

Vagal nerve stimulation in patients with disorders of consciousness

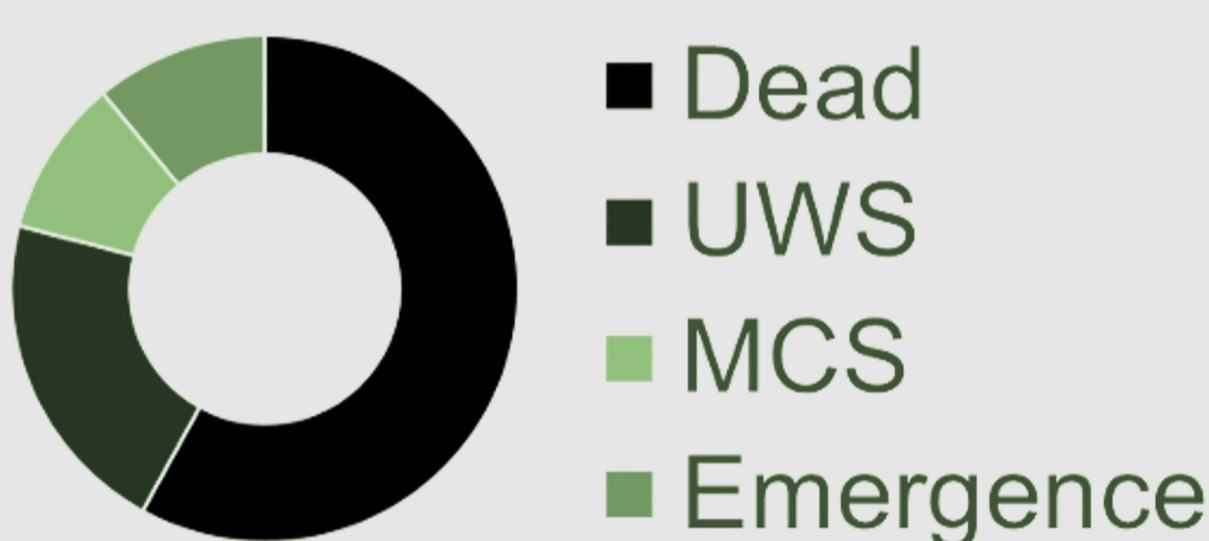

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BACKGROUND

DISORDERS OF CONSCIOUSNESS (DoC) AFTER COMA

UNRESPONSIVE WAKEFULNESS UWS	MINIMALLY CONSCIOUS MCS
<ul style="list-style-type: none"> Eye opening Reflex behaviors only^[1] 	<ul style="list-style-type: none"> Signs of consciousness^[2] No functional communication
1 year spontaneous evolution: ^[3] 	1 year spontaneous evolution: ^[3] 

TREATMENTS

NO EVIDENCE-BASED GUIDELINES

Class II existing evidence^[4]

- Amantadine
- Transcranial Direct Current Stimulation

Transauricular vagal nerve stimulation (taVNS)

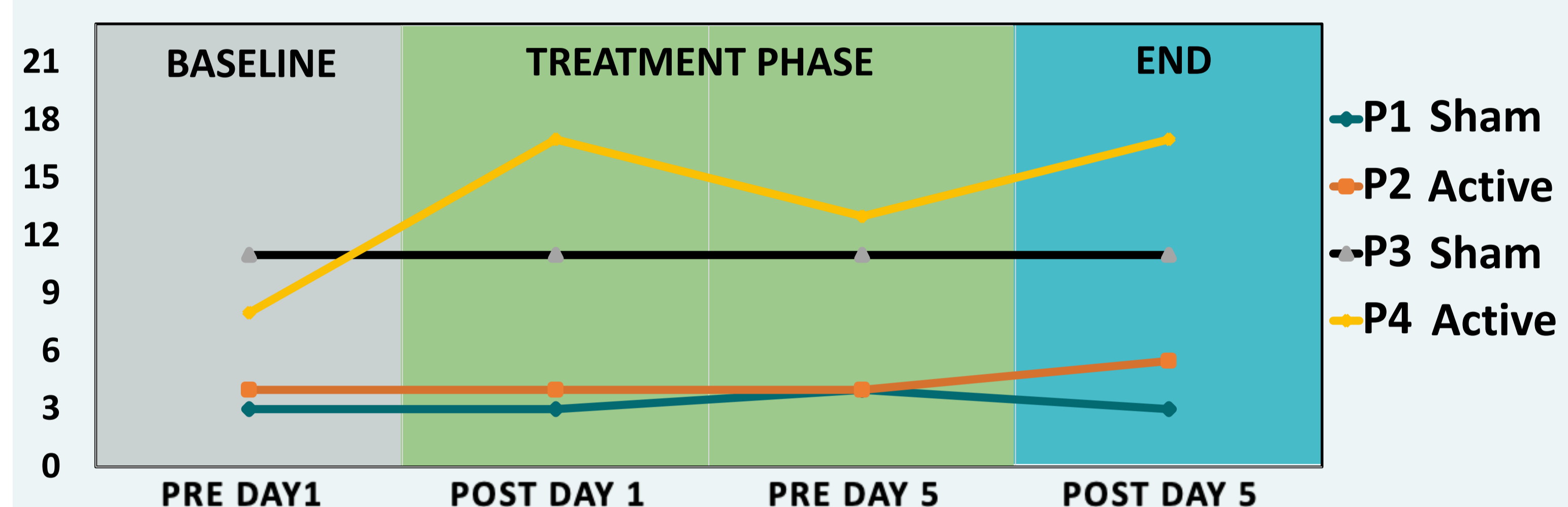
- Non-invasive & approved for other pathologies^[5]
- Promising results in chronic post-coma patients^[6,7]

