THE ELECTRICAL CONDUCTIVITY OF ELECTROLYTES FOUND IN THE SWEAT OF PATIENTS WITH FIBROCYSTIC DISEASE OF THE PANCREAS

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A search of the available medical literature reveals no study of the electrical conductivity relative to NaCl of the electrolytes found in the sweat of patients with fibrocystic disease of the pancreas.

Methods of Study

Simultaneous chemical and electrical conductivity studies have been done on the blood serum and sweat of five children with proven fibrocystic disease of the pancreas. The electrical conductivity tests were made by means of a modified Wheatstone bridge previously described (Bloxsum, 1959). These electrical conductivities in equivalent mEq./l. of sodium chloride, together with the chemical analyses of the serum and sweat, are compared with the normal (Table 1).

Comment

The electrolytes in sweat are sodium, chloride, potassium and lactic acid, with sodium chloride being the major constituent (Best and Taylor, 1950). The electrical conductivities of the electrolytes present in sweat vary considerably, and in this study ranged from 15 to 60 mEq./l. solutions of sodium chloride in the normal children. In the patients with fibrocystic disease of the pancreas the electrical conductivities ranged from 80 to 150 mEq./l. solutions of sodium chloride. The electrical conductivities of normal and abnormal sweat parallel closely the electrolyte content.

Lundgren, Ramanathan, Sen Gupta and Chakravarti (1955) report that, in 25 samples of sweat obtained from 12 normal subjects, the chloride con-

TABLE 1
ELECTROLYTE CONDUCTIVITIES OF NORMAL SWEAT AND ABNORMAL SWEAT
(FIBROCYSTIC DISEASE OF THE PANCREAS)

Patient	Chemical Values in mEq./l.				Electrical Conductivity in Equivalent mEq./l. NaCl Sweat
	Blood Serum		Sweat		
	Na	Cl	Na	Cl	
Normal:					
Hill	169		48	45	60
Hill	165	109	13	31	45
Shepherd	144	101	28	14	20
Shepherd	146	102	28	15	20
Radcliffe	144	121	31	24	38
Poinflick	154	112	15	7	15
Loekin			17	15	20
Gibson	144	110	10	10	16
Herde	146	110	26	19	25
Lee	148	107	37	32	35
Wagner	146	103	75	56	55
Mattfield	141	112	40	37	37
	Mean		31	25	32
Fibrocystic Disease of the Pancreas:					
Marsh	144	112	91	105	80
Hill	144	110	110	100	100
Williams	144	105	100	142	120
Lundgren	144		144	137	150
Emde	139	112	108	117	120
	Mean		130	120	114

centration varied from 8 to 80 mEq./l., with the majority of readings between 25 and 40 mEq./l. and an average of 35.9 mEq./l., these readings being made on a modified Philips conductivity bridge, model GM 4249. These investigators state that the procedure for determination of the specific conductivity of small amounts of sweat was found to give results which correlated with the chloride concentration ($r = 0.90$) and the sodium concentration ($r = 0.78$). They conclude that the electrical conductivity method can therefore be used for estimation of the concentration of sodium chloride which is the major electrolyte in sweat. The main requirements in determining electrical conductivity are that such a procedure is simple and rapid, can be applied to minute volumes of sweat (less than $\frac{1}{8}$ ml. (Lundgren *et al.*, 1955)) and is relatively free of error.

In this study there was no overlapping of the

electrical conductivities of normal and abnormal sweat. The determination of the electrical conductivity of sweat is a simple, rapid laboratory procedure, relatively free of error.

Summary

Electrical conductivities of normal and abnormal sweat, expressed relative to standard solutions of NaCl, parallel the concentrations of the electrolytes present and their determination constitutes a quick, simple and inexpensive, error-free laboratory procedure that can be used in the study of fibrocystic disease of the pancreas.

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