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Immunoreactivity of canine and feline polyglucosan bodies for monoclonal antibody against human polyglucosan

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Summary. With the use of monoclonal antibodies, raised against the human polyglucosan, positive staining of polyglucosan bodies (PGB) was detected in the brain, spinal cord and cecum of aged dogs. PGB in feline brain were also positively stained with these antibodies. These findings indicate that animal PGB share common antigenicity with human PGB.

Key words: Immunohistochemistry – Polyglucosan bodies – Dog – Cat

Polyglucosan bodies (PGB), the generic name referring to Lafora bodies, corpora amylacea and other similar structures, are composed of glucose polymers and observed in the nervous system in ageing and different pathological conditions [6, 9]. PGB have also been described in the extraneuronal tissues [8].

During a study of ageing phenomena in animals, we have described that canine and feline PGB are found in the intra- and extraneuronal tissues in the course of ageing [3, 4, 7]. We have also shown the similarities between human and animal PGB with regard to morphological and histochemical features [1, 4, 7]. In spite of this similarity in structure and histochemistry, no one has ever suggested the antigenic relationship between human and animal PGB. With use of antibodies made against human polyglucosan [10], we show here the possibility that both PGB are antigenically related.

Materials and methods

Tissue was obtained from five elderly dogs (over 10 years old) and three 10-year-old cats, free of neurological disease. Predilection sites for PGB [3, 4, 7] were removed from each animals. After fixation in 10% neutral buffered formalin and embedding in paraffin, sections (3–6 μm) were routinely stained with H&E and PAS.

For immunohistochemistry of PGB, deparaffinized sections were submitted to the avidin-biotin-peroxidase complex method [2], using biotinylated anti-mouse IgM goat serum (Vector laboratories, USA). The primary antiserum used in this study was the monoclonal antibodies (mAb) raised against polyglucosan extracted from the myocardium of a patient with Lafora disease [10], generous gift of Dr. T. Yokota (Yamaguchi University School of Medicine, Japan). The sections were incubated with mAb (diluted 1:5) for 1 h at room temperature. Finally, the sections were treated with diaminobenzidine and counterstained with hematoxylin. As control for the immunohistochemical reaction, either the primary antiserum was omitted or normal mouse serum was substituted for primary antiserum.

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Results

PGB in the CNS of aged dogs and cats were round and PAS-positive bodies and were found in the perikaryon of the neuron or in the neuropil (Fig. 1). Cecum PGB of the dog were also PAS positive and were found in the smooth muscle cells.

In immunohistochemical preparations, canine PGB in the CNS and cecum reacted positively to the mAb (Figs. 2, 4). Feline PGB in the CNS were also immunoreactive for the mAb (Fig. 5). No reaction product was detected at any site when the mAb was omitted or replaced with non-immune mouse serum (Fig. 3).

Discussion

It has been reported that there are similarities between human and animal PGB with regard to morphological and histochemical features [3, 4, 7]. Human and animal PGB were positive for PAS, dimedone-PAS, Best's carmine, iodine, methenamine silver and concanavalin A [1, 3–8]. Ultrastructurally, PGB were composed mainly of branching filaments.

Recently, Yokota et al. [9, 10] showed that the mAb, raised against human polyglucosan, reacted positively with Lafora bodies, the inclusions of the myocardial and liver cells in Lafora disease and type IV glycogenosis, corpora amylacea and in basophilic degeneration of the cardiac muscle cells. They also suggested that these tissue

