expression. Biochem. Biophys. Res. Commun. 495 : 2505–2511.

Zhang J., Ma L. 2012. MicroRNA control of epithelial-mesenchymal transition and metastasis. Cancer Metastasis Rev. 31 : 653–662.

Zhang P., Wei Y., Wang L., Debeb B.G., Yuan Y., Zhang J., Yuan J., Wang M., Chen D., Sun Y., Woodward W.A., Liu Y., Dean D.C., Liang H., Hu Y., Ang K.K., Hung M.C., Chen J., Ma L. 2014. ATM-mediated stabilization of ZEB1 promotes DNA damage response and radioresistance through CHK1. Nat. Cell Biol. 16 : 864–875.

Zhang W., Shi X., Peng Y., Wu M., Zhang P., Xie R., Wu Y., Yan Q., Liu S., Wang J. 2015. HIF-1α promotes epithelial-mesenchymal transition and metastasis through direct regulation of ZEB1 in colorectal cancer. PLoS One. 10(6) : e0129603.

Zhang X., Zhang Z., Zhang Q., Zhang Q., Sun P., Xiang R., Ren G., Yang S. 2018. ZEB1 confers chemotherapeutic resistance to breast cancer by activating ATM. Cell Death Dis. 9 : 57.

Zhang Y., Xu L., Li A., Han X. 2019. The roles of ZEB1 in tumorigenic progression and epigenetic modifications. Biomedicine & Pharmacotherapy 110 : 400–408.

TRANSCRIPTION FACTOR Zeb1 AND ITS ROLE IN METASTASIS AND CARCINOGENESIS

D. Y. Pozdnyakov[a], O. Y. Shuvalov[a], N. A. Barlev[a], and A. G. Mittenberg[a, *]

[a] *Institute of Cytology, Russian Academy of Sciences, St. Petersburg, 194064 Russia*

**e-mail: a.mittenberg@gmail.com*

Metastasis and relapse are the main causes of breast cancer mortality, but their major mechanisms are still not studied well. Understanding the mechanisms of metastasis is important for early diagnosis and treatment of tumors. The appearance and subsequent growth of carcinoma cells outside the primary tumor nodule is a complicated and multistep process. The epithelial-mesenchymal transition (EMT), which attenuates cell-cell junctions and allows tumor cells to migrate away from the bulk of the tumor characterized by multi-level regulation via transcription factors, signaling cascades and specific RNA molecules plays the key role in it. One of the master regulators of the epithelial-mesenchymal transition is the Zeb1 transcription factor, and the regulation of its activity, as well as its contribution to the metastasis of malignant tumors, the present review of recent scientific periodicals is dedicated.

Keywords: breast carcinoma, epithelial-mesenchymal transition, Zeb1 transcription factor, metastasis, regulation of gene expression