These results also indicate that the rat is not an entirely suitable specimen for the standardization and assay of cortical extracts, because of this variability in response to extract administration. Only by first keeping adrenalectomized rats on extract for a considerable period, then removing the extract and selecting the ones which develop adrenal insufficiency, could an animal suitable for accurate assay work be obtained.

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Antigenic Action of the Specific Polysaccharide of Pneumococcus Type I in Man.

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Francis and Tillett[1] demonstrated that following the intradermal injection of minute amounts of the type-specific polysaccharide of Type I, II or III Pneumococcus in humans, there developed in the serum of these individuals homologous type-specific agglutinins. In addition, the serum of individuals so treated was found to possess the capacity of conferring passive protection upon mice against infection with pneumococci of homologous type. These results were confirmed by Finland and Sutliff.[2]

Recently, it has been shown that the specific polysaccharide of Type I Pneumococcus exists as an acetyl polysaccharide.[3] The acetyl compound is capable of completely absorbing the type-specific antibodies from an homologous immune serum and of inducing type-specific active immunity in mice. The acetyl polysaccharide is readily converted into its deacetylated derivative by treatment with dilute alkali. The chemical and immunological properties of the deacetylated polysaccharide are identical with those of the soluble specific substance in the form in which it was originally isolated[4]; it is non-antigenic in mice and only partially absorbs the type-specific antibodies from Type I anti-pneumococcus serum.

The recognition of the specific polysaccharide in acetyl form raised the question as to whether the antigenicity of the pneumo-

[1] Francis, T., Jr., and Tillett, W. S., *J. Exp. Med.*, 1930, **52**, 573.

[2] Finland, M., and Sutliff, W. D., *J. Exp. Med.*, 1931, **54**, 637.

[3] Avery, O. T., and Goebel, W. F., *J. Exp. Med.*, 1933, **58**, 731.

[4] Heidelberger, M., and Avery, O. T., *J. Exp. Med.*, 1923, **38**, 73.

TABLE I.

The Occurrence of Specific Antibodies after Intradermal Immunization.

		Before Immunization													
Subject	Pn.I cc.	A.M.	I.P.	E.K.	E.R.	T.A.	M.S.	J.M,	E.T.	R.D.	K.G.	M.P.	R.L.	A.A.	B.H.	Controls
Mouse Protective Antibodies	10^{-3}	D 26	D 26	D 30	D 27	D 29	D 32	D 29	D 48	D 24	D 22	D 22	D 29	D 26	D 29	
	10^{-4}	D 46	D 32	D 36	D 46	D 32	D 36	D 54	D 32	D 36	D 26	D 46	D 29	D 32	D 30	
	10^{-5}	D 36	D 72	D 80	D 36	D 36	D 46	D 36	D 46	D 46	S	D 29	D 72	D 48	D 48	
	10^{-6}	D 72	D 36	D 46	D 72	D 72	D 72	D 46	D 46	D 36	D 80	D 72	D 72	D 54	D 36	
	10^{-7}															D.D. 46, 72
	10^{-8}															S. S.
Type-Specific Agglutinins		O	O	O	O	O	O	O	O	O	O	O	O	O	O	
Type-Specific Precipitins																
		After 0.03 mg. deacetylated polysaccharide							After 0.03 mg. acetylated polysaccharide							
Mouse Protective Antibodies	10^{-3}	S	S	D 72	S	D 48	D 48	D 48	S	D 48	D 24	D 29	D 27	D 53	S	
	10^{-4}	S	S	S	S	D 29	D 48	D 24	S	S	D 48	D 48	S	S	S	
	10^{-5}	S	S	D 72	S	D 48	D 48	D 56	S	S	S	D 72	D 48	S	S	
	10^{-6}	S	S	S	S	S	D 120	S	S	S	S	S	S	S	S	
	10^{-7}															D.D. 72, 48
	10^{-8}															D.D. 72, 48
Type-Specific Agglutinins		+	+	+	+	O	O	O	+	O	±	+	O	+	+	
Type-Specific Precipitins		O	O	O	O	O	O	O	?	+	+	—	O	O	+	

S = Survived.
D = Died. Numerals indicate the number of hours elapsing before death.
+ = Type-specific agglutinins or precipitins demonstrable.
O = Type-specific agglutinins or precipitins not demonstrable.
— = Not done.

coccus carbohydrates previously observed in humans had been due to the deacetylated product or to contaminations of that material with the acetyl polysaccharide. Consequently, 2 groups of normal humans, each 7 in number, were given intradermal injections of the acetyl polysaccharide and the deacetylated polysaccharide of Type I Pneumococcus, respectively. The deacetylated product was prepared by Dr. W. F. Goebel from the same lot of acetyl polysaccharide used in the experiment. An injection of 0.01 mg. in 0.1 cc. of physiological saline was made intradermally in each individual at weekly intervals for 3 weeks. Serum was obtained from each person before the first injection and again one week after the third injection. These sera were then tested for the presence of type-specific agglutinins, precipitins and mouse-protective antibodies.

Whereas the sera obtained before the course of immunization was begun contained no demonstrable antibodies for Type I Pneumococcus, in a large proportion of the sera of these individuals obtained after the injection of a total of 0.03 mg. of either the acetyl polysaccharide or its deacetylated derivative, a comparatively high titer of mouse-protective antibodies, as well as type-specific agglutinins, was found. When tested with the acetyl polysaccharide, a few sera also contained specific precipitins. Furthermore, in the individuals in whom the most marked antibody production occurred, the development of antibodies was first evidenced by the occurrence of wheal and erythema reactions at the site of the intradermal inoculation.

Although the deacetylated polysaccharide induces no demonstrable antibodies in mice or rabbits, the results of the present experiment demonstrate conclusively that in man the development of type-specific antibodies follows the injection of either the naturally acetylated or artificially deacetylated polysaccharide. In either form, the Type I pneumococcus polysaccharide administered intradermally is an effective agent in stimulating the production of specific antibodies in human beings. The present results confirm the earlier observations on the development of type-specific antibodies in the serum of individuals following the intradermal injection of the type-specific pneumococcus polysaccharides.