ABSTRACT
One out of 1000 children is born with clubfoot, a deformation of the foot characterized by equines, cavus, varus and adductus. Nowadays clubfoot is treated with the Ponseti method, including a casting and bracing phase where the foot is corrected for all deformations, leading to a fully functional foot after four years. However, up to fifteen percent of the clubfoot children have a relapse during or after treatment. Stiffer clubfeet have a higher tendency to relapse. Until now, it is not possible to quantify the stiffness of clubfeet in a clinical environment.

The first part of current research project focuses on a new method to measure stiffness with the use of the abduction dorsiflexion mechanism (ADM) brace. This brace is used in clinical practice and was modified to measure ankle torque. For validation of the ADM stiffness measure repeatability, reliability and torque-angle relationships were analyzed. To investigate torque in clubfeet both clubfoot (n:49, age: 4,3 ± 2,1) and healthy (n:18, age: 4,6 ± 1,9) children were included, from which the torque of both feet was measured over 15° rotation toward dorsiflexion and abduction. In the second part, deformations of hindfoot bones were evaluated using CT images of both clubfoot and control patients. Results show the ADM stiffness measure is reliable but not precise enough and does not match the expected torque-angle relationships. Between the healthy and clubfeet no significant torque differences were found, indicating that the ADM stiffness measure may be too simplistic to measure ankle stiffness. From the CT images it shows that the superior surface of talus in clubfeet is flattened compared to the control group. A foot model may give insight in the extent to which these bone deformations as well as other parts of the foot, influence hindfoot stiffness.