Y Chromosome Microdeletions

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Infertility affects 15-20% of couples of reproductive age, with male-factor infertility accounting for one-half of cases. Y chromosome microdeletions are typically characterized by azoospermia (absence of sperm), severe to moderate oligospermia, or abnormal sperm morphology/motility, depending on the size and location of the deletion. Identification of deleted azoospermia factor (AZF) region has implications for assisted reproductive technologies. Men with AZFc deletion have a positive prognosis for finding sperm sufficient for assisted reproduction. However, assisted reproductive techniques are contraindicated for men carrying AZFa, AZFb, AZFbc or AZFabc microdeletions, which are classically associated with spermatogenic failure. When assisted reproduction is successful, Y chromosome microdeletions are transmitted to all male offspring, making them at high risk for infertility. Female offspring have no increased risk for infertility.

Featured ARUP Testing

Y Chromosome Microdeletion 2001778

Method: Polymerase Chain Reaction (PCR)/Electrophoresis

- Use to determine the cause of infertility in men with nonobstructive azoospermia or moderate or severe oligospermia
- Aids in predicting effectiveness of assisted reproductive technologies in men with specific Y chromosome microdeletions

Genetics

Variants

Microdeletions involve one or more of three AZF regions. Among individuals with Y chromosome microdeletions, the frequency of the deletion type is[1]:

- AZFa: 5% of cases
- AZFb: 10% of cases
- AZFc: 70% of cases
- AZFbc: 13% of cases
- AZFabc: 2% of cases

Etiology

The prevalence of Y chromosome deletions and microdeletions is approximately 1/2,000-3,000 males.[2]

Inheritance

Y-linked

Penetrance

Approaches 100 percent in males; variable expression may result in intrafamilial variation of fertility in men with an identical microdeletion.

Test Interpretation

Sensitivity/Specificity

- Clinical sensitivity: Approximately 5-10% for men with nonobstructive azoospermia or severe oligospermia[1]
- Analytic sensitivity/specificity: 99%

Results

Result	Deletion Detected	Clinical Significance
Positive	AZFa deletion	Spermatogenic failure (SCOS) resulting in azoospermia

ICSI, intracytoplasmic sperm injection; SCOS, Sertoli cell-only syndrome

Result	Deletion Detected	Clinical Significance
	AZFb deletion	Azoospermia/spermatogenetic arrest
	AZFbc deletion	SCOS/spermatogenic arrest
	AZFc deletion	Variable phenotype ranging from mild oligospermia to azoospermia and SCOS Males with AZFc microdeletion have a high likelihood of finding sperm sufficient for successful ICSI for assisted reproduction
	AZFabc deletion	SCOS associated with azoospermia
Negative	Lack of detection of AZF microdeletion	Greatly reduces the possibility of Y chromosome deletion as the cause of azoospermia or oligospermia

ICSI, intracytoplasmic sperm injection; SCOS, Sertoli cell-only syndrome

Limitations

- Diagnostic errors can occur due to rare sequence variations.
- Breakpoints of identified microdeletions will not be determined.
- Variants within individual genes included in the AZF regions will not be detected.
- Male infertility due to causes other than the Y chromosome microdeletions tested will not be detected.

References

1. Kim SY, Kim HJ, Lee BY, et al. Y chromosome microdeletions in infertile men with non-obstructive azoospermia and severe oligozoospermia. *J Reprod Infertil*. 2017;18(3):307-315.

2. de Vries JW, Repping S, van Daalen SK, et al. Clinical relevance of partial AZFc deletions. *Fertil Steril*. 2002;78(6):1209-1214.

Related Information

Evaluation of Infertility

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