

Brain-Guided Hyperthermia in Amyotrophic Lateral Sclerosis (ALS): Rapid Functional Improvement After Brain Thermodynamics-Based Treatment – A Case Report

Abstract

Background

Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disorder characterized by motor neuron loss, muscle weakness, dysphagia, dysarthria, respiratory compromise, and functional decline. Despite pharmacological advances, patients frequently experience progressive disability. Brain-guided Advanced Hyperthermia (BgAH) is an emerging non-invasive therapeutic approach designed to modulate brain thermodynamics, promote heat shock protein 70 (HSP70) expression, and improve neuronal and muscular function.

Case Presentation

A 69-year-old male (Patient ID: 684) with diagnosed ALS underwent treatment sessions of Brain Thermodynamics-based Hyperthermia at BTT Medical Institute. Objective assessments including neuromuscular strength, orofacial/swallowing function, lower extremity endurance, force plate dynamics, and laboratory biomarkers were evaluated.

Results

Within 48 hours post-treatment, objective clinical improvements were documented across multiple functional domains, including upper and lower extremity strength, orofacial endurance, swallowing muscle engagement, and dynamic postural stability. Subjectively, the patient reported increased energy and improved breathing. Comprehensive laboratory monitoring confirmed safety, showing stable metabolic, inflammatory, cytokine, and neurodegenerative biomarker profiles.

Introduction

Amyotrophic Lateral Sclerosis (ALS) is a fatal neurodegenerative disease affecting upper and lower motor neurons, leading to progressive muscle atrophy,

weakness, dysarthria, dysphagia, and respiratory failure. Current standard therapies provide limited attenuation of disease progression. Non-invasive modulation via Brain Thermodynamics-based Hyperthermia (BgAH) aims to induce cellular neuroprotective pathways (such as HSP70), reduce neurogenic inflammation, and restore mitochondrial efficiency. This report describes the objective and subjective functional responses following treatment in a 69-year-old male with ALS.

Patient Information

- **Age / Sex:** 69 years / Male (Patient ID: 684)
- **Diagnosis:** Amyotrophic Lateral Sclerosis (ALS) (Diagnosed August 27, 2024, by EMG and clinical evaluation)
- **Symptom Onset:** Approximately May 2023 (cramps in legs/abdomen, fasciculations, distal weakness)
- **Major Baseline Symptoms:**
 - Progressive weakness (left hand and generalized)
 - Progressive dysphagia (predominantly to solids; frequent choking)
 - Speech difficulties / dysarthria
 - Dropped head posture & severe cervical muscle weakness (requiring cervical orthosis)
 - Shortness of breath at rest and minimal exertion
 - Involuntary weight loss
 - Tongue and extremity fasciculations
 - Postural instability and dorsolumbar pain
- **Recent Complications:**
 - Dependence on PEG tube for nutrition (limited soft oral intake)
 - Need for assisted cough machine and napkin use due to drooling/hypersalivation
 - Impaired ambulation requiring a cane and bilateral ankle orthoses

Pre-treatment Clinical Status

Neurological and functional examination demonstrated:

- Impaired ambulation requiring cane and bilateral ankle orthoses
- Dropped head posture secondary to cervical motor weakness

- Dysphagia, speech articulation impairment, and tongue fasciculations
- Shortness of breath at rest and during light evaluation tasks
- Impaired balance and postural control

Intervention

Sessions of Brain Thermodynamics-based Advanced Hyperthermia (BgAH) targeting HSP70 induction, neuroinflammation reduction, and mitochondrial modulation. Post-treatment functional and laboratory evaluations performed 48 hours post-session.

Objective Clinical Improvements

1. Speech, Orofacial, and Swallowing Function

- **Right Suprahyoid Muscle Contraction Load:** 66% improvement
- **Left Suprahyoid Muscle Contraction Load:** 24% improvement
- **Anterior Tongue Endurance (IOPI):** 0:12 sec → 0:14 sec
- **Posterior Tongue Endurance (IOPI):** -0:07 sec → 0:10 sec
- **Lip Strength Pmax (Right):** 12 kPa → 15 kPa
- **Lip Strength Pmax (Left):** 17 kPa → 18 kPa
- **Clinical Significance:** Enhanced orofacial muscle control, improved swallowing safety, reduced aspiration risk, and potential improvement in speech articulation clarity.

