after the first operation a partial removal of the caecum was performed through an 8 cm. incision. The response to this operation was an increase of 82.0% on the fourth day.

Conclusions. Removal of the spleen in rabbits is followed constantly by an increase in the number of circulating blood platelets. Other operations involving a similar degree of trauma are followed by an increase of platelets which does not differ in time of occurrence, degree or duration from that observed after splenectomy. The degree of the rise depends upon the amount of trauma sustained by the tissues.

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Fate of Poliomyelitis Virus in the Brain After Intracerebral Inoculation of Normal and Convalescent Monkeys.*

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The fate of poliomyelitis virus in the brain after intracerebral inoculation of normal monkeys has recently been studied very carefully by Fairbrother and Hurst.[1] These authors find the virus regularly present at the site of inoculation until the fifth day after infection, when the infectious agent suddenly disappears from the portal of entry on its way to further invasion of the more distant parts of the central nervous system. This critical point in the development of the disease, suggesting the operation of some autosterilizing mechanism in the infected brain tissue, apparently coincides with the first febrile response. The work of the above mentioned authors suggested a comparison of the survival of the virus after intracerebral inoculation in the normal monkey brain with the rate of disappearance from the site of inoculation in convalescent monkeys, immune through spontaneous recovery from the disease.

Six normal monkeys were inoculated intracerebrally with 1 cc. of a 10% virus cord emulsion, the potency of which was proved by simultaneous infection of several controls. By using a very

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[1] Fairbrother, R. W., and Hurst, E. W., *J. Path. and Bact.*, 1930, **33**, 17.

TABLE I.

Survival of Poliomyelitis Virus in the Brain after Intracerebral Inoculation of Normal and Convalescent Monkeys.

Donor	Type of Animal	Interval, hrs.	Macroscopic Local Reaction	Rise of Temp. first 12 hrs. after inoculation	Recipient	Incubation Period, days	Symptoms	Pathological Examination or Reinfection
B56	Normal	12	No distinct lesion	0.8	B67	17	Ptosis of left upper eye lid	—
B57	"	24	No distinct lesion	0.8	B68	19	Complete paralysis Dead 22 dys	Typical Polio lesions
B22	"	48	No distinct lesion	1.0	B24	—	None Dead 40 dys	No typical Polio les.
B93	"	48	Sm. hemorrhagic area	1.0	B100	10	Tremor, awkward Dead 21 dys	Lesions suggestive of Polio in cervical and lumbar cord
B94	"	72	Sm. hemorrhagic area	0.8	C1	—	None	Reinfection Polio 18 dys
B96	"	96	Fairly large hemorrhagic area	1.2	C2	8	Complete paralysis Dead 15 dys	Typical Polio lesions
A53	Conv.	12	Slight inflammation	3	B4	—	None. Dead 6 mos later	No typical Polio lesions
B7	"	12	None	0	C9	—	None	Reinfection Polio 6 dys
90	"	24	Slight inflammation	2	B5	—	None Dead 21 dys	No typical Polio lesions
A89	"	24	None	0	C10	—	None Dead 25 dys	No typical Polio lesions
A22	"	48	Definite inflammation	2.8	B7	22	Almost complete paralysis	Used as Donor for C9
76	"	48	None	4	C11	12	Tremor, awkward	Reinfection Polio 7 dys
A91	"	72	"	5.4	C12	—	None	Reinfection Polio 8 dys
A95	"	72	"	4.2	C13	—	None Dead 29 dys	No typical Polio lesions
6	"	96	"	4	C14	—	None Dead 42 dys	No typical Polio lesions
86	"	96	"	2	C15	—	None	Reinfection Polio 7 dys

Controls: B59 (for B56, B57) Polio 6 days. B72 (for B93, B94, B96) Polio 8 days. B23 (for B22) Polio 9 days. C8 (for B7, A89, 76, A91, A95, 6, 86) Polio 10 days. B2 (for A53, 9, A22) Polio 9 days. C84 (for reinoculation of C1, C9, C11, C12, C15) Polio 6 days.

short needle and exercising special care so as to avoid deposition of the infectious material in the ventricle, the inoculated area could, in every instance, be accurately determined from the depth of the needle prick. At intervals varying from 12 to 96 hours the 6 monkeys

were sacrificed and the sites of inoculation in each instance were transferred to a new passage animal by cerebral inoculation of the respective cortical area, emulsified into a 10% suspension. Another series of 10 convalescent monkeys was similarly infected together with an adequate number of controls, and, at the stated intervals, the respective sites of inoculation were likewise transferred to new monkeys. All of the convalescent monkeys except 3 (A89, A22, 76) showed definite residual paralysis at the time of the experiment. The results of the subinoculations in the 2 series are given in Table I.