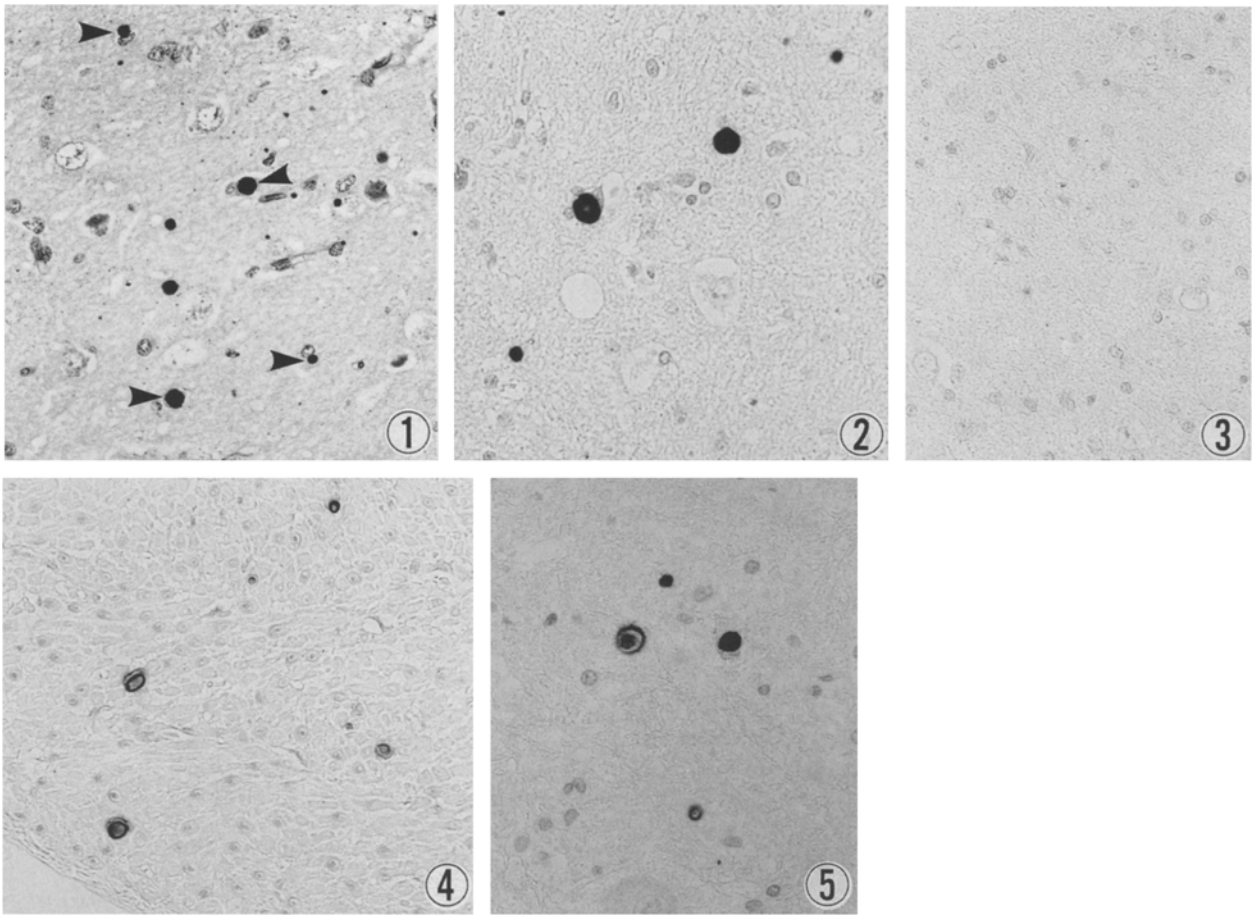

Fig. 1. Many polyglucosan bodies (PGB) in the perikarya of the neuron (*arrowheads*) or free in the neuropil in the thalamus of the dog. PAS, × 300
Fig. 2. PGB in the thalamus of dog react positively with monoclonal antibodies (mAb). × 300
Fig. 3. When a non-immune serum is substituted for mAb, no reaction product is observed. Thalamus of the dog. × 300
Fig. 4. PGB in the outer longitudinal muscle layer of the canine cecum are immunoreactive for mAb. × 300
Fig. 5. PGB in the Goll's nucleus of the cat are positively stained with mAb. × 300

entities share common antigenicity with Lafora bodies and that these disorders are closely related to some abnormality of glucose metabolism.

The present immunohistochemical study showed that mAb are available for the detection of canine and feline PGB. This finding also suggests that canine and feline PGB have the common antigenicity to human PGB.

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