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**Supplementary Data**

**Development of a novel virus-like particle-based vaccine for preventing tick-borne encephalitis virus infection**

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**Supplementary Fig. S1** Purification of TBEV-E protein and characterization of anti-TBEV E antibody. **A** Characterization of the purified TBEV-E protein. The whole-protein lysates were analyzed by Coomassie brilliant blue staining and western blotting. **B** Purification of the refolded TBEV-E protein. The samples of lysate were analyzed by InstantBlue staining. **C**, **D** Identification of anti-TBEV E antibody. U251 cells were followed by infection with or without WH2012 for 48 h. The whole-cell lysates were determined by western blotting (**C**). Confocal microscopy was performed using DAPI (DNA-binding dye; blue) as a probe and anti-TBEV-E antibody (red); scale bar, 10 μm (**D**).

**Supplementary Table S1** Nucleotide sequence of plasmids used in this study

|  |  |
| --- | --- |
| **Name** | **Nucleotide sequence** |
| Core/prM/E | atggccgggaaggccattctgaaaggaaaggggggcggtccccctcgacgagtgtcgaaagagaccgcgaggaagacgcgtcaatctagggtccaaatgccaaatggactcgtgttgatgcgcatgttggggattttatggcatgccgtggccggcaccgctaggagtcccgtgttgaagtctttctggaattcagtcccactgaaacaggccatggcagcactccggaaaattaaaaaggcagtgagcaccctgatggtaggtctgcaaagacgtggcaaaagaaggtcagcagcagactggacaagttggttgctggttctggttttggtgggggtgacacttgcagccacagtgcggaaagaaagggatggcactaccgtgatcagagctgaaggaaaagatgcggcaacccaggtgcgtgtggaaaatggcacctgtgtgatcctggccacggacatgggatcatggtgtgatgactcactaacctatgagtgtgtgaccatagaccagggggaggaaccagttgacgtggattgcttctgcaggaatgttgatggagtttacctggagtatggacggtgtggaaaacaagaaggatcaagaacaaggcgctcagtgctgatcccgtcccatgcccagggagacctcacaggaaggggacacaaatggttagaaggggattcactgcggacgcatctcactagggttgaaggatgggtctggaagaacaaagtgctcaccctggcggtgatcgccattgtgtggctgaccgtggaaagcgtggtgaccagggtcgccgtagtggtggtgctcttgtgcctggctccggtttatgcctcacgatgcacacatttggaaaacagagattttgttactggcactcagggaaccactcgtgtgactctggtgctggaactgggaggatgcgtcaccataacagccgaggggaagccctcgatggacgtgtggcttgactccatttatcaggagaatcctgccaaaacacgtgagtactgcctgcacgcaaagctgtcggacaccaaggtcgcggccagatgccccacaatgggacctgccactttggctgaagagcaccagagtggcacagtgtgcaagagagaccagagtgatcgaggctggggtaatcattgtggattatttggaaaaggcagcattgtgacctgcgtcaaggcgtcctgtggggcaaaaaagaaggccacaggacacgtgtatgatgccaacaaaattgtgtacacggttaaagtagagccgcatacgggggattacgtcgccgctaatgagacccatagtggaagaaaaacagcatccttcacggtttcctcggaaaaaaccatcttgaccatgggagactacggagatgtgtccttgttgtgtcgagtagctagcggtgttgaccttgctcagactgtcattctggaacttgacaagacttcagaacacctaccgacggcctggcaggttcaccgggactggttcaatgatctggccctgccgtggaaacatgaaggggcacagaactggaacaatgctgaacggctagttgagtttggagccccacatgctgtgaaaatggatgtgtataaccttggagaccagactggagtgttgcttaagtcacttgctggtgttccagtggcgcacattgatggaaccaagtaccacctgaaaagtggccacgtgacatgcgaggtaggactagaaaaactcaagatgaaaggtctcacatacacaatgtgcgacaagacgaaattcacgtggaagagaatcccaactgacagtggacatgatacagtggtcatggaagttgcattctctggaaccaaaccctgtaggatcccggtgagggccgtggcacacggctctccagatgtgaatgtggctatgttgataacacccaaccccacaatcgaaaccaatggtggtggtttcatagaaatgcagttaccgccaggagacaacatcatctatgtcggggaactgagtcaccaatggttccaaaaagggagtagcattggaagggtctttcaaaaaaccaggaaaggtatagaacgactgacagtgatcggagaacacgcctgggattttggctcaactggtggattcctgacctcggttggcaaggcgctacacacagttcttggtggtgccttcaacagcctgtttggaggagtagggttcttgcctaagatcctagtgggagtggtcctggcctggttgggcctgaacatgaggaatccgaccatgtccatgagcttcctcctggccggaggactggttctggccatgacactcggagtcggagcttag |
| NS2B/NS3Pro | atgtcattcagtgaaccactgactgttgtgggagtcatgctaaccctggccagcggcatgatgcggcacacctctcaggaggccctttgcgcgctcgccgtggcctcgttccttctgctcatgctggtgctagggacaaggaagatgcagctagtggctgaatggagtggctgtgtggagtggcacccagaactgatgaatgaaggtggagaggtgagcctgcgggtccggcaggactcaatgggaaacttccacctgacagagcttgagaaagaggagagagtgatggctttctggctgctggcaggactggcggcttcggccttccactggtctggcattcttggtgtgatgggattgtggacgctgtcggaaatgctgaggacggctcgaagatcagatttggtcttctctggacaggggggacgtgagcgtggtgacaggccctttgaggtcaaggatggcgtctatagaatcttcagcccaggactgctctgggggcagcgccaggtgggagttggctatggctccaaaggtgtcctacacacgatgtggcatgtgacgagaggggcggcgctgtccattgatgacgccgtcgcagggccctattgggctgacgtcaaagaggacgttgtatgctatggtggagcctggagtcttgaggagaagtggaaaggtgagacagtgcaggttcatgccttcccaccggggagagcccatgaggtgcatcaatgtcagcccggggaactgctcctggacacaggtaggaggataggggcagtgccaattgatctggcaaaagggacatctggcagccccatcctcaactcccaaggagtggttgtgggactgtatgggaatggactgaagaccaatgaaacctacgtcagcagcattgctcaaggtgaggctgaaaaaagtcgacccaatctcctgccggccgtcattggcacaggctggacagcaaaagggcagatcacagtgctggacatgcacccaggctag |

**Supplementary Table S2** Evaluation scale of brain tissue injury

|  |  |
| --- | --- |
| **Score** | **Histological change** |
| 0 | No necrosis, no inflammatory cell infiltration, no neuronal degeneration |
| 1 | Necrotic area < 10%, cell foci 1-2, neuronal degeneration < 5% |
| 2 | Necrotic area 11%-50%, cell foci 2-5, neuronal degeneration 5%-25% |
| 3 | Necrotic area 51%-75%, inflammatory cell infiltration 30%-65%, neuronal degeneration > 25% |
| 4 | Necrotic area > 75%, inflammatory cell infiltration > 65% |

**Supplementary Table S3** Evaluation scale of intestinal tissue injury

|  |  |
| --- | --- |
| **Score** | **Histological change** |
| 0 | The villi of intestinal mucosa were intact and normal in structure |
| 1 | Mild edema of villi, epithelial abscission was limited to the top of the villi |
| 2 | Villi are moderately damaged and necrotic |
| 3 | Villi are missing and crypts are still recognizable |
| 4 | Complete loss of mucosal epithelial structure or transmural necrosis |