

## Fahr's disease: bilateral symmetrical striopallidodentate calcification

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**Abstract:** Fahr's disease refers to a rare syndrome characterised by symmetrical and bilateral intracranial calcification. This disease refers to a sporadic or familial idiopathic calcification of the basal ganglia that may lead to neurological, psychiatric, and cognitive abnormalities. The origin and pathomechanism of this disorder are unknown, and is the reason why other cases with basal ganglia calcification remain asymptomatic.

**Key words:** Fahr's disease, pathology, sudden death

**B**ilateral striopallidodentate calcification, commonly known as Fahr's disease, is a rare syndrome characterised by calcification over the basal ganglion and dentate nucleus of the cerebellum and both the cerebral and cerebellar cortices [1].

The basal ganglia are most common site of involvement. Most cases present with extra-pyramidal symptoms initially. Patients have various clinical presentation, but most patients commonly display extrapyramidal and cerebellar dysfunctions, speech difficulties, dementia and neuropsychiatric symptoms [2].

Patients with Fahr disease (FD) mostly present with movement disorders, such as parkinsonism, chorea, tremor, dystonia, dysarthria, paresis or speech impairment [3]. Other common neurological features are seizures, syncope or stroke-like events, often combined with a frontal subcortical pattern of behavioural dysfunction and psychiatric symptoms such as psychosis, mood disorders, and dementia [4, 5].

The origin and pathomechanism of this disorder are unknown, as is the reason why other cases with basal ganglia calcification remain asymptomatic [6]. Fluoro-D-dopa uptake was found normal in a study of FD patients, suggesting an intact striatal dopaminergic pathway [7]. However, two single case studies have found reduced focal cerebral blood flow and glucose metabolism [8, 9]. Thus the observed symptoms may be manifestations of a cortico-subcortical disconnection. It is therefore of special interest to determine which parts of the brain show reduced metabolism in Fahr's disease, and whether areas of hypometabolism correspond with the clinical picture [3].

### Case report

A 49-year-old man was found dead near his home. A few days before his death he complained of nausea, vomiting, and headache. The medical record revealed a personality disorder (aggressivity, compulsive behaviour and anxiety) without elements of dementia and a normal neurological examination. The forensic autopsy revealed a cerebral cyst (3 x 2 x 2 cm) in lateral part of the thalamus and cardiac hypertrophy. The histopathological examination of brain evidenced focal calcifications in the thalamic region (fig. 1, 2).

### Discussion

Bamberger, in 1855, described the presence of bilateral symmetrical calcifications of the basal ganglia [10]. In 1930, Fahr described an adult case with the typical clinic and histological findings of this syndrome [11].

Idiopathic bilateral symmetrical striopallido-dentate calcinosis (Fahr's disease) is characterized by extensive calcification of the globus pallidus, putamen, caudate nucleus, internal capsule, the lateral parts of the thalamus and the dentate nuclei of the cerebellum. Less frequently calcifications are also present at the junction of the cortex and white matter at the bases of the cerebral sulci and in parts of the cerebellar cortex [12]. The onset of clinical symptoms usually occurs in the fourth and sixth decades of life, although it may also be evident in childhood.

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Patients have various clinical presentations, but most patients commonly display extrapyramidal and cerebellar dysfunction, speech difficulties, dementia and neuropsychiatric symptoms, rarely seizures, parkinsonism.

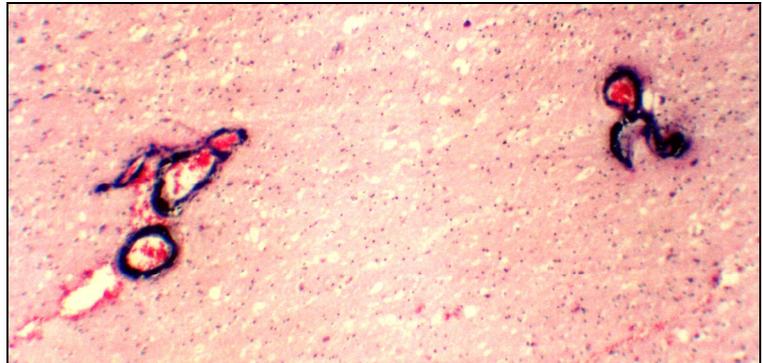
This disorders is thought to be inherited, although all cases do not exhibit this pattern [13]. Small calcifications in the basal ganglia and, less commonly, the dentate nucleus of the cerebellum, without associated symptoms are frequently seen in elderly patients [1].

However, the origin of this disorder is not clear. Combination of FD with other neurological conditions have been reported, among them corticobasal degeneration [14], mitochondrial encephalopathy, central nervous system lupus, motor neurone disease, Alzheimer's disease or frontal lobe dementia [6].

The involvement of frontal-subcortical circuits provides a hypothetical framework for the interpretation of cognitive and psychiatric problems in Fahr's disease.

Genetic studies revealed and autosomal dominant inheritance in the familial cases [15]. Genetic heterogeneity and an anticipatory affect have been observed. One multigenerational family with linkage to the IBGC1 of chromosome 14 has been identified but the causal gene is still unknown. Genetic studies on other families did not replicate this results [16]. No prenatal or genetic test is available for genetic counselling.

CT (computer tomography) is considerably more sensitive than skull X-rays to detect intracerebral calcifications. MRI (magnetic resonance imaging) provides better anatomical detail than CT, hut is less sensitive in detecting calcification [7]. SPECT imaging of the brain with <sup>99m</sup>Tc-HMPAO can be a useful tool in demonstrating regional cerebral blood flow and function in patients with conditions in which there is basal ganglia calcification [1].



**Fig. 1** Fahr's disease. Intracranial calcification. Thalamus (col. HE x40)



**Fig. 2** Fahr's disease. Intracranial calcification. Thalamus (col. HE x100)

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