**Supplementary Table 2. HPV cfDNA Levels and Clinical Treatment and Outcomes in the Whole Group of Patients**

| **No.** | **Age** | **IVB/R** | **Sample** | **HPV**  **Type** | **Pathology** | **PD-L1**  **CPS** | **Transfer model** | **Baseline HPV cfDNA** | **Treatment** | **HPV cfDNA** | **Treatment** | **HPV cfDNA** | **Treatment** | **HPV cfDNA** | **Treatment** | **HPV cfDNA** | **D** | **OS(m)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 57 | R | Sequential | 16 | SC | 5 | LR | 4.7 × 102 | (TP+Bev)\*6+ICIt\*3-SD | 5.2 × 104 | ICIt\*16+ICIc\*13-SD | 6.3 × 104 | ICIc\*5-PD | - | (nab-TP+BIc)\*6+BIc\*4-PR | - | N | 46.1 |
| 2 | 50 | IVB | Single | 16 | SC | - | LN | 4.7 × 102 | TP\*3+RTpm+TP\*2-CR | - | Follow up-CR | - | - | - | - | - | N | 42.3 |
| 3 | 48 | IVB | Sequential | 66 | SC | - | LN | 8.5 × 102 | TP\*2+RTp+TP\*1-PR | 0 | TP\*1 | 0 | RTm-CR | 0 | Follow up-PD | - | Y | 39.8 |
| 4 | 51 | IVB | Single | 16 | SC | - | LN | 2.8 × 103 | TP\*3+RTpm+TP\*2-PD | - | (ICIk+Apatinib)\*2-PD | - | Follow up-PD | - | - | - | Y | 16.3 |
| 5 | 46 | IVB | Single | 18 | LCNEC | - | H | 4.0 × 103 | EP\*6-PR | - | (ICIk+Anotilib)\*3-PD | - | nab-TP\*2-PD | - | - | - | Y | 11.1 |
| 6 | 53 | IVB | Sequential | 58 | SC | - | H | 6.6 × 103 | RTpm+BT\*1-PR | 1.5 × 103 | BT\*4-CR | 0 | TC\*2-CR | 0 | TC\*1-CR | 0 | N | 19.3 |
| 7 | 57 | IVB | Single | 16 | SC | - | LN | 7.5 × 103 | RTp-PR | - | RTm-CR | - | Follow up-PD | - | - | - | Y | 33.4 |
| 8 | 49 | IVB | Sequential | 16 | SC | - | LN+H | 1.3 × 104 | TP\*2-PR | 1.9 × 104 | TP\*2+RTp+TP\*1-PR | 7.4 × 104 | TP\*1+RTm-PD | - | - | - | Y | 12.5 |
| 9 | 67 | R | Sequential | 16 | SC | 60 | LN | 1.7 × 104 | SBRT | 1.2 × 104 | (TP+BIt)\*1-PR | 3.6 × 103 | BIt\*5-PR | - | BIt\*4-PR | - | N | 53.6 |
| 10 | 62 | IVB | Sequential | 18 | SC | 1 | LN+H | 2.0 × 104 | (TP+BIc)\*4-PR | 5.3 × 102 | (TP+BIc)\*2+BIc\*6-PR | 7.1 × 103 | (BIc)\*6-PR | - | (BIc)\*3-PD | - | N | 22 |
| 11 | 43 | IVB | Sequential | 16 | SC | 20 | LN | 2.8 × 104 | (TP+Bev)\*1 | 1.6 × 104 | (TP+Bev)\*1+RTp-PR | 4.6 × 102 | RTm-IT-PD | - | (TP+BIt)\*4-PR | - | N | 10.2 |
| 12 | 59 | IVB | Sequential | 16 | SC | - | LN+H | 3.0 × 104 | TP\*1 | 3.2 × 104 | TP\*1-IT-PD+RFA | 0 | (nab-T+ICIs)\*1+ICIs\*1-PD | 2.0 × 103 | - | - | Y | 16.5 |
| 13 | 38 | IVB | Sequential | 16 | SC | - | LN | 3.9 × 104 | TP\*1 | 1.3 × 104 | TP\*1+RTpm+TP\*3-PR | 5.4 × 104 | TP\*1-CR | - | Follow up-PD | - | N | 36.3 |
| 14 | 36 | IVB | Single | 16 | SC | - | LN | 7.3 × 104 | TP\*2+RTp+RTm+TP\*2-CR | - | Follow up-CR | - | - | - | - | - | N | 38.9 |
| 15 | 49 | R | Sequential | 16 | AC | - | LN+H | 4.2 × 104 | (TP+BIs)\*2-PR | 9.3 × 105 | (TP+BIs)\*1-PR | 3.8 × 104 | (TP+BIs)\*3+RTm-PR | - | BIs\*4-PD | - | Y | 50.2 |
| 16 | 42 | IVB | Sequential | 16 | SC | - | LN | 7.0 × 104 | TP\*2+RTpm+TP\*1-CR | - | Follow up-CR | 9.8 × 103 | Follow up-CR | 1.7 × 104 | Follow up-CR | - | N | 32.8 |
| 17 | 48 | R | Sequential | 16 | SC | 40 | LN | 7.2 × 104 | RTp-PR | 2.4 × 102 | Follow up 303d-PD | 2.2 × 103 | RTm+(TP+ICI\*4)-CR | - | Follow up-CR | - | N | 19.1 |
| 18 | 55 | IVB | Sequential | 16 | SC | - | H | 9.0 × 104 | TP\*2+RTpm+TP\*4-PR | - | Follow up-PR | 1.0 × 104 | Follow up-PR | 8.4 × 103 | Follow up-PR | - | N | 58.9 |
