ottobock.

C-Leg Bibliography.

English language publications

1. Hahn A, Bueschges S, Prager M, Kannenberg A. The effect of microprocessor controlled exo-prosthetic knees on limited community ambulators: systematic review and meta-analysis. Disabil Rehabil 2021 Oct 25:1-19. doi: 10.1080/09638288.2021.1989504. Online ahead of print. https://www.tandfonline.com/doi/full/10.1080/09638288.2021.1989504

2. Davie-Smith F, Carse B. Comparison of patient-reported and functional outcomes following transition from mechanical to microprocessor knee in the low-activity user with a unilateral transfemoral amputation. Prosth Orthot Int 2021;45(3):198-204. DOI: 10.1097/PXR.0000000000000017 https://journals.lww.com/poijournal/Abstract/2021/06000/Comparison_of_patient_reported_and_functional.3.aspx

3. Jayaraman C, Mummidisetty CK, Albert MV, et al. Using a microprocessor knee (C-Leg) with appropriate foot transitioned individuals with dysvascular transfemoral amputations to higher performance levels: a longitudinal randomized clinical trial. J Neuroeng Rehabil. 2021;18(1):88. https://jneuroengrehab.biomedcentral.com/track/pdf/10.1186/s12984-021-00879-3.pdf

4. Campbell JH, Stevens PM, Wurdeman SR. OASIS I: Retrospective analysis of four different microprocessor knee types. Journal Rehabil Assist Technol Eng 2020;7: 1-10. https://journals.sagepub.com/doi/10.1177/2055668320968476

5. Kuhlmann A, Krueger H, Seidinger S, Hahn A. Cost-effectiveness and budget impact of the microprocessor-controlled knee C-Leg in transfemoral amputees with and without diabetes mellitus. Eur J Health Econ 2020 Jan 2. doi: 10.1007/s10198-019-01138-y. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7188726/

6. Bellmann M, Köhler TM, Schmalz T. Comparative biomechanical evaluation of two technologically different microprocessor-controlled prosthetic knee joints in safety-relevant daily-life situations. Biomed Tech (Berl). 2019 Aug 27;64(4):407-420. doi: 10.1515/bmt-2018-0026.

7. Chen C, Hanson M, Chaturvedi R, Mattke S, Hillestad R, Liu HH. Economic benefits of microprocessor controlled prosthetic knees: a modeling study. J NeuroEng Rehabil 2018 Sep 5;15(Suppl 1):62. doi: 10.1186/s12984-018-0405-8.

8. Cutti AG, Verni G, Migliore GL, Amoresano A, Raggi M. Reference values for gait temporal and loading symmetry of lower-limb amputees can help in refocusing rehabilitation targets. J NeuroEng Rehabil 2018 Sep 5;15(Suppl 1):61. doi: 10.1186/s12984-018-0403-x.

9. Kaufman KR, Bernhardt KA, Symms K. Functional assessment and satisfaction of transfemoral amputees with mobility (FASTK2): A clinical trial of microprocessor-controlled vs. non-microprocessor-controlled knees. Clin Biomech (Bristol, Avon) 2018 Oct;58:116-122. doi: 10.1016/j.clinbiomech.2018.07.012. Epub 2018 Jul 19.

10. Morgenroth DC, Roland M, Pruziner AL, Czerniecki JM. Transfemoral amputee intact limb loading and compensatory gait mechanics during down slope ambulation and the effect or prosthetic knee mechanisms. Clin Biomech (Bristol, Avon). 2018 Jun;55:65-72. doi: 10.1016/j.clinbiomech.2018.04.007. Epub 2018 Apr 12.

11. Thiele J, Schöllig C, Bellmann M, Kraft M. Designs and performance of three new microprocessor-controlled knee joints. Biomed Tech (Berl) 2019 Feb 25;64(1):119-126. doi: 10.1515/bmt-2017-0053.

