

转录因子FoxM1在肿瘤耐药中的研究进展

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Title: Research progress of transcription factor FoxM1 in drug resistance of common tumors

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摘要: FoxM1(forkhead box M1,FoxM1)作为叉头框转录因子家族成员之一, 其被多项研究发现在乳腺癌, 卵巢癌, 膀胱癌, 胃癌, 结直肠癌, 肺癌等多种人类癌细胞中过表达, 而在正常细胞中表达较低甚至不表达。此外, FoxM1直接或间接参与肿瘤耐药过程, 并在肿瘤耐药过程中发挥了重要作用。本文就FoxM1在常见肿瘤耐药中的研究进展作一综述。

Abstract: FoxM1(forkhead box M1,FoxM1)as a member of the fork frame transcription factor family,has been found overexpressed in many human cancer cells,such as breast cancer,ovarian cancer,bladder cancer,gastric cancer,colorectal cancer,lung cancer and so on.But in normal cells,the expression is low or even not expressed.In addition,FoxM1 is directly or indirectly involved in the process of drug resistance and plays an important role in the process of drug resistance.In this paper,the research progress of FoxM1 in drug resistance of common tumors was reviewed.

参考文献/REFERENCES

- [1] Lippert TH,Ruoff HJ,Volm M.Current status of methods to assess cancer drug resistance [J] .Int J Med Sci,2011,238(3):245-253.
- [2] SU Lin,QIN Xia,JING Huaizhi,et al.Effect of silencing triplex 25 gene on cisplatin resistance and apoptosis in A549/DDP cell line [J] .Journal of Chongqing Medical University,2014,38(11):1604-1607. [粟林,秦霞,敬怀志,等.沉默三联基序蛋白25基因对A549 / DDP细胞株顺铂耐药性及凋亡的影响 [J] .重庆医科大学学报,2014,38(11):1604-1607.]
- [3] Koo CY,Muir KW,Lam EW.FoxM1 cancer initiation to progression and treatment [J] .Biochim Biophys Acta,2012,1819(1):28-37.
- [4] Kwok JM,Peck B,Monteiro LJ,et al.FoxM1 confers acquired cisplatin resistance in breast cancer cells [J] .Mol Cancer Res,2010,8(1):24-34.
- [5] Millour J,de Olano,Horimoto Y,et al.ATM and p53 regulate FoxM1 expresstion via E2F in breast cancer epirubicin treatment andresistance [J] .Mol Cancer Ther,2011,10(6):1046-1058.
- [6] Xu XS,Miao RC,Wan Y,et al.FoxM1 as a novel therapeutic target for cancer drug therapy [J] .Asian Pac J Cancer Prev,2015,16(1):23-29.
- [7] Masuko Katoh,Masaru Katoh.Human FOX gene family [J] .Int J Oncol,2004,25(5):1495-1500.
- [8] Wierstra I.The transcription factor FoxM1(Forkhead box M1):Proliferation-apeific expression,transcription factor function,target genes,mouse models,and normal biological roles [J] .Advances in Cancer Research,2013(118):397-398.
- [9] Pilarsky C,Wenzig M,Specht T,et al.Identification and validation of commonly overexpressed genes in solid tumors by comparison of Microarray data [J] .Neoplasia,2004,6(6):744-750.
- [10] Halasi M,Gartel AL.FOX(M1)news-it is cancer [J] .Molecular Cancer Therapeutics,2013,12(3):245-254.
- [11] Rinaldetti S,Wirtz RM,Worst TS,et al.FoxM1 predicts overall and disease specific survival in muscle-invasive urothelial carcinoma and presents a differential expression between bladder cancer subtypes [J] .Oncotarget,2017,188(29):47595-47606.
- [12] MA Ye,CHEN Jianhua,ZHOU Dacheng,et al.Study on the expression and clinical significance of FoxM1 and E-cadherin in breast cancer [J] .Journal of Clinical Surgery,2018,26(11):835-838. [马也,陈建华,周大胜,等.FoxM1及E-钙黏蛋白在乳腺癌组织中的表达及其临床意义的研究 [J] .临床外科杂志,2018,26(11):835-838.]

