exp.	Amt. of 0.25% isotonic $FeCl_3$ injected	Survival time after inoculation with virulent tubercle bacilli
	gm.	days		gm.	cc.	days		gm.	cc.	days
10-24	1550	27	9-58	2400	179	60	9-50	2530	233	97
10-96	2630	32	9-54	2770	203	75	9-48	2235	213	100
10-28	1890	35	9-47	2490		89	9-49	2525	230	100
10-97	2375	36	9-55	2505	229	93	9-56	2400	232	111
10-23	2375	43	9-45	2515		105	9-52	2425	239	122
10-13	2330	45					9-61	2025	245	270
10-22	1860	47								
10-18	3045	49								
Aver.		39				84				133

culous areas the course of the disease in rabbits is definitely retarded. This has been shown in 4 independent series of experiments.[1, 2, 3, 4, 5] The mechanism to account for this favorable effect has not as yet been elucidated. The accumulation of iron in tuberculous areas is as a rule demonstrable not by microscopic test but only in the gross when the tuberculous lung tissue is in contact with acidified $K_4Fe(CN)_6$. Experiments previously described[6] have shown that this is in large part due to considerable loss of the iron presumably during the "clearing" stage in the technique of microscopic preparation. Parallel to the deposition of iron in tuberculous areas an intracellular iron pigment is also found by microscopic examination to be deposited in the spleen, liver, and bone marrow. The pigment is indistinguishable from hemosiderin, but is not referable to hemoglobin degradation. It has therefore been termed *cytosiderin*.[6, 7, 8] The presence of this iron pigment in various organs in

TABLE II.
Summary of Studies on Effect of Ferric Chloride in Tuberculous Rabbits.

Series	Results published in	Dose of virulent tubercle bacilli	Route of inoculation of virulent bacilli	Total No. of rabbits	Aver. survival time		Increased survival time exp. animals
					Control animals	Exp. animals	
		mg.			days	days	%
1	1932	.001	intrav.	16	61	109	78
2	1933	.001 (appx.)	"	20	94	135	44
3†	1936	.01	"	19	84*	133	58
4	1934	.05	subcut.	10	130	246	89
5‡	1934	.05	"	10	81	198	144
Aver.					90	164	82

Series 6 (1933). 16 tuberculous rabbits sacrificed between 45th and 79th day of the disease. Extent of tuberculous involvement in lungs of experimental animals considerably less than in controls.

Series 7 (1933). 19 tuberculous rabbits sacrificed between 35th and 108th day of the disease. Tubercle bacilli inoculated subcutaneously. Experimental rabbits showed definite retardation in spread of the bacilli as evidenced by extent of lesion, particularly in the lungs.

Total No. of rabbits in series: 110.

*Average survival time in non-vaccinated group of 8 control rabbits was 39 days.

†This group received a preliminary vaccination with B.C.G.

‡This group received preliminary vaccination with Cernay strain.

