

---

**Reference**

Schmalz T, Knopf E, Drewitz H, Blumentritt S.

Otto Bock Healthcare, Department of Research, Duderstadt, Germany.

## Analysis of biomechanical effectiveness of valgus-inducing knee brace for osteoarthritis of knee

J Rehabil Res Dev 2010, 47 (5): 419-29

---

**Products****Genu Arthro**

---

**Major Findings**

With Genu Arthro:

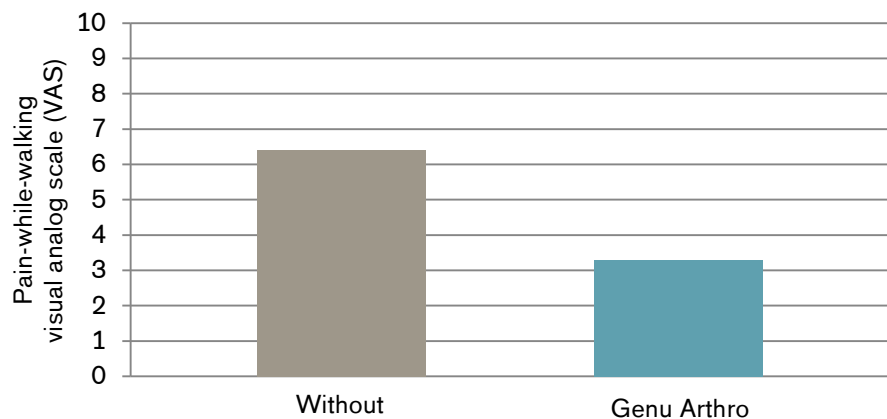
→ **Faster walking speed by 7.1%**

→ **Cadence (steps/min) increased by 2.8%**

→ **Genu Arthro raises the first vertical force maximum while walking by 4.8%.  
(Increase can be influenced by changes in walking speed)**

→ **Pain is significantly reduced by 51.6%**

### Significant decrease of pain by use of Genu Arthro



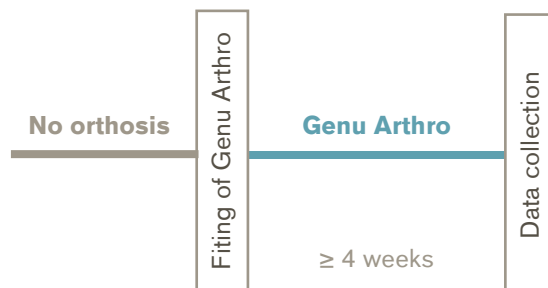
---

**Population**

Subjects:	16 (8 male, 8 female)
Mean age:	56 ± 9 years
Mean body mass:	83 ± 12 kg
Inclusion criteria:	Osteoarthritis grade I to IV

## Study Design

Interventional, comparative:



At the beginning of the treatment phase, the brace adjustment was optimized for each patient according to his or her individual needs. After the patients were recruited into this study, the individual adjustment of the valgus force was evaluated and modified as needed before the measurement session began. Besides the biomechanical investigations (with and without brace), the patients were surveyed before about their medical history and perceptions of the quality of brace fitting.

## Results

Functions and Activities						Participation
Biomechanics – Static measures	Biomechanics – Gait analysis	X-Ray	EMG	Functional tests	Clinical effects	Satisfaction

Category	Outcomes	Results for Genu Arthro	Sig.*						
Biomechanics – Gait analysis	Walking speed	<b>The walking speed significantly increases with Genu Arthro by 7.1%</b>	++						
	Cadence (steps/min)	<b>Users raise their number of steps per minute by 2.8% wearing Genu Arthro.</b>	++						
	Step length	No significant difference between walking with or without orthosis.	0						
	Ground reaction force	<b>The first vertical force maximum is also significantly increased by 4.8% with the orthosis compared to condition without orthosis. (Increase can be influenced by changes in walking speed)</b>	++						
		First horizontal force maximum of the contralateral limb and the orthosis condition are comparable:							
		<table border="1"> <thead> <tr> <th>Contralateral limb vs. no orthosis</th> <th>Contralateral limb vs. Genu Arthro</th> </tr> </thead> <tbody> <tr> <td><b>25.2% higher</b></td> <td>9.1% higher</td> </tr> <tr> <td>++</td> <td>+</td> </tr> </tbody> </table>	Contralateral limb vs. no orthosis	Contralateral limb vs. Genu Arthro	<b>25.2% higher</b>	9.1% higher	++	+	
Contralateral limb vs. no orthosis	Contralateral limb vs. Genu Arthro								
<b>25.2% higher</b>	9.1% higher								
++	+								
		No systematic differences could be identified in the mediolateral forces.	0						
Knee Joint		The knee flexion moment increased with Genu Arthro compared to wearing no orthosis:							
		<table border="1"> <thead> <tr> <th>Contralateral limb vs. no orthosis</th> <th>Contralateral limb vs. Genu Arthro</th> </tr> </thead> <tbody> <tr> <td><b>95.7% higher</b></td> <td>36.4% higher</td> </tr> <tr> <td>++</td> <td>+</td> </tr> </tbody> </table>	Contralateral limb vs. no orthosis	Contralateral limb vs. Genu Arthro	<b>95.7% higher</b>	36.4% higher	++	+	
	Contralateral limb vs. no orthosis	Contralateral limb vs. Genu Arthro							
<b>95.7% higher</b>	36.4% higher								
++	+								

Category	Outcomes	Results for Genu Arthro	Sig.*
		During stance phase flexion as well as extension the maximum values of the external varus moment show no significant difference between the conditions.	0
		For the mean maximum value of the external varus moment there is no significant difference between the conditions with or without orthosis.	0
	Effect on knee joint of moments created by the orthosis	Moderate increase of the external knee moment by the brace. 9% (mean maximum value) and 10% (mean value) are provided by the brace.	n.a.
Clinical effects	Pain-while-walking visual analog scale (VAS) (0 "no pain" – 10 "worst pain imaginable")	<b>The pain is significantly reduced by 51.6% due to Genu Arthro.</b>	<b>++</b>
Satisfaction	Questionnaire (0 "very poor – 6 "very good")	Mean scores between 4.3 ("good") and 4.9 ("very good") for fit of the brace, appearance and ease of use.	n.a.

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

### Author's Conclusion

"The results from this study show that the studied valgus-inducing knee brace can compensate for approximately 10 percent of the external genu varus moment. This compensation appears to be the main biomechanical mechanism that results in a reduction of joint force within the medial joint compartment. This biomechanical effect is an essential requirement for the reduced pain and improved overall function (such as a more symmetrical gait pattern) that result from the use of such braces. Orthotic treatment can effectively manage patients at early and middle stages of osteoarthritis or when other treatment methods are not applicable" (Schmalz et al. 2010)

© 2014, Otto Bock HealthCare Products GmbH ("Otto Bock"), All Rights Reserved. This article contains copyrighted material. Wherever possible we give full recognition to the authors. We believe this constitutes a 'fair use' of any such copyrighted material according to Title 17 U.S.C. Section 107 of US Copyright Law. If you wish to use copyrighted material from this site for purposes of your own that go beyond 'fair use', you must obtain permission from the copyright owner. All trademarks, copyrights, or other intellectual property used or referenced herein are the property of their respective owners. The information presented here is in summary form only and intended to provide broad knowledge of products offered. You should consult your physician before purchasing any product(s). Otto Bock disclaims any liability related from medical decisions made based on this article summary.