

# The use of rat EMG to quantify injection pain



OHironobu Ikeda, Akihito Ito, Naoko Katsu, Tomoko Nagao, Takeshi Iidaka  
Shiga Laboratory, NISSEI BILIS Co., Ltd

## Introduction

Various vaccines and protein drugs including antibody drugs are mainly used as injections such as subcutaneous and intramuscular administration. Pain caused by administration of these injections can be said to be a broad side effect. For this reason, it is necessary to select "less painful" in consideration of QOL of patients from multiple drugs having equivalent efficacy, but to predict and evaluate pain at the preclinical testing stage was not easy. In this study, we tried to quantify the pain using the electromyogram generated at the injection and report it. All experimental operations followed the Laboratory Animal Ethical Code of Shiga Institute of Nissei Bilis.

## Materials and Methods

### Animals

Male Wistar rats were used at 7 to 10 weeks old (Japan SLC, Inc.). The animals were housed in a room kept at a temperature 20 to 26°C, a humidity 35 to 75%, 12-hour light/dark cycle (7:00 to 19:00).

### Experimental Groups

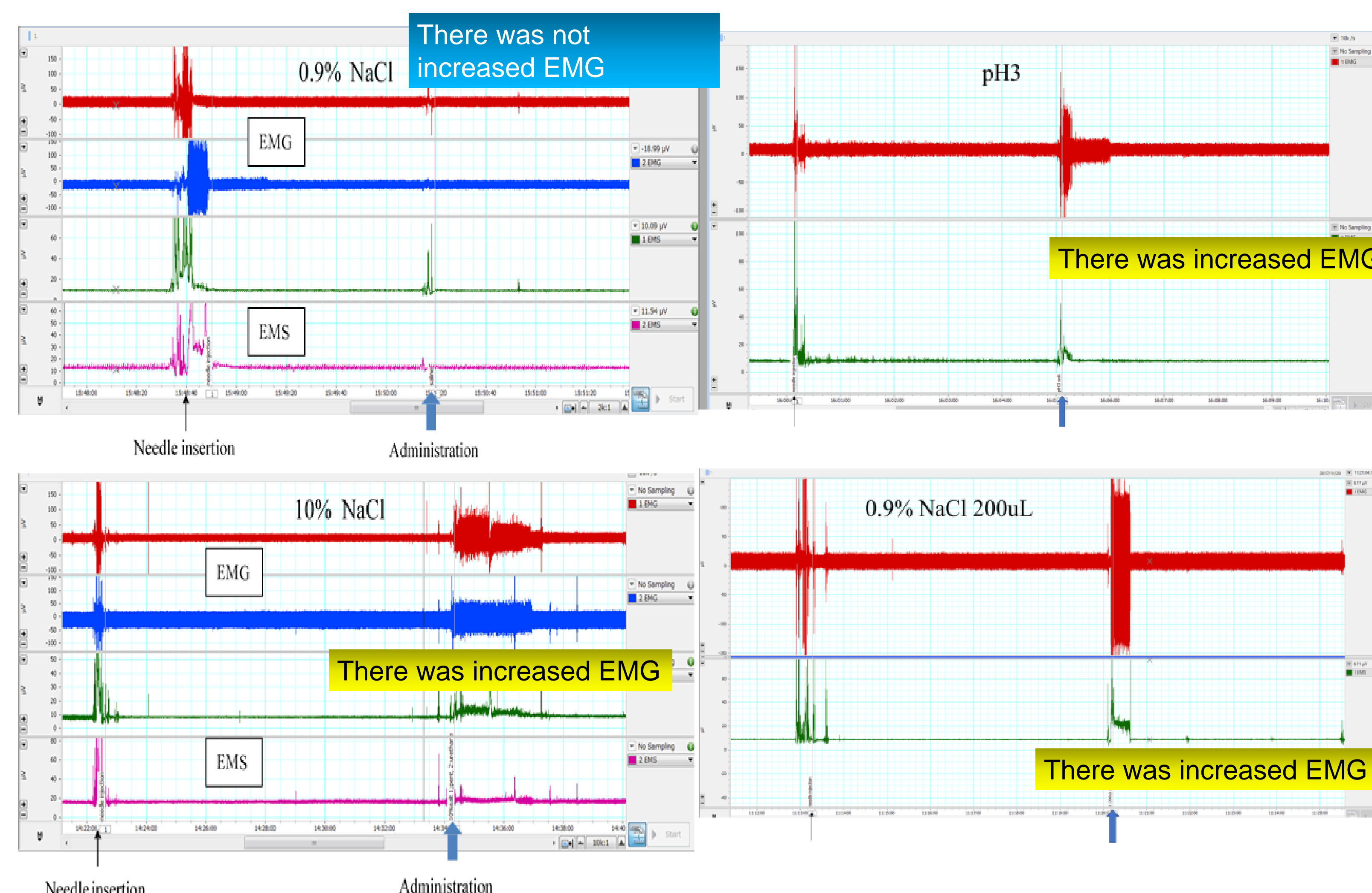
- 0.9%NaCl, 50μL (n5)
- 10%NaCl 50μL (n5)
- Dilute HCl (pH3), 50μL (n4)
- 0.9%NaCl 200μL (n2)

