Supplementary Table 1: Clinical and demographic data of individual subjects

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subject ID | Age | Sex | Handedness | Side of Lesion | Location of Lesion | WHO Grade | Histological Type | Presentation |
| F01 | 38 | F | R | L | frontal polar | 3 | grade 3 mixed astrocytoma | seizure; surveillance showed growth |
| F02 | 38 | F | R | R | parietal | 3 | grade 2-3 ODG some anaplastic features; 1p19q intact | nocturnal generalized seizure; surveillance showed growth |
| F03 | 44 | M | R | L | temporoinsular | 2 | LGG presumed | seizure |
| F04 | 38 | F | R | R | frontal | 2 | ODG | seizure |
| F05 | 36 | M | R | L | frontoparietal | 2 | ODG | seizure |
| F06 | 19 | F | R | R | frontoparietal and parasagittal | 2 | ODG | incidental -- concussion playing sports; then seizures |
| F07 | 68 | M | R | L | frontal | 4 | GBM | word-finding difficulties then seizures |
| F08 | 66 | M | R | L | temporal | 4 | GBM | difficulty reading on paper; speech |
| F09 | 58 | M | R | L | frontal | - | neurocysticercosis | headache and seizure |
| F10 | 18 | M | R | R | frontal precentral | 2 | mixed astrocytoma/ODG | headache |
| F11 | 69 | M | R | L | posterior frontal | 4 | GBM | language deficits then weakness |
| F12 | 39 | F | R | L | premotor cortex | 3 | anaplastic oligoastrocytoma (recurrent infiltrative glioma) | seizure; worsening headache and weakness |
| F13 | 59 | M | R | L | temporal | 4 | GBM | expressive aphasia |
| F14 | 35 | M | R | R | frontal abutting motor | - | metastasis: small cell lung cancer | L weakness |
| F15 | 53 | M | R | R | frontoparietal | 2 | ODG->anaplastic ODG (grade 3) on crani | seizure |
| F16 | 61 | M | R | L | temporal and thalamus | 4 | GBM | headache; language deficit |
| F17 | 42 | F | L | L | temporooccipital | 2 | low-grade glioma NOS | seizures; VF deficits |
| F18 | 22 | F | R | L | frontal abutting motor | 3 | intermediate grade between 2 and 3 ODG | headache |
| F19 | 35 | M | R | L | frontal | 2 | ODG | seizure; personality changes |
| F20 | 47 | F | R | L | frontal | 2 | ODG | seizures |
| F21 | 25 | F | R | R | frontal | 3 | grade 2-3 oligoastrocytoma vs astrocytoma | incidental |
| F22 | 51 | F | L | L | frontoparietal | 1 | meningioma | 4h episode of R hand numbness, clumsiness |
| F23 | 20 | M | R | L | frontal abutting motor | 1 | pilocytic astrocytoma | seizures |
| F24 | 68 | M | R | L | temporal | 4 | GBM | language difficulties and headache |
| F25 | 34 | F | R | L | frontotemporal | 3 | anaplastic ODG | seizures; surveillance showed anaplastic transformation |
| F26 | 50 | F | R | L | frontoparietal | - | breast carcinoma metastasis | seizures, headache, language deficit, paresthesia, weakness, nausea |
| F27 | 30 | F | R | L | frontal | 3 | ODG->anaplastic ODG | seizures; surveillance showed growth, weakness, incr seizures |
| F28 | 33 | F | R | R | frontal abutting motor | - | clinically isolated syndrome (demyelinating) | left weakness maximal arm |
| F29 | 57 | M | R | L | frontal | 2 | ODG | language deficits and seizures |
| F30 | 54 | M | R | L | temporal | 4 | GBM (gliosarcoma) | headache; seizures |
| F31 | 49 | M | R | L | frontal | - | meningioma | incidental |
| F32 | 58 | M | R | L | temporal | 4 | GBM | headache; language deficit |
| F33 | 55 | M | R | L | frontal and insular and anterior temporal | - | LGG presumed | incidental; headache |
| F34 | 47 | F | R | L | frontal | 3 | ODG->anaplastic ODG | surveillance showed growth |
| F35 | 63 | M | R | L | temporal | 4 | GBM | language deficits |
| F36 | 22 | M | R | R | frontal | 1 | ganglioglioma | incidental |
| F37 | 18 | M | R | L | posterior mesial temporal and inferior parietal | 1 | pilocytic astrocytoma | seizures |
| F38 | 56 | M | A | L | temporal | 2 | ODG | seizure; imaging |
| F39 | 51 | F | R | L | frontal motor strip | 4 | metastatic adenocarcinoma; unknown primary | seizure |
| F40 | 64 | M | R | L | frontoparietal opercular | 4 | GBM | aphasia episodes; seizures |
| F41 | 44 | M | R | L | mesial frontal (SMA) | 3 | ODG | seizures |
| F42 | 47 | M | R | L | parietal | 1 | meningioma | incidental; weakness |
| F43 | 24 | M | L | L | frontal | 2 | ODG | seizure |
| F44 | 67 | F | R | L | posterior temporal | 4 | GBM | speech problems; TIA-like |
| F45 | 61 | M | R | L | temporoparietal | 4 | GBM | seizures |
| F46 | 32 | F | R | L | temporal | 2 | ODG | seizures |
| F47 | 61 | M | R | R | temporoparietal | 4 | GBM | fatigue; headache, N/V |
| F48 | 37 | F | R | L | temporal polar | - | presumed cavernous malformation | seizures |
| F49 | 27 | M | L | L | frontal abutting motor | 2 | ODG->anaplastic | seizures |
| F50 | 42 | M | L | L | parietal | 2 | ODG->anaplastic | seizures; surveillance showed growth |
| F51 | 52 | M | R | R | frontal parasagittal | 2 | ODG | seizures, language deficits |
| F52 | 35 | M | R | R | frontoparietal parasagittal | 2 | pleomorphic xanthoastrocytoma (PXA)-> anaplastic | seizures; weakness |
| F53 | 45 | M | R | L | frontotemporal and insular | 2 | ODG | seizures |
| F54 | 48 | M | R | R | frontoinsular | 3 | anaplastic ODG | seizures |
| F55 | 53 | M | R | L | frontal | - | N/A; presumed LGG | seizures |
| F56 | 54 | M | R | L | temporal | 2 | glioma NOS | seizures |

