Unique Localization of Protein Gene Product 9.5 in the Joint of the Horse

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Synovial intima contains two types of cells: macrophage (Type A synoviocyte) and fibroblast-like cell (Type B synoviocyte).
Type B synoviocytes, which are responsible for production of collagen, fibronectin, hyaluronan and other glycosaminoglycans into the intimal interstitium and joint cavity, are proper cells in the synovial membrane. Protein gene product (PGP) 9.5, that was originally isolated from the human brain as a brain-specific protein, is structurally related to ubiquitin C-terminal hydrolase. PGP9.5 has been used as an immunohistochemical marker of neurons and related cells. When the equine synovial membrane was immunostained by use of PGP9.5 antiserum, many synoviocytes showed an intense immunoreactivity. The present study reports the selective localization of PGP9.5 in Type B synoviocytes and synovial fluid in equine joints.

Immunostaining of the synovial membrane using the antiserum against human PGP9.5 demonstrated cells with a few thin, long cytoplasmic processes, scattered in the synovial intima, in addition to nerve elements. In the villous region, the immunoreactive cells were more numerous and extended branching processes towards the surface of synovial membrane, in which they were regularly and densely arranged to form a superficial plexus, a kind of lamina limitans. Whole-mount preparations of the synovial membrane demonstrated the entire shape of immunoreactive synoviocytes, especially extensions of the processes. By electron microscope, immunoreactive cells were characterized by well-developed rough endoplasmic reticulum with broad cisternae, and these ultrastructural characteristics corresponded to those of Type B synoviocytes. Both Western and Northern blot analyses of the brain, synovial membrane and synovial fluid suggested the existence of PGP9.5 itself in Type B synoviocytes. ELISA system was established for detection of PGP9.5 in synovial fluid from normal joints and joints with arthropathy (osteochondrosis dissecans, intra-articular fracture and inflammatory arthritis). PGP9.5 concentration in samples of disease group tended to be higher than control group. The concentration in the intra-articular fracture was significantly higher than that in clinically normal joints.

This study suggested that PGP9.5 is a useful marker for Type B synoviocytes in the horse. Although the functional significance of PGP9.5 in Type B synoviocytes has not been well established yet, this protein might regulate metabolism and degradation of proteins or inflammatory products in the synoviocytes or synovial fluid.