



US DEPARTMENT OF DEFENSE  
**BLAST INJURY RESEARCH PROGRAM**  
**COORDINATING OFFICE**

## Orthotics and Prosthetics

### A Case Series of Initial Fit with the PowerKnee™

Researchers at CRSR at USUHS conducted a case study on use of the PowerKnee™ (PK), the first motor-powered, artificially intelligent prosthesis for individuals with above-the-knee amputation. Four Service Members with unilateral transfemoral amputation were fitted with the PK immediately following surgical closure and clearance for prosthetic fitting and training. These patients all suffered combat-related limb loss, but no significant neuromuscular deficits existed for their contralateral intact lower limb. Each individual was fit by the same prosthetist and was provided minimal training on the device, including instructions to ambulate normally. All four Service Members had ambulation timelines that were faster than those of the average Service Member equipped with a traditional passive prosthesis, including achieving step-over-step stair ascent and descent within one to three weeks of initial fitting. Patients reported mixed feedback on the PK, with one patient abandoning the device in favor of a variable cadence microprocessor knee. Over-ground gait analyses revealed similar outcomes between the C-Leg and the PK, although intact knee and hip joint powers tended to be lower than those in the group using the PK. The PK may be a viable choice for the initial prosthetic fitting of individuals with transfemoral amputation in order to rapidly progress through early rehabilitation, with no apparent adverse effects on gait outcomes. A paper discussing this study has been submitted to the *Journal of Rehabilitation, Research, and Development*. Further research is needed to better understand the potential advantages or disadvantages of this technology, including defining patient selection criteria and optimal timing of prosthetic fitting. Future studies will also investigate biomechanical outcomes in more demanding tasks where additional power may be beneficial.