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NOTES

Localization of Group A Streptococci and Particles of Titanium Dioxide in Arthritic Lesions in the Rabbit

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In a previous study [1] it was shown that group A streptococci labeled with fluorochrome and particles of titanium dioxide which have been injected intraperitoneally into rabbits become localized within phagocytic cells in myocardial, hepatic, and diaphragmatic lesions induced by streptococcal toxins. It was also shown that both streptococci and particles of titanium dioxide were localized in delayed hypersensitivity lesions induced in the skin of guinea pigs by injections of tuberculin [1]. It was postulated that the phagocytic cells, which engulfed streptococci and particles of titanium dioxide while in the peritoneal cavity, migrated and transported them to inflammatory areas remote from the site of injection of these particles. It was also proposed that the localization of streptococci in such lesions may be followed by the degradation of the components of the streptococcal cell wall; subsequent lysis of cells would result in release of toxic components that may augment and perpetuate a chronic inflammatory process [2, 3].

Since several products of group A streptococci, such as streptolysin S (SLS), cell-wall components, and extracellular products, were found to cause severe arthritis and hepatitis in the rabbit [4–7], it was of interest to investigate the possibility that group A streptococci and particles of titanium dioxide injected intratonsillarly would subsequently localize in the inflammed joints and hepatic lesions induced by streptococcal products.

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Materials and Methods

Streptolysin S was prepared from a group A type 3 (strain S84) *Streptococcus* according to the method of Ginsburg and Bentwich [8]. Usually, 10,000 hemolytic units/ml of toxin have been employed.

Fragments of cell walls were prepared from a type 4 *Streptococcus* following mechanical breakage with a Mickle disintegrator for 60 min, at 4 C, with use of Balottini no. 14 glass beads. The large fragments of cell walls were removed by centrifugation at 36,000 *g*, and the supernatant fluid, concentrated by pervaporation, was filtered through a 0.6-μ Millipore filter and then a 0.22-μ Millipore filter. Such soluble preparations contained 2.5 mg/ml of protein and approximately 500 μg/ml of rhamnose [7].

Induction of arthritis. Five rabbits (weighing 2–3 kg) from a local laboratory stock were injected intra-articularly in both knee joints with 0.5-ml aliquots of streptococcal cell-wall components; three rabbits were similarly injected with 0.5 ml of streptolysin S (2,000 hemolytic units per joint). Usually 2–3 injections at 24-hr intervals were sufficient to cause severe arthritis in all of the animals. Other rabbits were injected intra-articularly with 0.5 ml of pyrogen-free saline.

Injection of fluorochrome-labeled streptococci and titanium dioxide. Twenty-four hr following the first intra-articular injection of either streptococcal cell-wall components or SLS, a single intratonsillar injection of a mixture of 10^9 fluorescein isothiocyanate-labeled type 4 streptococci [3] and