Unipath
SPECIALTY LABORATORY Ltd.

Y chromosome

Microdeletions detection - 16 STS

(To determine the etiology of azoospermia or oligospermia resulting in male infertility)

Department of Molecular Biology

Biological Role of Y-Chromosome

- Male sex determination
- Genes for Male reproduction related functions
- SRY Gene : Sex determining Region on Y chromosome
- Genes controlling spermatogenesis :
  - ✓ located on Yq11,
  - ✓ Important for male germ cell development
  - ✓ Most genes involved in spermatogenesis have mapped to the proximal long arm of the Y chromosome (Yq11) and are arranged in AZF (Azoospermia Factor) region
  - ✓ subdivided into three different non overlapping sub regions associated with male infertility are AZFa, AZFb, and AZFc
  - ✓ Each one of these regions contains several genes proposed as candidate genes involved in male infertility.

The deletion of any of this genes/part of gene can result in infertility

Disease Overview

Y chromosome microdeletions are most commonly detected in men with Azoospermia (absence of sperm) or severe oligospermia (<1 million sperm/ml semen). Less commonly, men with sperm counts between 1–5 million sperm/ml semen will carry a Microdeletion.

Y chromosome microdeletions frequently **involve three Azoospermia factor regions (AZFa, AZFb, and AZFc) on the long arm of the Y chromosome that each contains numerous genes involved with spermatogenesis.**

Generalized genotype/phenotype correlations are possible for common microdeletions. Their frequencies have been estimated:

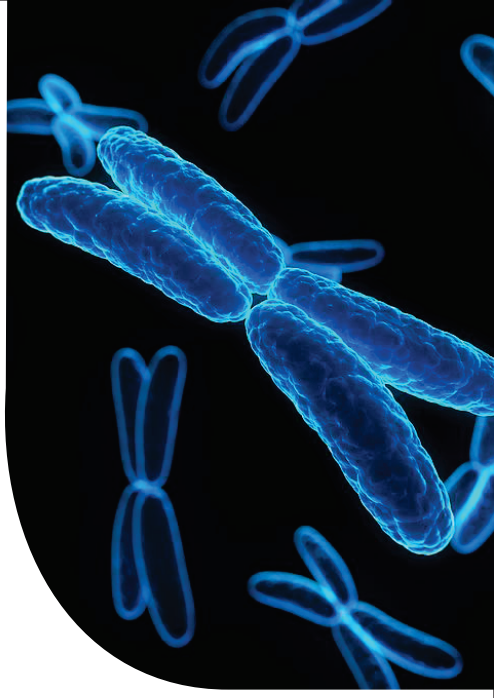
- ✓ **AZFa deletion:** spermatogenic failure (Sertoli-cell-only syndrome, SCOS) resulting in Azoospermia; 5 percent of cases.
- ✓ **AZFb deletion:** azoospermia/spermatogenetic arrest; 10 percent of cases.
- ✓ **AZFbc deletion:** SCOS/spermatogenic arrest; 13 percent of cases.
- ✓ **AZFc deletion:** variable phenotype ranging from mild oligospermia to Azoospermia and SCOS; 70 percent of cases.
- ✓ **AZFabc deletion:** SCOS associated with Azoospermia; 2 percent of cases.

Identification of the deleted AZF region has implications for effectiveness of assisted reproductive technologies. Testicular sperm retrieval is ineffective for males with SCOS, which is typically associated with deletions involving AZFa or AZFb, but has been effective for men with AZFc deletions.

If the male partner has an AZFc microdeletions, intracytoplasmic sperm injection (ICSI) may be an option to achieve pregnancy

using in vitro fertilization (IVF). Retrieval of residual sperm may be possible from ejaculate (for men with oligospermia) or from testicular biopsy (for men with Azoospermia).

Y chromosome microdeletions are transmitted to all male offspring if assisted reproductive techniques are utilized. Male offspring are at very high risk for infertility, whereas female offspring are not at increased risk for fertility issues.



✦ Prevalence

Infertility affects approximately **10 percent of couples of reproductive age**. Male-factor infertility is a factor in one-half of these cases.
Approximately 15–20 percent of infertile men are Azoospermic.
Y chromosome deletions and microdeletions are estimated to occur in one in 2,000–3,000 males.

✦ Genetics

Inheritance is Y-linked.
Y chromosome microdeletions typically occur de novo. Rarely, men carrying a microdeletion may be fertile and father infertile sons.
Penetrance is near 100 percent in affected males.
Microdeletions of the Azoospermia factor (AZF) regions on the q arm of the Y chromosome are present in 5–10 percent of males with non-obstructive Azoospermia or severe oligospermia.
Routine karyotype will detect abnormalities in 5–10 percent infertile males. **Cytogenetic analysis cannot detect Y chromosome deletions, interstitial deletions of the AZF regions, or whether a visible Y chromosome deletion includes the AZF regions.**

✦ Indication of Testing

To determine the cause of male infertility in men with nonobstructive Azoospermia or moderate to severe oligospermia.
To help **predict the effectiveness of assisted reproductive technologies** in men with specific Y chromosome microdeletions.

✦ Methodology

Multiplex polymerase chain reaction (PCR) to detect 16 STS.
Analytical sensitivity and specificity are 99 percent.
Clinical sensitivity is estimated at 5–10 percent for men with nonobstructive azoospermia or severe oligospermia.

✦ Interpretation

Lack of detection of an AZF microdeletion greatly reduces the possibility of a Y chromosome deletion being causative for azoospermia or oligospermia.
Detection of an AZFa, AZFb, AZFbc, or AZFabc microdeletions predicts **Sertoli-cell-only syndrome or azoospermia and male infertility. Assisted reproductive technologies are predicted to have decreased efficacy and are not advised.**
Detection of an AZFc may result in a variable phenotype of Azoospermia, oligospermia, or abnormal sperm morphology. Assisted reproductive technologies may be effective.
All male offspring will inherit the microdeletions.

✦ Specimen Required

EDTA Blood

✦ TAT

2 Days

ISO 9001 International Standard Certification LIC No QAC/R91/3585 NABL M-0520

Unipath SPECIALTY LABORATORY Ltd.

Unipath Specialty Laboratories Ltd.
102, Sanoma Plaza, B/S JMC House, Opp. Parimal Garden, Ellis Bridge, Ahmedabad - 380006
Phone No. 079-49006800/31
Mail to: unipathmdx@gmail.com