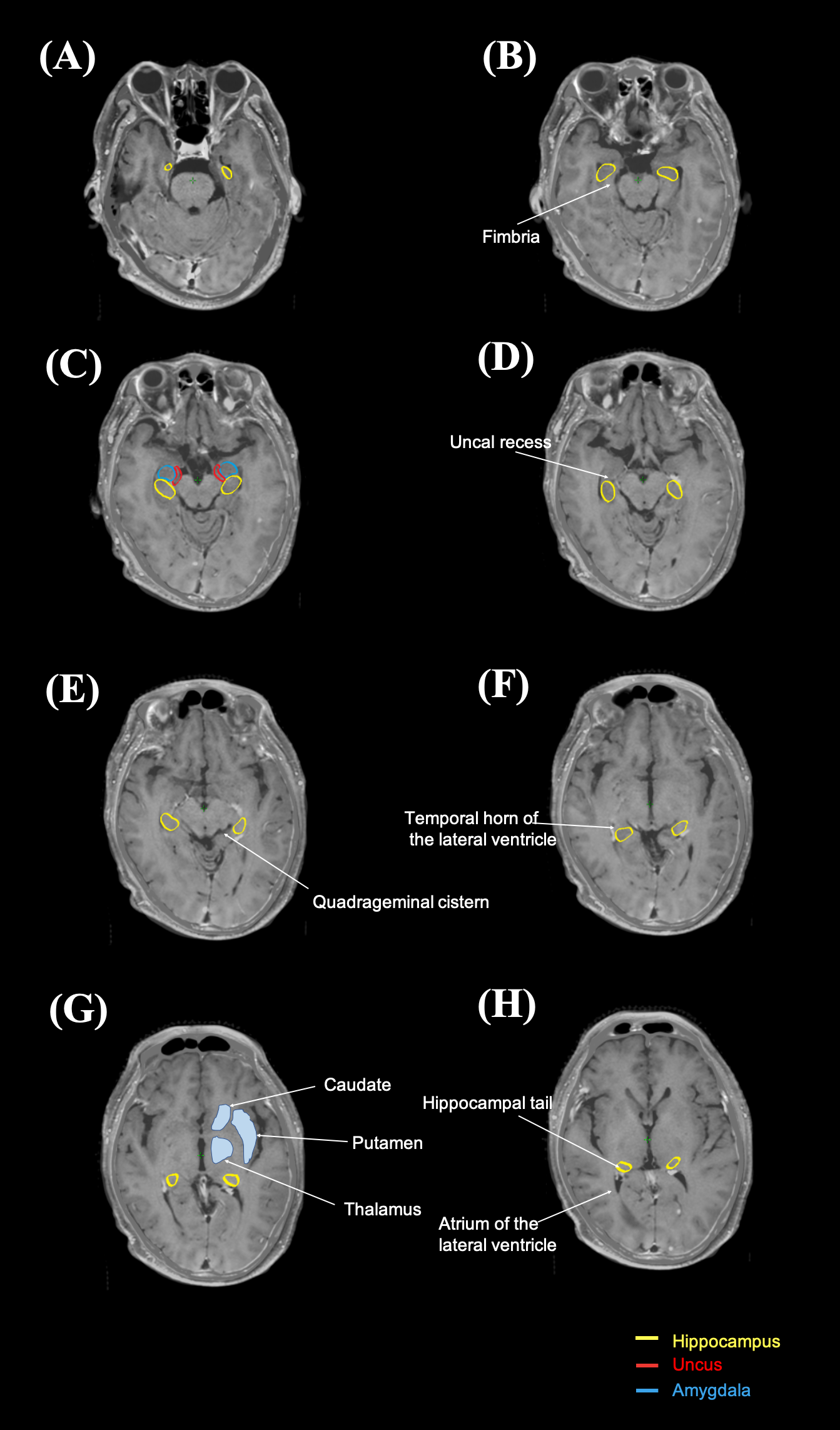
**Hybrid split-arc partial-field volumetric modulated arc therapy: an improved beam arrangement for linear accelerator-based hippocampal-avoidance whole brain radiation therapy**

