



## Prescribing Information

### Abbreviated Prescribing Information

#### NeuroAid™ Capsules 400mg

##### INDICATION

Post stroke recovery to improve motor and neurological functions.

##### DOSAGE AND METHOD OF ADMINISTRATION

Dosage: Take 4 capsules 3 times a day for 3 months.

##### Method and route of administration

Oral administration. The capsules must be taken as a whole. Content can also be diluted in water, to be drunk or administered via gastric tube.

##### CONTRAINDICATION

The use of NeuroAid™ in children, in pregnancy and lactating women is not well-established. No contraindication known to date.

##### SIDE EFFECTS AND SPECIAL PRECAUTIONS

Rare cases of dry throat and diarrhea have been reported.

##### MONITORING

To date, no harmful interactions between NeuroAid™ and other medicinal compound, or between NeuroAid™ and prescription / OTC drugs have been observed.

As a routine precaution, patients on oral anticoagulant are advised to have their INR monitored initially in a similar way as for any changes in their prescription.

##### STORAGE CONDITIONS

To be kept sealed and stored in a cool and dry place. Keep away from children.

##### PRESENTATION

The capsules are packed using aluminum blister sheet with 4 capsules per sheet. The available pack contains 9 blister sheets of 4 capsules.



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## NeuroAid: Expanding the frontiers of neurological rehabilitation

### Beyond stroke: NeuroAid in neurosurgery

#### Professor Yeo Tseng Tsai

Senior Consultant Neurosurgeon  
National University Hospital  
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### Preclinical support: Promoting neurogenesis and neuroprotection

#### Professor Michel Lazdunski

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# NeuroAid: Expanding the frontiers of neurological rehabilitation

Despite advances in modern medicine, stroke and neurological damage remain leading causes of death and disability worldwide and a huge area of unmet medical need. Recent disappointments in major clinical trials have led to pessimism in the field, but where Western medicine has failed, it may be Eastern medicine that provides the answer.

Momentum is already gathering behind NeuroAid™ (MLC601; Moleac Pte Ltd) – a combination of 14 components from traditional Chinese medicine (TCM) which has been used extensively in post-stroke patients in China. Early reports and case studies suggest that the compound is safe and well tolerated, and offers beneficial effects in improving long-term functional recovery after stroke. [*Stroke* 2009;40:859-63; *Eur Neurol* 2008;60:264-6]

Several other studies are underway on NeuroAid and important new data are beginning to accumulate. Moreover, as a natural product, NeuroAid does not require a prescription, and clinicians and academics have already begun using the compound in a widening range of indications and situations. Many have reported positive experiences so far, and anticipation is growing for the results of large-scale clinical trials which will shed new light on the role of this novel approach to neurological rehabilitation

## Beyond stroke: NeuroAid in neurosurgery



**Professor Yeo Tseng Tsai**  
Senior Consultant Neurosurgeon  
National University Hospital  
Singapore

As an independent, university-based neurosurgeon, Professor Yeo Tseng Tsai was initially skeptical about using a concoction of TCMS to aid brain recovery. But local and regional patients of Chinese ethnicity often asked to use TCM or TCM-like drugs, and he reluctantly agreed to try NeuroAid in a few initial cases. There were no attributable complications or side effects, and the neurological outcomes were surprisingly good. He did not undergo a true apostasy, but slowly became less skeptical, he says.

Two cases in particular stand out for Yeo. The first is that of a 55-year-old Singaporean Chinese male, who was admitted to hospital with a severe head injury and rapid deterioration of consciousness. CT scans showed bifrontal cerebral contusions with mass effect (Figure 1). He underwent a large decompressive craniectomy, evacuation of the contusions, and insertion of an intracranial pressure monitor. The postoperative course was complicated: he had a long stay in the ICU, developed multiple infections and required several further operations.

The patient was started on NeuroAid 1 month after admission, and received 3 months of therapy in total. After 4 weeks, his physical functioning was still poor but he had improved from a vegetative state to being able to converse in English, Chinese and Japanese. His improvement made him eligible for an intensive rehabilitation program, and within 6 weeks of starting NeuroAid therapy he was able to walk with help.

The second memorable case cited by Yeo is that of a 43-year-old Indonesian man

who presented with sudden-onset left-sided weakness and numbness. CT and MRI scans revealed a 5.5 cm diameter hemorrhage in the right fronto-parietal cortex, and angiography showed a small parafalcine arteriovenous malformation (AVM) bleed (Figure 2). The patient underwent gamma knife radiosurgery to treat the AVM, and began usual rehabilitation therapy.

Three weeks after the brain hemorrhage, the patient began taking NeuroAid. Within 1 week of treatment there was a very noticeable improvement in his functional status. After a further 3 weeks taking NeuroAid, he had regained full power in his upper and lower limbs. Only his ankle dorsiflexion remained mildly impaired after completing a full month of therapy.

These cases are promising, says Yeo, but he acknowledges that further study is still required before routine adoption of NeuroAid. Phase III randomized controlled trials (RCTs) are already being planned at National University Hospital to test whether NeuroAid can assist recovery after hypertensive thalamic hemorrhages, hypertensive basal ganglia hemorrhages, and moderate to severe head injuries with brain contusions.

Yeo's hunch is that NeuroAid may prove to be clinically beneficial when these RCTs are analyzed. In the meantime, he says that he is not a full-blown enthusiast but does recommend it to patients who can afford it and to those who ask to use a TCM, after talking them through the scientific literature on the product. Besides gathering more clinical data, the basic mechanisms of action also need to be elucidated more thoroughly, Yeo says. But even evidence-based medicine has its limitations. "Sometimes we have to do what's best for our patients even in the lack of a very strong evidence base," he says.

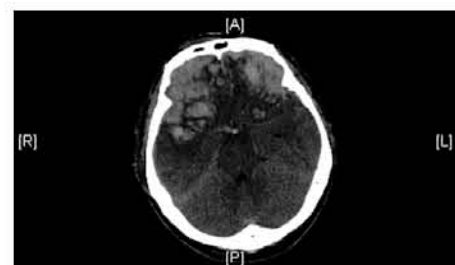
## Preclinical support: Promoting neurogenesis and neuroprotection



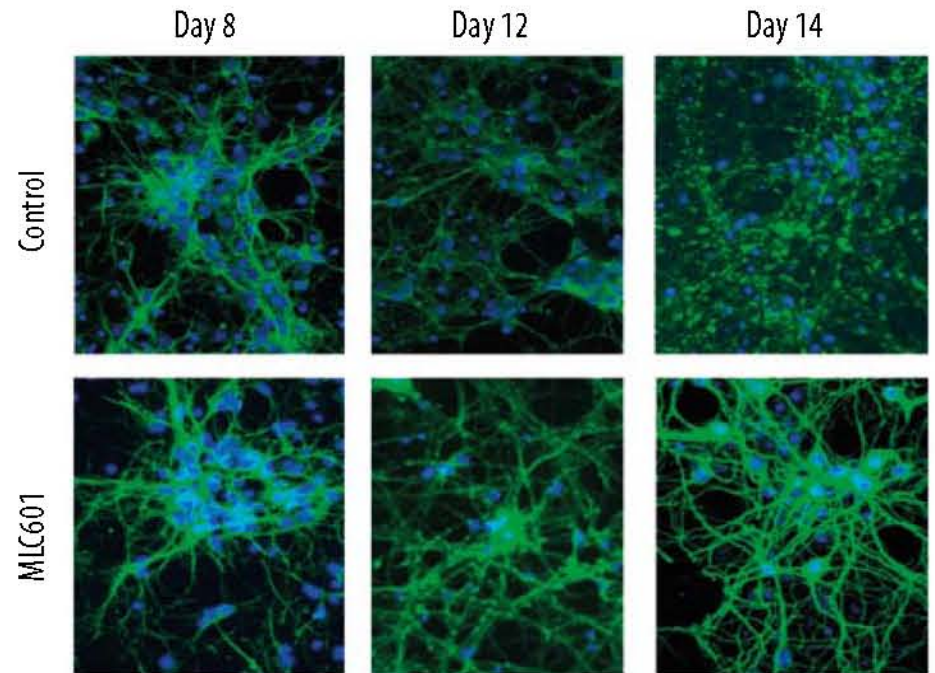
**Professor Michel Lazdunski**  
Founder and former director  
CNRS (French National Scientific  
Research Institute) Institute of  
Molecular Neuromedicine  
France

Having devoted his career to studying ion channels, Professor Michel Lazdunski has a strong interest in the neurological effects of naturally occurring compounds. Many biological poisons – tetrodotoxin, for example – work by blocking nerve transmission, so when he first heard about a natural TCM product which could improve neurological recovery, his reaction was one of interest rather than skepticism. Lazdunski began

**Figure 1:** CT scan showing severe bifrontal contusions in a head injury patient. He underwent a wide decompressive craniectomy before receiving 3 months of NeuroAid therapy.



**Figure 3:** Epifluorescence microscopy images showing the expression of doublecortin (a marker of neurogenesis) in cell cultures exposed to NeuroAid (MLC601) and a control solution.



laboratory studies on NeuroAid at CNRS in 2008, and has made several interesting observations so far, which he reported at a recent symposium in Singapore.

Lazdunski's data suggest that NeuroAid can stimulate the growth of new neurons *in vitro*: cells treated with a NeuroAid-based preparation showed greater expression of doublecortin (a marker of neurogenesis) af-

ter 3 days after ischemia compared to those who had received only water – spending more time climbing and moving, and performing better on the rotarod task.

There is also some evidence from mouse models that NeuroAid could be a vasodilator – increasing blood flow through the area of occlusion in the middle cerebral artery, Lazdunski says. He concludes that more re-

## Clinical and laboratory data are continuing to accumulate on the role of NeuroAid in promoting neurological regeneration after stroke and other pathologies

ter 14 days, compared to cells treated with a control solution (Figure 3). NeuroAid also appears to be neuroprotective: a significantly higher proportion of cortical neurons survived for 14 days in culture when treated with NeuroAid compared to controls. The compound may also protect specifically against glutamate-induced excitotoxicity: NeuroAid-treated neurons were significantly less sensitive to the damaging effects of exposure to the neurotransmitter.

These beneficial effects have also been borne out *in vivo*, according to Lazdunski. NeuroAid significantly reduced infarct volume in mice which were given the compound 3 hours after the onset of ischemia, compared to those given a control substance. Moreover, there appear to be protective benefits to giving NeuroAid even before brain damage occurs: mice which were pretreated with NeuroAid for 6 weeks before induction of focal ischemia had significantly lower infarct volume at 30 hours after ischemia, compared to controls. These pretreated mice also displayed considerable functional improve-

ment 3 days after ischemia compared to those who had received only water – spending more time climbing and moving, and performing better on the rotarod task.

## Conclusions

Clinical and laboratory data are continuing to accumulate on the role of NeuroAid in promoting neurological regeneration after stroke and other pathologies. In the meantime, clinicians are already beginning to report encouraging anecdotal results, even in some cases of very severe brain damage. Large-scale RCTs are underway, and it is hoped that the results will further our understanding of NeuroAid and its potential to improve the lives of those left disabled by brain injuries. **MI**

Professors Yeo and Lazdunski were speaking at a recent symposium in Singapore, sponsored by Moleac Pte Ltd.

**Figure 2:** (A) Axial MRI scan showing a 5.5 cm diameter hemorrhage in the right fronto-parietal cortex of a second patient seen by Yeo and (B) angiogram showing a small parafalcine arteriovenous malformation (AVM) in the patient's right internal carotid artery. The patient underwent gamma knife radiosurgery to treat the AVM, before receiving 1 month of NeuroAid therapy.

