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ISOLATION AND ENZYMATIC ACTIVITY OF TOXINS OF CORYNEBACTERIUM PYOGENES HOMINIS (C. HAEMOLYTICUM)

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Corynebacterium pyogenes hominis (C. haemolyticum) is regularly isolated from human infections in central Europe, USA and the Pacific.

This corynebacterium produces into the medium soluble toxins with haemolytic activity, capacity to produce necrosis of skin in a sensitive animal, to adsorbe into erythrocytes, dissolve and precipitate egg yolk, and split lecithin and lysolecithin. All tested hyperimmune sera neutralized these activities. At least two antigenic systems were demonstrated by quantitative immunoprecipitation. The mode of action and enzymatic activity was studied in broth culture filtrates and in a semisynthetic medium. Active components were purified by adsorbtion of toxin into sheep erythrocytes, followed by elution and precipitation with ammonium sulfate, methanol fractionation according to Cohn, gel filtration through Sephadex G 100 and G 200, and DEAE cellulose.

While investigating the mechanism of action on the wall of erythrocytes and substrates (egg yolk, lecithin, lysolecithin), the splitting of lecithin and lysolecithin was demonstrated. The byproducts of this splitting were indentified as choline, lysophosphatic acid, phosphatide acid, and fatty acids. In studies of the dynamics of the splitting a decrease of nitrogen in the ether phase was observed while the concentration of phosphorus remained unchanged. In accordance with this free choline was found in the aqueous phase, and in the ether phase lysophosphatide acid was detected by paper and thin layer chromatography.

Both, phospholipase D and A take part in the splitting of the lecithin molecule. We demonstrated interaction with C phospholipase of Clostridium perfringens and alpha- and betalysin of Staphylococci pyogenes.

It is possible to conclude that phospholipases of Corynebacterial pyrogenes hominis act so upon the molecule of purified lecithin, as on the wall of erythrocytes, and posses a dermonecrotic and lethal activity. Parallel neutralization of these activities can be accomplished with hyperimune serum.