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Bacterial Antifibrinolysins.*

MICHAEL DOUDOROFF. (Introduced by W. H. Manwaring.)

From the Laboratory of Bacteriology and Experimental Pathology, Stanford University, California.

The specific antihuman fibrinolysin formed or secreted by certain strains of Streptococci is presumably one of the main factors causing the rapid spread of certain streptococcus infections on or within human tissues. The effect of associated bacterial species on this aggressive chemical factor, therefore, is of practical clinical interest.

To study such effects, an arbitrary dose of streptofibrinolysin was added to chloroformed broth cultures of the commoner associated microorganisms. At various times after this addition the fibrinolytic titers of the resulting mixtures were determined. Data thus obtained are recorded in Table I.

From the table it is seen that there is a suggestive parallelism between the destruction of the fibrinolysin and the power of the associated microorganisms to liquefy gelatin. Clinically important exceptions to this rule are: *Staph. aureus* (2 strains), *Cl. welchii* and *Cl. oedematiens-maligni,* which liquefy gelatin but are without demonstrable antifibrinolytic action.

The table further shows that the antifibrinolysin in certain bacterial cultures is partially or completely destroyed by heating to 60°C. for 30 minutes. All but one of the antifibrinolysins thus far tested are destroyed quantitatively by heating to 100°C. for 5 minutes.

Heating a non-lytic fibrinolysin-antifibrinolysin mixture to 100°C. for 5 minutes will not restore its fibrinolytic function. Such a

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TABLE I.

Destruction of Strepto-fibrinolysin by Associated Bacteria.

Chamberland (L 3) filtrate of a 24-hour broth culture of a fibrinolytic strain of *Streptococcus hemolyticus*, heated to 100° C for 5 minutes to destroy possible living organisms, was diluted with 0.8% NaCl-solution to form a stock reagent containing 20 minimum fibrinolytic units per cc., the lytic unit being determined by the serum-free fibrin-clot technic of Tillett and Garner.[1] Samples of this stock lysin were added to equal volumes of 48-hour broth cultures of the micro-organisms to be tested and a drop of chloroform added to each mixture to inhibit bacterial growth. The mixtures were incubated at 37° C for 24 hours, and the rate of destruction of the fibrinolysin determined by the serum-free fibrin-clot technic.

The following arbitrary symbols are used to record results: ++++, cultures causing at least 90% destruction of the fibrinolysin by the end of one hour; +++, by the end of three hours; ++, six hours; +, 24 hours; ±, 50% destruction by the end of 24 hours; and 0 no demonstrable reduction in fibrinolytic titer.

Bacterial strains tested	Antifibrinolytic titer	Titer of heat-inactivated cultures		Gelatin liquefaction
		60°, 30 min.	100°, 5 min.	
Non-fibrinolytic *Strep. hemolyticus* (8 strains)	0	0	0	0
Non-fibrinolytic *Strep. hemolyticus* (1 strain)	++++	±	0	+
Non-hemolytic Streptococci (26 strains)	0	0	0	0
Strep. viridans (2 strains)	±	0	0	0
Strep. liquefaciens (1 strain)	+++	0	0	+
Strep. liquefaciens (1 strain)	++++	+	0	+
Staphylococcus albus (1 strain)	0	0	0	0
Staphylococcus aureus (1 strain)	0	0	0	0
Staphylococcus aureus (2 strains)	0	0	0	+
Dip. pneumoniae (5 strains)	0	0	0	0
Kleb. pneumoniae (2 strains)	0	0	0	0
C. diphtheriae (2 strains)	0	0	0	0
Esch. coli (2 strains)	0	0	0	0
Eberth. typhi (1 strain)	0	0	0	0
S. dysenteriae (1 strain)	0	0	0	0
Proteus vulgaris (2 strains)	0	0	0	±
Proteus vulgaris (1 strain)	+++	++	+	+
Ps. fluorescens (1 strain)	++++	++++	0	+
Ps. aeruginosa (2 strains)	++++	++++	0	+
Ps. cyanogena (1 strain)	0	0	0	0
B. anthracis (1 strain)	++	0	0	±
Cl. welchii (1 strain)	0	0	0	+
Cl. oedematiens-maligni (1 strain)	0	0	0	+
Cl. sporogenes (1 strain)	++++	++++	0	+
Cl. histolyticum (1 strain)	++++	++	0	±

restoration would be logical if the coctostable fibrinolysin were merely bound or inhibited by the coctolabile antifibrinolysin.

None of the associated bacteria thus far tested increase the lytic action of streptofibrinolysin.

[1] Tillett, W. S., and Garner, R. L., *J. Exp. Med.*, 1933, **58**, 485.