

## **The lentiform fork sign on MRI after methamphetamine and alcohol abuse**

Juliane Hiesgen – corresponding author  
Dr. med./ Neurologist (Germany)

Department of Neurology, University of Pretoria, Pretoria, South Africa

Address: Kalafong Hospital, Klinikala Building, Klipspringer Street 1, Atteridgeville,  
Pretoria, 0008, South Africa

Email: [juliane.hiesgen@up.ac.za](mailto:juliane.hiesgen@up.ac.za)

+27 76 858 6330

ORCID: <https://orcid.org/0000-0003-2686-2402>

Jacques Badenhorst – co-author  
MBChB (UP), FC Rad Diag (SA)

Department of Radiology, University of Pretoria, Pretoria, South Africa

Email: [u27113796@tuks.co.za](mailto:u27113796@tuks.co.za)

+27 825561272

ORCID: <https://orcid.org/0000-0001-9038-157X>

Word count: 463

Date of resubmission: 11.02.2023

A 37-year-old man presented to the Emergency Department with a three-day history of acute blindness. He had delayed the consultation because of the belief that the symptoms were transient side effects from an overuse of alcohol and drugs. After inquiry, he reported alcohol and methamphetamine use for three consecutive nights before the onset of his visual impairment. He denied drinking home brewed alcohol or any methanol containing spirits. The stimulant he had used, "Crystal Meth", was consumed via inhalation but he was not a regular user of recreational drugs. There was no open fire or other carbon monoxide source at his home. His vision was severely impaired; he could only see very bright light, and his pupils were dilated and unresponsive. Fundoscopy was unremarkable. He did not report any other symptoms and the remaining neurological examination was normal. An initial computer tomography (CT) of the brain revealed bilateral basal ganglia hypodensities (Figure 1A). All routine blood and cerebrospinal fluid tests were normal, and his arterial blood gas did not show metabolic acidosis. Urine screen for substances of abuse was positive for methamphetamines only. Over the next few days his vision improved gradually, and he could soon recognize shapes and eventually objects, but on colour testing failed to identify red. Brain magnetic resonance imaging (MRI) could only be arranged after three weeks, showing persistence of the basal ganglia abnormalities that affected both lentiform nuclei. The findings, shown in Figure 1B, are consistent with the radiological pattern of the lentiform fork sign.

While extensive basal ganglia lesions have been reported secondary to methamphetamine<sup>1</sup>, the lentiform fork sign is most often seen in patients with uremic encephalopathy and metabolic acidosis.<sup>2</sup> Other associated conditions are intoxications,

particularly methanol, and genetic acidopathies.<sup>2</sup> Rare cases without acidosis, e.g. in atypical posterior reversible encephalopathy syndrome, have been described.<sup>3</sup>

Interestingly, despite additional features suggestive of hemorrhage and necrosis shown in Figure 2 A-B, our patient did not have any clinical features of encephalopathy or movement disorder at presentation and follow up over three months.

Although anecdotal reports of consecutive MRI studies at three to six months follow up have described resolution of the lentiform fork sign, these seem to be limited to cases that demonstrated vasogenic edema.<sup>2,3</sup>

Our patient's visual symptoms were highly suggestive of a toxic optic neuropathy with acute, painless, bilateral onset of anterior optic pathway pathology, dyschromatopsia and gradual improvement during recovery.

The use of "Crystal meth" has been associated with ocular damage, particularly corneal ulcers, crystalline retinopathy and retinal artery occlusion – however, transient loss of vision is a rare manifestation.<sup>4</sup>

**Conclusion:** This case demonstrates that basal ganglia oedema with the lentiform fork sign on MRI may occur secondary to alcohol and methamphetamine intoxication, emphasizing that alternative causes beside uraemia may result in this characteristic imaging finding.