**Supplementary File**

**Table S1.** Dose criteria of RTOG 0933 protocol

|  |  |  |  |
| --- | --- | --- | --- |
| **RTOG 0933 protocol** | **Per protocol** | **Acceptable variation** | **Unacceptable deviation** |
| Whole brain PTV | D2% < 37.5 Gy | D2% = 37.5 Gy | D2% > 40 Gy |
| D98% > 25 Gy | D98% < 25 Gy | V30 < 90% |
| Hippocampus | D100% < 9 Gy | D100% = 10 Gy | D100% > 10 Gy |
| Dmax < 16 Gy | Dmax = 17 Gy | Dmax > 17 Gy |
| Optic nerves and optic chiasm | Dmax < 37.5 Gy | Dmax = 37.5 Gy | Dmax > 37.5 Gy |

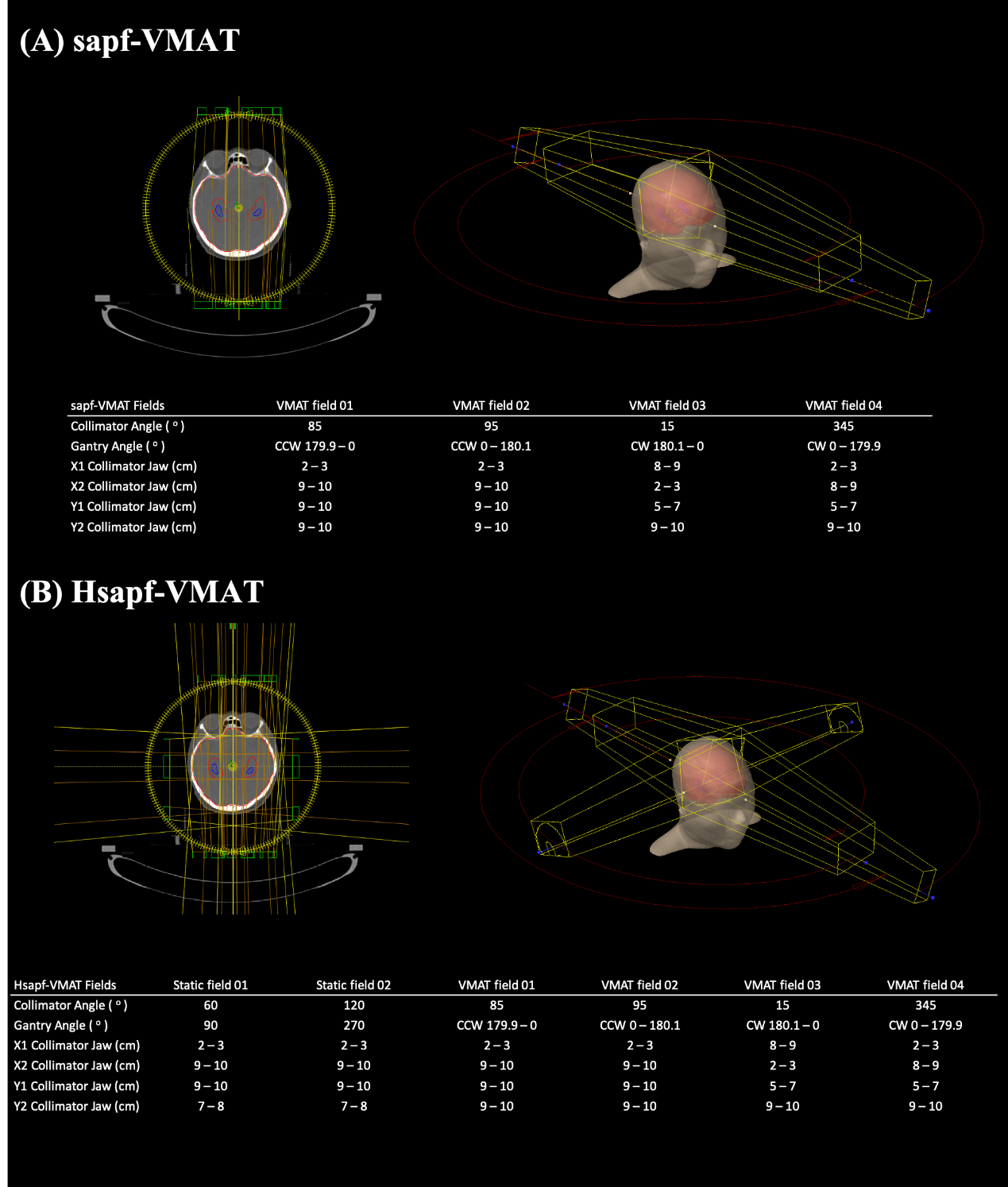
**Figure S1.** Delineation of the hippocampus made on T1-weighted MRI axial sequence images with reference to the RTOG 0933 guidelines. **A.** Delineation of hippocampus begins at the inferior extent of the crescentic-shaped floor of the temporal horn of the lateral ventricle. The low-density grey matter was contoured on the low signals of the cerebrospinal fluid (CSF); **B.** Avoid delineating the grey matter (amygdaloid nucleus and hamulus) in the fimbriae that are located superomedial to the hippocampus; **C.** The anterior boundary of the hippocampus is defined by the anterior edge of the temporal horn, to distinguish the hippocampus from the T1-hypointense gray matter of the amygdala, lying anterior and superior to the hippocampus. The medial boundary of the hippocampus is defined by the “boomerang-shaped” uncus; **D.** The uncal recess of the temporal horn defines the anterior boundary of the hippocampus. The medial boundary of the hippocampus becomes defined by the medial edge of the uncal recess; **E.** Postero-cranially, the medial boundary of the hippocampus is defined by the lateral edge of the quadrageminal cistern; **F.** The hippocampus remains medial to the temporal horn of the lateral ventricle throughout its extent; **G.** The hippocampal tail remains posterior to the thalamus as it curves medially toward the splenium of the corpus callosum. The hippocampus is medially located relative to the lateral ventricle; **H.** The postero-cranial extent of the hippocampal tail is located antero-medially to the atrium of the lateral ventricle



