

Zeitschrift:	Schweizer Archiv für Tierheilkunde SAT : die Fachzeitschrift für Tierärztinnen und Tierärzte = Archives Suisses de Médecine Vétérinaire ASMV : la revue professionnelle des vétérinaires
Herausgeber:	Gesellschaft Schweizer Tierärztinnen und Tierärzte
Band:	137 (1995)
Heft:	2
Artikel:	Neuronal vacuoles in the canine brain
Autor:	Pumarola, M. / Juanola, B. / Fatzer, Rosmarie
DOI:	https://doi.org/10.5169/seals-590164

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 11.08.2025

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

Departament de Patologia i de Producción Animals, Facultat de Veterinària, *Hospital Clínic Veterinari, Universitat Autònoma de Barcelona und **Institut für Tierneurologie, Universität Bern.

Neuronal vacuoles in the canine brain

M. Pumarola, B. Juanola*, Rosmarie Fazter**

Summary

Intraneuronal vacuoles have been observed in the motor trigeminal nucleus of the medulla oblongata of two dogs which showed neurological deficits. Its significance and possible relation with the same lesions observed in other animal species are discussed.

Key words: neuronal vacuoles – brain – dog

Neuronale Vakuolen im Gehirn von Hunden

Bei zwei Hunden mit neurologischen Ausfallerscheinungen wurden intraneuronale Vakuolen im motorischen Trigeminuskern der Medulla oblongata beobachtet. Die Bedeutung dieser Vakuolen und ihre möglichen Zusammenhänge mit ähnlichen Läsionen bei anderen Tierarten werden besprochen.

Schlüsselwörter: neuronale Vakuolen – Gehirn – Hund

Ever since the outbreak of bovine spongiform encephalopathy (BSE) in Great Britain (Wells et al., 1987) and shortly after of a similar disease in domestic cats, feline spongiform encephalopathy (FSE) (Legget et al., 1990; Wyatt et al., 1991), both most likely caused by the sheep scrapie agent via contaminated food (Wilesmith et al., 1992), any neuronal vacuole in the histologic section of a brain evokes uneasiness, in particular if the brain belongs to a species hitherto unaffected by a spongiform encephalopathy, as for instance dog or horse. Meanwhile both BSE and FSE have been diagnosed in captive wild ruminants (for references see Kirkwood et al., 1992; Williams and Young, 1993) and felines respectively (Peet and Curran, 1992; Willoughby et al., 1992). The sudden emergence of a spongiform encephalopathy in cattle and, even more so, in cats suggests that the agent of sheep scrapie spontaneously breaks through the species barrier, and thus it cannot be excluded that sooner or later more species may become host of the agent and develop spongiform encephalopathies.

It has long been known that neuronal vacuoles, one of the main diagnostic criteria in these diseases, may also occur in different species in connection with pathological changes other than a spongiform encephalopathy or alone with no evident cause. According to Zlotnik and Rennie (1958) they are regularly found in normal sheep brain; Fankhauser et al. (1971) describe large neuronal vacuoles in the red nuclei of cattle and consider them as

non-specific; and Wells and McGill (1992) give a synopsis of the species in which non-specific vacuoles have been found including personal observations in cats and pigs. Neuronal vacuoles in the canine brain are extremely rare; they occasionally have been seen in the motor trigeminal nucleus of the medulla oblongata (personal observation; K. Muñana, Fort Collins/USA, personal communication). Recently we have examined the brains of a 13 years old spayed female German Shepherd with marked old age changes and a 8 months old male Brittany Spaniel with a moderate meningitis; both animals had shown signs suggestive of a multifocal to diffuse neurologic disorder. In both brains we found single or multiple vacuoles in the above mentioned location on either side (fig 1). The spectrum of species with a spongiform encephalopathy is large. The significance of the neuronal vacuoles in the brains of the dogs studied in this paper is uncertain. They are very much limited to the trigeminal motor nuclei in both animals yet clearly in excess of what may be considered an incidental finding. In contrast with ruminants, where non-specific vacuoles are regularly found, they are extremely rare in dogs. Furthermore both dogs showed signs suggestive of a multifocal to diffuse neurologic disorder. Neither the old age changes in dog 1 nor the rather mild meningo-encephalitis in dog 2 fully explain the neurological signs. A link between the neuronal vacuoles and the clinical observations may exist. At the time being it certainly is inappropriate to classify

