Hippocampus histological changes in epileptic dogs and cats.

Alejandro Domínguez González
Facultat de Veterinària, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

INTRODUCTION

Epilepsy-associated tissue changes can be useful for the understanding of the pathology of the disease and for therapeutic research. Among all structures of the central nervous system (CNS), the hippocampus seems to be one of the most commonly affected areas in epilepsy. Hippocampal sclerosis (HS) is the most common pathology encountered in human Mesial Temporal Lobe epilepsy and can be described as a neuronal loss and a reactive neuroinflammation (Wagner et al., 2014).

OBJECTIVES

The aim of this work was to:

• assess whether the characteristics of human HS can be found in epileptic dogs and cats, mainly focusing on neuroinflammation using immunohistochemical techniques; and if so, characterize the main features of HS in dogs and cats.

• check whether neuronal loss can be evaluated by means of biomarkers.

• prove whether epileptic dogs and cats can be a useful animal model for HS.

MATERIALS AND METHODS

This study involved 11 dogs and 3 cats. Out of these animals, 8 dogs and 1 cat suffered from epilepsy, while the remaining 3 dogs and 2 cats did not show any neurological signs and counted in the control group. Brains were sampled according to the protocol described by Mattasek et al. (2015) and evaluated under H&E and immunohistochemistry.

Immunohistochemical techniques used in the study.

<table>
<thead>
<tr>
<th>Antibody name</th>
<th>Trade house</th>
<th>Dilution</th>
<th>Pre-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neu N</td>
<td>Merck</td>
<td>1:500</td>
<td>C trate buffer 0.01M pH 6, 20°-96-98°C water bath + 30° room temperature</td>
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<tr>
<td>GFAP</td>
<td>Dako Z0334</td>
<td>1:5000</td>
<td>C trate buffer 0.01M pH 6, 20°-96-98°C water bath + 30° room temperature</td>
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<tr>
<td>AQP4</td>
<td>Millipore</td>
<td>ab3594</td>
<td>Without pre-treatment</td>
</tr>
<tr>
<td>Iba-1</td>
<td>Abcam</td>
<td>ab5076</td>
<td>C trate buffer 0.01M pH 6, 20°-96-98°C water bath + 30° room temperature</td>
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RESULTS AND DISCUSSION

Figure 1. The comparison of all the techniques used in the study between an epileptic dog and a control one showed no important differences except for the AQP4 expression, that appeared overexpressed in the epileptic dog court. (2.5x)

Taking into account the fact that no neuronal loss was found, no neuroinflammatory alterations were expected, as neuroinflammation may occur as a consequence of neuronal loss (Fawcett and Asher, 1999).

No other reports exist in veterinary literature about AQP4 in epileptic dog. The overexpression of AQP4 observed in epileptic dogs is similar to the one described in human revised bibliography (Coulter and Steinhäuser, 2015).

CONCLUSIONS

• None of the studied epileptic dogs showed histopathological and immunohistochemical changes corresponding with Hippocampal Sclerosis.

• Only the epileptic cat showed a remarkable neuronal loss and neuroinflammatory changes similar to those described for human Hippocampal Sclerosis. These findings confirm the cat as a useful animal model for epilepsy.

• AQP4 is a useful biomarker for studying epilepsy in both dogs and cats.

• A further investigation in canine epilepsy histopathology is needed in order to state whether dogs suffer from hippocampal sclerosis.

BIBLIOGRAPHY


