

Serologic Differences Among Strains of the Coxsackie Group of Viruses. (17321)

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Since the isolation in suckling mice of an infectious agent from feces of 2 paralyzed children¹⁻⁴ a number of fecal specimens from other patients with a tentative diagnosis of poliomyelitis have been examined and 18 additional strains isolated. Some of these differ from the agent originally described in the signs of disease and the lesions they induce in suckling mice, and are being studied. The remaining 11 strains are similar to the original in causing extensive degeneration of the striated muscles of the experimental animal without damage to the central nervous system. In this group 3 serologic types have been encountered.

The localities from which the strains were obtained are indicated in Table I. The first 2 are those originally isolated. Five were obtained from fecal specimens collected in Wilmington, Del., during the 1947 epidemic of poliomyelitis and 6 from cases in 1948 in widely separated communities in New York State.

The serologic differentiation was made by the neutralization test method. Sera were prepared in mice and hamsters. Adult hamsters received living virus, in 10% hamster brain suspension, intraperitoneally in 3 or 4 weekly doses of 1 ml. Mice were given formalinized (strain T.T.) or living virus in mouse brain suspension intraperitoneally in 3 weekly series of 3 daily doses. The amounts injected increased from 0.1 to 0.5 ml. Bleedings were usually taken on the 7th or 8th day after the last dose. All mice and hamster sera were pools. Rabbits were immunized with one strain (J.Ol.). A total of 35.5 to 40.5 ml. of living virus in 10% mouse brain suspension was given intravenously and intraperitoneally over a period of 36 to 46 days. Serum of only one of 3 rabbits was satisfactory. It appeared to be type- rather than species-specific.

Equal amounts of serum and infected suckling mouse brain suspension were mixed and let stand at room temperature for one hour.

TABLE I.
Serologic Types of Strains Isolated in Suckling Mice.

Patient	Age, yr	Outbreak		Serologic type
		Year	Locality	
T.T.	9	1947	New York State	1
K.H.	3½	1947	"	1
Fl. Pool	9.5	1947	Wilmington	2
M.H.	13	1947	"	2
J.K.	8	1947	"	2
A.W.	4	1947	"	2
C.R.	12	1947	"	1
N.C.	8	1948	New York State	2
J.H.	6	1948	"	2
R.T.	4	1948	"	2
L.P.	4	1948	"	2
N.A.B.	4	1948	"	2
J.Ol.	2	1948	"	3

¹ Dalldorf, Gilbert, and Sickles, Grace M., *Science*, 1948, **108**, 61.

² Dalldorf, Gilbert, Sickles, Grace M., Plager, Hildegard, and Gifford, Rebecca, *J. Exp. Med.*,

1949, **89**, 567.

³ Gifford, Rebecca, and Dalldorf, Gilbert, *Proc. Soc. Exp. Biol. and Med.*, 1949, **71**, 589.

⁴ Dalldorf, Gilbert, *Science*, in press.

TABLE II.
Neutralization Tests with Type-3 Strain J.Ol., No. 49,191.

Undiluted serum	Mouse brain suspension					
	10-1*	10-2	10-3	10-4	10-5	10-6
Normal hamster pool, 1/20/49				7/7	2/7	1/7
Type 1, T.T. hamster pool, 11/4/48		8/8	8/8	8/8	5/8	
Normal hamster pool, 6/16/47				8/8	6/8	1/8
Type 2, Fl., hamster pool, 11/8/48		8/8	8/8	8/8		
Normal mouse pool, 2/14/49			8/8	8/8		
Type 3, J.Ol., mouse pool, 3/4/49	0/7	0/7				

* Original dilutions.

Denominator indicates number of mice inoculated; numerator records number dead, paralyzed, or missing during the critical period of the test.

TABLE III.
Effect of Type-3 Rabbit Serum on Strains of 3 Types.

Undiluted serum	Infected mouse brain suspension									
	Type 1, T.T.			Type 2, Fl.			Type 3, J.Ol.			
	10-1*	10-2	10-3	10-1	10-2	10-3	10-1	10-2	10-3	10-4
Normal rabbit No. M813, 3/9/49	8/8	4/7	1/6	7/7	6/6	8/8		9/9	4/7	2/7
J.Ol. immune rabbit No. M813, 5/4/49	8/8	7/7		7/7	7/7		0/6	0/7		

* Original dilutions.

Denominator indicates number of mice inoculated; numerator records number dead, paralyzed, or missing during the critical period of the test.

One family of mice was inoculated intraperitoneally (0.05 ml.) with each dose.

One of the 1947 New York State isolations, T.T. (type 1), was selected as the representative strain for serum preparation. Each newly isolated virus was tested for neutralization by this serum. When a strain was encountered that failed to be neutralized, antiserum was prepared with it.

The first Wilmington isolation, Fl., proved to be a second type (type 2) and a 1948 New York State strain, J.Ol., a third type (type 3). Cross-neutralization tests demonstrated a

distinct differentiation among the types. Representative tests have been summarized in Tables II and III.

The remaining strains when tested with these sera fell into the types indicated in Table I.

Summary. Among 13 virus strains which have been isolated from fecal specimens of patients with a tentative diagnosis of poliomyelitis, and which induce muscle injury in suckling mice, 3 serologic types have been encountered.

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