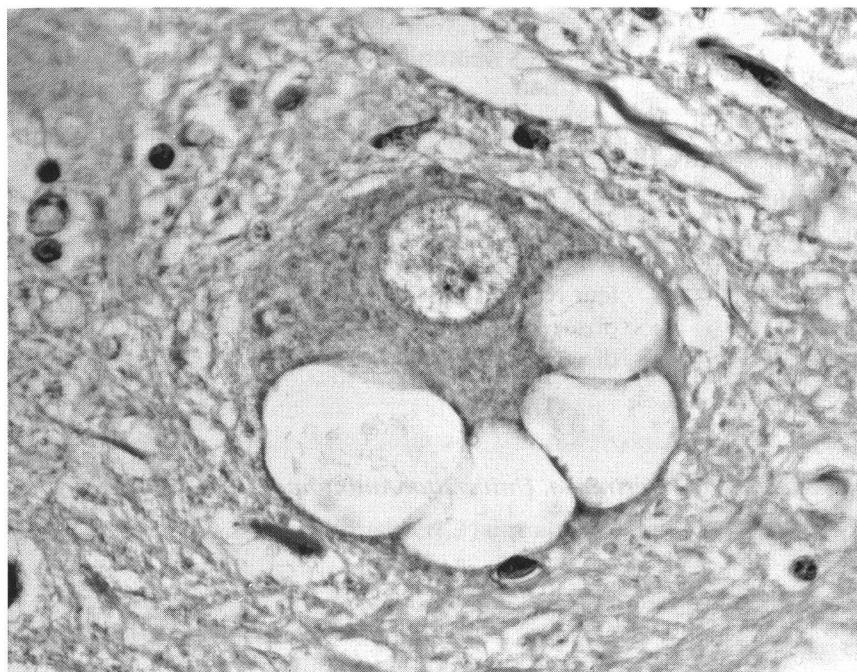


Figure 1: Neuronal vacuolation in the Nucleus motorius trigeminus, medulla oblongata. HE X160

the observation as a spongiform encephalopathy. The distribution and the extent of neuronal vacuolation and/or spongiform changes in the neuropil is variable in this group of diseases dependent on host species and agent strain. We have no way of knowing how a transmissible spongiform encephalopathy would look like in the canine brain. Causes other than a spongiform encephalopathy must be considered. However, if the occurrence of such vacuoles in dogs should become more frequent in the future it might be worthwhile to test prospectively saved frozen brain of neurological cases for Scrapie Associated Fibrils (SAF) by electron microscopy or for the porcine resistant isoform of PrP protein by means of immunocytochemistry.

References

- Fankhauser R., Fatzer R., Frauchiger E. (1971): Bemerkungen zur spastischen Parese des Rindes. Schweiz. Arch. Tierheilk. 113, 24–32.
- Kirkwood J.K., Wells G.A.H., Cunningham A.A., Jackson S.I., Scott A.C., Dawson M., Wilesmith J.W. (1992): Scrapie-like encephalopathy in a greater kudu (*Tragelaphus strepsiceros*) which had not been fed ruminant-derived protein. Vet. Rec. 130, 365–367.
- Legget M.M., Dukes J., Pirie H.M. (1990): A spongiform encephalopathy in a cat. Vet. Rec. 127, 586–588.
- Peet R.L., Curran J.M. (1992): Spongiform encephalopathy in an imported cheetah (*Acinonyx jubatus*). Austr. Vet. J. 69, 171.
- Wells G.A.H., Scott A.C., Johnson C.T., Gunning R.F., Hancock R.D., Jeffrey M., Dawson M., Bradley R. (1987): A novel progressive spongiform encephalopathy in cattle. Vet. Rec. 121, 419–420.