### Method

Rats were anesthetized with pentobarbital (50 mg / kg, ip). A bipolar stainless steel electrode was inserted into the semitendinosus muscle. And GND was placed subcutis of head region of rat. The EMG signals were recorded using Powerlab 8/35 and LabChart (AD Instruments). After bipolar electrode was inserted, we strongly pinch the fingers of the rat hind limbs, and confirmed that the EMG becomes increased. Test solutions were injected into the rat plantar aspect subcutaneously. The syringe with 27 gauge blunt needle filled with the administration solution was injected subcutaneously in to the plantar part, and administration was started after confirming that the EMG was stable.

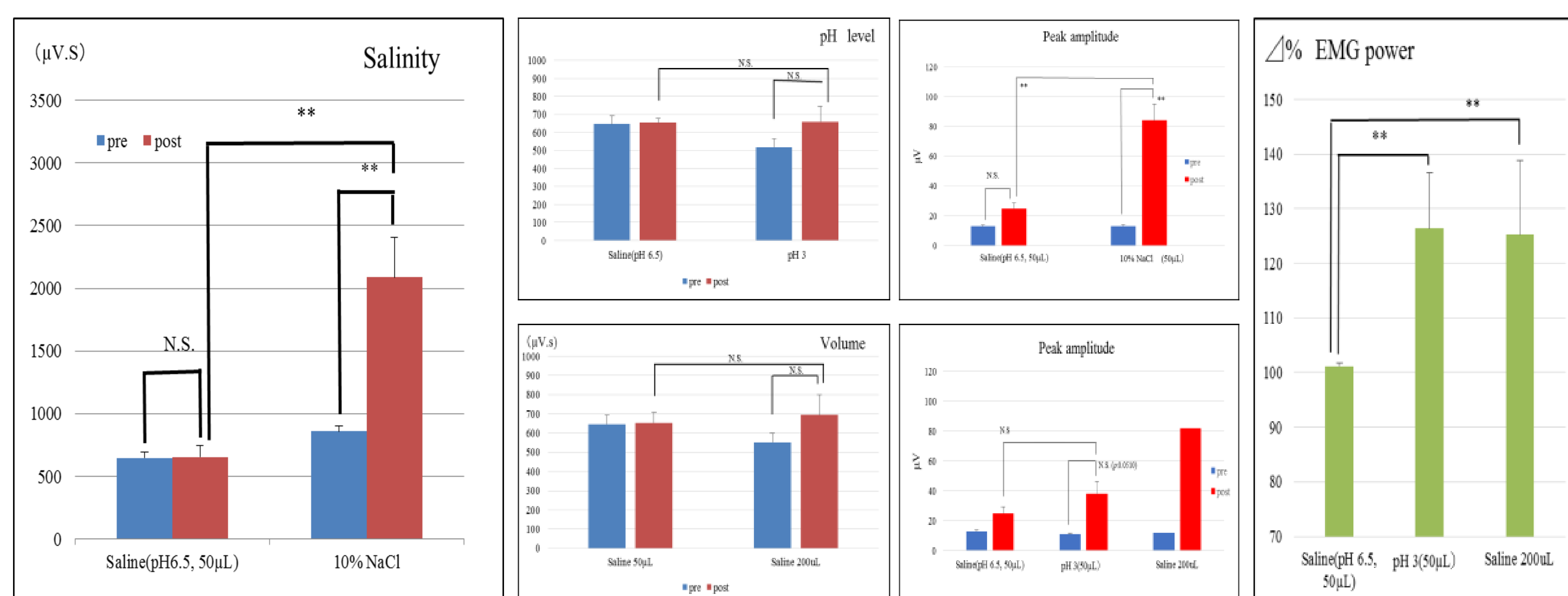
## Result

### EMG Wave



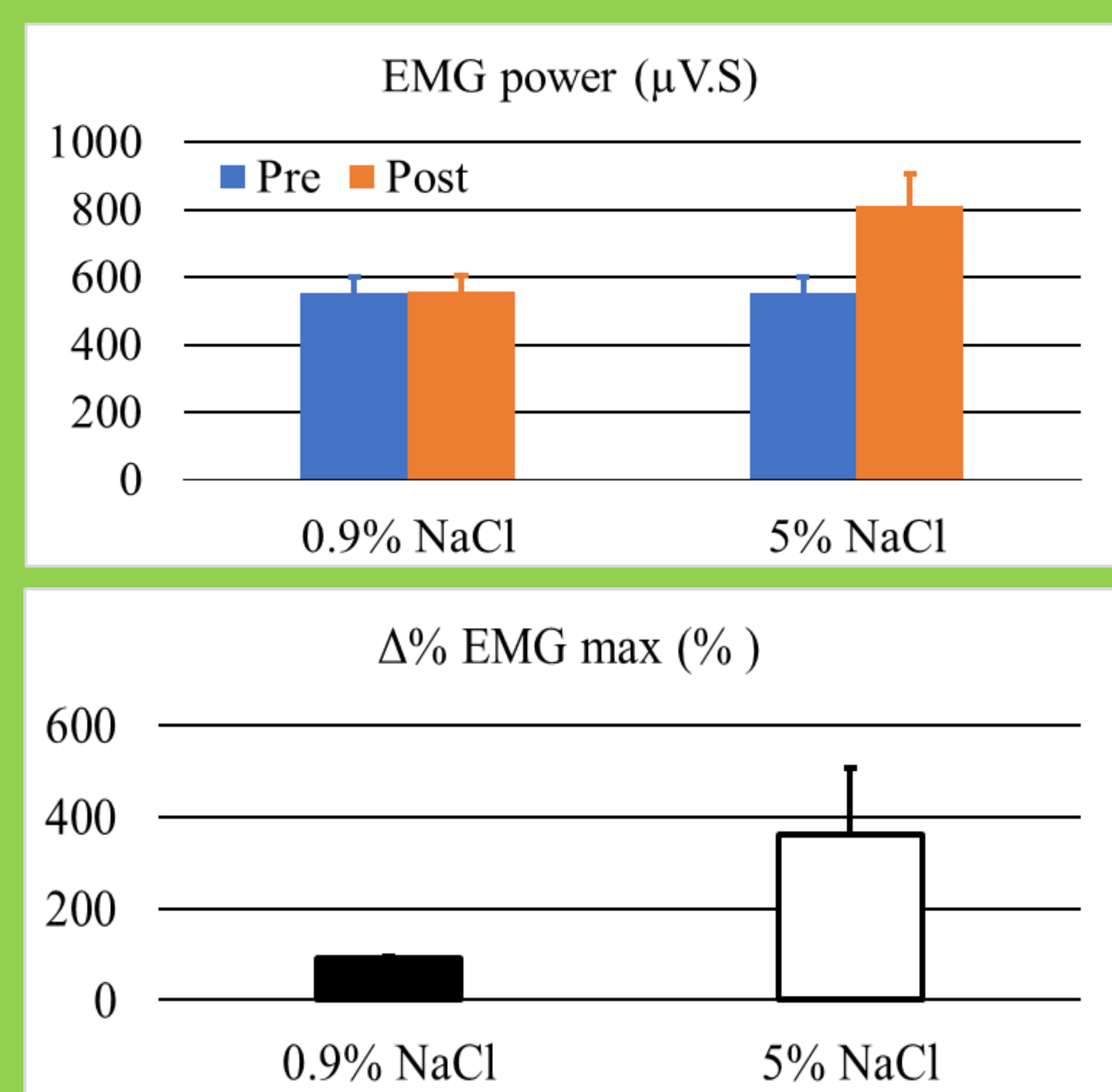
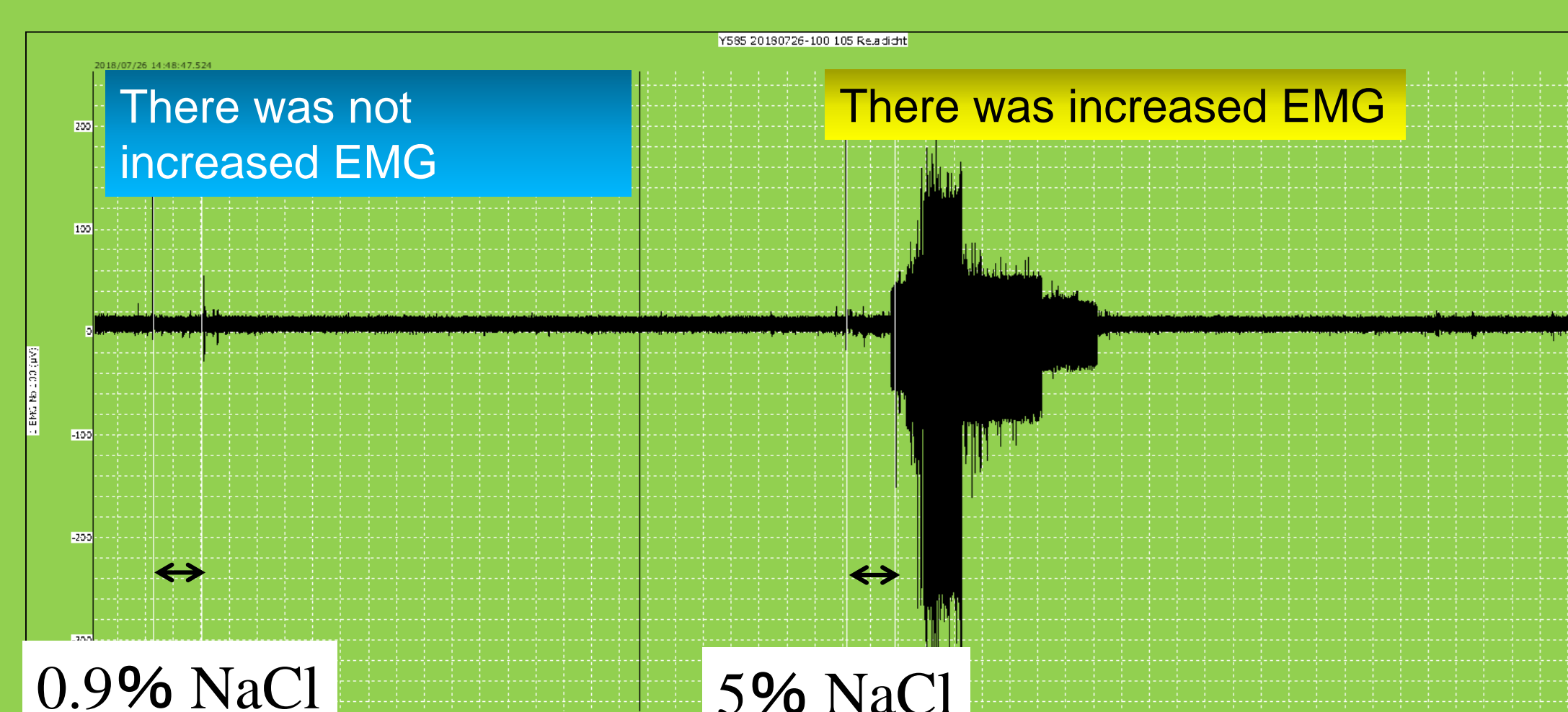
When 50 μL of 0.9% NaCl solution was administered subcutaneously to paw, there was no change in EMG derived from semitendinosus muscle.

In group of 10% NaCl solution, diluted hydrochloric acid of pH 3 and 200 μL of 0.9% NaCl solution, transient elevation of EMG potential was observed.



## 【Evaluation of Vascular pain】

Vascular pain assessment is currently being studied using rat arteries.



## Conclusion

The results of this study suggested that the pain during injections can be quantified in preclinical studies, and it was considered to be a useful evaluation system. There is a high possibility that this test method can be applied to the evaluation of vascular pain, and it is currently under investigation. In addition, the present study was some modifications with reference to the method of Ami<sup>1)</sup> *et al.*

1) :Nozomi Ami et al, The use of rat spinal reflexes to quantify injection pain, European J of Pharmaceutical Sciences, 74(2015), 36-39

