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Tubulovesicular structures are present in brains of hamsters infected with the Echigo-1 strain of Creutzfeldt-Jakob disease agent

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Tubulovesicular structures (particles; TVS) are virion-like particles 25–30 nm in diameter found by thin-section electron microscopy in brains of all prion diseases including scrapie, Creutzfeldt-Jakob disease (CJD), fatal familial insomnia (FFI) and Gerstmann-Sträussler-Scheineker disease (GSS), as well as in cell cultures infected with TSE agents. TVS are regarded as a disease-specific ultrastructural marker for TSEs and, by those not completely satisfied with the prion hypothesis, they are even considered to be a possible candidate for the infectious TSE agent itself. A caveat regarding that interpretation stemmed from previous failures to find TVS by electron microscopic studies of tissues from animals infected with the Echigo-1 strain of CJD agent. We now report detecting TVS in brains of hamsters infected with that strain of CJD agent, albeit with a very low frequency.

Key words: prion diseases, tubulovesicular structures, Echigo-1, Creutzfeldt-Jakob disease

INTRODUCTION

The Echigo-1 strain of Creutzfeldt-Jakob disease (CJD) agent is one of two described panencephalopathic strains of CJD agent. Echigo-1 was first isolated by Mori and colleagues (1989) and then passaged several times in hamsters in our laboratory. A detailed description of the immunohistochemical and ultrastructural characteristics of this model was published recently (Liberski et al. 2004, Sikorska et al. 2004).

Tubulovesicular structures (particles) are virion-like particles 25–30 nm in diameter found by thin-section electron microscopy in brain tissues from humans and animals with all transmissible spongiform encephalopathies (TSEs) including scrapie (David-Ferreira et al. 1968), CJD (Liberski et al. 1992), fatal familial insomnia (FFI) and Gerstmann-Sträussler-Scheineker disease (GSS) (Liberski and Budka 1994, Liberski et al. 2005), as well as in cell cultures infected with TSE agents (Manuelidis et al. 2007). The tubulovesicular structures (TVS) are regarded as a disease-specific ultrastructural marker for TSEs (Liberski and Jeffrey 2004, Liberski and Brown 2007, Manuelidis 2007, Manuelidis et al. 2007) and somehow involved in the TSEs pathogenesis. A caveat regarding that interpretation stemmed from previous failures to find TVS by electron microscopic (EM) studies of tissues from animals infected with the Echigo-1 strain of CJD agent (Liberski and Mori 1997). We now report detecting TVS in brains of hamsters infected with that strain of CJD agent, albeit with a very low frequency.

METHODS

Prion strain, animals, incubation period of illness

Outbred 6-week-old golden Syrian hamsters (Medical University of Lodz, Department of Oncology, Lodz, Poland) were inoculated intracerebrally with 0.05 ml of a 10% (w/v) centrifugation-clarified hamster brain suspension containing the Echigo-1 strain of CJD agent (Liberski and Mori 1997).

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