| 19 | 56 | R | Sequential | 16 | SC | 5 | H | 1.8 × 105 | (nab-TC+Bev)\*2-PR | 5.7 × 102 | (nab-TC+Bev)\*1-PR | 1.7 × 104 | (nab-TC+Bev)\*2-PD | - | (nab-TP+Bev+ICIk)\*4-PD | - | Y | 88.5 |
| 20 | 34 | IVB | Single | 16 | SC | - | LN+H | 1.8 × 105 | TP\*4-PR | - | Dermatomyositis-IT | - | Follow up-PR | - | - | - | N | 78.5 |
| 21 | 54 | IVB | Single | 16 | SC | - | LN+H | 1.9 × 105 | TP\*2-PR | - | EBRT+IT | - | Follow up-PD | - | - | - | Y | 23.7 |
| 22 | 55 | IVB | Sequential | 58 | SC | 25 | LN | 4.9 × 105 | (TP+Bev)\*2+RTp-IT-PD | 3.4 × 106 | (TP\*Bev)\*1-PD | 3.7 × 105 | (nab-T+BIt)\*1+RTm-PR | - | (nab-T+ICIt)\*2+ICIt\*2-PR | - | N | 17 |
| 23 | 37 | R | Sequential | 16 | SC | - | LN+H+DSM | 1.7 × 106 | (TP+Bev)\*2-PR | 5.6 × 104 | (TP+Bev)\*2-PR | 2.0 × 104 | (TP+Bev)\*2+Bev\*2-PD | - | (Bev+ICIt)\*2-SD | - | N | 68.9 |
| 24 | 66 | IVB | Sequential | 58 | SC | - | LN+H | 3.1 × 106 | TP\*1 | 1.6 × 104 | TP\*1-PR | 9.0 × 103 | RTpm-CR | - | Follow up-PD | - | Y | 12.4 |
| 25 | 61 | R | Sequential | 31 | SC | - | LN+H+DSM | 3.8 × 106 | RTm+(nab-T+ICIk)\*1+G\*1-PR | 2.1 × 106 | ICIk\*1 | 8.5 × 105 | ICI\*1+(nab-T+ICIk)\*1-PD | - | Follow up-PD | - | Y | 52.1 |
| 26 | 66 | IVB | Sequential | 16 | SC | 70 | LN+H | 7.4 × 106 | (TP+BIt)\*6-PR | 1.8 × 104 | RTpm+IT+BT\*2-PR | 3.3 × 104 | (BIt)\*6-CR | - | ICIt\*9-CR | - | N | 17.9 |
| 27 | 36 | IVB | Sequential | 16 | SC | 5 | LN+H | 9.7 × 106 | (TP+BIt)\*8-PR | 1.3 × 104 | RTp+IT-PR | 2.9 × 105 | BT\*3-PR | 1.5 × 103 | RTm+ICIt\*1-CR | - | N | 19 |
| 28 | 53 | IVB | Sequential | 16 | SC | 10 | LN+H+DSM | 7.7 × 102 | TP\*4+RTp-PR | 1.9 × 104 | TP\*2-PD | 1.2 × 104 | (TP+BIt)\*1-PR | 8.5 × 102 | (TP+BIt)\*1+SBRT+BIt\*2-PD | - | Y | 24.2 |
| 33 | LN+H+DSM | 1.5 × 107 | TP\*4+RTp-PR | 2.8 × 105 | TP\*2-PD | 6.7 × 104 | (TP+BIt)\*1-PR | 0 | (TP+BIt)\*1+SBRT+BIt\*2-PD | - |

**Abbreviations**: AC, adenocarcinoma; Bev, bevacizumab; BIc, bevacizumab+immune checkpoint inhibitor-cadonilimab;BIs, Bevacizumab+immune checkpoint inhibitor-sindilizumab; BIt, Bevacizumab+immune checkpoint inhibitor-tislelizumab; BT, brachytherapy; CPS,combined positive score; CR, complete response; D, death; DSM, diffuse serosal metastasis; EBRT, external beam radiation therapy; HM, hematogenous metastasis; ICIc, immune checkpoint inhibitor-cadonilimab; ICIk, Immune checkpoint inhibitor-pembrolizumab; ICIs, Immune checkpoint inhibitor-sindilizumab; ICIt, Immune checkpoint inhibitor-tislelizumab; IVB, First diagnosis of FIGO (International Federation of Gynecology and Obstetric) stage; IT, Interrupt Treatment; LCNEC, large cell neuroendocrine carcinoma; LNM, lymph node metastasis ; LR, local recurrence; nab-TP, nanoparticle albumin-bound paclitaxel/cisplatin; PD, progressive disease; PR, partial response; R, recurrence; RFA, radiofrequency ablation; RTp, radiotherapy for the primary tumor; RTm, Radiotherapy for the metastatic lesion; RTpm, simultaneous radiotherapy of primary and metastatic lesions; SBRT, stereotactic body radiotherapy; SC, squamous cell carcinoma; SD, Stable Disease; TP, paclitaxel/cisplatin; TC, paclitaxel/carboplatin. It should be noted that due to the width limitations of the table, not all treatments for each patient are included in the table.