1 Menkin, V., and Menkin, M. F., *J. Exp. Med.*, 1931, **53**, 919.

2 Menkin, V., *J. Exp. Med.*, 1932, **55**, 101.

3 Menkin, V., *Am. J. Med. Sci.*, 1933, **185**, 40.

4 Menkin, V., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 951.

5 Menkin, V., *J. Exp. Med.*, 1934, **60**, 463.

6 Menkin, V., *Arch. Path.*, 1935, **19**, 53.

7 Menkin, V., and Talmadge, S. M., *Arch. Path.*, 1935, **19**, 61.

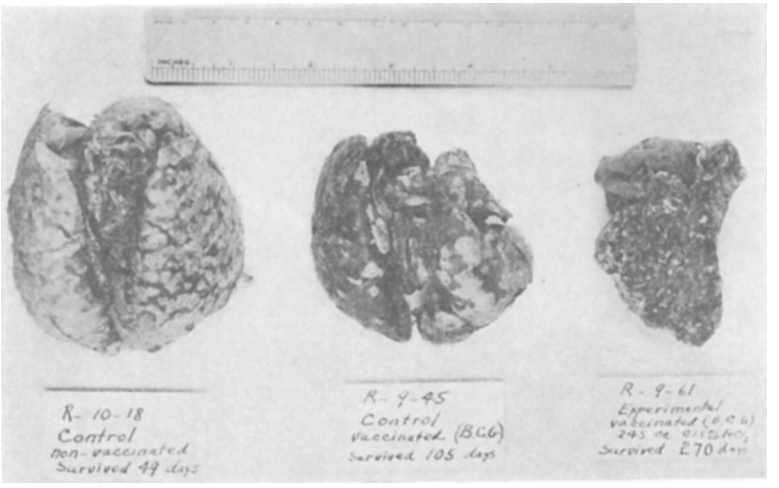
8 Menkin, V., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 755.

addition to the non-pigmented form of the metal, seen in the gross within pulmonary tubercles, renders it difficult at present to account adequately for the beneficial effect of $FeCl_3$ in tuberculous rabbits. Furthermore a few preliminary experiments employing other iron compounds, or injection routes other than the intravenous one, fail to yield results identical with those obtained by the writer when large numbers of rabbits are repeatedly treated with dilute ferric chloride solution intravascularly.[9] In addition to the present set of data, a summary of all previous studies is tabulated (Table II).

A group of Flemish rabbits was immunized by BCG, by the intravenous injection of 10 mg. of the bacilli intravenously. About 2 months later these same animals were reinoculated intravenously with a large dose of a virulent bovine strain of tubercle bacilli (Ravenel). In this series the reinfecting dose of bacilli was 10 times greater (.01 mg.) than that employed in previous sets of intravenously infected rabbits. The purpose of this was to determine whether the favorable effect of ferric chloride on the experimental disease would still be appreciable with massive infection. Half of the animals were then immediately started on a course of repeated intravenous injections of ferric chloride (0.25%) for a period of 16 weeks. To avoid hemolysis, the iron chloride solution was rendered isotonic with mammalian blood by the addition of sodium chloride (680 mg. of NaCl to 100 cc. of solution). (In previous series the ferric chloride crystals had simply been dissolved in distilled water.) Half of the remaining tuberculous animals served as controls, some of which, however, received repeated intravenous injections of physiological saline. A group of control tuberculous but non-immune animals was run parallel to the immunized series. The latter succumbed at a very early stage (Table I). As in previous series and in spite of the larger intravenous inoculating dose of virulent bacilli, the immunized and iron-treated rabbits survived for distinctly longer intervals than the immunized controls (Table I). The initial weight seemed to bear no direct relationship to the survival time. Fig. 1 shows the extent of tuberculous involvement in the lungs of the longest survivors in the 3 groups of rabbits. It is clear that the lung of rabbit 9-61, the longest experimental survivor, evidently shows the least involvement, both in respect to size and amount of confluence of the lesions.

These consistent results, involving 5 independent series of experiments carried on for a period of 5 years, are now based on well

[9] Steinmann, B., *Beitr. Z. Klin. d. Tuberk.*, 1935, **86**, 84.



over 100 rabbits as summarized in Table II. The data show that dilute ferric chloride intravenously administered definitely retards the progress of tuberculosis in experimentally infected rabbits. The observations suggest possible clinical application which therefore the writer, with the permission of Dr. Donald S. King, has started at Channing Home, Boston. Several patients with far advanced tuberculosis received repeated intravenous injections of 0.0625% of isotonic ferric chloride for a few months. These injections proved completely harmless as far as noting any generalized deleterious effects. Small palpable thickenings occurred occasionally in injected arm veins. These invariably subsided within several days. The iron salt was evidently well tolerated in the concentration used.

8584 C

Fibrinolytic Activity of Beta Hemolytic Streptococci from Cow's Milk.

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One of the many unsettled problems concerning mastitis is its relationship to the organism designated as *S. mastitidis*. While the majority of workers agree that this relationship must be a very significant one, any new approach to the study of this subject should be of interest.