12. Cutti AG, Lettieri E, Del Maestro M, Radaelli G, Luchetti M, Verni G, Masella C. Stratified cost-utility analysis of C-Leg versus mechanical knees: Findings from an Italian sample of transfemoral amputees. Prosthet Orthot Int 2017; 41(3): 227-236. [Epub 2016 ahead of print]

13. Hahn A, Lang M. Effects of mobility grade, age, and etiology on functional benefit and safety of subjects evaluated in more than 1200 C-Leg trial fittings in Germany. J Prosthet Orthot 2015; 27(3): 86-95.

14. Wong K, Rheinstein J, Stern MA. Benefits for adults with transfemoral amputation and peripheral artery disease using microprocessor compared with nonmicroprocessor prosthetic knees. Arch Phys Med Rehabil 2015; 94 (10): 804-810.

15. Kannenberg A, Zacharias B, Pröbsting E: Benefits of microprocessor prosthetic knees to limited community ambulators: A systematic review.
J Rehabil Res Dev 2014; 51 (10): 1469-1495.

16. Highsmith MJ, Kahle JT, Shepard NT, Kaufman KR: The effect of the C-leg knee prosthesis on sensory dependency and falls during sensory organization testing. Technol Innov 2014; 15: 343-347.

17. Thiele J, Westebbe B, Bellmann M, Kraft M: Designs and performance of microprocessor-controlled knee joints. Biomed Tech (Berl) 2014; 59(1): 65-77.

18. Eberly VJ. Mulroy SJ, Gronley JK, Perry J, Burnfield JM: Impact of a stance phase microprocessor-controlled knee prosthesis on level walking in lower functioning individuals with transfemoral amputation. Prosth Orthot Int 2014; 38(6): 447-455.

19. William D, Beasley E, Shaw A: Investigation of the quality of life of persons with a transfemoral amputation who use a C-leg® prosthetic device. J Prosthet Orthot 2013; 25(3): 100-109.

20. Tofts LJ, Hamblin N: C-Leg® improves function and quality of life in an adolescent traumatic transfemoral amputee – a case study. Prosthet Orthot Int 2013; Sep 20 [epub ahead of print]

21. Wolf EJ, Everding VQ, Linberg AA, Czerniecki JM, Gambel, JM: Comparison of the Power Knee and C-Leg during step-up and sit-to-stand tasks. Gait Posture 2013; 38(3): 397-402

22. Wolf EJ, Everding VQ, Linberg AA, Schnall BL, Czerniecki JM, Gambel, JM: Assessment of transfemoral amputees using C-Leg and Power Knee for ascending and descending inclines and steps. J Rehabil Res Dev 2012; 49(6): 831-842

23. Highsmith MJ, Kahle JT, Miro RM, Mengelkoch, MJ: Ramp descent performance with the C-leg and interrater reliability of the Hill Assessment Index. Prosthet Orthot Int 2013; 37(5): 362-368

24. Wong CK, Benoy S, Blackwell W, Jones S, Rahal R: A comparison of energy expenditure in people with transfemoral amputation using microprocessor and nonmicroprocessor knee prostheses: a systematic review. J Prosthet Orthot 2012; 24(4): 202-208

25. Meier MR, Hansen AH, Gard SA, McFayden AK: Obstacle course: users´ maneuverability and movement efficiency when using Otto Bock C-leg, Otto Bock 3R60, and CaTech SNS prosthetic knee joints. J Rehabil Res Dev 2012; 49(4): 583-596

26. Schaarschmidt M, Lipfert SW, Meier-Gratz C, Scholle H, Seyfarth A. Functional gait asymmetry of unilateral transfemoral amputees. Human Movement Science. 2012;31: 907–917.

27. Kaufman KR, Frittoli S, Frigo CA: Gait asymmetry of transfemoral amputees using mechanical and microprocessor controlled prosthetic knees. Clin Biomech 2012; 27 (5): 460-465.

28. Bar JB, Wutzke CJ, Threlkeld AJ: Longitudinal gait analysis of a person with a transfemoral amputation using three different prosthetic knee/foot pairs. Physiother Theor Pract 2012; 28(5): 407-411.

