Product sheet

U251 MG/TMZ Cells | 305884

General information

Description	U251 MG/TMZ is a temozolomide-resistant derivative of the human glioblastoma cell line U251 MG. The parental U251 MG line was established from the malignant glioma of an adult patient and is widely used as a model of high-grade astrocytic tumors. U251 MG/TMZ cells are generated through stepwise, long-term exposure of parental U251 MG cells to increasing concentrations of temozolomide (TMZ), the standard alkylating chemotherapeutic agent used in glioblastoma treatment. This selection process results in a stable phenotype characterized by significantly reduced sensitivity to TMZ-induced cytotoxicity compared to the parental line. Mechanistically, TMZ resistance in U251 MG/TMZ cells is commonly associated with upregulation of O6-methylguanine-DNA methyltransferase (MGMT), enhanced DNA damage repair capacity, alterations in mismatch repair pathways, and activation of pro-survival signaling cascades. Resistant cells frequently exhibit reduced apoptosis following TMZ exposure, with decreased caspase activation and attenuated mitochondrial pathway engagement. Additional molecular adaptations may include dysregulation of PI3K/AKT, MAPK, NF-κB, or STAT3 signaling pathways, as well as altered expression of drug transporters and stemness-associated markers, depending on the selection protocol used. U251 MG/TMZ cells maintain adherent growth with astrocytic morphology similar to the parental line but demonstrate higher TMZ IC50 values and sustained proliferation under drug pressure. This model is widely used to investigate mechanisms of acquired chemoresistance, identify biomarkers predictive of therapeutic response, and evaluate novel combinatorial strategies aimed at overcoming TMZ resistance. As such, U251 MG/TMZ provides a clinically relevant in vitro platform for studying treatment failure and therapeutic vulnerability in glioblastoma.
Organism	Human
Tissue	Brain
Disease	Astrocytoma
Metastatic site	Primary tumor site (brain)
Applications	Glioblastoma TMZ resistance research; acquired chemoresistance mechanisms; MGMT overexpression; DNA mismatch repair pathway; PI3K/AKT/MAPK/NF-κB pro-survival signaling; evaluation of agents overcoming TMZ resistance; GBM recurrence modeling; resistance biomarker discovery
Synonyms	U-251MG, U-251-MG, U-251_MG, U251-MG, U251MG, U-251, U251, U251n, U251N, 251 MG, 251MG

Characteristics

Age	75 years
Gender	Male

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Ethnicity	Caucasian
Morphology	Epithelial-like
Cell type	Glial cells (astrocytic)
Growth properties	Adherent

Regulatory Data

Citation	U251 MG/TMZ (Cytion catalog number 305884)
Biosafety level	1
NCBI_TaxID	9606
CellosaurusAccession	Not assigned (U251 MG/TMZ is a selected TMZ-resistant subline; parental U251 MG CVCL_0021)
GMO Status	No genetic modification; TMZ resistance acquired by stepwise selection under increasing TMZ concentrations (non-engineered phenotype)

Biomolecular Data

Mutational profile	TMZ-resistant

Handling

Culture Medium	DMEM, w: 4.5 g/L Glucose, w: 4 mM L-Glutamine, w: 3.7 g/L NaHCO3, w: 1.0 mM Sodium pyruvate (Cytion article number 820300a)
Supplements	Supplement the medium with 10% FBS and 50 µM Temozolomid (TMZ)
Dissociation Reagent	Accutase
Doubling time	approx. 36 to 48 hours (TMZ-resistant sublines often proliferate slower than parental)
Split ratio	1 to 3

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Seeding density	1 to 3 × 10^4 cells/cm^2
Fluid renewal	2 to 3 times per week
Freeze medium	As a cryopreservation medium, we use complete growth medium + 10% DMSO for adequate post-thaw viability.
Thawing and Culturing Cells	1. Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit. 2. Upon receipt, either store the cryovial immediately at temperatures below -150°C to ensure the preservation of cellular integrity, or proceed to step 3 if immediate culturing is required. 3. For immediate culturing, swiftly thaw the vial by immersing it in a 37°C water bath with clean water and an antimicrobial agent, agitating gently for 40-60 seconds until a small ice clump remains. 4. Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening. 5. Carefully open the disinfected vial and transfer the cell suspension into a 15 ml centrifuge tube containing 8 ml of room-temperature culture medium, mixing gently. 6. Centrifuge the mixture at 200 x g for 5 minutes, carefully discard the supernatant containing freezing medium. 7. Follow the procedure described under Post-Thaw Recovery
Incubation Atmosphere	37°C, 5% CO_2, humidified atmosphere.
Shipping Conditions	Cryopreserved cell lines are shipped on dry ice in validated, insulated packaging with sufficient refrigerant to maintain approximately −78 °C throughout transit. On receipt, inspect the container immediately and transfer vials without delay to appropriate storage.
Storage Conditions	For long-term preservation, place vials in vapor-phase liquid nitrogen at about −150 to −196 °C. Storage at −80 °C is acceptable only as a short interim step before transfer to liquid nitrogen.

Quality Control & Molecular Analysis