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### Summary

Psychogenic non-epileptic seizures (PNES) represent a relatively frequent challenge for clinicians. While they resemble epileptic seizures, they are not the consequence of paroxysmal electrical discharges in the brain, but are related to psychological triggers in vulnerable subjects. Gold standard of PNES diagnosis remains the recording of a typical event under video-EEG. PNES recognition is not only important in order to offer an appropriate treatment to the patient, which should include a multidisciplinary approach by psychiatrists and neurologists, but also, especially in the acute phase, to avoid a potentially harmful escalation of pharmacological treatment.

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**Key words:** PNES, dissociative disorder, conversion disorder, diagnosis, psychiatrist

### Nichtepileptische, psychogene Anfälle aus der Neurologenperspektive

Nichtepileptische, psychogene Anfälle stellen eine relativ häufige Herausforderung für Neurologen dar. Auf der einen Seite ähneln diese Ereignisse epileptischen Anfällen, sie sind aber nicht das Resultat einer paroxysmalen neuronalen Entladung, sondern bei vulnerablen Patienten mit psychologischen Auslösefaktoren verbunden. Der Gold-Standard der Diagnose ist die Video-EEG-Aufnahme einer charakteristischen Episode. Die Identifizierung der Patienten mit nichtepileptischen psychogenen Anfällen ist nicht nur wegen der Möglichkeit einer adäquaten Therapieeinleitung wichtig, welche idealerweise durch einen multidisziplinären Ansatz von Psychiatern und Neurologen durchgeführt werden sollte, sondern auch, um eine in der Akutphase möglicherweise gefährliche Therapieeskalierung zu vermeiden.

**Schlüsselwörter:** PNES, dissoziative Anfälle, Konversionsstörung, Diagnose, Psychiater

### Crises non-épileptiques psychogènes depuis une perspective neurologique

Les crises non-épileptiques psychogènes représentent un défi relativement fréquent pour les neurologues. Si d'une part ces manifestations ressemblent à des crises épileptiques, elles ne sont pas dues à des décharges neuronales paroxystiques, mais sont liées à des facteurs déclenchants d'ordre psychologique survenant chez des sujets vulnérables. Le gold-standard pour le diagnostic des crises non-épileptiques psychogènes est l'enregistrement d'un événement typique sous vidéo-EEG. L'identification de patients avec crises non-épileptiques psychogènes est non seulement important pour offrir aux malades un traitement approprié (idéalement par une approche interdisciplinaire avec psychiatre et neurologue), mais aussi afin d'éviter une surenchère médicamenteuse qui peut se révéler dangereuse, particulièrement dans la phase aiguë.

**Mots clés :** Trouble dissociatif, trouble somatoforme, trouble de conversion, diagnostic, psychiatre

### Why are psychogenic non-epileptic seizures important?

Psychogenic non-epileptic seizures (PNES) are defined as paroxysmal disorders that clinically resemble epileptic seizures, but occur without epilepsy-specific changes on the EEG, together with a psychological substrate [1]. Furthermore, PNES patients, as opposed to subjects with convulsive seizures, do not show any meaningful elevation of muscle CK or lactate [2], and as opposed to patients after an organic syncope or seizure, do not have any modification in serum prolactine.

PNES patients are not rare, especially for epileptologists or for neurologists working in a hospital. Up to 20% of patients with PNES may present a "status", meaning that their attacks are prolonged over several minutes to hours [3]; and a considerable proportion of patients treated in the intensive care unit for suspected status epilepticus may finally receive a diagnosis of PNES [2]. This may lead to potentially inappropriate treatments, as up to 60% of patients are treated with antiepileptic drugs (AEDs), which do not prevent PNES episodes [4], and an escalation to an intensive care

admission and tracheal intubation may induce a non negligible morbidity and mortality of iatrogenic origin. These patients may have a history or show signs of other non-organic disorders [5]. Finally, PNES patients show a higher yearly mortality rate as compared to matched controls [6]. For all these reasons, the ability to recognize PNES is of utmost importance for the well-being of patients.

## Epidemiology

**Table 1** gives an overview of estimations of PNES incidence, while the prevalence has been estimated at 2-33/100'000 population [7]. These numbers represent about 1/15, respectively 1/100 of the epilepsy incidence and prevalence; however, a considerable proportion of PNES patients may go unrecognized, as it is relatively common to diagnose patients several years (up to 20) after symptom onset [8]. In all studies, there is a prevalence of women. This is especially true for middle-aged patients. **Table 2** summarizes data regarding comorbidity with epilepsy, which seems to oscillate between 10 and 20%. A consistent proportion of PNES patients, thus, may have concomitant epileptic attacks; in the experience of the author, however, patients can report in most cases the difference between these two entities.

## Causes

The classical psychodynamic theory explains PNES as part of dissociative or somatoform disorders as an unconscious development of a somatic symptom that reduces an inner tension in patients with some sort of unsolved psychological conflicts. In fact, virtually all

patients with PNES exhibit a strong psychiatric comorbidity, mostly in terms of anxio-depressive disorders, but also regarding personality disorders (particularly, narcissistic or histrionic, but also unstable personalities such as borderline) [1, 9]. As stated above, other signs and symptoms of dissociative disorders are not infrequent, both as concomitant diagnoses, and as occurrences in the patient's history.