29. Wong CK, Wilska J, Stern M: Balance, balance confidence, and falls using nonmicroprocessor and microprocessor knee prostheses: a case study after vascular amputation with 12-month follow-up. JPO 2012;24(1): 16-18

30. Theeven PJ, Hemmen B, Geers RP, Smeets RJ, Brink PR, Seelen HA
Influence of advanced prosthetic knee joints on perceived performance and everyday life activity of low-functional persons with a transfemoral amputation or knee disarticulation. J Rehabil Med 2012, 44 (5): 454-461.

31. Burnfield JM, Eberly VJ, Gronely JK, Perry J, Yule WJ, Mulroy SJ
Impact of stance phase microprocessor-controlled knee prosthesis on ramp negotiation and community walking function in K2 level transfemoral amputees. Prosthet Orthot Int 2012, 36 (1): 95-104.

32. Theeven P, Hemmen B, Rings F, Meys G, Brink P, Smeets R, Seelen H
Functional added value of microprocessor-controlled knee joints in daily life performance of Medicare Functional Classification Level-2 amputees. J Rehabil Med 2011; 43 (10): 906-915

33. Highsmith MJ, Kahle JT, Carey SL, Lura DJ, Dubey RV, Csavina KR, Quillen WS: Kinetic asymmetry in transfemoral amputees while performing sit to stand and stand to sit movements. Gait Posture 2011; 34(1): 86-91.

34. Mâaref K, Martinet N, Grumillier C, Ghannouchi S, André JM, Paysant J. Kinematics in the Terminal Swing Phase of Unilateral Transfemoral Amputees: Microprocessor-Controlled Versus Swing-Phase Control Prosthetic Knees. *Arch Physl Med Rehabil* 2010; 91(6): 919-925.

35. Theeven P, Hemmen B, Stevens C, Ilmer E, Brink P, Seelen H. Feasibility of a new concept for measuring ACTUAL functional performance in daily life of transfemoral amputees. *J Rehabil Med* 2010; 42: 744–751.

36. Highsmith MJ, Kahle JT, Bongiorni DR, Sutton BS, Groer S, Kaufman KR
Safety, energy efficiency, and cost efficacy of the C-leg for transfemoral amputees. Prosth Orthot Int 2010, 34 (4): 362-377

37. Bellmann M, Schmalz T, Blumentritt S
Comparative biomechanical analysis of current microprocessor-controlled prosthetic knee joints. Arch Phys Med Rehabil 2010, 91(4): 644-652

38. Petersen AO, Comins J, Alkjær T: Assessment of gait symmetry in transfemoral amputees using C-leg compared with 3R60 prosthetic knees. J Prosthet Orthot 2010; 22(2): 106-112

39. Blumentritt S, Schmalz T, Jarasch R: The safety of C-leg: Biomechanical tests. J Prosthet Orthot 2009, 21(1): 2-17

40. Hafner BJ, Smith DG
Differences in function and safety between Medicare Functional Classification Level-2 and -3 transfemoral amputees and influence of prosthetic knee joint control. J Rehabil Res Dev 2009, 46 (3): 417-434

41. Seelen HAM, Hemmen B, Schmeets AJ, Ament AJHA, Evers SMAA
Costs and consequences of a prosthesis with an electronic stance and swing phase controlled knee joint. Technology and Disability 2009, 21: 25-34

42. Berry D, Olson MD, Larntz K: Perceived stability, function, and satisfaction among transfemoral amputees using microprocessor and non-microprocessor controlled prosthetic knees: a multicenter survey. J Prosthet Orthot 2009, 21 (1): 32-42

43. Kaufman KR, Levine JA, Brey RH, McCrady SK, Padgett DJ, Joyner MJ: Energy Expenditure and Activity Level of Transfemoral Amputees using Passive Mechanical and Microprocessor-controlled Prosthetic Knees. *Arch Phys Med Rehabil 2008 (89(7), 1380-1385.*

44. Gerzeli S, Torbica A, Fattore G: Cost utility analysis of knee prosthesis with complete microprocessor control (C-leg) compared with mechanical technology in trans-femoral amputees. *Eur J Health Econ* 2009; 10 (1): 47-55.

