U251 MG/TMZ

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.

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

CLASSIFICATION

Organism	Human
Sex	Male
Growth properties	Adherent

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GMO status	Non-GMO

GMO status details

No genetic modification; TMZ resistance acquired by stepwise selection under increasing TMZ concentrations (non-engineered phenotype)

Biosafety level	1

CHARACTERISTICS

Morphology	Epithelial-like
Cell type	Glial cells (astrocytic)
Doubling time	approx. 36 to 48 hours (TMZ-resistant sublines often proliferate slower than parental)

IDENTIFIERS

Citation

U251 MG/TMZ (Cytion catalog number 305884)

NCBI TaxID	9606
Cellosaurus	Not assigned (U251 MG/TMZ is a selected TMZ-resistant subline; parental U251 MG CVCL_0021)

EXPRESSION AND SUSCEPTIBILITY

Mutational profile

TMZ-resistant

HANDLING AND CULTURE

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)

Incubation atmosphere	37°C, 5% CO_2, humidified atmosphere.

Supplements

Supplement the medium with 10% FBS and 50 µM Temozolomid (TMZ)

Dissociation reagent	Accutase
Split ratio	1 to 3
Seeding density	1 to 3 × 10^4 cells/cm^2
Fluid renewal	2 to 3 times per week

Thawing and culturing

Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit.
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.
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.
Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening.
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.
Centrifuge the mixture at 200 x g for 5 minutes, carefully discard the supernatant containing freezing medium.
Follow the procedure described under Post-Thaw Recovery

QUALITY CONTROL AND CRYOPRESERVATION

Freeze medium	As a cryopreservation medium, we use complete growth medium + 10% DMSO for adequate post-thaw viability.

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.

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.

DONOR

Donor age	75 years
Ethnicity	Caucasian

LEGAL AND SAFETY

Safety precautions

When planning to store a cryovial in liquid nitrogen for future thawing, it is mandatory to adhere to stringent safety measures. Appropriate protective gloves and clothing are essential, and the use of a face mask or safety goggles is required during the transfer of frozen samples to or from the liquid nitrogen tank. This is to mitigate the risk of injury from potential cryovial explosions upon removal, which can result in the projection of sharp fragments.

Warranty

At Cytion, we stand behind the quality and viability of our products.
We guarantee that our cells will be viable at the start of culture for
60 days after shipment from our facilities.
We assure that all materials conform to the specifications described in the
Certificate of Analysis and/or Product Sheet.
For full details, please refer to our
Warranty Statement.

Material Transfer Agreement required	Yes