Objective human evidence for the neural mechanisms of notalgia paresthetica: A scoping review

Authors: Valerie J. Figueroa Thon[1], Kristal Arraut[1], Ania Mezouari[1]

Affiliations:

[1]University of Medicine and Health Sciences, Basseterre, Saint George Basseterre Parish, Saint Kitts and Nevis

Abstract:

Background:

Notalgia paresthetica (NP) is a chronic neuropathic dysesthesia that can be difficult to diagnose and manage. However, the objective human mechanistic evidence underlying its pathophysiology remains incompletely mapped.

Objective:

To map the objective human evidence available across four prespecified mechanistic domains, including imaging, sensory, tissue, and central mechanisms in NP.

Methods:

We conducted a PubMed search and screened 179 titles and abstracts against our predefined inclusion criteria. Eligible studies included human participants with NP or human biological/tissue data derived from individuals with NP that provided evidence in at least one

prespecified mechanistic domain, regardless of clinical, geographic, or healthcare setting. This scoping review was reported following the PRISMA-ScR guidelines.

Results:

Of the 179 identified records, 20 studies met the inclusion criteria along with one additional study identified through citation searching. Evidence was most frequently from imaging, sensory, and tissue mechanistic domains. Central mechanisms were a more recently investigated domain, but were the least studied of the four and remained limited. Imaging evidence supported the association between spinal nerve compression and cutaneous symptoms of NP. Sensory studies demonstrated sensory abnormalities corresponding to the NP dermatome. Tissue studies showed no reproducible neural phenotype as variable alterations in cutaneous innervation were identified.

Conclusion:

Objective human evidence supports a multifactorial neural basis for NP, with structural, peripheral, and central processes potentially contributing to its pathophysiology. Central mechanisms remain comparatively less studied.

Keywords: notalgia paresthetica; neuropathic dysesthesia; neuropathic itch; scoping review

Table 1. Characteristics of included studies and mechanistic evidence

Study	Sample size	Mechanistic domain(s)	Objective method(s)
Springall et al., 1991	5	Tissue	Histopathology, neural IHC (PGP 9.5, S-100 and neuropeptide markers)
Raison-Peyron et al., 1999	12	Imaging; tissue	Spinal X-ray, histopathology
Şavk et al., 2000	10	Imaging; sensory; tissue	Spinal MRI/X-ray, neurologic exam, nerve conduction studies/EMG, histopathology
Şavk et al., 2002	19	Tissue	Histopathology, neural IHC
Tacconi et al., 2004	1	Sensory	Neurologic sensory examination, EMG
Wang et al., 2009	4	Sensory	Electrodiagnostics, temperature testing
Alai et al., 2010	1	Imaging; sensory	Cervical/thoracic spine MRI; touch, vibration, pinprick test
Huesmann et al., 2012	65	Imaging; tissue	Spinal MRI/CT/X-ray, PGP 9.5 IENFD
Shin and Kim, 2014	1	Imaging; tissue	Spinal MRI, histopathology, S-100 IHC
Terzi and Bekdik Şirinocak, 2016	1	Imaging; sensory	Spinal MRI/X-ray, sensory exam, EMG
Low et al., 2017	1	Imaging; sensory	Spinal CT, sensory examination

Pereira et al., 2018	58	Imaging; sensory; tissue	Spinal MRI, ice-pack sign, PGP 9.5 IENFD
Alai and Skinner, 2018	1	Imaging; sensory	Spinal MRI, light touch and pinprick test
Şenel et al., 2020	117	Imaging; tissue	Spinal MRI, histopathology
Mülkoğlu and Nacır, 2020	80	Imaging; sensory	Spinal MRI/X-ray, motor and sensory neurologic examination
Akram, 2021	1	Imaging; sensory	Spinal X-ray, light touch and pinprick test
Ozen et al., 2021	1	Imaging	Spinal MRI
Harper et al., 2024	15	Sensory; central	Quantitative sensory testing
Trager et al., 2024	1	Imaging	Spinal X-ray
Cirakoglu and Etgü, 2025	90	Imaging; central	Spinal 2-view radiographs, Central Sensitization Inventory
Gaycken et al., 2025	1	Imaging; tissue	Spinal MRI, histopathology

Abbreviations: CT (computed tomography), EMG (electromyography), IENFD (intraepidermal nerve fiber density), IHC (immunohistochemistry), MRI (magnetic resonance imaging)