Smart IP

Blatchford was the first company in the world to have a microprocessor knee (MPK) available on the prosthetic market; the Intelligent Prosthesis (IP) in 1993. Sensors were incorporated and took measurements to determine walking speed and the behaviour of the pneumatic section of the piston was adapted, providing the appropriate degree of swing phase extension. A further iteration of this technology included the IP+, which had programming advancements and was simpler for the prosthetist to calibrate. The algorithm changed to no longer simply measure time between full extensions of the limb, but also used knee flexion information too.

Smart IP is an intelligent prosthetic knee with mechanical control in stance (via an ESK - most frequently supplied with the stance flexion version) and microprocessor-controlled pneumatic swing control. It builds on the previous IP knee iterations, with the same mechanical structure, however it introduced a new learning algorithm, allowing the prosthesis to self-adjust settings as the user walks.

Improvements in Clinical Outcomes using prosthetic knees with microprocessor-controlled swing phase

Improvement in **SAFETY**
- Less cognitive demand during walking, leading to reduced postural sway[1]

Improvement in **MOBILITY**
- Increased walking speed[2-5]
- Easier to walk at different speeds[4,6]
- More natural gait[4]
- Easier to walk on slopes[4,6]

Improvement in **ENERGY EXPENDITURE**
- Reduced energy expenditure compared to (non-MPK) mechanical knees[3-8]
- Equivalent energy expenditure to other MPKs (swing *and* stance controlled)[9]
- Reduced self-perceived effort[4,6]
- Energy expenditure closer to that of able-bodied control subjects[10]
- Able to walk further before becoming tired[4]

Improvement in **SYMMETRY**
- Better step length symmetry[2,6]

Improvement in **USER SATISFACTION**
- Preference over other prosthetic knees[4,6]

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