



Biomechanical analysis of gait in stroke patients according to conventional evaluation

HyeongMin Jeon^{1†}, Eun-Hye Chung¹, Se-Young Bak¹, Heegoo Kim¹, Seyoung Shin¹, Hongseok Baek¹, IkHyun Lim¹, MinYoung Kim^{1†}

¹Department of Rehabilitation Medicine, CHA Bundang Medical Center



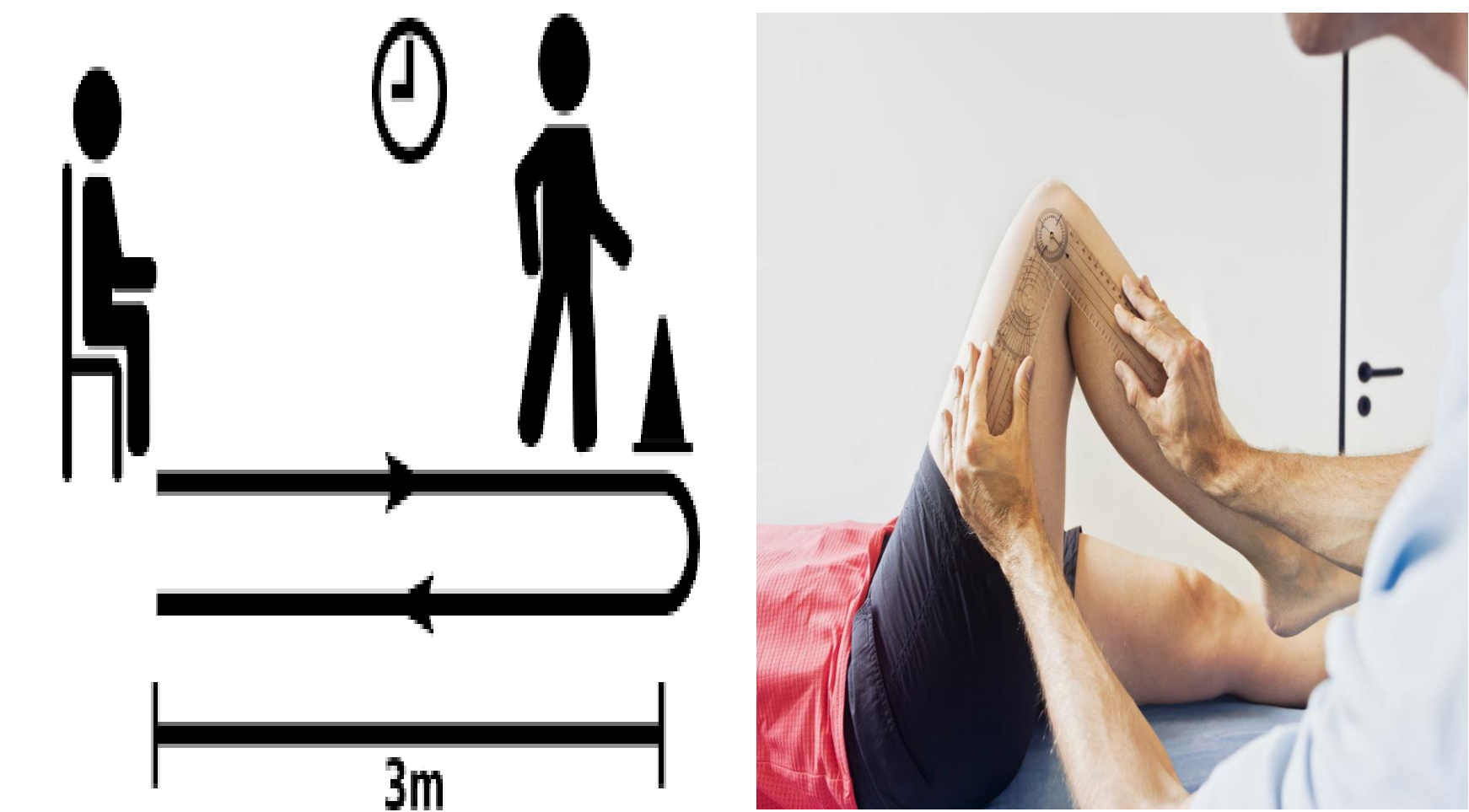
[Objective]

1-1. Functional Ambulation Category(FAC)

- Used to assess clinical gait levels (graded by 0 to 5) of the patients with chronic stroke
- FAC 4 to 5 means independent gait capability for the patients with chronic stroke.