In recent years, some attention has been directed towards identifications of biological markers in this clinical context; all studies have been conducted interictally. Decreased metabolism in the anterior cingulate cortex (a key location for integration of the self) and in the right pericentral cortical regions (subtending orientation in space and movement control) has been identified with PET [10]. A functional MRI study suggested that PNES patients show stronger connectivity values between areas involved in emotion (insula), executive control (inferior frontal gyrus and parietal cortex), and movement (precentral sulcus) [11], suggesting a sort of short circuit facilitating dissociative manifestations, while high-density EEG studies detected a disconnection of the frontal regions, whose extent correlated with the density of PNES attacks over time [12, 13]. A follow-up analysis showed in addition a decrease in connectivity between basal ganglia and several cortical regions, suggesting a correlate of attenuation of the effect of potentially disturbing mental representations [8].

## Semiology and differentiation from epileptic seizures

As with epileptic seizures, the great inter- (and at times intra-) individual variability of symptoms justifies some classification attempts. One relatively straightfor-

**Table 1:** Yearly incidence of psychogenic non-epileptic seizures (PNES)

Location	Incidence/100'000	Women	Age range	Reference
Iceland	1.4	79%	16 - 54	[14]
Ohio (USA)	3.0	73%	>18	[15]
Scotland	4.9	81%	14 - 71	[16]

**Table 2:** Proportion of patients with psychogenic non-epileptic seizures (PNES) also having epilepsy

Location	Cohort	Proportion	Reference
Iceland	population	50%	[14]
Ohio (USA)	population	20%	[15]
Florida (USA)	hospital	9%	[17]
Shiraz (Iran)	hospital	16%	[18]
Lausanne (CH)	hospital	22%	[19]

ward approach categorizes motor episodes into three main groups: overt motor manifestations (resembling generalized convulsive seizures), subtle motor manifestations (resembling temporal lobe seizures), and atonic manifestations (resembling syncope) [20, 21]. Interestingly, it has been shown that younger patients tend to present significantly less often with overt motor episodes as compared to adults [22].

Surveys among neurologists illustrated that PNES diagnosis solely based upon semiology has a sensitivity and specificity of 80 - 85% [23], while the interrater agreement seems moderate for PNES and substantial for epileptic seizures [24]. Clinical items that help in differentiating PNES from epileptic seizures are given in **Table 3**. It is important to underscore that no sign bears a 100% specificity and that at first glance “bizarre” clinical manifestation may well occur in patients having an epileptic seizure, especially if originating from the frontal lobe.

### Diagnosis and differential diagnosis

Given the aforementioned limitations, the gold standard relies in capturing a typical clinical event during EEG recording [25]. The sensitivity of an ambulatory extended EEG is about 50 - 65% [26, 19, 27], and may be increased during long-term video-EEG. Provocation methods may include strong verbal suggestion, intermittent photic stimulation, hyperventilation, placing a tuning fork on the forehead, and hand compression over the temporal regions [28]; these are all non-invasive and may further improve the sensitivity of the re-

ording. A debate exists regarding the use of a nocebo, particularly injection of physiological saline under suggestion [29, 30]. It is the opinion of this author that nocebo has its place if other maneuvers do not allow an attack induction. However, it is of greatest importance how to verbally reinforce the injection: stating that “the liquid will induce an epileptic seizure” is not only incorrect but also deceives the patient; conversely, saying that “the diluted salt may induce a characteristic attack that will enable a correct diagnosis” is both well accepted and potentially very helpful.

Differential diagnoses with physiological disorders include, in the order of frequency (but in an incomplete listing): syncope, (frontal lobe) seizures, migraine with aura, movement disorders (such as tremor, hemiballismus, chorea, and even limb shaking heralding an ischemic stroke), as well as non REM and REM parasomnias.

### What to do

Once a patient has been diagnosed with PNES, it is important that the neurologist, most optimally within an interdisciplinary approach with the liaison psychiatrist, explains it to the patient and the relatives. The stepwise technique is to first listen to the patient’s considerations and representations, then to underscore that the attacks are not due to epilepsy, and finally to bring the keyword “functional disorder”. This allows on the one side to reassure the patient that his/her condition has a name, and on the other side to offer a mechanistically-based explanation (“the function of

**Table 3:** Clinical signs in psychogenic non-epileptic seizures and epileptic seizures (modified after La France *Curr Opin Neurol* 2008)

Sign	Psychogenic non-epileptic seizure	Epileptic seizure
Closed eyes, resistance to opening (ictally)	Highly specific	Exceptional
Asymmetrical, wandering, and crescendo-decrescendo movements	Highly specific	Rare (frontal lobe seizures)
Pelvic thrusting	Highly specific	Rare (frontal lobe seizures)
Lateral tongue bite	Extremely uncommon	Highly specific (generalized convulsion)
Teddy bear in the bed	Very specific in adults	Exceptional in adults
Avoiding gaze contact (postictally)	Relatively frequent	Exceptional
Ictal weeping	Relatively common	Exceptional
Postictal stertorous breathing	Exceptional	Very common after generalized convulsion
Postictal whispering	Highly specific	Exceptional
Self injury	May occur	May occur
Urine incontinence	May occur	May occur

the brain is at times impaired, but restorable”). At this point, questions should be answered and the possibility of a psychogenic trigger mentioned, in accordance with the receptivity and the level of understating of the patient [31]. Further appointments may be needed, and looking together with the family at the recorded, typical episode can be of considerable help. It has been shown that the mere explanation of a PNES diagnosis drastically reduces the emergency visits and may contribute to a better quality of life [32].

It is extremely important that neurologists remain involved on a long-term basis during psychiatric treatment, which represents the mainstay of the therapeutic approach, in order to offer a somatic frame [31], and to guarantee a timely recognition of other dissociative manifestations, which may develop in as much as 25% of patients [5].

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