

It is considered probable that the patient acquired his infection in Kern County, where Hammon and Reeves have shown the ex-

istence of naturally infected mosquitoes.

The pathogenic properties of the virus are described and discussed.

15276

Elimination in Human Feces of Infectious Hepatitis Virus Parenterally Introduced.*

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Experiments in the transmission of *infectious hepatitis* and *homologous serum jaundice* to human volunteers have revealed certain similarities and differences in the properties and distribution of virus, and route of infection in these 2 conditions. These points have been summarized recently by Neefe *et al.*¹ The etiologic agents of both conditions are filtrable, resistant to a temperature of 56°C for 30 minutes, and transmissible to human volunteers in serial passage.²⁻⁵

In contrast to these similarities are certain differences: namely; (1) the etiologic agent of infectious hepatitis is present in the serum and feces of patients in the acute phase of the naturally occurring or experimentally produced (by feeding) disease.⁶⁻¹¹ On the other

hand attempts to demonstrate the etiologic agent of homologous serum jaundice in the stools of patients with this disease have been unsuccessful.^{1,11,12} (2) Infectious hepatitis may be produced in human volunteers by *feeding* or parenteral inoculation of infectious material.^{2,6-11,13} In contrast, while homologous serum jaundice has been produced experimentally by parenteral inoculation of infectious serum,^{3-5,9,14} attempts to transmit this condition by feeding similar material have, with one exception, been unsuccessful.^{1,5,12} This one exception is an experiment of MacCallum and Bauer⁴ who produced the disease in a human volunteer by feeding infectious serum.

In view of these apparent differences it appeared possible that the *route of inoculation* might affect the distribution of virus and thereby constitute an artificial difference between these 2 conditions in experimental subjects. Failure to recover virus from the stool of patients with homologous serum jaun-

* Representing work done for the Commission on Neurotropic Virus Diseases, Army Epidemiological Board, Preventive Medicine Service, Office of the Surgeon General, United States Army.

Acknowledgment is made of the assistance and cooperation of the following agencies: Selective Service, Camp Operations Division and the Civilian Public Service Unit No. 140.

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¹² Unpublished experiments of the author.

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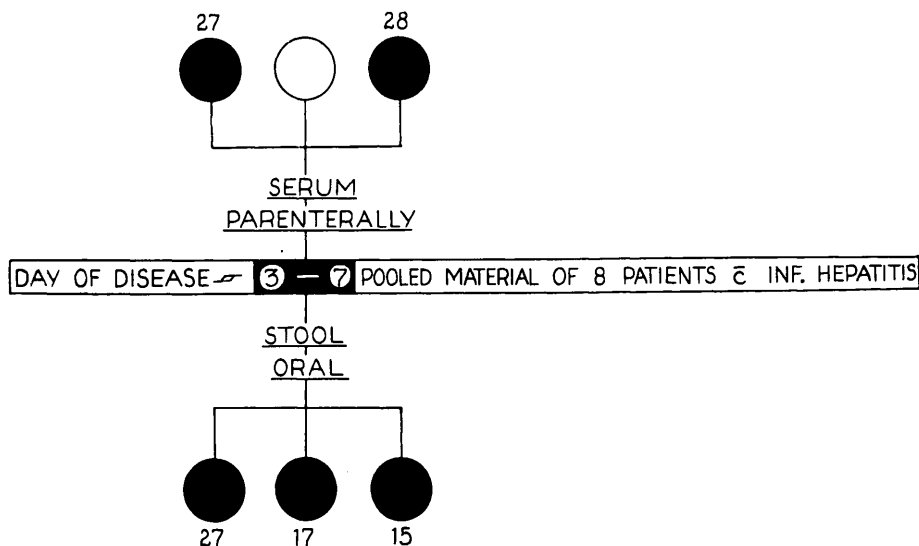


Fig. 1.

Illustration of results of administration to human volunteers of pools of serum and stool obtained during the acute phase (3-7th day) of 8 patients with infectious hepatitis experimentally induced by parenteral inoculation of infectious material. Open circle indicates a volunteer who was inoculated and failed to contract the disease; black circles indicate volunteers who contracted infectious hepatitis. The figure adjacent to the black circles represents the length of incubation period in days.

dice suggested that more information on the relation between this condition and infectious hepatitis might be gained if a similar situation were found when infectious hepatitis was produced by *parenteral inoculation*.

