

BBC3 (BCL2 binding component 3)

Identity

Other names **PUMA (p53-upregulated modulator of apoptosis)**
JFY1
 Hugo **BBC3**
 Location 19q13.3-q13.4

DNA/RNA

Description The gene spans 12kb on the reverse strand; 8 exons
 Transcription numerous transcripts

Protein

Description multiple isoforms; BH3 only protein (the BH3 domain is essential for proapoptotic function).
 Expression wide
 Localisation mitochondria
 Function BBC3 is transcriptionally induced upon diverse apoptotic stimuli to induce apoptosis via the mitochondrial apoptotic pathway. BBC3 is transcriptionally activated by p53; it is also upregulated after endoplasmic reticulum stress, independantly to P53 status. BBC3 is also transactivated by p73, a p53 related protein with, also, G1 cell cycle arrest and apoptosis functions. BBC3 induces BAX conformational change and multimerization.
 Homology Bcl2 family members:
 The antiapoptotic members with BH 1 to 4 domains: [BCL2](#) (18q21), BCL1L1/BCLX-L ID: n129> (20q11), BCL2L2/BCL-W (14q11), BCL1L10/BCL-B/BOO/DIVA (15q21), BCL2A1/BFL1/A1 (15q24), BNIP1/EIB-19K (5q33), MCL1 (1q21) HOMOLOGY
 The proapoptotic members with BH 1 to 3 domains: BAK1/BCL2L7 (6p21), BAX (19q13), (22q11),
 The only-BH3 apoptotic members: [BAD/BCL2L8/BBC2](#) (11q13), BCL2L11/BIM/BOD (2q13), BID (22q11), BIK/NBK/BBC1 (22q13), BLK (8p23), BMF (15q14), BNIP3/NIP3 (10q26), BMIP3L/NIX (8p21), HRK/DP5/BID3 (12q24), PMAIP1/NOXA (18q21)

Implicated in

Note BBC3 mediates apoptosis in various cancer cells.

External links

	Nomenclature
Hugo	BBC3
GDB	BBC3
Entrez_Gene	BBC3 27113 BCL2 binding component 3
	Cards
Atlas	BBC3ID759ch19q13
GeneCards	BBC3
Ensembl	BBC3

[CancerGene](#) [BBC3](#)
[Genatlas](#) [BBC3](#)
[GeneLynx](#) [BBC3](#)
[eGenome](#) [BBC3](#)
[euGene](#) [27113](#)

Genomic and cartography

[GoldenPath](#) [BBC3](#) - [chr19:52415924-52426291](#) - [19q13.32](#) (hg17-May_2004)
[Ensembl](#) [BBC3](#) - [19q13.32](#) [[CytoView](#)]
[NCBI](#) [Genes Cyto](#) [Gene Seq](#) [Map View - NCBI]
[OMIM](#) [Disease map](#) [[OMIM](#)]
[HomoloGene](#) [BBC3](#)

Gene and transcription

[Genbank](#) [AF332558](#) [SRS] [AF332558](#) [ENTREZ]
[Genbank](#) [AF354654](#) [SRS] [AF354654](#) [ENTREZ]
[Genbank](#) [AF354655](#) [SRS] [AF354655](#) [ENTREZ]
[Genbank](#) [AF354656](#) [SRS] [AF354656](#) [ENTREZ]
[Genbank](#) [U82987](#) [SRS] [U82987](#) [ENTREZ]
[RefSeq](#) [NM_014417](#) [SRS] [NM_014417](#) [ENTREZ]
[RefSeq](#) [NT_086903](#) [SRS] [NT_086903](#) [ENTREZ]
[AceView](#) [BBC3](#) AceView - NCBI
[TRASER](#) [BBC3](#) Traser - Stanford
[Unigene](#) [Hs.467020](#) [SRS] [Hs.467020](#) [NCBI] [HS467020](#) [spliceNest]

Protein : pattern, domain, 3D structure

[SwissProt](#) [Q9BXH1](#) [SRS] [Q9BXH1](#) [EXPASY] [Q9BXH1](#) [INTERPRO]
[Prosite](#) [PS01259 BH3](#) [SRS] [PS01259 BH3](#) [Expasy]
[CluSTR](#) [Q9BXH1](#)
[Blocks](#) [Q9BXH1](#)