1-2. Conventional evaluation

- Timed-up-and-go (TUG), Motor Assessment Scale (MAS), Motricity Index (MI), and range of motion (ROM) have generally measured for patients in clinical fields.



1-3. Motion analysis

- Three dimensional motion analysis could provide a wealth of kinematic and kinetic data to discuss with novel insights into patients' conditions for effective rehabilitation.
- The analysis could show the differences among the persons even whose conventional evaluation results were almost same.

1-4. Aim of this study

- Finally, the qualitative changes in the gait of patients with stroke were investigated depending on the differences in the conventional clinical assessment scores.

2-3 Procedures

- Recruiting the patients who were capable of independent gait (FAC 4 to 5) with chronic stroke and normal persons
- Measuring conventional evaluation (TUG, MAS, MI, ROM)
- Measuring gait with motion analysis system
- Analyzing kinetic and kinematic data

[Conclusion]

- Functional differences in gait were found in patients classified based on conventional evaluation capable of independent gait after post-stroke rehabilitation.
- Patients may still not exhibit complete recovery in the kinetic indices even if they are judged normal in conventional evaluation and the kinematic gait indices indicate recovery.
- Thus, evaluating kinetic indices in addition to evaluating kinematic indices is necessary, and joint power may be an especially useful index.

[Results]

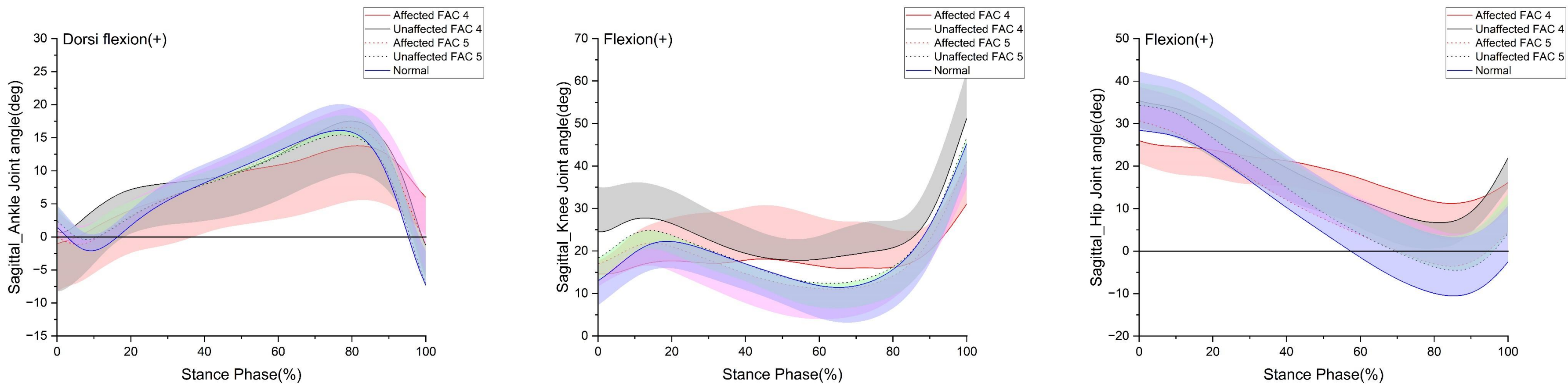


Figure 1. Sagittal plane-lower limb joint angle in the stance phase. The y- and x-axes are the value joint angle (degree) and the stance phase expressed as a percentile, respectively. The red and black solid lines and shaded areas indicate the patient group with FAC 4 stroke, and the red and black dotted lines and purple and chartreuse-shaded areas indicate the patient group with FAC 5 stroke. The blue solid line and shaded area indicate healthy participants. Each line represents the mean value for each group, with the standard deviation shaded and either positive or negative for better readability

