Zusammenfassung

Flexner-Jobling-Karzinome, die spontan regressieren, weisen eine zwei- bis vierfache Steigerung ihrer katheptischen Aktivität auf. Dabei ist die saure Phosphatase nicht veränderlich; die alkalische Phosphatase hingegen sinkt in regressierenden Tumoren auf einen Bruchteil ihrer ursprünglichen Aktivität.

Enzymic Activities of Vi Strains of *Salmonella typhosa* and their W Variants

SHRIVASTAVA *et al.*[1] sought to correlate the enzymatic activities of various strains of *S. typhosa* with the presence of Vi antigen in these strains. These authors reported marked differences in the oxidative metabolism of glutamic acid and tyrosine and concluded that the Vi antigen is in some way responsible for the higher metabolic activities of Vi containing strains. The strains examined by SHRIVASTAVA *et al.* represented the recognized possible antigenic combinations known to occur in *S. typhosa*. Thus, the Vi I strain contained predominantly Vi antigen, the Watson V strain possessed all three antigens, Vi, O, and H, the H901 strain contained the H and O antigens, while the O901 strain possessed O antigen only. Although these strains cover all antigenic variations of *S. typhosa*, their known antecedents clearly indicate that they are separate isolates and aside from possession of common antigens, they are unrelated. Consequently, the possibility must be considered that the observed variations in oxidative metabolism may be due to enzymatic differences inherent in each strain. If this were the case, such differences would not be correlated with the presence of the Vi antigen. In order to determine whether such a causal relationship actually exists, a number of V strains of *S. typhosa* were compared with W variants (substrains) isolated directly from each of the strains. In one instance a V form substrain isolated from strain H901 following mouse passage was compared with its original non-Vi strain[2].

The strains examined in these experiments are given in the table. The cells were grown on meat extract agar plates for 18 h at 37°C, and were harvested, washed and resuspended in M/15 phosphate buffer. The suspensions were then adjusted to a final density of 500 as measured with the Klett-Summerson photoelectric colorimeter using the blue filter (420 mμ). Oxidative activities were followed manometrically at 37°C in the usual Warburg apparatus. Final volume in all vessels was 2·5 ml, which included 2·0 ml cells in the main compartment, 0·4 ml substrate in the side arm (either M/50 l-glutamic acid, M/50 tyrosine or 20% glucose), and 0·1 ml 20% KOH in center well.

The results of this comparison of activities on the substrates tested indicated identical uptake by V and W forms of the same strain. Thus, the data obtained for strain Ty2 V and Ty2 W when plotted as activity curves were found to be superimposed throughout the course of the experiment. Tests with the V and W forms of the Watson strain, the V and W forms of strain 58 as well as the V and W forms of strain H901 confirmed these results. The data clearly indicated that the V and W forms of each strain behaved in an identical manner

Oxidation of Glutamic Acid by V and W Substrains

S. typhosa Strain	$\mu l\ O_2$	
	60 min	120 min
Ty2 V	164	347
Ty2 W	170	355
Watson V	104	214
Watson W	102	208
H901 V	130	264
H901 W	124	258
58 V	74	158
58 W	82	176

towards the substrates tested (glucose, tyrosine and glutamic acid). However, it will be seen that differences existed between the strains. These experiments demonstrate that the interstrain differences cannot be correlated with the presence or absence of the Vi antigen.

FELIX and PITT[1] have established the important role played by the Vi antigen in mouse virulence. The nutritional requirements of the culture as a major factor in mouse virulence have been clarified by BACON *et al.*[2], and FORMAL *et al.*[3]. Any attempt to correlate enzymatic activities of the various typhoid strains with antigenicity and virulence should take into account the individual differences of strains having different origins. Thus, any comparison of Vi and non-Vi containing strains for effects attributable to the Vi component is best accomplished by the use of W variants isolated from the same Vi strain. This is further borne out in a later paper by the authors themselves in their study of aryl sulphatase activity in *S. typhosa*[4]. The fact that only strain Vi I demonstrated any appreciable activity while other Vi strains tested were essentially inactive further serves to emphasize the desirability of including the W form of strain Vi I as a control[5].

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Zusammenfassung

Enzymatische Aktivitäten in V-Stämmen von *Salmonella typhosa* wurden mit solchen in W-Stämmen, welche aus V-Kulturen isoliert worden waren, verglichen. Die Aktivitäten in V- und W-Formen gleicher Stämme waren identisch und sind daher unabhängig vom Vorhandensein oder Fehlen des Vi-Antigens.

[1] G. C. SHRIVASTAVA, S. C. AGARWALA, and S. S. BHATANAGAR, Exper. *9*, 421 (1953).

[2] L. S. BARON, unpublished data (1952).

[1] A. FELIX and R. M. PITT, J. Hyg. *49*, 92 (1951).

[2] G. A. BACON, T. W. BURROWS, and M. YATES, J. Exptl. Pathol. *32*, 85 (1951).

[3] S. B. FORMAL, L. S. BARON, and W. SPILMAN, J. Bacteriol. *68*, 117 (1954).

[4] G. C. SHRIVASTAVA, K. L. ARORA, and S. S. BHATANAGAR, Exper. *10*, 493 (1954).

[5] G. P. GLADSTONE, Br. J. Exptl. Path. *18*, 67 (1937). Growth of Vi strains in synthetic media where amino acids provide the sole carbon source results in rapid conversion to the non-Vi state. This provides a convenient means of obtaining W substrains.