

The three-dimensional reconstruction of the innervation pattern in the lymphoid compartments of the ovine pharyngeal tonsil highlighted a possible way of neuro-invasion by the scrapie agent

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Scrapie is a neurodegenerative disease affecting sheep and goats, caused by an unconventional transmissible agent: the pathogen prion protein (PrP^d). During a first silent phase of amplification inside lymph follicles, the pathogen reaches the peripheral nervous system and spread retrogradely to the central nervous system. Recently, it has been demonstrated that the respiratory system and more specifically the pharyngeal tonsil could serve as natural portal of entry for scrapie. In this context, we realised a three-dimensional reconstruction of the innervation pattern in the lymphoid compartments of the ovine pharyngeal tonsil.

The AMIRA 4.0.1 Mercury system software allowed the 3D reconstruction of a chain of 3 follicles surrounded by the nervous pattern revealed by the immunolabelling of unmyelinated nerve fibres on serial cryosections.

The nervous network seemed to follow the vasculature and was denser on the follicle side close to the connective central axis of the pharyngeal tonsil. This density diminished as the fibres walked along the follicle in direction to the respiratory epithelium covering the tonsil surface. Inside the entire reconstruction, only two nerve fibre extensions invaded a lymphoid follicle.

The computing 3D reconstruction ensures a representation closer to the reality than an analysis on histological slides and allowed to evaluate the frequency and distribution of the nerve fibres surrounding lymphoid follicles of the pharyngeal tonsil. Because some nerve fibres were detected inside the lymphoid follicles, neuro-immune connections between nerve endings and immune cells responsible for prions amplification could be one of the link between lympho- and neuro-invasion.