PRELIMINARY RESULTS

PATIENTS DATA

P1. F, 56 yo, cardiac arrest, UWS P3. M, 54 yo, hemorrhage, MCS
 P2. M, 42 yo, traumatic, UWS P4. M, 63 yo, stroke, MCS

BEHAVIOURAL RESULTS N=4 CRS-R^[8]



3 MONTHS FOLLOW-UP N=4

	P1	P2	P3	P4
GOS-E ^[9] Outcome	(1) Deceased	(3) Severe handicap	(7) Good recovery	(1) Deceased
DRS ^[10] Disability level	Deceased	(13) Severe	(5) Moderate	Deceased

METHODS

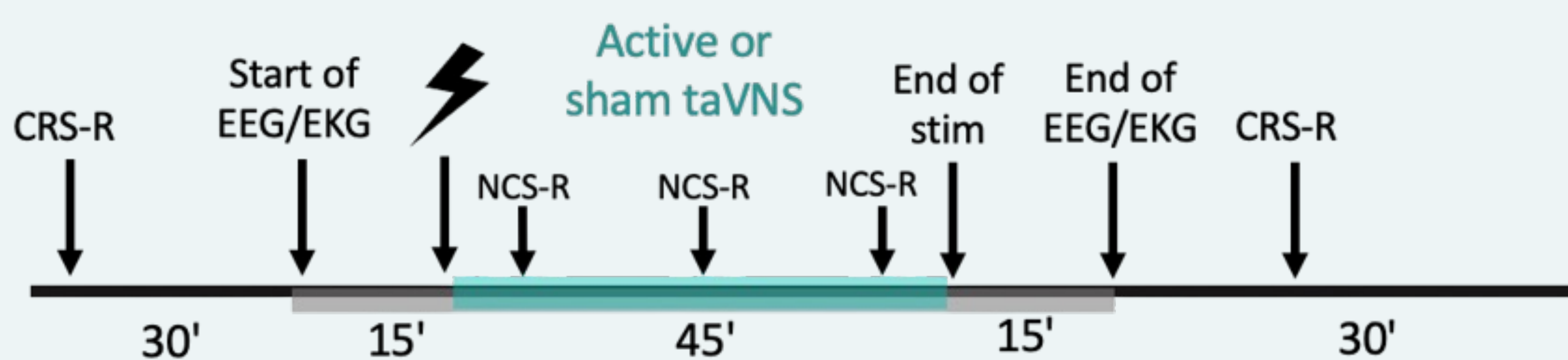
DESIGN: Parallel double-blind controlled trial

TREATMENT: 5-day bilateral stimulation, 45 min, 3 mA, 25 Hz

PATIENTS: 48 acute patients (>90 days)

OUTCOMES: Primary: Behavioural scores (CRS-R*) **Secondary:** Brain connectivity (EEG*), follow-up (GOS-E*, DRS*), heart frequency (EKG*), pain scale (NCS-R*)

PROTOCOL: 1st & 5th day of treatment



DISCUSSION

Protocol is **safe and feasible** in patients in the acute phase of DoC

The 2 patients in the active group demonstrated **overall behavioural scores improvements** following 5 days of treatment with P4 having new signs of consciousness

The large-scale study will confirm taVNS efficacy and show its **effects on multimodal measurements** (hd-EEG, EKG)

REFERENCES

- [1] Laureys et al, *BMC Med*, 2010 [3] Bruno et al, *Coma and Disorders of Consciousness*, 2012 [5] Yap et al, *Frontiers Neurosci*, 2020 [7] Hakon et al, *NeuroMod*, 2020 [9] Levin et al, *J Neurotrauma*, 2001 [2] Giacino et al, *Neurology*, 2002 [4] Thibaut et al, *Lancet Neurol*, 2019 [6] Noé et al, *Brain Stim*, 202 [8] Giacino et al, *Arch Phys Med Rehabil*, 2004 [10] Rappaport et al, *Arch Phys Med Rehabil*, 1982

- * CRS-R: Coma Recovery Scale-Revised
 * EEG: electro-encephalography
 * GOS-E: Glasgow Outcome Scale Revised
 * DRS: Disability Rating Scale
 * EKG: Electrocardiogram
 * NCS-R: Nociception Coma Scale-Revised

The authors have no potential conflict of interest to disclose