Supplementary Figure 1. H&E staining and immunostaining of the three different intracranial tumors analyzed in this study. (Top) Glioblastoma Multiforme: (A) Hypercellular field devoid of normal brain parenchyma; single grey arrow: endothelial proliferation; black arrows: necrosis; (B) Glial fibrillary acidic protein (GFAP) showing most of the cells stained positive (cytoplasmic, stained brown). (Middle) Lung metastatic tumor: (C) Lung metastatic tumor cells shown with a background of necrosis; (D) Diffuse positive staining for cytokeratin (carcinoma marker). (Bottom) Colon metastatic tumor: (E) Metastatic adenocarcinoma of colon showing complex glandular structures; (F) Diffuse positive staining for cytokeratin.
Supplementary Figure 2. Dual immunofluorescence staining of cell cultures derived from the excised GBM tumor (actin –red-, glial fibrillary acidic protein –green-, and cell nuclei –blue-) after 3 (A-C), 9 (D-F), and 15 (G-I) passages. The micrographs show representative cells from different locations of the culture surface for each passage number. As can be seen in the micrographs, all of the cells had a tendency to stain positive for GFAP, which is an astrocytic marker commonly used in the pathological diagnosis of glioblastoma multiforme. The absence of any actin(+)GFAP(-) cells in the cultures suggests that the cells derived from the brain stroma and parenchyma (e.g., neurons, other glial cells) succumbed to the isolation/culture conditions at very early stages (passage ≤3), thus resulting in the establishment of short-term and/or permanent lines exclusively derived from the tumorous tissue.
Supplementary Figure 3. Tracks followed by patient-derived tumor cells on the microfabricated platform (A,B) and flat TCPS (C). The cell in panel (A) maintained a motility pattern along the same axis throughout the entire experiment (axially persistent migration), but reversed direction twice (on separate tracks). The cell in panel (B) not only moved along the same axis, but also maintained the same direction during the full experiment (directionally persistent migration). The cell in panel (C) on the other hand had a tendency to move randomly over the flat surface (non-persistent migration). Both axial and directional persistence migrations were greatly influenced by the aligned microfeatures on the surface of the platform.
Supplementary Figure 4. Analysis of GBM cells migrating on a conventional/flat tissue culture plastic surface. (A) Traces of the tracks followed by each cell (t = 13.6 hours, scale bar = 100 µm). (B-E) Box/Whisker plots of the geometric parameters of GBM cells migrating on flat tissue culture plastic surfaces. (F) Box/Whisker plot of the migratory velocity. (G) Box/Whisker plot of the migratory efficiency.