Progressive Osseous Heteroplasia

Subjects: Genetics & Heredity
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Progressive osseous heteroplasia is a disorder in which bone forms within skin and muscle tissue.

Keywords: genetic conditions

1. Introduction

Bone that forms outside the skeleton is called heterotopic or ectopic bone. In progressive osseous heteroplasia, ectopic bone formation begins in the deep layers of the skin (dermis and subcutaneous fat) and gradually moves into other tissues such as skeletal muscle and tendons. The bony lesions within the skin may be painful and may develop into open sores (ulcers). Over time, joints can become involved, resulting in impaired mobility.

Signs and symptoms of progressive osseous heteroplasia usually become noticeable during infancy. In some affected individuals, however, the disorder may not become evident until later in childhood or in early adulthood.

2. Frequency

Progressive osseous heteroplasia is a rare condition. Its exact incidence is unknown.

3. Causes

Progressive osseous heteroplasia is caused by a mutation in the *GNAS* gene. The *GNAS* gene provides instructions for making one part of a protein complex called a guanine nucleotide-binding protein, or a G protein.

In a process called signal transduction, G proteins trigger a complex network of signaling pathways that ultimately influence many cell functions. The protein produced from the *GNAS* gene is believed to play a key role in signaling pathways that help regulate the development of bone (osteogenesis), preventing bony tissue from being produced outside the skeleton.

The *GNAS* gene mutations that cause progressive osseous heteroplasia disrupt the function of the G protein and impair its ability to regulate osteogenesis. As a result, bony tissue grows outside the skeleton and causes the complications associated with this disorder.

The Gene Associated with Progressive Osseous Heteroplasia

- GNAS

4. Inheritance

This condition is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder.

People normally inherit one copy of each gene from their mother and one copy from their father. For most genes, both copies are active, or "turned on," in all cells. For a small subset of genes, however, only one of the two copies is active. For some of these genes, only the copy inherited from a person's father (the paternal copy) is active, while for other genes, only the copy inherited from a person's mother (the maternal copy) is active. These differences in gene activation based on the gene's parent of origin are caused by a phenomenon called genomic imprinting.

The *GNAS* gene has a complex genomic imprinting pattern. In some cells of the body the maternal copy of the gene is active, while in others the paternal copy is active. Progressive osseous heteroplasia occurs when mutations affect the paternal copy of the gene.

5. Other Names for This Condition

- cutaneous ossification
- ectopic ossification
- heterotopic ossification
- myositis ossificans progressiva
- osteodermia
- osteoma cutis
- osteosis cutis
- POH

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