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THE STORY OF THE SOX GENES: FOR BETTER OR FOR WORSE...

Milena Stevanović^{1,2,3}

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The *SOX* genes encode a group of transcription factors showing diverse expression patterns during development and acting as key regulators of diverse cellular processes. *SOX* transcription factors are involved in multiple events from the maintaining of stem cells pluripotency and cell fate decision to driving terminal differentiation of cells into specialized cell types. During adulthood *SOX* transcription factors control various physiological processes. Mutations in *SOX* genes have been associated with severe clinical disorders, while deregulation of their expressions cause a broad range of pathological condition. Accumulating evidence suggests that *SOX* proteins act as oncogenes and recent evidence points toward pro-proliferative, pro-survival and/or anti-differentiation roles of the *SOX* proteins.

The results of long-term research of the structure, regulation of expression and the function of selected *SOX* genes will be presented. It will include data obtained by studying the roles of *SOX* genes in *in vitro* neural differentiation of pluripotent embryonal carcinoma cells, as well as interaction of *SOX* transcription factors with signalling pathways active during neurogenesis and oncogenesis. Special focus will be made on ongoing research focused on the roles of *SOX* genes in promotion of malignant phenotype of cancer cells and maintaining of cancer stem cells. The interplay of *SOX* transcription factors and microRNAs in the brain under physiological and pathological conditions, along with crosstalk between *SOX* genes and long non-coding RNAs in glioblastoma will be discussed. The role of *SOX* transcription factors in ageing and age-related diseases will be outlined.

Key words: *SOX* genes; neural differentiation; signalling pathways; cancer stem cells; ageing