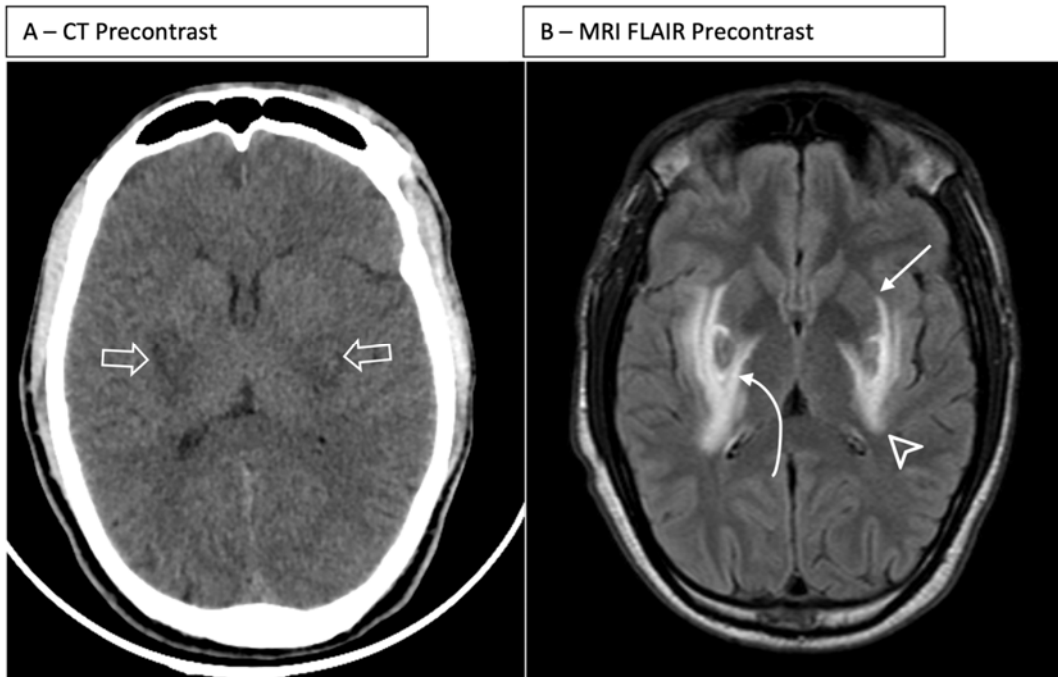


Figure 1: CT and MRI brain

A - CT brain showing bilateral and symmetrical basal ganglia hypodensities (thick arrows). B - T2-weighted/ fluid attenuation inversion recovery (FLAIR) magnetic resonance imaging demonstrates hyperintense signal of the external capsules (straight arrow) and posterior internal capsules (curved arrow), forming the prongs of the fork. The stem of the fork is formed by the confluence of the oedematous internal and external capsules at the posterior putamen (arrowhead).

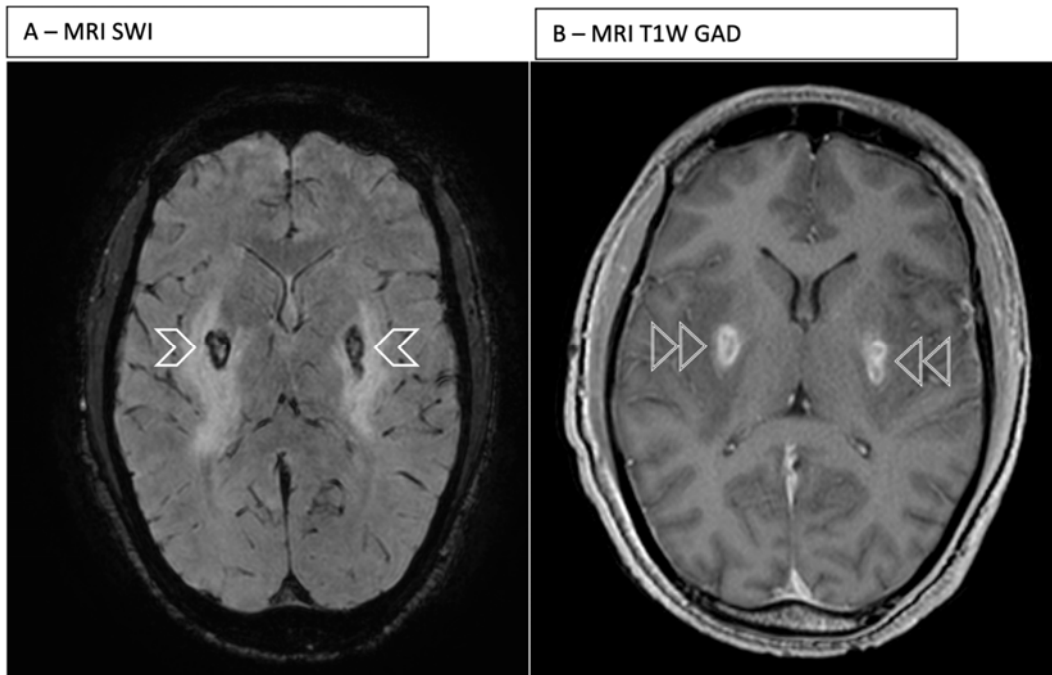


Figure 2:

A - Bilateral areas of hypointense signal on susceptibility-weighted imaging (SWI) representing hemorrhage within the posterior putamina (chevron). B - Rim-enhancement on T1-weighted images with gadolinium of the hemorrhagic necrotic areas (double arrowhead).

#### **Article information**

**Author affiliations:** J. Hiesgen, Department of Neurology, University of Pretoria, Pretoria, South Africa, J. Badenhorst, Department of Radiology, University of Pretoria, Pretoria, South Africa

**Corresponding author:** J. Hiesgen, Department of Neurology, University of Pretoria, South Africa, (juliane.hiesgen@up.ac.za)

**Conflict of interest disclosures:** None reported

**Additional Contributions:** We thank the patient for granting permission to publish this information.

## References:

1. Sanchez A, Malaty IA, Khanna A, et al. Bilateral Basal Ganglia Necrosis Secondary to Methamphetamine. *Mov Disord Clin Pract*. 2018 Aug 2;5(5):555-556. doi: 10.1002/mdc3.12649
2. Kumar G, Goyal MK. Lentiform Fork sign: a unique MRI picture. Is metabolic acidosis responsible?. *Clin Neurol Neurosurg*. 2010;112(9):805-812. doi:10.1016/j.clineuro.2010.06.006
3. Laespada-García MI, Azcárate-Díaz FJ, Méndez-Guerrero A. 'Lentiform fork sign' as a radiological feature of posterior reversible encephalopathy syndrome. *Acta Neurol Belg*. 2021;121(3):757-759. doi:10.1007/s13760-021-01643-z
4. Hazin R, Cadet JL, Kahook MY, Saed D. Ocular manifestations of crystal methamphetamine use. *Neurotox Res*. 2009 Feb;15(2):187-91. doi: 10.1007/s12640-009-9019-z