It is the object of this paper to determine whether a strain of infectious hepatitis virus, introduced *parenterally* into human volunteers, is eliminated in the feces of these same subjects when they contract the disease.

Materials and Methods. Virus. The strain of infectious hepatitis virus used in this laboratory was originally obtained from the stool of a U. S. Army soldier (BE) who contracted *epidemic infectious hepatitis* in Sicily in September 1943.⁹ It has been through 4 passages in human volunteers to date. This agent is filtrable through an L2 Chamberland filter and withstands heating to 56°C for at least 30 minutes.² It has produced the disease in 27 out of 40 human volunteers (including this experiment) inoculated parenterally or orally with incubation periods ranging from 15 to 34 days.

Infectious materials employed in this experiment were pooled specimens of serum and of stools obtained during the acute (3-7th

day) stage of disease experimentally induced in 8 volunteers by *parenteral inoculation* of this strain of infectious hepatitis. Stool and serum were always collected from the same patient on the same day. All material was stored at dry-ice box temperature for periods ranging from 3-7 months. Before use equal amounts of the same material from each volunteer were pooled and treated in the following manner: (a) serum was heated to 56°C for 30 minutes in a water bath; (b) stools were ground with sterile alundum and suspended in enough sterile 10/M buffered sodium phosphate to make a 10 percent suspension. This was centrifuged at 1500 r.p.m. for 30 minutes at room temperature to remove coarse particles. The supernate was removed and centrifuged at 6500 r.p.m. for 30 minutes at room temperature. This fairly clear supernate was removed and filtered through a Seitz EK filter at a pH of 7.0. The filtrate was then heated to 56°C for 30 minutes in a water bath. The serum and filtrates of stool were heated to eliminate the possibility of the presence of pathogenic bacteria. Both materials were sterile before administration.

TABLE I.
Duration and Height of Fever and Jaundice and Severity of Illness in 5 Human Volunteers with Experimentally Induced Infectious Hepatitis.

Volunteer	Inoculum	Source*	Amount	Route	Duration days			Maximum		Severity
					Incub. per.	Fever	Jaundice	Fever†	Serum Bilirubin mg. %	
BS	S	3-7th day disease (8 patients)	0.5	P	27	13	13	103.8	7.6	++
TR	S	"	0.5	P	28	5	14	101.0	2.5	+
SR	F	"	10	O	27	12	30	104.0	7.0	+++
HD	F	"	10	O	17	5	22	100.5	7.3	++
FW	F	"	10	O	15	10	14	102.5	7.4	++

S = Serum; F = Feces; P = Parenteral; O = Oral.

* Cf. Fig. 1. † Rectal temperatures are recorded.

Feces were administered as Seitz filtrates of 10% suspensions.

Three volunteers were fed the stool filtrate and 3 were inoculated sub- and intracutaneously with serum. The results are indicated in Fig. 1. It is apparent that virus is present in both the stool and serum of patients in the acute-phase of *parenterally induced* infectious hepatitis. Certain clinical data on the 5 volunteers who contracted the disease in this experiment are recorded in Table I.

Summary. 1. A strain of infectious hepatitis virus inoculated *parenterally* into 8 human

volunteers was recovered from pools of serum and feces obtained from these same subjects during the acute-phase of their illness. These materials produced infectious hepatitis in 5 out of 6 healthy, human volunteers on reinoculation.

2. This recovery of virus from the stool of patients with infectious hepatitis induced by *parenteral inoculation* constitutes an apparent difference between this condition and homologous serum jaundice in which the etiologic agent has not been recovered from the stool up to the present time.

15277 P

Transplantability of Induced Granulosa Cell Tumors and of Luteoma in Mice. Secondary Effects of These Growths.*

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Granulosa cell tumors can be readily induced in the ovaries of mice by exposing the latter to X-rays.¹⁻³ A single dose of 87r

given over the entire body to 44 mice approximately 6 weeks of age produced tumors in 31 mice. The induced ovarian growths

* These investigations have been supported by The Anna Fuller Fund, The International Cancer Research Foundation and The Jane Coffin Childs Memorial Fund for Medical Research.

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