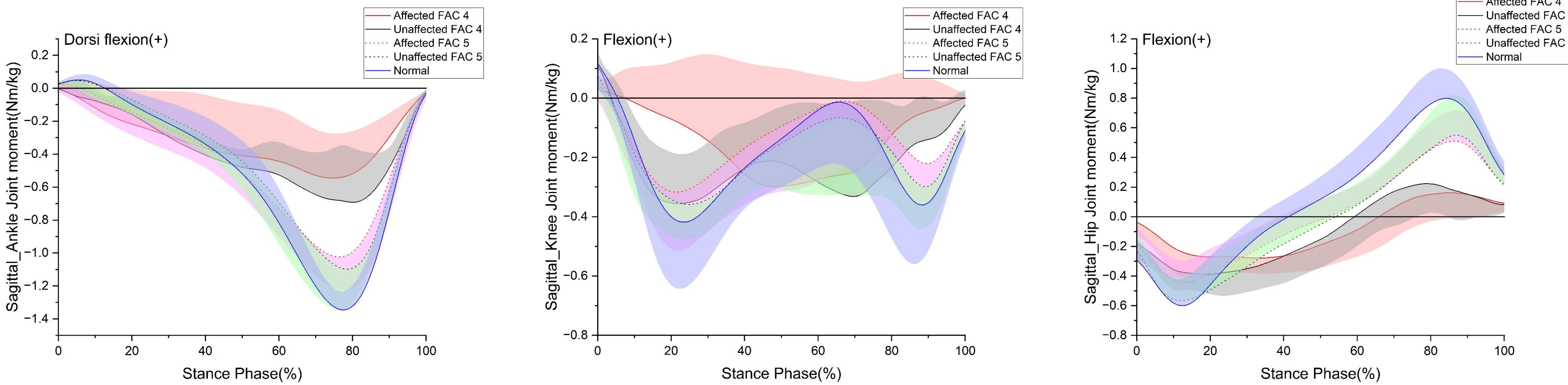


Figure 2. Sagittal plane-lower limb joint moment in the stance phase. The y- and x-axes are the value normalized for body weight and the stance phase expressed as a percentile, respectively. The red and black solid lines and shaded areas indicate the patient group with FAC 4 stroke, and the red and black dotted lines and purple and chartreuse-shaded areas indicate the patient group with FAC 5 stroke. The blue solid line and shaded area indicate healthy participants. Each line represents the mean value for each group, with the standard deviation shaded and either positive or negative for better readability.

