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**Stair ascent and ramp gait training with the Genium knee**


**Products**
- Genium

**Major Findings**
- 70% of subjects are able to climb stairs reciprocally
- Ability to cross obstacles improves when subject are able to climb stairs reciprocally
- Focal pressure near the anterior aspect of the hip during ramp ascent is experienced as decreased compared to other prosthesis

**Population**
- Subjects: 20 transfemoral amputees
- Previous prosthesis: not reported
- Amputation causes: trauma
- Mean age: not reported
- Mean time since amputation: not reported
- MFCL: K3 – K4 (unlimited community ambulators)

**Study Design**
- Technical report about stair ascent and ramp gait training with Genium
### Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Outcomes</th>
<th>Results for Genium</th>
<th>Sig.*</th>
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</thead>
<tbody>
<tr>
<td>Stairs</td>
<td>Observations</td>
<td>70% of subjects demonstrated ability to climb stairs reciprocally.</td>
<td>n.a.</td>
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<tr>
<td>Ramps, Hills</td>
<td>Observations</td>
<td>Ascent: less focal pressure was experienced by subjects near the anterior aspect of the hip.</td>
<td>n.a.</td>
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<td>Descent: On 5° declines, more active walkers utilized a stepping strategy similar to level walking with two sagittal knee flexion peaks.</td>
<td>n.a.</td>
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<tr>
<td>Uneven Ground, Obstacle Course</td>
<td>Subject’s report</td>
<td>Subjects believe that stair climbing practice improved the ability to cross obstacles</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

* no difference (0), positive trend (+), negative trend (−), significant (++/−−), not applicable (n.a.)

### Author's Conclusion

"Technological developments in assistive devices continue to outpace rehabilitation strategies to maximize their utilization and implementation. Clinical rehabilitation techniques remain limited. This technical note presents strategies for training the patient with transfemoral amputation in how to utilize the reciprocal stair ascent and ramp gait functions of the Genium knee. Additional training suggestions for further advanced training with these skills are also discussed. Functional training strategies introduced here were specifically used with the Genium knee in high-functioning patients. Therefore, they may not be appropriate for all patients with transfemoral amputation based on component or functional level. Thus, clinical judgment and patient goals are vital in the decision of whether or not to include such training in the course of an amputee’s therapy. We maintain that ramp and stair training in a broader context may be functionally important even if a patient indicates these obstacles are not often encountered in their usual routines. This training is important because it is difficult to determine when daily activities require out-of-the-ordinary settings or present unanticipated challenges. Supervised practice and familiarity may improve safety by decreasing fall risk, should the situation arise." (Highsmith et al., 2014)