SickKids | Genome Diagnostics

Spinal and Bulbar Muscular Atrophy

Spinal and bulbar muscular atrophy (SBMA or Kennedy disease) is a motor neuron disease characterized by slowly progressive muscle weakness associated with mild insensitivity to the hormone androgen. Symptoms typically begin between the ages of 20 and 50 years, with difficulty walking and a tendency to fall. Patients often show breast development, testicular atrophy and reduced fertility due to androgen insensitivity. The vast majority of patients with SBMA have a normal life expectancy and do not die from direct complications of their disease.

Genetics

The principal mutation causing SBMA is an increase in the number of CAG repeats within the androgen receptor (*AR*) gene located on the X chromosome (Xq11-q12). The normal gene contains a three base pair sequence (CAG) that is repeated on each X chromosome.

SBMA is an X-linked recessive disease occurring once in every 50,000 males. Males normally have one X chromosome in each cell. If that X chromosome carries the expansion mutation in the *AR* gene, the boy will have SBMA. Affected males who are fertile will pass the expanded gene to each daughter who will become a carrier, but not to their sons.

Females normally have two X chromosomes in each cell. If one X chromosome carries the mutation in the *AR* gene and the other one does not, the girl will be a carrier of SBMA. Carriers do not have and will not develop SBMA. Carrier females may, however, transmit the repeat expansion in the *AR* gene to their children. Each son of a carrier mother has a 50% chance of being affected. Each daughter of a carrier mother has a 50% chance of being a carrier.

Who Should Be Tested?

- Individuals clinically suspected of being affected with SBMA
- Individuals with a family history of SBMA, to determine carrier status of unaffected individuals

Test Methods

- PCR analysis across the CAG repeat to measure the number of repeats in the androgen receptor (*AR*) gene.

Test Sensitivity

Expansion of the *AR* repeat occurs in 99% of individuals affected with SBMA. Approximately 1% of SBMA cases are caused by other types of mutation in the *AR* gene that will not be detected by this test.

Potential Outcomes & Interpretation of Test Results

Sex of Patient	*AR* (CAG) Repeats	Expansion Range	Explanation
Male	9 - 34	Normal	This result does not support a diagnosis of SBMA
Male	36 - 66	Affected	This result confirms a diagnosis of SBMA
Female	9 - 34	Normal	This individual is unlikely to be affected with, or a carrier of, SBMA
Female	36 - 66	Carrier	This individual is a carrier of SBMA and may transmit a mutation to offspring

For More Information

Online Mendelian Inheritance in Man http://www.ncbi.nlm.nih.gov/omim/ Item # 313200

GeneReviews online clinical information resource http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=gene&part=kennedy

To locate a genetics center near you, please visit the Canadian Association of Genetic Counsellors website at www.cagc-accg.ca or the National Society of Genetic Counsellors website at www.nsgc.org

SickKids

1. Current molecular testing may not detect all possible mutations for this disease.

2. The clinical course or severity of symptoms cannot be predicted by molecular analysis.

3. Test results should be interpreted in the context of clinical findings, family history and other laboratory data.

4. This test was developed and its performance characteristics validated by the Genome Diagnostics Laboratory at the Hospital for Sick Children. It has not been cleared or approved by the U.S. Food and Drug Administration. The FDA has determined that such clearance or approval is not necessary. This test is used for clinical purposes.