Transcription regulator protein BACH1 is a protein that in humans is encoded by the BACH1 gene.

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This gene encodes a transcription factor that belongs to the cap'n'collar type of basic region leucine zipper factor family (CNC-bZip). The encoded protein contains broad complex, tramtrack, bric-a-brac/poxvirus and zinc finger (BTB/POZ) domains, which is atypical of CNC-bZip family members. These BTB/POZ domains facilitate protein-protein interactions and formation of homo- and/or hetero-oligomers. The C-terminus of the protein is a leucine zipper of the bzip_maf family. When this protein forms a heterodimer with MafK, it functions as a repressor of Maf recognition element (MARE) and transcription is repressed. Multiple alternatively spliced transcript variants have been identified for this gene. Some exons of this gene overlap with some exons from the C21orf41 gene, which is transcribed in an opposite orientation to this gene but does not seem to encode a protein.

Overexpression of BACH1 in GBM cells conferred resistance to temozolomide, whereas its inhibition markedly sensitized resistant cells to temozolomide in vitro and in vivo. Further investigation revealed that BACH1 activation significantly enhanced the expression of MGMT, and depletion of p53 disrupted the effects of BACH1 on MGMT and temozolomide resistance. P53 sequesters SP1 to prevent its binding to the MGMT promoter region and thus inhibits MGMT expression. Moreover, BACH1 overexpression impaired the association between p53 and SP1 via competitive binding p53, and antagonized the impact of p53 on MGMT expression. Finally, we found that BACH1 low expression correlated with better prognosis in GBM patients undergoing temozolomide therapy, especially in patients with wild-type TP53. Collectively, this findings identify a potential mechanism by which wild-type TP53 GBM cells develop resistance to temozolomide and suggest that targeting this pathway may be beneficial for overcoming resistance¹⁾.

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Nie E, Jin X, Wu W, Yu T, Zhou X, Zhi T, Shi Z, Zhang J, Liu N, You Y. BACH1 Promotes Temozolomide Resistance in Glioblastoma through Antagonizing the Function of p53. Sci Rep. 2016 Dec 21;6:39743. doi: 10.1038/srep39743. PubMed PMID: 28000777.

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