FOOTPRINTS CHARACTERISATION IN PATIENTS WITH DRAVET SYNDROME

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DRAVET ITALIA Onlus
Associazione Italiana Sindrome di Dravet Onlus

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INTRODUCTION

Dravet Syndrome (DS) is a rare childhood disease characterised by recurrent polymorphic seizures, intellectual disability and behavioural disturbances, ataxia, myoclonus and eventually pyramidal or extrapyramidal signs. Gait abnormalities have been described only by observational video analysis [1]. Baropodometry might be a useful tool to objectify, even on scarcely collaborative subjects, abnormalities of walking patterns [2]. This study aims at characterizing foot pressure maps of subjects with Dravet Syndrome, comparing the results with a control group.

Figure 1 – Example of flat feet in DS.

METHODS

Participants

9 patients (DS):
14.7±6.0 years-old, BMI: 19.5±3.6 kg/m^2, foot-size: 23.4±2.4 cm

7 healthy subjects (CS):
15.1±10.5 years-old, BMI: 16.9±5,6 kg/m^2, foot-size: 22.3±3.7 cm

Data collection & processing

- Participants walked self-paced
- Pressure matrix (emed-x400, 100 Hz, range 10-1270 kPa)
- Five right and five left footprints recorded
- Automatic masking to define the regions of interest in Fig. 3
- Variables:
  - Contact area (CA, cm2)
  - Averaged force (AF, %BW)
  - Contact time (CT, %stance and ms)
  - Max averaged pressure (AP, kPa)
  - Pressure peak (PP, kPa)
  - Maximum force (MF, %BW)

Figure 2 – The pressure matrix (Novel – DE).

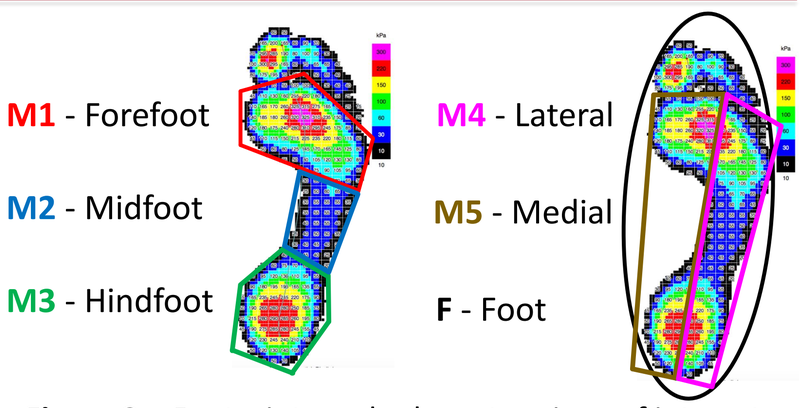
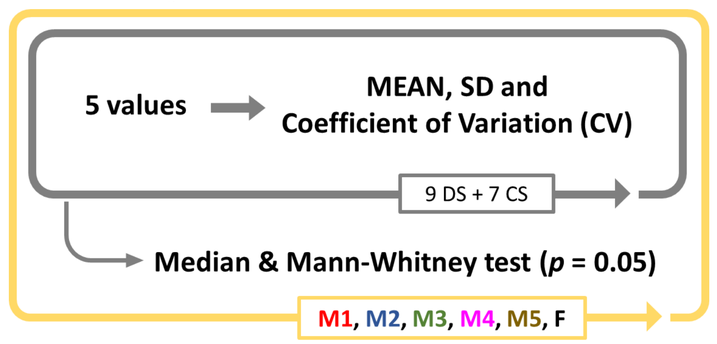


