Lower-limb EMG Activity during Drum-kit Playing in A Professional Drummer with Dystonia

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Introduction

Prolonged practice of professional musicians
→ Acquisition of skilled motor control abilities[1]
Task-specific dystonia (TSD)
→ movement disorder that interfere with the skilled motor control of musicians

Related studies on TSD of musician

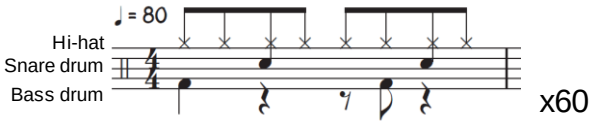
1. Investigation of dysfunction of upper-limb muscle coordination in pianists[2]
2. electromyographic (EMG) activity of a lower-limb muscle in a drummer with lower-limb TSD during the fastest foot-pedaling movements[3]

This study investigates the TSD-related EMG activities of lower-limb muscles during playing the drum-kit.

Methods

Participant：1 male professional drummer with lower-limb TSD

Task: Playing a rhythm pattern with the drum-kit (tempo: 80 bpm, 1.33 Hz)
1 set: 60 bars, 4sets



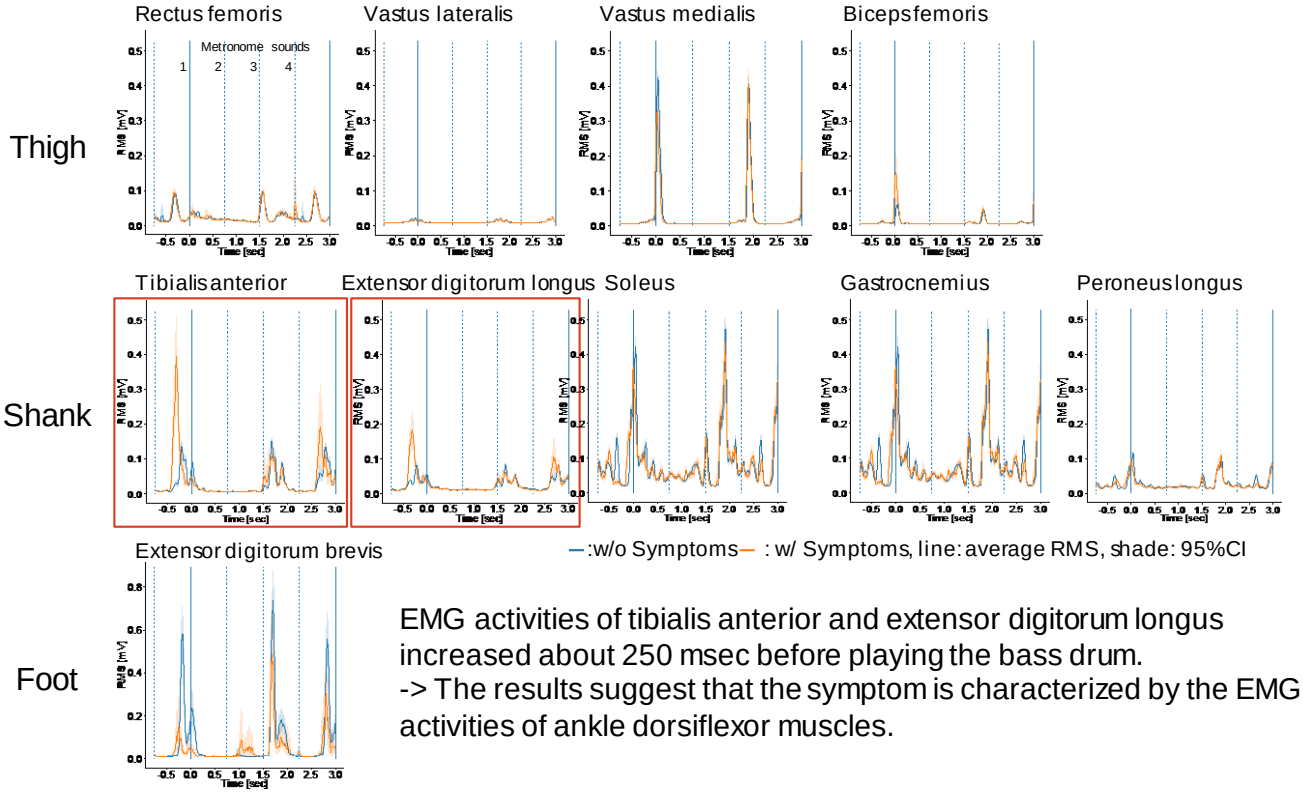
x60

Measure: Electromyography (EMG)

Thigh	Rectus femoris, Vastus lateralis, Vastus medialis, Biceps femoris
Shank	Tibialis anterior, Extensor digitorum longus, Soleus, Gastrocnemius, Peroneus longus
Foot	Extensor digitorum brevis

Sampling frequency: 1,111 Hz
Smoothing: Root mean square (window size: 30msec)

Results and Discussion



—:w/o Symptoms— : w/ Symptoms, line: average RMS, shade: 95%CI

EMG activities of tibialis anterior and extensor digitorum longus increased about 250 msec before playing the bass drum.
-> The results suggest that the symptom is characterized by the EMG activities of ankle dorsiflexor muscles.

Future:
Applying the muscle synergy analysis[2] to clarify pattern of lower-limb muscle synergy during the drum-kit playing in the drummer with TSD

References

1. Münte, et al., *Nat. Rev. Neurosci.*, 2002
2. Furuya, et al., *Ann. N. Y. Acad. Sci.*, 2015
3. Lee & Altenmüller, *Med. Probl. Perform. Art*, 2014