



**Fig. S1.** Changes in hypoxia levels following exposure to normoxic or hypoxic conditions in 2-dimensional (2D) and 3-dimensional (3D) models formed using the A549 lung cancer cell line. (A) Hypoxia levels were assessed in 2D and 3D models using a hypoxia staining dye, with nuclei counterstained with Hoechst 33342. (B) The hypoxia level in the 3D model was 1.86-fold higher than that in the 2D model. (C) The expression of vascular endothelial growth factor (VEGF), a hypoxia-related marker protein, was analyzed in both models. (D) VEGF protein expression was 2.14-fold higher in the proposed 3D model under hypoxic conditions for 24 hours than in the 2D model under normoxic conditions.