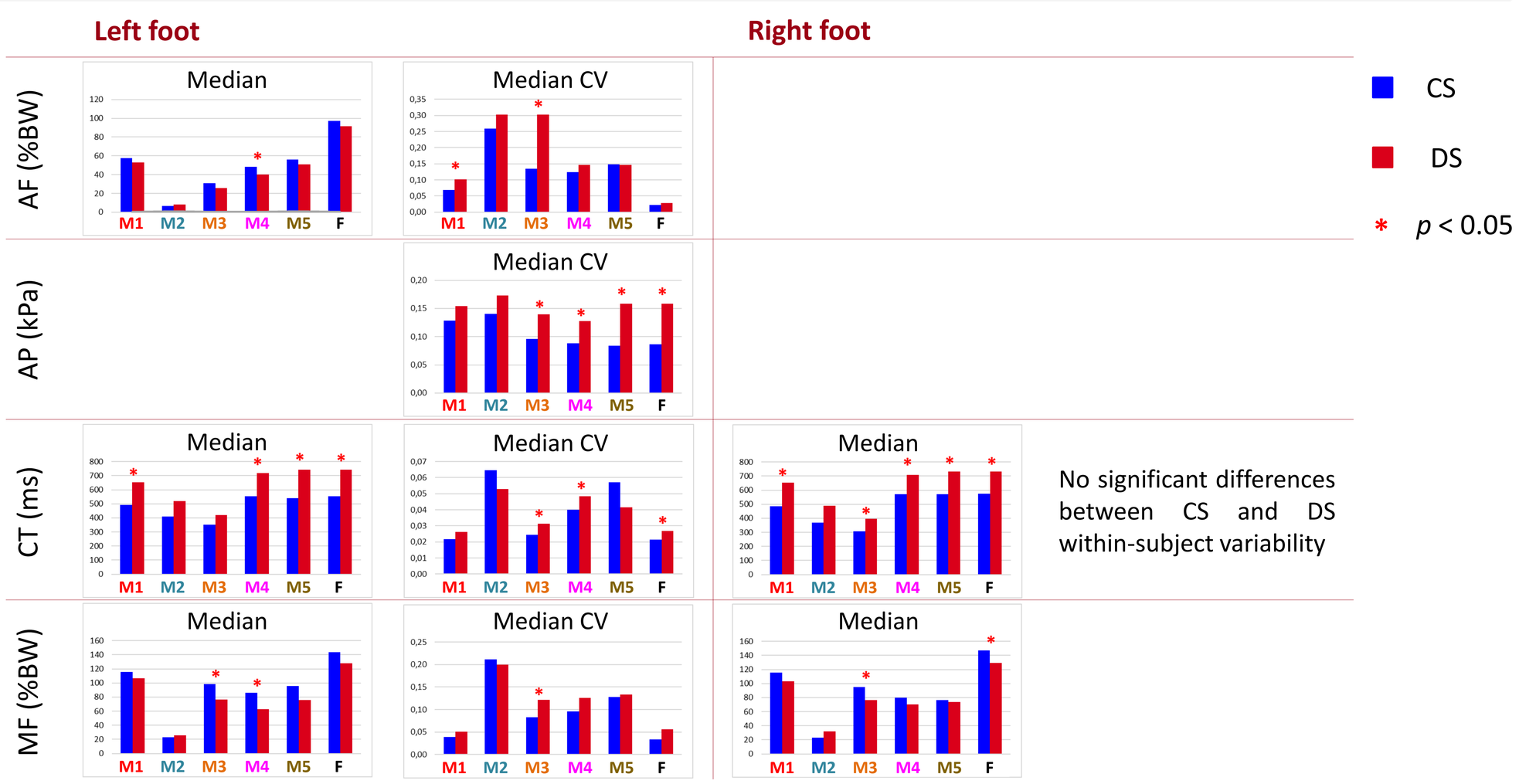
Figure 3 – Footprints and relevant regions of interest.

Data analysis



RESULTS

Only variables that reported significant differences are shown



DISCUSSION

Our data characterise foot pressure maps in subjects with Dravet syndrome, highlighting a reduced force exchanged with the ground at the rear foot. This finding is in line with results obtained with conventional gait analysis, which identifies defective power generation at the knee and the ankle (unpublished data from the University Hospital Gait Lab). Defective propulsion is compensated by trunk anteposition, which shifts forward the Centre of Pressure and increases the force applied by fore- and midfoot to the ground (also linked to the typical flat feet of DS patients). In addition, a marked lateralization of balance function emerged, with dominant right foot providing more stable support than left foot. This observation has been previously reported in healthy subjects [3,4], but a very few data exists on pathological conditions. Overall increased variability in pressure and averaged forces, more evident on the left side, confirms the clinical sign of ataxia.

CONCLUSION

Baropodometry is useful to identify major gait pattern abnormalities in hardly compliant subjects with DS (or possibly with other behavioral or cognitive disturbances), helping with the design of subject-specific rehabilitation programs.

ACKNOWLEDGEMENTS

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