Immunohistochemical Evidence of Human Parvovirus B19 Infection in the Post-Mortem Brain Tissue of the Elderly

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Introduction

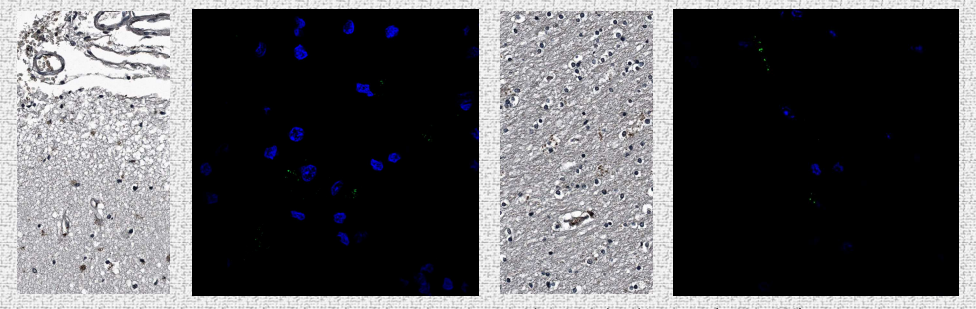
The parvoviruses ability to replicate is host cells' dependent. In recent studies presence of B19V DNA in human brain tissue has been determined therefore the cellular source of parvovirus replication in the human brain should be clarified.

Materials & Methods

Brain tissue autopsy samples were selected from 24 elderly individuals with morphological signs of encephalopathy. Thereafter, the grey and the white brain matter obtained from temporal and frontal lobes were sectioned. Immunohistochemical reactions using anti-B19 monoclonal antibody, and quantitative estimation of immunopositive cells were performed. All tissue sections were analysed using conventional and confocal microscopes. Calculations were performed using SPSS 23.0 program. Data were presented as medians with interquartile range [IQR (25%; 75%)].

Tissue samples were embedded in epoxy blocks and analysed by a JEM 1011 electron microscope.

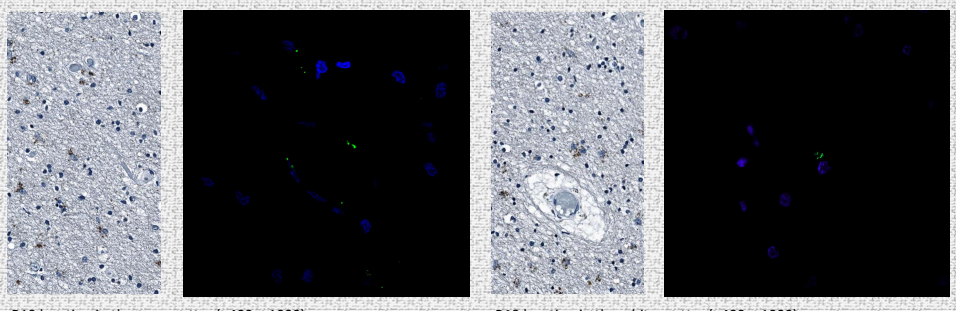
FRONTAL LOBE



B19 subpial location in the grey matter (×400, ×1000)

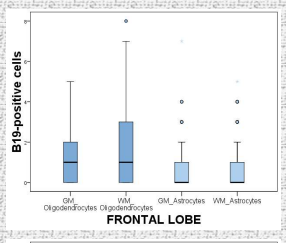
B19 location in the white matter (×400, ×1000)

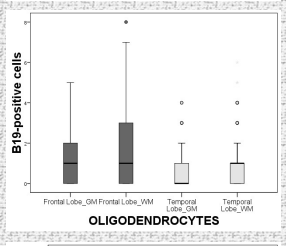
TEMPORAL LOBE

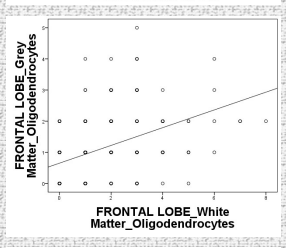


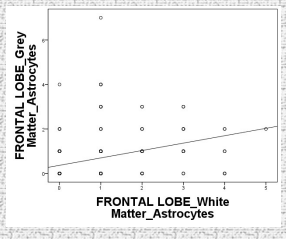
B19 location in the grey matter (×400, ×1000)

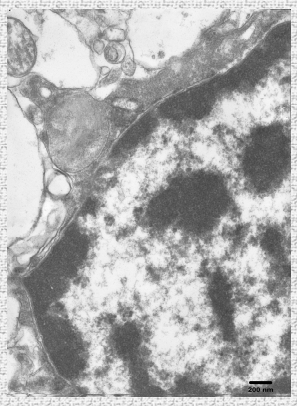
B19 location in the white matter (×400, ×1000)



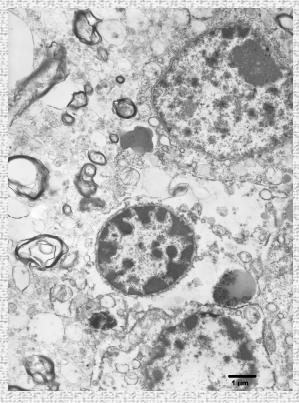








Oligodendrocyte, white matter, TEM (×20 000)



Neuron and oligodendrocytes, grey matter, TEM (×5 000)

Conclusions

In the white matter an increased number of B19-positive oligodendrocytes is found as compared to the grey matter of the frontal lobe and to selected regions of the temporal lobe. Our data demonstrate that the B19 invades the central nervous system with oligodendrocytes being the target cell, and this occurs with advanced age.

Acknowledgements

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Results

In the frontal lobe, a statistically greater number of B19-positive oligodendrocytes compared to astrocytes was found [in the grey and white matter: 1.00 (0.00; 2.00) and 0.00 (0.00; 1.00); 1.00 (0.00; 3.00) and 0.00 (0.00; 1.00), respectively].

In the temporal lobe, a statistically greater number of B19-positive oligodendrocytes compared to astrocytes was found [in the grey and white matter: 0.00 (0.00; 1.00) and 0.00 (0.00; 0.00); 1.00 (0.00; 1.00) and 0.00 (0.00; 0.00), respectively].

A statistically significant positive correlation between B19-positive oligodendrocytes in the grey and in the white matter of the frontal lobe was observed ($r=0.487$, $p<0.001$). Similar correlation was found between B19-positive astrocytes ($r=0.467$, $p<0.001$).

Electron micrographs showed myelinated nerve fibres with abnormal myelin structure. Ultrastructural findings showed abnormal swollen mitochondria with disrupted cristae in oligodendrocytes. Number and size of mitochondria varied in cell bodies and processes.