Kinetic fingerprints in Duchenne muscular dystrophy

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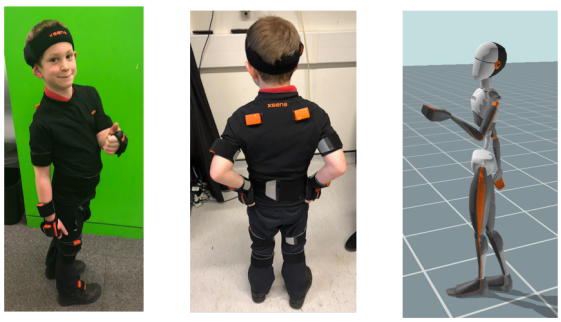
Digital behavioural biomarkers - disruptive healthcare technology supporting clinical trials

- Clinical trials for Duchenne muscular dystrophy (DMD) rely on endpoints of muscle function and strength, which are largely dependent on motivation and hospital appointments
- A compact and wireless system, attached to clothing for the recording of body motion in clinic and in a natural environment was employed, leveraging Artificial Intelligence (AI) for the readouts

Measurement of digital biomarkers- two levels of data acquisition

High-resolution "body-suit"

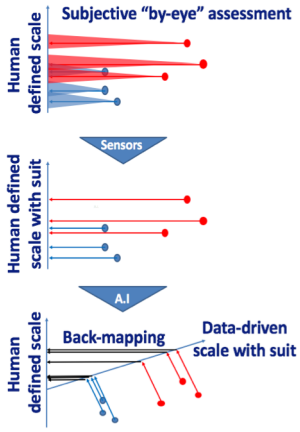


- Used in clinic during 6 monthly visits in conjunction with clinical scales and daily activities
- 17 sensors, full body kinematics

Low-resolution "bracelets"

- Used in and outside of the home 24/7, capturing daily life activities
- 4 smart-watches, arm and leg kinematics

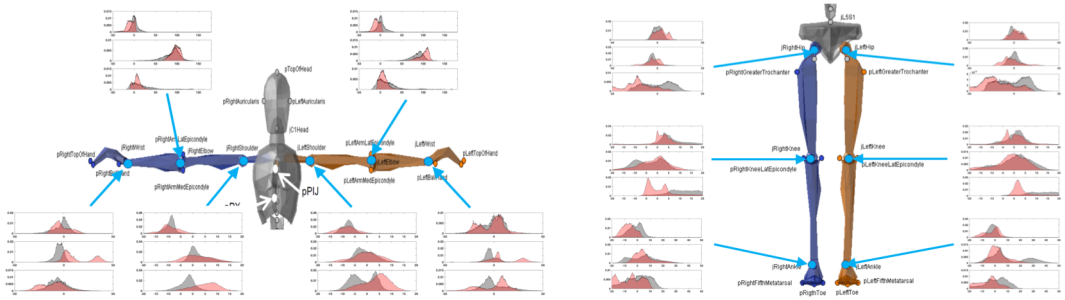
Redefining clinical scales



Interim analysis and results

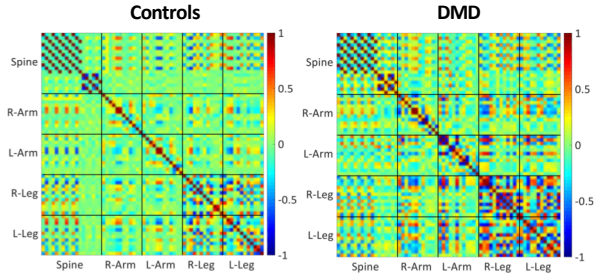
DMD: 5 age 7- 13 years
Healthy controls: 7 age-gender matched

Target recruitment ~ 20 subjects in each cohort followed over 12 months

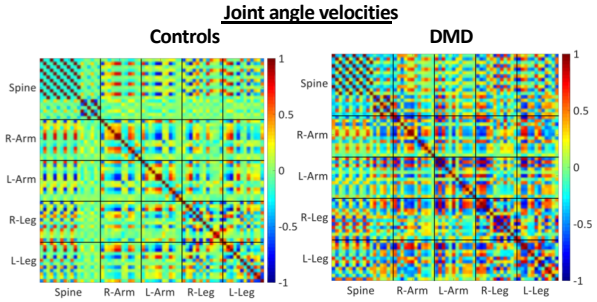


"Bodysuit" data for 6MWD test were analysed in DMD and HCs for baseline visit at GOSH. The figures above show joint angle distributions for DMD (in red) and healthy boys (in blue/gray) for the 22 joints (12 shown) captured by the bodysuit (x,y,z axis)

Joint angles



Joint angle velocities



- Correlation matrix (figures above): degree of correlation between each pair of joints for range of movement and velocity showed striking differences in walking patterns between healthy boys and DMD ($p<0.01$)
- Further analysis will be carried out on longitudinal data and data acquired from low-resolution recording of daily life activities with the goal to identify novel DMD-specific objective and quantifiable kinetic biomarkers

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