TUBEROUS SCLEROSIS

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Tuberous sclerosis is an autosomal dominant inherited genetic disorder that causes non-cancerous tumors in the skin, kidneys, heart and brain and is under the category of neurocutaneous syndromes. Two gene mutations have been detected at TSC1 and TSC2 in this disease however most occurrences of this disorder are sporadic. The TSC1 gene was discovered in 1997 and is located on chromosome 9 that produces a protein called hamartin. The TSC2 gene was discovered in 1993 and is located on chromosome 16 that produces the protein tuberin. These proteins act as growth suppressors of a conserved kinase called mTOR. Due to this mutation, mTOR is no longer regulated and this leads to abnormal differentiation, cell growth and development. Therefore enlarged cells are produced, as seen in tuberous sclerosis patients.

The course of this disorder varies with each patient. Some individuals may have signs of tuberous sclerosis at birth and others develop signs later on in adult life. In some cases the disease is mild, while in others it causes severe intellectual disabilities. The disorder affects as many as 25,000 to 40,000 individuals in the United States and about 1 to 2 million individuals worldwide.

The typical skin manifestations of tuberous sclerosis are light patches due to decreased pigment. These are sometimes called ash leaf spots due because the shape resembles the leaf of an ash tree. In addition patients will experience red bumps on the face containing blood vessels, called angiofibromas or adenoma sebaceum. These are mostly concentrated on the nose and cheeks. Another skin sign is a thickened patch of skin with an orange-peel texture called shagreen patch, most commonly located on the lower back. Other symptoms include seizures, behavior problems, learning disabilities, mental retardation, kidney problems, cardiac rhabdomyomas and pitted tooth enamel.

There are a variety of tests that can be conducted on patients with tuberous sclerosis. These include a CT and MRI scan of the head, and an ultrasound of the kidney. As tumors grow rapidly on the kidneys, it is important for the patient to be informed of the necessity to get regular ultrasound check-ups. DNA testing for mutations in the two genes mentioned above can be done if needed. The skin should also carefully be examined for the wide variety of skin features. An ultraviolet light examination of the skin is useful for detecting hypomelanotic macules that may be difficult to see in light skinned individuals. The fingernails and toenails should also be examined for ungual fibromas, the teeth and gums for dental pits and gum fibromas, and the eyes for retinal lesions.

There is no specific treatment for tuberous sclerosis as each individual manifests the disease differently; treatment is based on the symptoms. If a patient experiences severe seizures, medications are needed to control them. In addition, a child may need special education if mental retardation is severe. The adenoma sebaceum on the face can be removed by **laser** treatment however they often grow back and additional treatment will need to be done. In terms of the cardiac rhabdomyomas, they commonly disappear after puberty, and do not need to be treated with surgery. Because tuberous sclerosis is a lifelong condition, individuals should be regularly monitored by a doctor to make sure they are receiving the best possible treatments.

This information has been provided to you compliments of the American Osteopathic College of Dermatology and your physician.