INTRODUCTION

- New electromechanically driven knee simulator (SimSol, UK).
- 5 fully independently controlled axes of articulation for each station.
- Enhanced capability.
- Wear and kinematics were investigated using a fixed bearing total knee replacement (TKR).
- Data compared to previous data from a predominantly pneumatically controlled simulator that was not fully independently controlled.

MATERIALS & METHODS

- Six Sigma CR fixed bearing TKR (DePuy, UK) with curved moderately cross-linked polyethylene inserts.
- Displacement controlled kinematics.
- A maximum anterior-posterior displacement of 10mm (high kinematics) or 5mm (intermediate kinematics) [1].
- 3 million cycles (MC) each of high and intermediate kinematics.
- 25% new born calf serum.
- Output kinematics and gravimetrical wear were determined.
- Data compared to data from pneumatic knee simulators to investigate the simulator performance.

RESULTS

Input and average output kinematic profiles from the electromechanical and pneumatic knee simulators under high kinematic inputs.

Volumetric wear rates (mean ± 95% CI, n=6) under intermediate and high kinematic conditions measured from pneumatic [2] and electromechanical knee simulators.

SIGNIFICANCE

- The second generation fully independent electromechanically driven knee simulator showed improved performance and capability compared to the previous generation of predominantly pneumatically driven knee simulator.
- Therefore the second generation fully independent electromechanically driven knee simulator can be applied in our SAFER® pre-clinical wear simulation approach to investigate a wider range of conditions.

Financial Disclosure

J. Fisher is a consultant to DePuy Synthes, Invibio, Simulation Solutions and Tissue Regenix and share holder of Tissue Regenix plc.