- [13] LI Yanli,HU Xiaoli,HAN Hua,et al.Expression and significance of miR-214 FoxM1 in breast cancer [J] .Shandong Medicine,2018(41):57-60. [李艳丽,胡晓丽,韩华,等.乳腺癌组织中miR-214和FoxM1的表达变化及意义 [J] .山东医药,2018(41):57-60.]
- [14] Nestal de Moraes G,Delbue D,Silva KL,et al.FoxM1 targets XIAP and Survivin to modulate breast cancer survival and chemoresistance [J] .Cell Signal,2015,27(12):2496-2505.
- [15] Bergamaschi A,Madak-Erdogan Z,Kim YJ,et al.The forkhead transcription factor FoxM1 promotes endocrine resistance and invasiveness in estrogen receptor-positive breast cancer by expansion of stem-like cancer cells [J] .Breast Cancer Res,2014,16(5):436.
- [16] Karunarathna U,Kongsema M,Zona S,et al.OTUB1 inhibits the ubiquitination and degradation of FoxM1 in breast cancer and epirubicin resistance [J] .Oncogene,2016,1735(11):1433-1444.
- [17] Jemal A,Murray T,Samuels A,et al.Cancer statistics [J] .CA Cancer,2003,53(1):5-26.
- [18] Burger RA.A new model of ovarian carcinogenesis may influence early detection strategies [J] .Am J Obstet Gynecol,2008,198(4):349-350.
- [19] Zeng L,Xiao YU,Ning S,et al.Effect of taxol on the expression of FoxM1 ovarian cancer-associated gene [J] .Oncol Lett,2016,11 (6):4035-4039.
- [20] Zhou J,Wang Y,Wang Y,et al.FoxM1 modulates cisplatin sensitivity by regulating EXO1 in ovarian cancer [J] .PLoS One,2014,139(5):e96989.
- [21] Zhao F,Siu MK,Jiang L,et al.Overexpression of forkhead box protein M1(FoxM1)in ovarian cancer correlates with poor patient survival and contributes to paclitaxel resistance [J] .PLoS One,2014,209(11):e113478.
- [22] Chiu WT,Huang YF,Tsai HY,et al.FoxM1 confers to epithelial-mesenchymal transition,stemness and chemoresistance in epithelial ovarian carcinoma cells [J] .Oncotarget,2015,106(4):2349-2365.
- [23] Tassi RA,Todeschini P,Siegel ER,et al.FoxM1 expression is significantly associated with chemotherapy resistance and adverse prognosis in non-serous epithelial ovarian cancer patients [J] .J Exp Clin Cancer Res,2017,836(1):63.
- [24] Westhoff GL,Chen Y,Teng NNH.Targeting FoxM1 improves cytotoxicity of paclitaxel and cisplatin in platinum-resistant ovarian cancer [J] .Int J Gynecol Cancer,2017,27(5):887-894.
- [25] Liu D,Zhang Z,Kong CZ,et al.High FoxM1 expression was associated with bladder carcinogenesis [J] .Tumour Biol,2013,34(2):1131-1138.
- [26] Rinaldetti S,Wirtz R,Worst TS,et al.FoxM1 predicts disease progression in non-muscle invasive bladder cancer [J] .J Cancer Res Clin Oncol,2018,144(9):1701-1709.
- [27] Roh YG,Mun MH,Jeong MS.Drug resistance of bladder cancer cells through activation of ABCG2 by FoxM1 [J] .BMB Rep,2018,51(2):98-103.
- [28] Okada K,Fujiwara Y,Takahashi T,et al.Overexpression of forkhead box M1 transcription factor(FoxM1)is a potential prognostic marker and enhances chemoresistance for docetaxel in gastric cancer [J] .Ann Surg Oncol,2013,20(3):1035-1043.
- [29] Li X,Yao R,Yue L,et al.FoxM1 mediates resistance to docetaxel in gastric cancer via up-regulating Stathmin [J] .J Cell Mol Med,2014,18(5):811-823.
- [30] Hu CJ,Wang B,Tang B,et al.The FoxM1-induced resistance to oxaliplatin is partially mediated by its novel target gene Mcl-1 in gastric cancer cells [J] .Biochim Biophys Acta,2015,1849(3):290-299.
- [31] Li X,Liang J,Liu YX,et al.Knockdown of the FoxM1 enhances the sensitivity of gastric cancer cells to cisplatin by targeting Mcl-1 [J] .Pharmazie,2016,71(6):345-348.
- [32] GAO Zhicheng.Expression of FoxM1 in colorectal cancer and its clinical significance [J] .Worldundefineds Newest Medical Information Abstract,2018,18(42):67. [高志程.FoxM1在结直肠癌中的表达及其临床意义 [J] .世界最新医学信息文摘,2018,18(42):67.]
- [33] Wan LY,Deng J,Xiang XJ,et al.miR-320 enhances the sensitivity of human colon cancer cells to chemoradiotherapy in vitro by targeting FoxM1 [J] .Biochem Biophys Res Commun,2015,6457(2):125-132.
- [34] Liu X,Xie T,Mao X,et al.MicroRNA-149 increases the sensitivity of colorectal cancer cells to 5-fluorouracil by targeting forkhead box transcription factor foxM1 [J] .Cell Physiol Biochem,2016,39(2):617-629.
- [35] Xie T,Geng J,Wang Y,et al.FoxM1 evokes 5-fluorouracil resistance in colorectal cancer depending on ABCC10 [J] .Oncotarget,2017,318(5):8574-8589.
- [36] Cao S,Lin L,Xia X,et al.MicroRNA-761 promotes the sensitivity of colorectal cancer cells to 5-Fluorouracil through targeting FoxM1 [J] .Oncotarget,2017,109(1):321-331.
- [37] Xu N,Wu SD,Wang H,et al.Involvement of FoxM1 in non-small cell lung cancer recurrence [J] .Asian Pac J Cancer Prev,2012,13(9):4739-4743.
- [38] Liu Y,Chen X,Gu Y,et al.FoxM1 overexpression is associated with cisplatin resistance in non-small cell lung cancer and mediates sensitivity to cisplatin in A549 cells via the JNK/mitochondrial pathway [J] .Neoplasia,2015,62(1):61-71.
- [39] Wang Y,Zhang W,Wen L,et al.FoxM1 confers resistance to gefitinib in lung adenocarcinoma via a MET/AKT-dependent positive feedback loop [J] .Oncotarget,2016,137(37):59245-59259.
- [40] Wang K,Zhu X,Zhang K,et al.FoxM1 inhibition enhances chemosensitivity of docetaxel-resistant A549 cells to docetaxel via activation of JNK/mitochondrial pathway [J] .Acta Biochim Biophys Sin (Shanghai),2016,48(9):804-809.
- [41] Li M,Yang J,Zhou W,et al.Activation of an AKT/FoxM1/STMN1 pathway drives resistance to tyrosine kinase inhibitors in lung cancer [J] .Br J Cancer,2017,26117(7):974-983.

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