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Zscan4 regulates cellular immortality and response to DNA damage of embryonic stem cells

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Tuman stem cells hold great promise for future cure of numerous degenerative diseases such as Parkinson, Alzheimer's and H diabetes. Recent advances in stem cell and induced pluripotent stem (iPS) cell technologies have emphasized the need for methods to stabilize and prevent genomic transformations following massive expansion of cultured cells. For that purpose, we have used embryonic stem cells. Mouse embryonic stem (ES) cells retain their genomic integrity in long-term cultures and portray lower frequencies of chromosomal abnormalities compared to other pluripotent stem cells, such as embryonal carcinoma (EC) cells, iPS cells and some human ES cells. An essential component in this remarkable attribute is their ability to maintain their telomere length. Telomeres are repetitive DNA sequences accompanied by proteins which cap and protect the end of chromosomes from degradation, thus secure and protect chromosomal integrity. We have recently reported mouse ES cells employ a novel mechanism for telomere regulation and genomic stability induced by the activity of the gene Zscan4. Zscan4 is essential for immortality and long-term culture of mouse ES cells (Zalzman et al., Nature. 2010). Our current research advances our understanding of this fundamental mechanism. Zscan4 is further involved in stem cell survival and response to DNA damage. Our new data reveal a unique mode of genome stability in undifferentiated ES cells. The study of genomic stability and telomere repair may ultimately lead to novel protocols to prevent cancerous transformation in long term stem cells cultures. Therefore, achieve an abundant, safer resource for future cell therapies

Biography

Zalzman, an assistant professor at the department of Biochemistry and Molecular Biology at the University of Maryland School of Medicine, is a molecular cell biologist, specializing on stem cell research since the year 2000. She completed her Ph.D. from the department of Human Molecular Genetics and Biochemistry, Tel Aviv University, Israel and her postdoctoral studies at the Laboratory of genetics NIA/National Institutes of Health. Her work was published in multiple leading scientific journals

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