2. Upper Limb Strength and Endurance

- **Arm Curl with 10 lb Weight (Right):** 15 → 18 repetitions
- **Arm Curl with 10 lb Weight (Left):** 16 → 20 repetitions
- **Palmar Pinch (Right):** 2.40 → 2.90
- **Fatigue Grip Score (Right):** 8.40 → 9.90
- **Fatigue Grip Score (Left):** 7.40 → 7.60
- **Clinical Significance:** Increased upper extremity muscular endurance facilitating activities of daily living (dressing, grasping objects, self-feeding).

3. Lower Limb Endurance and Postural Transfers

- **Leg Raise with 10 lb Weight Hold (Right):** 3:22 min → 5:00 min
- **Leg Raise with 10 lb Weight Hold (Left):** 3:24 min → 5:00 min
- **ForceDecks Dynamic Analysis:** Objective improvements in Sit-to-Stand/Stand-to-Sit transfers, Time to Peak Sitting Force, Time to Stand, and Time to Peak Standing Force.

- **Clinical Significance:** Enhanced lower extremity force production, improved transfer efficiency, better postural control, and fall risk mitigation.

Subjective Improvements

At 48 hours post-treatment, the patient reported:

- Increased physical energy
- Noticeable improvement in breathing effort

Laboratory Findings & Safety Profile

- **Neurodegenerative Biomarkers:**
 - Plasma p-Tau217: 0.75 pg/mL (Pre) → 0.72 pg/mL (Post)
 - Neurofilament Light Chain (NfL): 8.08 pg/mL (Pre) → 9.16 pg/mL (Post)
 - Plasma Beta-Amyloid 42/40 Ratio: 0.147 (remained stable in higher-risk range)
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- **Inflammatory / Cytokine Profile:**
 - TNF-alpha (<1.7 to 1.9 pg/mL), IL-6 (<2.0 to 2.7 pg/mL), CRP (4.5 to 6.9 mg/L), and Sed Rate (19 mm/h) confirmed absence of acute systemic hyperinflammatory reaction or cytokine storm post-treatment.
- **Metabolic Panel:** Stable renal, hepatic, and electrolyte parameters (e.g., eGFR 115 mL/min/1.73m², Sodium 142 mmol/L, Potassium 4.1 mmol/L).

Discussion

In this case of advanced ALS, single-cycle Brain Thermodynamics-based Hyperthermia resulted in rapid, quantifiable functional gains in motor strength, orofacial endurance, swallowing mechanics, and lower extremity power. The objective improvements documented by ForceDecks, IOPI, and resistance testing coincided with patient-reported increases in daily energy and respiratory comfort. Laboratory analyses over 48 hours post-treatment demonstrated a safe biochemical profile without evidence of systemic inflammation or rapid biomarker degradation. These early findings suggest that thermodynamic brain modulation may transiently restore neuromuscular efficiency and physiological capacity in motor neuron disease.

Conclusion

Brain-Guided Hyperthermia was associated with rapid, objective improvements in orofacial endurance, swallowing strength, upper/lower limb muscular capacity, and dynamic postural transfers in a patient with Amyotrophic Lateral Sclerosis. Combined with a stable post-treatment safety and biomarker profile, these results warrant further clinical investigation into BgAH as a supportive neuroprotective therapy for ALS.

Key Evidence Summary

Domain	Objective Evidence
Swallowing / Orofacial	Suprahyoid muscle contraction load: +66% (Right), +24% (Left); Lip Pmax: 12→15 kPa (Right)
Tongue Endurance	Posterior tongue endurance improved from -0:07 s to 0:10 s (IOPI)
Upper Limb Strength	Arm curl (10 lb): R 15→18 reps, L 16→20 reps; Palmar pinch: 2.40→2.90
Lower Limb Endurance	Leg raise hold (10 lb): Right 3:22→5:00 min, Left 3:24→5:00 min
Postural Dynamics	ForceDecks showed improved Sit-to-Stand and Peak Standing Force times
Subjective Response	Patient reported increased energy and improved breathing at 48h
Laboratory Safety	No acute inflammatory activation (TNF- α < 1.9 pg/mL, CRP < 7.0 mg/L); stable NfL and p-Tau217