

agglutinated at 1:800, ten at 1:1,600, one at 1:3,200, three at 1:6,400, and one at 1:12,800. The greatest number in any one dilution agglutinated at 1:1,600.

The height of the agglutinating titers of the serums in glomerulonephritis with the above strain of streptococcus was decidedly higher than that found with the same strain with the serums of 110 normal individuals, 50 patients with acute rheumatic fever, and 300 patients with chronic arthritis. The greatest percentage of the serums in these 3 conditions agglutinated the streptococcus at the dilution of 1:200, but in each there were many serums which failed to show agglutinins in dilutions as low as 1:50 and 1:100.

The height at which agglutination with the serums in glomerulonephritis took place was also higher than that found in a limited number of cases of scarlet fever, bacterial endocarditis, and ulcerative colitis.

Several of the serums from the cases of glomerulonephritis were tested for agglutinins for *B. typhosus*. A positive agglutination occurred in one at a dilution of 1:50.

Three serums from patients suffering from renal insufficiency associated with essential hypertension were also tested for streptococcic agglutinins. The highest titers at which agglutination occurred were 1:50 in 2 and 1:400 in one.

The relative height of the streptococcic agglutinating titers in glomerulonephritis suggested (1) an etiologic relationship and (2) a possible biologic method for differentiating renal insufficiency due to glomerulonephritis from renal insufficiency associated with primary hypertension.

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Subcutaneous Nodules in Chronic Arthritis.

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In 200 patients with chronic arthritis subcutaneous nodules were found in 59 (29.5%). Forty-nine of the 58 cases were 50 years of age or older.

The nodules when removed often had a definite capsule but in some cases this was poorly defined. When sectioned and examined grossly, multiple areas of necrosis were usually seen, surrounded

by fibrous tissue. Necrotic and mucinous material could frequently be expressed from the center.

The nodules from 20 cases were examined microscopically. They were found to be made up of multiple inflammatory areas. The centers of these commonly showed varying stages of necrosis. Two types of structure were seen in the necrotic centers, viz., a hyaline eosin-staining material and a fibrillar substance that stained with hematoxylin. Scattered in this necrotic material were varying numbers of polymorphonuclear leucocytes. Surrounding the necrotic centers there were many mononuclear and multinucleated cells (polyblasts) which varied in size and shape. Many of them resembled the epithelioid cells in a tuberculous lesion. These polyblasts generally but not always had a marked tendency to be arranged in a radial or palisade fashion. In this respect the arrangement was similar to that commonly found in the heart valve in acute rheumatic endocarditis. Polymorphonuclear leucocytes were scattered among the polyblasts, in many cases in small pockets or abscesses. These nodules simulate abscesses more closely than the acute rheumatic nodules which we have studied. These necrotic abscessed areas, since they contain streptococci, would probably tend to bring about a state of hypersensitiveness to streptococci in the patient.

The structure of the nodules from chronic arthritis does not differ in any respect except degree from that described in the nodules in subcutaneous tissues, joints, tendons, *galea aponeurotica*, diaphragm, tongue, tonsils, arteries, heart valves, and auricles and ventricles of the heart in cases of acute rheumatic fever.

Seventeen nodules were cultured in beef infusion broth with a reaction of pH 7.6. Streptococci were recovered in pure culture in 12 (70.6%). Some of the strains grew well and some poorly. As a rule they were diplococci, though 2 strains grew out into chains of diplococci. All were gram positive and produced a green discoloration faintly when grown on the sheep blood agar plate for 24 hours at 37°C.

The frequency of subcutaneous nodules in acute rheumatic fever and in chronic arthritis, the similarity of the gross and microscopic structure of the nodules in these 2 conditions, and the frequency with which streptococci can be cultured from the blood in acute rheumatic fever and from the blood and subcutaneous nodules in chronic arthritis strongly suggest, for the most part, that acute rheumatic fever and chronic arthritis have a common streptococcic etiology and that the 2 diseases are in all probability different manifestations of the same process.