It appears from Table I that in the normal monkey the virus may regularly be recovered from the site of inoculation during the first 24 hours of the infectious process, although the long incubation periods of Monkeys B67 and B57 indicate that only little growth can have occurred during that time. Between 48 and 72 hours, recovery of the virus is apparently less regular, none of the 3 monkeys sacrificed at these particular intervals harboring enough virus at the site of inoculation to cause typical poliomyelitis in the recipients. Beyond this point, i. e. at 96 hours after infection, a sufficient quantity of virus has apparently accumulated in the inoculated area to induce readily typical infection on passage. These findings are somewhat analogous to Levaditi and Nicolau's[2] observations with neurovaccinia virus in rabbits while in herpetic monkey infection the virus is apparently found more regularly at the site of inoculation, following a brief period of lag. (Levaditi and Lepine[3]).

The results obtained in the series of convalescent monkeys demonstrate clearly that at the early and late phases of the infection the injected virus is not present at the portal of entry in such a form as to cause typical poliomyelitis on passage. However, in 2 monkeys, sacrificed 48 hours after infection, the inoculated area evidently contained active virus in more or less virulent form. It is interesting to note that in the convalescent monkeys the virus was encountered at exactly that stage of the infection which seemed to be least favorable for the storage of the virus in the primarily infected monkeys, although the small number of experimental animals does not preclude chance differences between individual monkeys. We certainly do not consider the evidence sufficient as proving a fixation of the antigen in the immune tissues, such as has recently

[2] Levaditi, C., and Nicolau, S., *C. R. Soc. Biol.*, 1922, **86**, 562.

[3] Levaditi, C., and Lepine, P., *C. R. Acad. Sciences*, 1929, **189**, 66.

been found to be the case with rabies virus by Isabolinsky and Zeitlin.[4] A possibility of intervening specific and non-specific inhibitory factors must finally be kept in mind.[5] Without resorting to special physical and chemical treatment of the inoculum such as cataphoresis[6] and pH adjustment[7] this cannot be successfully eliminated.

In confirmation of our earlier work[8] it was found that, with the exception of 2 (B7, A89), all of the convalescent animals reacted within the first few hours after inoculation with a more or less marked rise of the body temperature, while none of the normal monkeys, during this time, displayed more than the usual traumatic febrile reaction. The 2 animals which failed to react showed extensive tuberculosis at autopsy.

A number of moneys, apparently having received with the transfer an amount of virus insufficient to cause typical poliomyelitis with definite paralysis, responded with an elevation of the body temperature, which occasionally seemed to show a tendency to run in distinct cycles, afebrile periods alternating with several days of high fever. Those cases may correspond with the abortive and relapsing infections recently described by Harmon, Shaughnessy and Gordon,[9] were it not for the fact that all of these monkeys succumbed to reinfection with fully developed symptoms of the disease.

The irregularity of the presence of the virus at the site of inoculation in the normal animal during the earlier intervals makes it difficult to establish positive proof for a quicker disappearance of the infectious agent from the brain of the convalescent animal. From the evidence at hand, however, it would seem that whereas in the normal animal the virus at the end of the fourth day after infection had considerably increased locally, the site of inoculation in the immune animal had been definitely sterilized.

[4] Isabolinsky, M. P., and Zeitlin, A. J., *Z. f. Immun. Forschg.*, 1929, **62**, 233.

[5] Jungeblut, C. W., Meeting of Am. Soc. for Exp. Path., Montreal, 1931, abstract in print.

[6] Olitsky, P. K., Rhoades, C. P., and Long, P. H., *J. Exp. Med.*, 1929, **50**, 273.

[7] Sittenfield, M. J., Johnson, B. A., and Jobling, J. W., PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 517.

[8] Jungeblut, C. W., *J. Exp. Med.*, 1931, **53**, 159.

[9] Harmon, P. H., Shaughnessy, H. J., and Gordon, F. B., *J. Prev. Med.*, 1931, **5**, 139.