

# Cyclin D1

Cyclin D1 is a [protein](#) required for progression through the [G1 phase](#) of the [cell cycle](#). During the G1 phase, it is synthesized rapidly and accumulates in the [nucleus](#), and is degraded as the cell enters the [S phase](#). Cyclin D1 is a regulatory subunit of cyclin-dependent kinases [CDK4](#) and [CDK6](#).

Cyclin D1 (CCND1) is frequently overexpressed in [malignant gliomas](#).

Zhang et al., have previously shown ectopic overexpression of CCND1 in human malignant gliomas [cell lines](#).

Quantitative [Reverse transcription polymerase chain reaction](#) and [Western Blot](#) (WB) was performed to investigate the expression of CCND1 in glioma tissues and cell lines. The biological function of CCND1 was also investigated through knockdown and overexpression of [BCYRN1](#) in vitro.

They reported that CCND1 expression was positively associated with the pathological grade and proliferative activity of [astrocytomas](#), as the lowest expression was found in normal brain tissue (N = 3) whereas the highest expression was in [high grade glioma](#) tissue (N = 25). Additionally, they found that the expression level of [CCND1](#) was associated with IC50 values in malignant glioma cell lines. Forced inhibition of CCND1 increased [temozolomide](#) efficacy in [U251](#) and SHG-44 cells. After CCND1 overexpression, the temozolomide efficacy decreased in U251 and SHG-44 cells. Colony survival assay and [apoptosis](#) analysis confirmed that CCND1 inhibition renders cells more sensitive to temozolomide treatment and temozolomide-induced apoptosis in U251 and SHG-44 cells. Inhibition of P-gp (MDR1) by [Tariquidar](#) overcomes the effects of CCND1 overexpression on inhibiting temozolomide-induced apoptosis. Inhibition of CCND1 inhibited cell growth in vitro and in vivo significantly more effectively after temozolomide treatments than single temozolomide treatments. Finally, inhibition of CCND1 in glioma cells reduced tumor volume in a murine model.

Taken together, these data indicate that CCND1 overexpression upregulate P-gp and induces chemoresistance in human malignant gliomas cells and that inhibition of CCND1 may be an effective means of overcoming CCND1 associated chemoresistance in human malignant glioma cells <sup>1)</sup>.

1)

Zhang D, Dai D, Zhou M, Li Z, Wang C, Lu Y, Li Y, Wang J. Inhibition of Cyclin D1 Expression in Human Glioblastoma Cells is Associated with Increased Temozolomide Chemosensitivity. Cell Physiol Biochem. 2018 Dec 11;51(6):2496-2508. doi: 10.1159/000495920. [Epub ahead of print] PubMed PMID: 30562739.

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