Commentary

Micro-RNAs, next-generation molecular markers in male infertility field

Saeid Ghorbian

Department of Biology, Bonab Branch, Islamic Azad University, Bonab, Iran

Correspondence to: Saeid Ghorbian, Ph.D. Department of Biology, Bonab Branch, Islamic Azad University, Bonab, Iran. Email: ghorbian20@yahoo.com or saeid.ghorbian@bonabiau.ac.ir.

Submitted Oct 04, 2012. Accepted for publication Nov 06, 2012.
doi: 10.3978/j.issn.2223-4683.2012.11.01
Scan to your mobile device or view this article at: http://www.amepc.org/tau/article/view/1201/1676

The prevalence of male infertility appraised 10-15% in worldwide. Male infertility is frequently coupled to deficient in sperm development and production (1). Of note, in principle of the number of sperm cells in seminal fluid, has been categorised in azoospermia, severe oligozoospermia and mild oligozoospermia. In azoospermia condition, a sperm cell counts approximately $\leq 5\times10^6$ cells/mL, and in severe oligozoospermia and mild oligozoospermia, sperm cell counts $>5\times10^6$ cells/mL and $<20\times10^6$ cells/mL respectively (2). Male infertility is a multi-factorial syndrome accompanied a broad category of disorders. Moreover, until several decades, investigators endeavor to reveal the molecular procedures of male infertility, although the most aspects remain a clinical obstacle. Interestingly, the cause of infertility in more than 50% of infertile men is undiscovered. In generally, the known causes of male infertility are categories in genetic and environmental conditions. The genetic abnormalities are involving, numerical and structural chromosomal in sufferers for oligozoospermia and azoospermia (3,4). Routinely; the diagnosis of male infertility can be supported by assessment of microdeletions that occurred in the long arm of the Y chromosome (Yq) especially in azoospermia factor (AZF) regions (5,6). As previously an investigation in this filed revealed that, the frequency of these microdeletions in azoospermia and severe oligozoospermia men are approximately 13% and 1-7% respectively (7). Notwithstanding, the Y chromosome microdeletions consideration can be customarily be proposed to each of men with azoospermia and severe oligozoospermia. Although in more than cases, they are not powerful tolls to explore all of factors that leading to infertility. Furthermore, we need to introduce a new biomolecular marker for consideration of infertile men with the cause of unexplained. Currently, the results of several investigators have been suggesting that with providing of miRNAs expression patterns, it possibly that a benefit to reveal of causes of the infertile men unexplained. However, the results of authors revealed that miRNAs play strictly roles in post-transcriptional and post-translational regulatory in several biological procedures (8). The miRNAs are involvement in several of reproductive processes such as embryogenesis, oogenesis, and spermatogenesis (9,10). Here, I summarize a short overview in recent studies revealed that dysregulation in miRNAs expression's patterns, leading to defective sperm production (11-16) (*Table 1*). In generally, in mammalian spermatogenesis, miRNAs plays an important impact in development of spermatozoa, particularly in germ cells and somatic cells (17). However, It is conceivable that for any up-regulation and down-regulation in miRNAs expression patterns, significantly affecting in spermatogenesis pathways and leading to several types of reproduction abnormalities (18,19). Importantly, the spermatogenetic disturbance is the most common feature of male-factor infertility, but it is not complete explained of causes. Furthermore, with considering the important role of miRNAs in spermatogenesis, it has potential to provide and development expression profile of miRNAs in different conditionals of infertility. Finally, it is possible that using of the measurement expression pattern's of these molecules in the seminal fluids; introduce as a novel biomolecular marker for consideration and determination of idiopathic infertility patients.

