Tick-borne encephalitis virus (TBEV) causes serious infections of the central nervous system of humans. There are more than 10,000 cases of tick-borne encephalitis reported in Europe and Asia every year. TBEV is a representative of Flavivirus genus within the Flaviviridae family. The genome consists from single-stranded positive sense RNA [1]. Nucleocapsis is approximately 50 nm in outer diameter and is surrounded with lipid envelope.

The production of virions is associated with dramatic alterations of the endoplasmic reticulum and formation of special compartments, called microenvironments or replication factories. Typical flavivirus-induced structures are convoluted membranes and induced vesicles [2, 3, 4]. Neural cells represent the main target for TBEV. In our study, primary neurons and astrocytes were infected with TBEV (strain Neudoerfl) and the morphological changes in the infected cells were investigated by electron tomography. The samples were prepared by high pressure freezing and freeze substitution method. Single axis electron tomography was done over a tilt range from -65 to 65 with 0.65 degree step (JEOL 2100F equipped with high tilt stage and Gatan camera Orius SC 1000) by means of Serial EM software [5]. Tomograms were aligned, reconstructed and 3D models were generated by manually masking the area of interest using IMOD software package [6].

Interestingly, we observed unique tubule-like structures in the endoplasmic reticulum of the infected cells. The 3D reconstructions revealed their detailed organization. The diameter of tubule-like structures observed in TBEV-infected astrocytes and neurons was different (22.0 nm ± 1.3 nm, n = 51).

Tubule-like structures have origin in viral activity it was confirmed by examination of non-infected cells.

3. S. Welch et. Al, Cell Host & Microbe 5 (2009), 365-375

Acknowledgement: This work was supported by the ASCR (Z60220518, P302/12/2490), CSF project P502/11/2116 and P302/12/2490, AdmireVet project CZ.1.05./2.1.00/01.006 (ED006/01/01), and TACR (TE 01020118).