Supplementary Table 2: Functional MRI paradigms performed by individual subjects

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Language** | | | | **Motor** | | | | **Sensory** | | | | **Memory** | | | **Visual** | | | |  |
| Subject ID | VerbGen | SentenceCompl | Naming | Listening | Rfinger | Lfinger | Rfoot | Lfoot | Rhand | Lhand | Rfoot | Lfoot | SCENE 1 | SCENE 2 | autobiography | Retino | SACC | Checker | Frontal | Resting State |
| F01 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F02 | **X** |  | **X** |  | **X** |  |  |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |
| F03 | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F04 |  | **X** | **X** |  | **X** | **X** | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |
| F05 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  | **X** |  |  |  |  |  |  |  |
| F06 |  |  |  |  | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F07 | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F08 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F09 |  | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F10 | **X** | **X** |  |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F11 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F12 | **X** | **X** | **X** |  | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F13 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F14 |  |  |  |  | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F15 |  |  |  |  | **X** | **X** |  |  | **X** | **X** |  |  | **X** | **X** |  |  |  |  |  |  |
| F16 | **X** | **X** |  |  |  |  |  |  | **X** | **X** |  |  | **X** |  |  |  |  |  | **X** |  |
| F17 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **X** |  | **X** |  |  |
| F18 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F19 | **X** | **X** | **X** |  | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F20 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F21 | **X** | **X** |  |  |  | **X** |  |  |  | **X** |  |  |  |  |  |  |  |  |  |  |
| F22 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F23 |  |  |  |  | **X** | **X** |  |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |
| F24 | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F25 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F26 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F27 | **X** | **X** |  |  | **X** |  | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |
| F28 | **X** | **X** |  |  |  | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F29 | **X** | **X** | **X** |  | **X** | **X** |  |  | **X** |  |  |  |  |  |  |  |  |  |  |  |
| F30 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F31 | **X** | **X** | **X** |  | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F32 | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F33 | **X** | **X** |  | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F34 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F35 | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F36 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F37 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F38 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  | **X** |  |  |  |  |  |  |  |
| F39 |  |  |  |  | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F40 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F41 | **X** | **X** | **X** |  | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F42 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F43 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  | **X** |  |  |  |  |  |  |  |
| F44 | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F45 | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F46 | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F47 |  |  |  |  | **X** | **X** |  |  | **X** | **X** |  |  |  |  |  |  |  |  |  | **X** |
| F48 |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F49 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  | **X** |  |  |  |
| F50 | **X** | **X** |  |  | **X** |  | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |
| F51 | **X** | **X** |  |  |  | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F52 |  |  |  |  | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |
| F53 | **X** | **X** |  |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F54 | **X** | **X** | **X** |  | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F55 | **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F56 | **X** | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |