

# Anti-Nogo treatment enhanced behavioral recovery after unilateral lesion of the primary motor cortex (M1) in macaque monkeys



A. Wyss<sup>1</sup>, A. Belhaj-Saif<sup>1</sup>, T. Wannier<sup>1,2</sup>, J. Bloch<sup>3</sup>, A. Mir<sup>4</sup>, M.E. Schwab<sup>2</sup> and E.M. Rouiller<sup>1</sup>

1. Dept. Med., Univ. Fribourg, 1700 Fribourg, Switzerland 2. Dept. Neuromorphol., Univ. Zurich, 8057 Zurich, Switzerland  
3. Dept. Neurosurg., Univ. Lausanne, 1011 Lausanne, Switzerland 4. Inst. Biomed. Res., Novartis, 4002 Basel, Switzerland

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## INTRODUCTION

An increased behavioral recovery was observed in rats subjected to motor cortex lesion and treated with anti-NOGO (Emerick et al., 2004; Papadopoulos et al., 2002; Wenk et al., 1999). Our goal is to transpose this procedure to subhuman primates (monkeys), on which more sophisticated behavioral assessment can be performed in order to create a model closer to the clinic patients subjected to cortical lesion. The distribution of anti-NOGO-A in the CNS, resulting from the infusion technique used to treat spinal cord lesions in our laboratory, leads to an anti-NOGO distribution which is detectable in the spinal cord as well as in the brain.

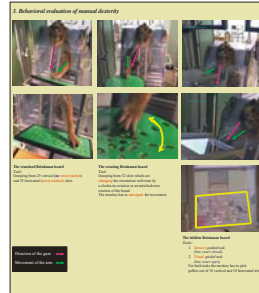
## METHODS

### Experimental Protocol

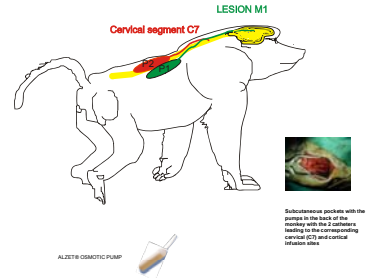
Experiments were conducted on two adult monkeys (*macaca fascicularis*)

1. Behavioral training for various manual dexterity tasks
2. Mapping of M1 in both hemispheres using ICMS (intracortical microstimulation)
3. Lesion of hand representation (fingers) in one hemisphere by infusion of ibotenic acid (13.5µl [10µg ibotenic acid / 1µl saline])
4. 2 weeks of anti-NOGO-A treatment (11C7 [3.7mg/ml]) in 1 of the 2 monkeys
5. Behavioral assessment during several months post-lesion
6. Remapping of both hemispheres

### Behavioural evaluation of manual dexterity

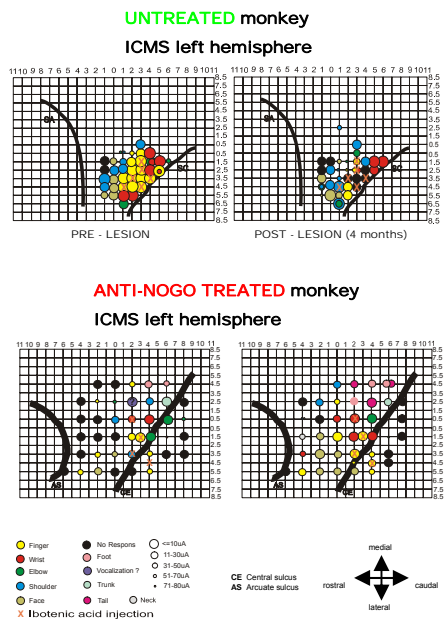


### Placement of the Anti - Nogo - A infusing pumps



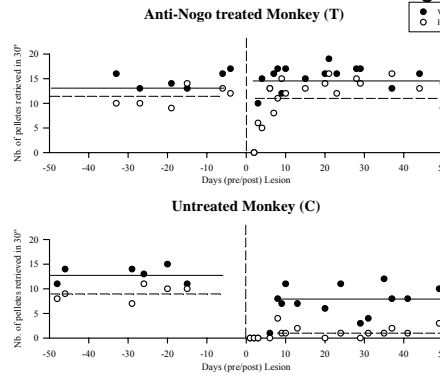
## RESULTS

### MAPPING DATA (ICMS)

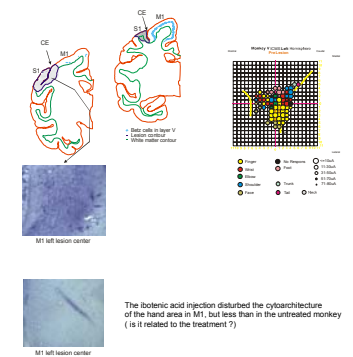


### BEHAVIOURAL AND HISTOLOGICAL DATA

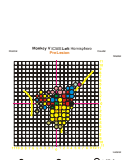
#### Modified Brinkman board scores of the right hand



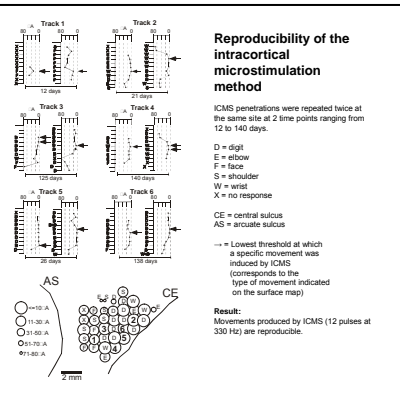
#### Lesion reconstruction on two representative sections for the UNTREATED monkey



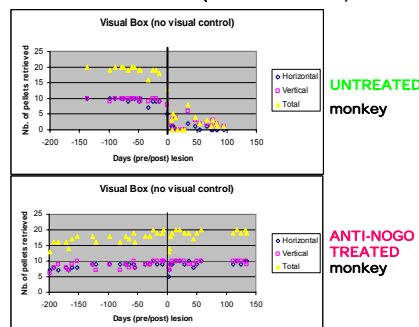
#### FUTURE DIRECTIONS, PRELIMINARY DATA



#### Handshape sequence during pellet picking



#### Manual dexterity assessed with the 'Hidden Brinkman board' (no visual feedback)



## CONCLUSIONS

These preliminary data using anti-nogo A treatment after cortical lesion of the hand representation in M1 show that:

1. Behavioral recovery in the treated monkey was fast and reached almost 100% of the pre-lesion score versus 30 % for the untreated monkey.
2. ICMS effects were persistent in lesion sites in the treated monkey and were absent in the untreated monkey.

In conclusion it is important to emphasize that the observations in the present study were based on comparing data from one treated monkey with that from one untreated monkey. Nevertheless, we believe that these data are important in revealing a remarkable degree of recovery in the treated monkey, an observation which needs to be confirmed on a larger number of monkeys.

#### ACKNOWLEDGMENT

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