Wells G.A.H., McGill I.S. (1992): Recently described scrapie-like spongiform encephalopathies of animals, case definition. Res. Vet. Sci. 53, 1–10.

Wilesmith J.W., Ryan J.B.M., Hueston W.D. (1992): Bovine spongiform encephalopathy: case-control studies of feeding practices and meat and bone meal inclusion in proprietary concentrates. Res. Vet. 52, 325–331.

Williams E.S., Young S. (1993): Neuropathology of chronic wasting disease of mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus nelsoni*). Vet. Pathology. 30, 36–45.

Willoughby K., Kelly D.E., Lyon D.G., Wells G.A.H. (1992): Spongiform encephalopathy in a captive puma (*Felis concolor*). Vet. Rec. 131, 431–434.

Wyatt J.M., Pearson G.R., Smerdon T.N., Gruffydd-Jones T.J., Wells G.A.H., Wilesmith J.W. (1991): Naturally occurring scrapie-like spongiform encephalopathy in five domestic cats. Vet. Rec. 129, 233–236.

Zlotnik I., Rennie J.C. (1958): A comparative study of the incidence of vacuolated neurons in the medulla from apparently healthy sheep of various breeds. J. Comparat. Pathology. 68, 411–415.

Acknowledgements

The authors are grateful to Dr. Isidre Ferrer from the Unit of Neuropathology, Service of Pathology, Hospital Príncipes de España, University of Barcelona, for his advice and collaboration.

Diese Arbeit wurde unterstützt durch das Bundesamt für Veterinärwesen, Bern.

Vacuoli neuronali nel cervello canino

Sono stati osservati dei vacuoli intraneuronali nel nucleo motorio trigeminale del midollo allungato in due cani che presentavano sintomi neurologici. Il significato e la possibile relazione con lesioni identiche osservate in altre specie animali vengono discusse.

Vacuoles neuroniques dans le cerveau du chien

Des vacuoles intraneuroniques ont été observées dans le nucleus trigéminal moteur de la medulla oblongata de deux chiens qui présentaient des symptômes neurologiques. Leur signification et leur relation possible avec des lésions similaires observées chez d'autres espèces animales sont discutées.

Korrespondenzadresse: Dr Martí Pumarola, Facultat de Veterinària, Universitat Autònoma de Barcelona, E-08193 Bellaterra

Manuskripteingang: 9. März 1994



Clientèle chevaux à remettre en Suisse romande, occasion à saisir!

Développement d'une clientèle petits animaux possible.

Idéal pour jeune vétérinaire ou couple de vétérinaires en début de carrière. Important matériel de qualité à disposition. Reprise souhaitée au 1er juillet 1995.

Discretion et confidentialité sont assurées.

Faire offre par écrit sous chiffre SAT 2-95 à l'édition Hans Huber SA, Archives Suisses de Médecine Vétérinaire, Case postale, 3000 Berne 9.

Unsere neusten HITS

1. der erste PC-gesteuerte **MULTIPULS-RÖNTGEN-GENERATOR**
LEXRAY 500 PC MULTIPULS 500 mA/125 kV 35 kW
2. Portabler und fest installierbarer **MULTIPULS-RÖNTGEN-GENERATOR**
LEXRAY 80 MULTIPULS 80 mA/110 kV 5 kW

Portabel: Fr. 19 900.-. Für Netzanschluss 220 V!
Fest montiert mit Stativ, Bucky und fahrbarem Tisch,
auch portabel verwendbar: Fr. 25 900.-

Revidierte Occasions-Röntgenanlage mit Vollgarantie
500 mA/125 kV. Buckystand, fahrbarer Tisch, Fr. 19 500.-

R. Liechti AG, Röntgen, 2075 Thielle/Gals, Tel. 032 88 21 27

NEU!