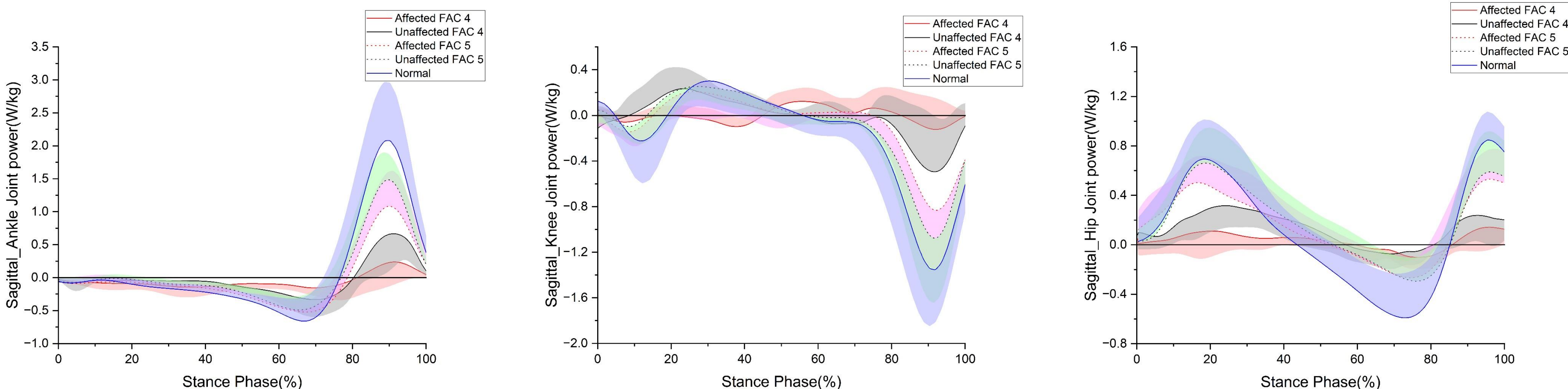


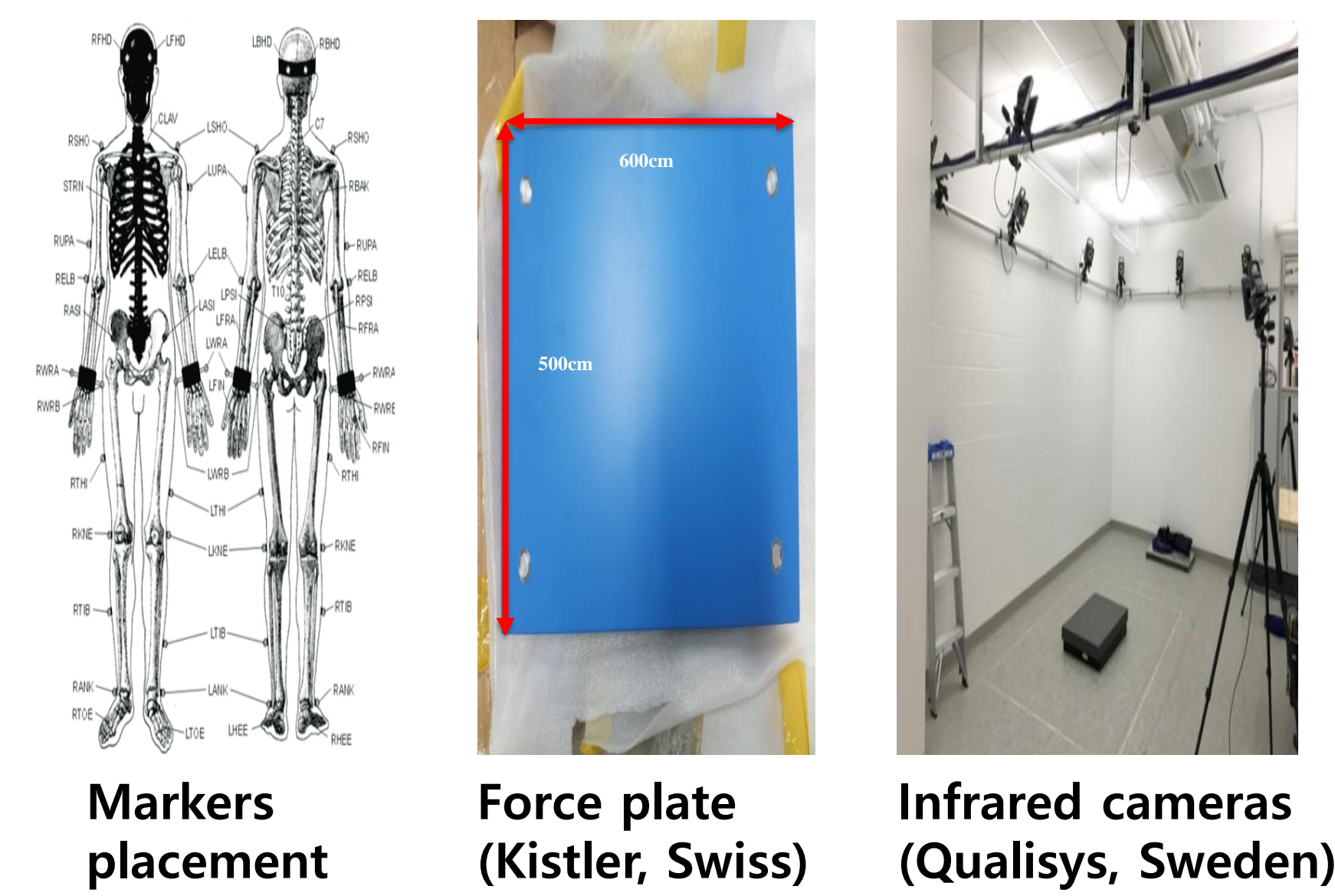
Figure 3. Sagittal plane-lower limb joint power in the stance phase. The y- and x-axes are the value normalized for body weight and the stance phase expressed as a percentile, respectively. The red and black solid lines and shaded areas indicate the patient group with FAC 4 stroke, and the red and black dotted lines and purple and chartreuse-shaded areas indicate the patient group with FAC 5 stroke. The blue solid line and shaded area indicate healthy participants. Each line represents the mean value for each group, with the standard deviation shaded and either positive or negative for better readability.

[Methods]

2-1. Subjects

| | FAC 4 (n=8) | FAC 5 (n=11) | Normal (n=12) |
|-------------|--------------|---------------|---------------|
| Age (years) | 64.13 ± 6.53 | 57.00 ± 14.00 | 41.92 ± 13.79 |

2-2. Measurement system



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