

edly reduced in the deficiency diseases, while the inorganic phosphorus was increased but not to the same extent as the former was reduced. The alcohol extract phosphorus fraction was only slightly increased. The phosphorus of the brain residue after alcohol and trichloroacetic acid extractions as well as the total phosphorus content of brain was unaffected. Further, the amount of alcohol-soluble material of the brains was similar in both deficient and control chicks. Certain nutritional deficiencies, among them the lack of the encephalomalacia factor, vitamin A, or B₄, cause a disturbance of normal phosphorus metabolism in the brain of the chick.

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Relation of the Carrier State to Pneumococcal Peritonitis in Young Children with the Nephrotic Syndrome.

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Most deaths in children afflicted with the nephrotic syndrome are caused by intercurrent infection. In nearly every instance, the infection is due to the pneumococcus, and the site of localization is the peritoneal cavity.

In the nephrotic child peritonitis develops suddenly, and without any apparent precipitating factor such as an upper respiratory infection. This fact suggests two possibilities: First, that peritonitis is due to the acquisition from a carrier of an invasive strain of pneumococcus, and second, that peritonitis is caused by the strain or strains of pneumococcus which are carried in the patient's nasopharynx.

Nose and throat cultures have been made periodically on 12 nephrotic children, 1½ to 7 years of age. The children have been observed over periods varying from one week to 2 years. The pneumococci isolated from the nasopharynx have been typed by Neufeld's technic. Only those studies are presented here which deal with the children developing peritonitis.

In every child who developed peritonitis, the same type of pneumococcus has been recovered from the throat and the peritoneal cavity. During the carrier-state repeated cultures showed the same type or types of pneumococcus to persist in the nasopharynx. In 2

TABLE I.

Case	Age, yrs.	Sex	Type of pneumococcus causing peritonitis	Type of pneumococcus in patient's nasopharynx	Time of isolation of organism from throat in relation to onset of peritonitis	Outcome
1. R.R.	3	M	XIX	XI and XIX	69 days before peritonitis developed	Died
2. J.Mc.	7	M	X	X	47 days before peritonitis developed	"
3. R.B.	2	M	VI	IV and VI	7 days before peritonitis developed	"
4. J.F.	6	M	XX	XX	Day on which peritonitis developed	"
5.* J.C.	4	M	XIX	XIX	a. Day on which peritonitis developed b. 77 days after peritonitis developed	Recovered
6. L.E.	3	F	XXVIII	XXVIII	17 days after peritonitis developed	"

*This case was in contact with Case 1 for several weeks before the latter developed Type XIX pneumococcal peritonitis.

such cases 2 types of pneumococcus were carried persistently in the nasopharynx, but one type only was isolated from the peritoneal cavity during the acute infection. That the carrier-state may continue for a prolonged time following recovery from peritonitis is shown by the isolation of the infecting type of pneumococcus from the throat of 2 convalescent cases.

The data on 6 children with the nephrotic syndrome who developed pneumococcal peritonitis are presented in Table I. This shows the time at which the type of pneumococcus which caused peritonitis was isolated from the throat, in relation to the time of onset of the peritoneal infection.

In 3 cases (1, 2, 3) the type of pneumococcus which caused the peritonitis was isolated repeatedly from throat cultures taken over a variable period before peritonitis developed (69, 47, and 7 days respectively). In 2 cases (4, 5) the invading type of pneumococcus was recovered from throat cultures taken within a few hours after the onset of peritonitis and in one of these cases (5) the organism was isolated repeatedly from the throat during a period of 77 days after recovery from peritonitis. In one case (6) the organism causing the peritonitis was not recovered from the throat until 17 days after the subsidence of the acute infection. The correlation noted in the present study between the types of pneumococcus found during the carrier-period and during peritonitis was not observed in the cases reported by Peacock and Werner.¹

Summary. In 6 young children with the nephrotic syndrome who developed pneumococcal peritonitis, the type of pneumococcus recovered from the nasopharynx was the same as that causing peritonitis. Evidence is presented which indicates that peritonitis may be caused by a strain of pneumococcus of the same specific type as that of the organism known to have been carried in the nasopharynx for a considerable time before the development of the infection; this carrier-state may persist for a prolonged period after recovery from peritonitis.

¹ *Am. J. Dis. Child.*, 1937, **53**, 1022.