Acknowledgements

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

Table 1 The short overview of recent studies that worked on patterns miRNAs dysregulation in azoospermic or idiopathic infertile patients

Abnormality type	Locations	Up-regulation	Ref	Down-regulation	Locations	Ref
Azoermia/	4q25	hsa-mir-302a	(12)	hsa-mir-34c-5p	11q23.1	(13,16)
Idiopathic infertile	9p21.3	hsa-mir-491-3p		hsa-mir-122	18q21.31	
men				hsa-mir-146b-5p	10q24.32	
				hsa-mir-509-5p	Xq27.3	
	4	hsa-mir-574-5p	(15)	hsa-mir-29c	1q32.2	(12)
	4q25	hsa-mir-297		hsa-mir-34b	11q23.1	
	18q21.31	hsa-mir-122		hsa-mir-520d-3p	19	
	6	hsa-mir-1275		hsa-mir-383	8p22	
	19q13.42	hsa-mir-373		hsa-mir-383	8p22	(11)
	22q11.21	hsa-mir-185				
	16p13.12	hsa-mir-193b				
	13q31.3	miR-19b	(14)	hsa-mir-100	11q24.1	
	-	let-7a		hsa-mir-512-3p	19q13.42	
				hsa-mir-16	16p12-p11.2	(15)
				hsa-mir-23b	9q22.32	
				hsa-mir-26a-1	3p22.2	

References

1. Comhaire FH, de Kretser DM, Farley TM, et al. Towards more objectivity in diagnosis and management of male infertility. Int J Androl 1987;7:1-53.
2. Clementini E, Palka C, Iezzi I, et al. Prevalence of chromosomal abnormalities in 2078 infertile couples referred for assisted reproductive techniques. Hum Reprod 2005;20:437-42.
3. Chandley AC. Chromosome anomalies and Y chromosome microdeletions as causal factors in male infertility. Hum Reprod 1998;13 Suppl 1:45-50.
4. Poongothai J, Gopenath TS, Manonayaki S. Genetics of human male infertility. Singapore Med J 2009;50:336-47.
5. Ghorbian S. Routine diagnostic testing of Y chromosome deletions in male infertile and subfertile. Gene 2012;503:160-4.
6. Simoni M, Bakker E, Krausz C. EAA/EMQN best practice guidelines for molecular diagnosis of y-chromosomal microdeletions. State of the art 2004. Int J Androl 2004;27:240-9.
7. McLachlan RI, Mallidis C, Ma K, et al. Genetic disorders and spermatogenesis. Reprod Fertil Dev 1998;10:97-104.
8. Chekulaeva M, Filipowicz W. Mechanisms of miRNA-mediated post-transcriptional regulation in animal cells. Curr Opin Cell Biol 2009;21:452-60.
9. Tang F, Kaneda M, O'Carroll D, et al. Maternal microRNAs are essential for mouse zygotic development. Genes Dev 2007;21:644-8.
10. McIver SC, Roman SD, Nixon B, et al. miRNA and mammalian male germ cells. Hum Reprod Update 2012;18:44-59.
11. Lian J, Tian H, Liu L, et al. Downregulation of microRNA-383 is associated with male infertility and promotes testicular embryonal carcinoma cell proliferation by targeting IRF1. Cell Death Dis 2010;1:e94.
12. Lian J, Zhang X, Tian H, et al. Altered microRNA expression in patients with non-obstructive azoospermia. Reprod Biol Endocrinol 2009;7:13.
13. Wang C, Yang C, Chen X, et al. Altered profile of seminal plasma microRNAs in the molecular diagnosis of male infertility. Clin Chem 2011;57:1722-31.
14. Wu W, Hu Z, Qin Y, et al. Seminal plasma microRNAs: potential biomarkers for spermatogenesis status. Mol Hum Reprod 2012;18:489-97.
15. Liu T, Cheng W, Gao Y, et al. Microarray analysis of microRNA expression patterns in the semen of infertile men with semen abnormalities. Mol Med Rep 2012; 6:535-42.
16. Wang J, Li LC. Small RNA and its application in andrology and urology. Transl Androl Urol 2012;1:33-43.
17. Papaioannou MD, Nef S. microRNAs in the testis: building up male fertility. J Androl 2010;31:26-33.
18. Bouhallier F, Allioli N, Lavial F, et al. Role of miR-34c microRNA in the late steps of spermatogenesis. RNA 2010;16:720-31.
19. He Z, Kokkinaki M, Pant D, et al. Small RNA molecules in the regulation of spermatogenesis. Reproduction 2009;137:901-11.

Cite this article as: Ghorbian S. Micro-RNAs, next-generation molecular markers in male infertility field. Transl Androl Urol 2012;1(4):245-246. doi: 10.3978/j.issn.2223-4683.2012.11.01

