

## Case Presentation

# A Persistent Metopic Suture: A Case Report

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## Abstract

An adult human skull found in a college osteological collection presented with a persistent metopic suture. The metopic suture or frontal suture is noted to be between the two frontal bones extending from the nasion to the bregma. The metopic suture generally fuses between 1 and 8 years of life. If it remains after that time it is known as metopism. Its presence is a normal variant of the cranial sutures. Its presence may be mistaken for a skull fracture and also may be associated with frontal sinus irregularities.

**Keywords:** Metopic suture; Cranial sutures; Frontal bone

## Introduction

The human frontal bones begin to ossify in the mesenchyme via two ossification centers at approximately eight weeks gestation [1]. The two bones tend to fuse in the midline via the metopic or frontal suture. The term metopic is from Greek meaning “in the middle of the face” [2]. The metopic suture is a dentate-type suture extending from the nasion to the bregma [3]. The fusion of the metopic suture normally begins at the nasion proceeding superiorly and terminates at the anterior fontanelle [4]. The suture is situated almost exactly on the median line of the two frontal bones [2]. It usually will close within the first or second year of life, but it has been reported to take up to seven years to fuse [5]. Racial variations have been reported in the literature [6], as well as complications related to incomplete development of the frontal sinus. When the metopic suture persists into adulthood it is known as “metopism”. It is rare to find this suture in adults and its presence is not considered pathological. However, premature closure of any of the cranial sutures results in a pathology known as craniosynostosis [3].

## Case Presentation

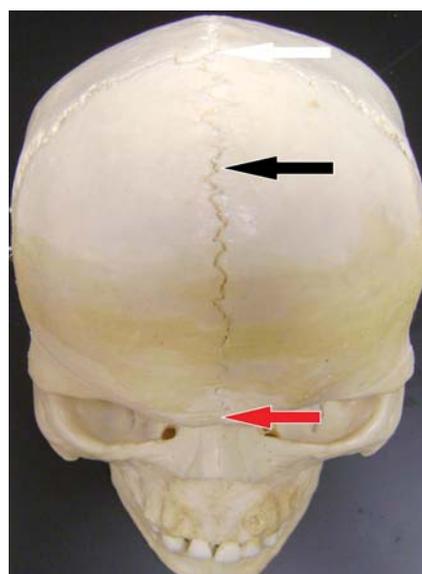
A dry human skull used in the anatomy program at Bowling Green State University Firelands in Huron, Ohio was found to have a persistent metopic suture or metopism. Based upon the size and shape of the piriform aperture as well as the various other anthropometric markings, the skull was suspected to be from a black male of unknown age. The two frontal bones were clearly seen due to the complete metopic suture. The suture extended from the bregma to the nasion as seen in Figure 1.

## Discussion

The persistence of the metopic suture is called metopism. This suture disappears by the second or third year of life. It is thought to be a normal variant of the cranial sutures [7]. It forms from the lack of union of the two frontal bones during embryonic development. Del Sol [8] suggested that metopism can be related to abnormal growth of the cranial bones, hydrocephalus, heredity, or atavism. The genetic factor is the one currently accepted by most scientists [9]. Metopism is found in approximately 5% of Asians and 9% of European Caucasians and 1% of Blacks [1,7]. Bergman [7] reported

the persistence of the metopic suture in approximately 1-12% of skulls. One author, Agarwal [10] reported the finding of 38.17% in Indian skulls, and Linc [11] observed it in 11% in Czech skulls, and finally Woo [12] reported the finding in 10% in Mongoloid skulls. The data may suggest that metopism is higher in temperate climates than in warmer climates [13].

Berry and Berry [14] reported a 0%-7% incidence associated with ethnicity. Metopism has been found by several investigators as being more prevalent in males than females [15,16]. Castillo reported a world index of incidence of 2.75%. It has also been reported to be perhaps associated with frontal sinus abnormalities but those studies seem flawed [2]. Some authors reported various suspected causes of metopism, including active expression of cytokines during cranial fusion and even resorption of the chondroidal tissue [6]. One author states “that a persistent metopic suture probably occurred in conjunction while refining the ability to walk” [8]. The author further notes that the persistent metopic suture is an adaptation for giving birth to babies with larger brains, and is related to the shift to a rapidly



**Figure 1:** The White arrow indicates Bregma. The Black arrow indicates Metopic Suture. The Red arrow indicates the Nasion.

growing brain after birth and even may be related to the expansion of the frontal lobes [8].

## Conclusion

The presence of a metopic suture is important from a clinical point of view. It must be included in the differential diagnosis of a suspected skull fracture particularly of the frontal bone. It is not a pathological entity but most certainly should be noted as an incidental finding on an x-ray. The suture is best identified in an A-P view of the skull. This view can help differentiate it from a vertical skull fracture. Neurosurgeons should be aware of the many suture configurations before cranial surgery.

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