Polymorphism : SNP, mutations, diseases

[OMIM](#) [605854](#) [[map](#)]
[GENECLINICS](#) [605854](#)
[SNP](#) [BBC3](#) [dbSNP-NCBI]
[SNP](#) [NM_014417](#) [SNP-NCI]
[SNP](#) [BBC3](#) [GeneSNPs - Utah] [BBC3](#) [SNP - CSHL] [BBC3](#) [HGBASE - SRS]

General knowledge

[Family Browser](#) [BBC3](#) [UCSC Family Browser]
[SOURCE](#) [NM_014417](#)
[SMD](#) [Hs.467020](#)
[SAGE](#) [Hs.467020](#)
[Amigo](#) [process|apoptosis](#)
[Amigo](#) [component|mitochondrion](#)
[PubGene](#) [BBC3](#)

Other databases

Probes

[Probe](#) [BBC3 Related clones \(RZPD - Berlin\)](#)

PubMed

[PubMed](#) [10 Pubmed reference\(s\) in LocusLink](#)

Bibliography

PUMA, a novel proapoptotic gene, is induced by p53.
Nakano K, Vousden KH.

Mol Cell. 2001; 7: 683-694.
Medline [11463392](#)

Yu J, Zhang L, Hwang PM, Kinzler KW, Vogelstein B
Mol Cell. 2001; 7: 673-682.
Medline [11463391](#)

Expression of *bbc3*, a pro-apoptotic BH3-only gene, is regulated by diverse cell death and survival signals.

Han J, Flemington C, Houghton AB, Gu Z, Zambetti GP, Lutz RJ, Zhu L, Chittenden T.
Proc Natl Acad Sci U S A. 2001; 98: 11318-11323.
Medline [11572983](#)

The voltage-dependent anion channel: an essential player in apoptosis.

Tsujimoto Y, Shimizu S.
Biochimie 2002; 84: 187-193.

PUMA mediates the apoptotic response to p53 in colorectal cancer cells.

Yu J, Wang Z, Kinzler KW, Vogelstein B, Zhang L.
Proc Natl Acad Sci U S A. 2003; 100: 1931-1936.
Medline [12574499](#)

Bax conformational change is a crucial step for PUMA-mediated apoptosis in human leukemia.

Liu FT, Newland AC, Jia L.
Biochem Biophys Res Commun. 2003; 310: 956-962.
Medline [14550297](#)

Gene expression during ER stress-induced apoptosis in neurons: induction of the BH3-only protein *Bbc3*/PUMA and activation of the mitochondrial apoptosis pathway.

Reimertz C, Kogel D, Rami A, Chittenden T, Prehn JH.
J Cell Biol. 2003; 162: 587-597.
Medline [12913114](#)

p73 Induces apoptosis via PUMA transactivation and Bax mitochondrial translocation.

Melino G, Bernassola F, Ranalli M, Yee K, Zong WX, Corazzari M, Knight RA, Green DR, Thompson C, Vousden KH.
J Biol Chem. 2004; 279: 8076-8083.
Medline [14634023](#)

Structural biology of the Bcl-2 family of proteins

Petros AM, Olejniczak ET, Fesik SW.
Biochimica et Biophysica Acta - Molecular Cell Research 2004; 1644: 83-94.
Medline [14996493](#)

Bcl-2 family members: intracellular targeting.

Schinzel A, Kaufmann T, Borner C.

Biochimica et Biophysica Acta - Molecular Cell Research 2004; 1644: 95-105.
Medline [14996494](#)

Control of proliferation by Bcl-2 family members.

Bonnefoy-Berard N, Aouacheria A, Verschelde C, Quemeneur L, Marçais A, Marvel J.

Biochimica et Biophysica Acta - Molecular Cell Research 2004; 1644: 159-168.
Medline [14996500](#)

Bcl-2 family members and disease.

Sorenson CM.

Biochimica et Biophysica Acta - Molecular Cell Research 2004; 1644: 169-177.
Medline [14996501](#)

[REVIEW articles](#) *automatic search in PubMed*

[Last year publications](#) *automatic search in PubMed*

[BiblioGene - INIST](#)

Contributor(s)

Written 08-2004 Jean-Loup Huret, Sylvie Senon

Citation

This paper should be referenced as such :

Huret JL, Senon S . BBC3 (BCL2 binding component 3). Atlas Genet Cytogenet Oncol Haematol. August 2004 .

URL : <http://www.infobiogen.fr/services/chromcancer/Genes/BBC3ID759ch19q13.html>

© *Atlas of Genetics and Cytogenetics in Oncology and Haematology*
