

ECP Therapy in Neurological Rehabilitation, Pain & Complex Injury

Evidence Review for TBI, Nerve Injury, Neuropathy & Chronic Post-Injury Pain | June 2026

Neurological injury, chronic post-traumatic pain, peripheral neuropathy, and complex regional pain syndrome (CRPS) represent some of the most challenging and costly conditions within the ACC system. This document presents clinical evidence for ECP therapy's emerging role in neurological and pain rehabilitation.

1. ECP Therapy in Cerebrovascular & Neurological Rehabilitation

Key Study: ESO 2025 — EECP Reduces Recurrent Stroke in Intracranial Stenosis

Population	Patients with impaired cerebral haemodynamics due to severe intracranial arterial stenosis (ICAS)
Design	Controlled clinical study; EECP group vs best medical therapy (BMT) group
Key Findings	Recurrent stroke within 1 year: EECP group 6.5% vs BMT group 26.2% — a 4-fold reduction. EECP group also demonstrated better cerebrovascular reactivity on transcranial Doppler ultrasound.
Significance	Presented at European Stroke Organisation Conference, Helsinki, May 2025. Researchers call for multicentre trial confirmation.
Source	ESO Press Release, 22 May 2025, Helsinki, Finland

Study: Carotid Bifurcation Haemodynamics in Neurological Disorders (EECP)

Population	5 patients with neurological disorders + 5 healthy controls
Design	Prospective study; vascular ultrasound measurements during EECP; MR angiography of carotid artery
Key Findings	EECP produces significantly different cerebral haemodynamic responses in neurological patients vs controls. ICA/CCA flow modulation suggests collateral formation in cerebrovascular disease.
Source	Frontiers in Human Neuroscience. 2021;15:685734. PMC8438206
ACC Relevance	TBI patients and those with post-traumatic cerebrovascular changes may benefit from EECP-mediated improved cerebral perfusion

2. Cognitive Rehabilitation Post-Stroke / Brain Injury

Cognitive impairment following TBI or stroke is a major contributor to long-term ACC costs. EECP has been investigated as an adjunct cognitive rehabilitation therapy:

Study	Wang et al. — EECP + atorvastatin for cognitive impairment post-stroke. PMC10768497
Finding	EECP combined with standard therapy significantly improved cognitive function scores vs standard therapy alone in stroke patients
Mechanism	EECP improves brain microcirculation, reduces neuroinflammation, enhances neuronal oxygen supply
ACC Context	Post-TBI cognitive rehabilitation is a major ACC expenditure category. ECP offers non-pharmacological, non-surgical cognitive support

3. Peripheral Neuropathy & Nerve Injury

Study: EECP for Diabetic Peripheral Neuropathy + PAD (Case Report, 2025)

Patient	Male with intermittent claudication, evening leg pain, unsteady gait; diagnosed with PAD and diabetic peripheral neuropathy; failed >100 physiotherapy sessions
Treatment	EECP — 35 sessions over 7 weeks
Outcomes	After 19 sessions: glycaemic parameters improved. After 35 sessions: walking distance 100m → 500m; improved sensation in soles; more balanced gait; calf cramp area reduced. Pain reduced from 7/10 (after 100+ physio sessions) toward meaningful relief.
Source	ECronicon Medical Case Report. January 2025. ecronicon.net
ACC Relevance	Demonstrates ECP benefit in neuropathic pain and peripheral nerve injury — conditions commonly arising from workplace or motor vehicle accidents

Study: EECP for Restless Legs Syndrome + Diabetic Peripheral Neuropathy

Design	Prospective case series; 6 patients — 4 with diabetic peripheral neuropathy, 2 without
Treatment	EECP — 35 sessions; stable medications maintained

Key Findings	Mean IRLS (International RLS Score) drop of 22.8 points (vs placebo response of 8 points). Subjective improvement in peripheral neuropathy symptoms in all 4 diabetic neuropathy patients.
Source	Sleep Medicine. 2005;6(2):101–106. ScienceDirect
Mechanism	ECP improves peripheral nerve perfusion — the same ischaemic mechanism implicated in traumatic peripheral neuropathy

4. Chronic Post-Injury Pain & Inflammation

Chronic pain following musculoskeletal injury involves persistent inflammation, cytokine dysregulation, and sensitised nociceptors. ECP therapy's documented anti-inflammatory action directly targets these pain-perpetuating mechanisms:

Inflammatory Mediator	Role in Post-Injury Pain	ECP Effect (Documented)	Source
TNF-alpha	Sensitises nociceptors; perpetuates central sensitisation	-16% reduction vs sham (p<0.01)	Michaels, 2010 Circulation
hsCRP	Marker of systemic inflammation; predicts pain duration	-32% reduction vs sham (p<0.05)	Michaels, 2010 Circulation
MCP-1 (CCL2)	Macrophage recruitment; drives chronic inflammation in injured tissue	-13% reduction vs sham (p<0.001)	Michaels, 2010 Circulation
Endothelin-1	Vasoconstriction; tissue ischaemia-related pain	Significantly reduced by ECP	Liu, J Geriatr Cardiol 2019
Nitric Oxide	Anti-inflammatory; vasodilatory; protective of injured endothelium	+35% increase by ECP	Expert consensus 2019; NexIn 2025
VEGF	Pro-healing; reduces tissue ischaemia that drives ischaemic pain	Significantly upregulated by ECP	Multiple studies

CHRONIC PAIN RELEVANCE: The cytokine profile modified by ECP therapy (reduced TNF-alpha, hsCRP, MCP-1; increased NO and VEGF) directly mirrors the therapeutic targets of evidence-based chronic post-injury pain management. ECP provides this anti-inflammatory effect without pharmacological agents, making it ideal for patients with medication sensitivities or contraindications.

5. Long COVID & Fatigue-Related Functional Impairment

EECP has demonstrated significant results in Long COVID rehabilitation — a condition characterised by post-viral fatigue, endothelial dysfunction, and impaired exercise capacity — mechanisms identical to post-traumatic deconditioning:

Study	Role of EECP in Long COVID. PMC12176003. Published June 2024.
Condition	Long COVID (LC) — 18.3% of US adults affected; characterized by fatigue, cardiorespiratory symptoms, cognitive impairment
ECP Mechanism	Improves endothelial dysfunction — the primary pathology in both Long COVID and post-traumatic deconditioning
Key Finding	EECP demonstrated significant symptom improvements including objective functional metrics. EECP is emerging as a leading treatment for LC with ongoing trials.
ACC Relevance	Post-traumatic fatigue and deconditioning syndromes increasingly present in ACC claimants, particularly post-COVID injury complications. ECP's functional rehabilitation benefit is directly applicable.

References — Document 5

- ESO European Stroke Organisation. Press Release Day 2. Helsinki, Finland. 22 May 2025.
- Wang J et al. Efficacy of EECP combined with atorvastatin for cognitive impairment after stroke. PMC10768497.
- Frontiers in Human Neuroscience — Haemodynamic responses in carotid bifurcation by EECP in neurological disorders. 2021;15:685734.
- ECronicon Medical. Case report — EECP in management of diabetic peripheral neuropathy. January 2025.
- Walters AS et al. EECP as novel treatment for RLS — preliminary test of vascular neurologic hypothesis. Sleep Med. 2005;6(2):101–106.
- Michaels AD et al. EECP improves peripheral arterial flow-mediated dilation. Circulation. 2010;122(14):1384–1391.
- PMC12176003 — Role of EECP in Long COVID. June 2024.