Таблица 2. Предсказанные мишени для некоторых микроРНК, дифференциально экспрессированных в сперме самцов с моделированным ПТСР по сравнению с группой контроля

микроРНК	Гены-мишени								
	Dnmt3a (а)	*Setd5* (а)	*Turc6*b (а)	*Hdac1* (а)	*Mllt10* (а)	*Mtdh* (а)	*Igf2* (б)	*Igf2bp2* (б)	*Igf2r* (б)
с повышенной экспрессией									
let-7-a-5p									
let-7-b-5p									
let-7-c-5p									
let-7-d-5p									
let-7-g-5p									
let-7-i-5p									
rno-miR-30d-5p									
rno-miR-34c-5p									
с пониженной экспрессией									
let7a-1-3p/let-7c-2-3p									
rno-miR-29b-3p									
rno-miR-30a-3p									
rno-miR-30e-3p									
rno-miR-30b-3p									
rno-miR-101a-3p									
rno-miR-185-3p									
rno-miR-185-5p									
rno-miR-98-5p									
rno-miR-103-3p									

(а) – Гены, вовлеченные в регуляцию хроматина, метилирования, процессинга микроРНК; (б) – гены, вовлеченные в регуляцию инсулиноподобного фактора роста 2. Цветом выделены ячейки, показывающие возможные взаимодействия между дифференцильно экспрессированными миРНК и генами-мишенями, предсказанными с использованием базы микроРНК (http://www.mirdb.org/).

КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют об отсутствии конфликта интересов.

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Changes in the Content of Small Non-Coding RNAs in Spermatozoa as a Possible Mechanism of Transgenerational Transmission of the Effects of Paternal Stress: Experimental Research

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It has been proven that the stress of the father can affect the phenotype of offspring, causing somatic, behavioral, hormonal and molecular changes. One of the hypothetical mechanisms responsible for the transmission of paternal effects to offspring may be a change in the spectrum of regulatory non-coding RNAs in spermatozoa. In this paper, we investigated the effect of paternal stress in models of post-traumatic stress disorder (PTSD) and depression on the representation of small RNAs (micro- and piwiRNAs) in the sperm of stressed animals. Male Wistar rats were subjected to stress in two paradigms ("stress–restress" and "learned helplessness"), which leads to the development of PTSD-like and depressive-like states in model animals, respectively. 48 days after the restress, sperm preparations were received and RNA was isolated. The spectrum of small RNAs was studied by NGS sequencing. In males with a PTSD-like condition, a change in the expression of 27 piwi RNAs and 77 microRNAs was detected compared with the control group. Among the targets of these miRNAs, it is possible to identify genes whose products may be involved in such mechanisms of transmission of paternal effects to offspring as changes in DNA methylation, histone modifications and RNA interference (*Dnmt3a*, *Setd5*, *Hdac1*, *Mllt10*, *Mtdh*), as well as genes associated with the functioning of insulin-like growth factor 2, the expression of which as previously shown, it is altered in the central nervous system in the offspring of males with a PTSD-like condition (*Igf2*, *Igf2bp2*, *Igf2r*). No changes in the representation of small RNAs were registered in males with a simulated depression-like state. The results indicate a pronounced effect of paternal stress on the spectrum of short non-coding RNAs in sperm cells in rats, however, it depends on the nature of the stress effect.

Keywords: paternal stress, depression, post-traumatic stress disorder, sperm, small noncoding RNAs, microRNAs, piwiRNAs, rat