3D Tumor Model for Testing Anticancer Drugs

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Current cancer models in preclinical cancer drug research are not yielding effective treatments. The objective of my research was to study a simple three-dimensional (3D) spheroid method to test cytotoxic effects of various anticancer drugs for Glioblastoma Multiforme (GBM), a primary brain tumor that originates from the glial cells. 3D spheroid cultures are physiologically relevant for testing drugs because they closely resemble cancer tumors in the body unlike monolayers. Methods: GBM cancer cell line T98G was seeded into the Perfecta 3D Hanging Drop Plate in RPMI medium and placed at 37 C in a water-saturated atmosphere of 95% air and 5% CO2. On day 7, the spheroids were exposed to a 1-hour pulse with a panel of anticancer drugs for GBMs. Each anticancer drug was tested in a range of doses including the clinically relevant dose. Cell viability and cytotoxicity assessment was performed using Trypan blue exclusion and MTT assay after 48 hours following anti-cancer treatment. Results: GBM tumor cells formed single spheroid aggregates in the individual wells of hanging drop plate within 3 days, and spheroid cell growth was observed to 12 days. The culture of small spheroids with a size of up to 200 - 250 µm was determined to be adequate for drug testing. Cell death resulting from anticancer drug treatment was observed in the peripheral cells, while internal cells remained alive. Compared to other drugs tested for treatment of brain cancer, Vincristine at 1.4 mg/kg showed the most cytoxic effect followed by Temodar at 150 mg/kg.

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