

## Neuroaid in Stroke Recovery

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Stroke is a leading cause of death and disability worldwide [1]. Many patients only make a partial or poor recovery after stroke, and the major burden of stroke is chronic disability [2]. To date, no effective treatment has been found for reducing stroke-induced disabilities.

Neuroaid originates from Traditional Chinese Medicine. It has been developed to aid post-stroke recovery, and has recently been approved in 7 countries, including Singapore.

Early trials of Neuroaid, performed in China on 605 patients in 2000, established its safety and demonstrated a positive effect on the recovery of independence and motor functions. Patients receiving Neuroaid were found to be 2.4 times more likely to achieve independence at 1 month after stroke than the control group [3, 4]. More recently, safety trials showed that Neuroaid, taken either alone or in combination with aspirin, does not modify hemostasis, hematology and biochemistry in normal subjects and stroke patients [6]. Additional double-blind randomized placebo-controlled trials are ongoing in Asia [5].

This is a case description of 10 patients who took Neuroaid after ischemic stroke onset. All patients were seen in a private clinic at Mount Alvernia Hospital in Singapore and in the Neurology Outpatient Clinic for subsequent follow-up.

Neuroaid was given as an add-on to other medications, including antiplatelet, anticoagulant (warfarin), lipid-lowering, antihypertensive, diabetic and antidepressant medications, which were used as the patient's

condition dictated (table 2). The Neuroaid dose received was 4 tablets, 3 times per day. Treatment was initiated between 1 week and 6 months after stroke, and given to each patient for 2–3 months.

Cases presented with neurological impairments affecting motor, balance, speech and visual functions. These were assessed during initial examination and confirmed with imagery (table 1).

The patients showed a good tolerability to the treatment. Only 1 mild adverse event was reported, with patient No. 4 reporting diarrhea after starting Neuroaid. Treatment was reduced, and then progressively increased to full dosage within a week.

On follow-up, all cases reported improvements over the period in which they received Neuroaid. There were 6 cases of patients showing full recovery, 3 cases of good or moderate recovery and 1 case of poor recovery. Significant improvements were recorded in motor, visual, speech and cognitive functions (table 1). **Motor skills:** the 8 patients with motor deficits improved in the strength of their upper and lower extremities, and their ability to walk; motor disabilities fully resolved in 6 patients. **Balance:** the 3 patients showing difficulties in their balance recovered. **Vision:** the diplopia and hemianopia in 5 patients resolved. **Speech:** 4 patients reported improvements in speech disabilities, including expressive aphasia and anomia; after 3 months, 2 had fully recovered from their speech impairments.

The impact of Neuroaid treatment cannot be differentiated from the contribution of natural recovery, med-

**Table 1.** Patient recovery

Case No.	Presentation at treatment initiation			Follow-up				
	time since stroke	symptoms and assessment at examination	MRI	assessment	areas of improvement			
					motor	balance	vision	speech
1	1 week	acute right-sided weakness, strength 4/5 RUE, 4+/5 RLE; dysarthria	acute left internal capsule infarct	full recovery (2 months)	√			√
2	1 week	dizziness	hyperintensity in the pons	full recovery (7 months)		√		
3	2 weeks	strength 4/5 RLE-LLE; blurred vision, right hemianopia; right-sided headache	acute left PCA infarct	full recovery (3 months)	√			√
4	1 week	left facial droop, strength 4+/5 RUE-RLE, left dysmetria; vertigo, difficulty with tandem gait; left hemianopia; short-term memory loss, mild headache	acute left cerebellar corona radiate and basal ganglia infarcts	full recovery (3 months)	√	√		√
5	1 week	left arm/leg numbness, left leg weakness, strength 4+/5 LLE, left dysmetria; acute vertigo; diplopia	acute right pontine infarct	full recovery (2 weeks)	√	√		√
6	1 month	transient diplopia, left hemianopia	right occipital infarct	full recovery (3 months)				√
7	1 month	Strength 4+/5 RUE; right hemianopia; expressive and mild receptive aphasia, anomia; acalculia	left parietal-temporal cerebral infarct	only residual acalculia (1 month)	√			√
8	6 months	right hand weakness, strength 4/5 RUE-RLE; speech difficulties: mild anomia, expressive aphasia	left parietal-temporal cerebral infarct	only residual mild aphasia (3 months)	√			√
9	1 week	walking difficulties, right-sided weakness, strength 3/5 RUE-RLE	acute left internal capsule infarct	residual motor deficit: strength 4/5 RUE, 4-/5 RLE (2 months)	√			
10	1 week	severe motor difficulties, strength 0/5 RUE, 1/5 RLE, 4/5 LUE, 2/5 LLE; severe speech difficulties: aphasia	acute left middle cerebral artery infarct	strength 1/5 RUE, 2/5 RLE, 5/5 LUE-LLE, can turn over and make noises (3 months)	√			√

RUE = Right upper extremities; RLE = right lower extremities; LLE = left lower extremities; LUE = left upper extremities.

ication and physiotherapy effects. However, all cases reported improvements.

Interestingly, 3 patients started Neuroaid treatment at a later stage of stroke recovery. In particular, patient No. 8 started Neuroaid 6 months after reaching a plateau in his recovery, and after this continued to experience improvements in his speech and cognitive abilities. Another 2 patients (No. 6 and 7) started Neuroaid 1 month after their strokes, and both recovered significantly.

These findings support the safety of Neuroaid and its positive effect on the recovery of the post-stroke patient.

It is consistent with late-stage recovery data shown in early clinical trials. Although the exact mechanism is not well understood, initial laboratory studies suggest improvements in brain neuroplasticity and neuroprotection. Larger double-blind placebo-controlled studies will provide more comprehensive data on Neuroaid in the future.

**Table 2.** Concomitant medications

Pa-tient No.	Gender	Age	Antiplatelet/Anticoagulant				Antihypertensive			Cholesterol lowering		Antidiabetic			Antidepressant			Others					
			Clopidogrel 75 mg M	Aspirin 100 mg M	Dipyridamole 75 mg T	Warfarin 4 mg M	Nifedipine 30 mg M	Perindopril 4 mg M	Candesartan 16 mg M	Rosuvastatin 20 mg N	Lovastatin 20 mg N	Metformin 500 mg T	Sitagliptin 100 mg M	Gliclazide 30 mg B	Escitalopram 10 mg N	Fluoxetine 20 mg N	Amitriptyline 10 mg N	Tebonin Rote 120 mg M	Sodium valproate 500 mg N	Etoricoxib 120 mg D	Omeprazole 20 mg D	Senna 7.5 mg B	Melatonin 3 mg N
1	F	50	√					√		√													
2	M	51	√							√													
3	F	67		√	√												√		√				
4	M	68		√	√																		√
5	M	60	√					√		√			√	√	√								√
6	M	69	√										√	√	√								
7	F	70			√			√															
8	M	68				√		√										√	√				
9	F	89	√	√	√			√									√						√
10	F	76				√		√ <sup>b</sup>	√				√				√						√

M = Morning; N = night; D = once a day; B = twice a day; T = thrice a day.

<sup>a</sup> Intake for patient No. 2 was D.

<sup>b</sup> Intake for patient No. 10 was B.

**References**

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