**Table S2.** Optimization objectives of major structures used in sapf-VMAT and Hsapf-VMAT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Structures** | **Limit** | **Volume (%)** | **Dose [cGy]** | **Priority** |
| Whole brain PTV | Upper | 0 | 3300 | 80 |
|  | Upper | 1 | 3150 | 80 |
|  | Upper | 2 | 3120 | 80 |
|  | Lower | 99 | 3030 | 100 |
| Hippocampus | Mean | - | 800 | 80 |
|  | Upper | 0 | 850 | 80 |
|  | Upper | 0 | 900 | 80 |
|  | Upper | 0 | 1350 | 80 |
|  | Upper | 0 | 1360 | 80 |
|  | Upper | 0 | 1370 | 80 |
|  | Upper | 0 | 1380 | 80 |
|  | Upper | 0 | 1390 | 80 |
| Left eye | Upper | 1 | 1380 | 80 |
|  | Upper | 2.5 | 1345 | 80 |
| Right eye | Upper | 1 | 1400 | 80 |
|  | Upper | 2.5 | 1360 | 80 |
| Left lens | Upper | 0 | 600 | 80 |
|  | Upper | 0.1 | 540 | 80 |
| Right lens | Upper | 0 | 600 | 80 |
|  | Upper | 0.1 | 540 | 80 |
| Left optic nerve | Upper | 0.5 | 2970 | 80 |
|  | Upper | 1.5 | 2940 | 80 |
| Right optic nerve | Upper | 1 | 3050 | 80 |
|  | Upper | 2 | 3020 | 80 |
| Optic chiasm | Upper | 0 | 3180 | 80 |
|  | Upper | 1.5 | 3165 | 80 |

**Figure S1.** Beam arrangement of (**A**) sapf-VMAT and (**B**) Hsapf-VMAT. CCW — counterclockwise; CW — clockwise



**Figure S3.** Left (**A**) and (**B**) right static fields have been employed in Hsapf-VMAT. The eyes and lenses were shielded by the X1 collimator jaw