45. Kahle JT, Highsmith MJ, Hubbard SL: Comparison of Non-microprocessor Knee Mechanism versus C-Leg on Prosthesis Evaluation Questionnaire, Stumbles, Falls, Walking Tests, Stair Descent, and Knee Preference; J Rehabil Res Dev 2008; 45 (1): 1-14.

46. Brodtkorb TH, Henniksson M, Johanneson-Munk K, Thidell F: Cost-effectiveness of C-leg compared with non-microprocessor-controlled knees: a modeling approach. Arch Phys Med Rehabil 2008 89(1): 24-30.

47. Kaufman KR, Levine JA, Brey RH, et al. Gait and Balance of transfemoral amputees using passive mechanical and microprocessor-controlled prosthetic knees. *Gait Posture.* 2007; 26: 489-493

48. Schmalz T, Blumentritt S, Marx B: Biomechanical Analysis of Stair Ambulation in Lower Limb Amputees. *Gait Posture*. 2007; 25: 267-278.

49. Seymour R, Engbretson B, Kott K, Ordway N, Brooks G, Crannell J, Hickernell E, Wheller K: Comparison between the C-leg(R) microprocessor-controlled prosthetic knee and non-microprocessor control prosthetic knees: A preliminary study of energy expenditure, obstacle course performance, and quality of life survey. *Prosthet Orthot Int* 2007; 31(1): 51 – 61.

50. Hafner BJ, Willingham LL, Buell NC, Allyn KJ, Smith DG: Evaluation of Function, Performance, and Preference as Transfemoral Amputees Transition from Mechanical to Microprocessor Control of the Prosthetic Knee. *Arch Phys Med Rehabil* 2007; 88(2): 207-17.

51. Bunce DJ, Breakey JW: The Impact of C-Leg on the Physical and Psychological Adjustment to Transfemoral Amputation. *J Prosthet Orthot* 2007; 19(1): 7-14.

52. Segal AD, Orendurff MS, Klute GK, McDowell ML, Pecoraro JA, Shofer J, Czerniecki JM: Kinematic and Kinetic Comparisons of Transfemoral Amputee Gait using C-Leg and Mauch SNS Prosthetic Knees. *J Rehabil Res Dev* 2006; 43(7): 857-870.

53. Klute GK, Berge JS, Orendurff MS, Williams RM, Czerniecki JM: Prosthetic Intervention Effects on Activity of Lower Extremity Amputees. *Arch Phys Med Rehabil* 2006; 87: 717-722.

54. Williams RM, Turner AP, Orendurff M, Segal AD, Klute GK, Pecoraro J, Czerniecki J: Does Having a Computerized Prosthetic Knee Influence Cognitive Performance during Amputee Walking? *Arch Phys Med Rehabil* 2006; 87: 989-994.

55. Orendurff MS, Segal AD, Klute GK, McDowell ML, Pecoraro JA, Czerniecki JM: Gait Efficiency Using the C-Leg. *J Rehabil Res Dev* 2006; 43(2):239-246.

56. Chin T, Machida K, Sawamura S, Shiba R, Oyabu H, Nagakura Y, Takase I, Nakagawa A: Comparison of different microprocessor controlled knee joints on the energy consumption during walking in trans-femoral amputees: intelligent knee prosthesis (IP) vs. C-Leg. Prosthet Orthot Int 2006; 30(1): 73-80

57. Johannson JL, Sherill DM, Riley PO, Bonato P, Herr H
A clinical comparison of variable-damping and mechanically passive prosthetic knee devices.Am J Phys Med Rehabil 2005, 84 (8): 563-575

58. Swanson E, Stube J, Edman P
Function and body image levels in individuals with transfemoral amputation using the C-leg. JPO 2005, 17 (3): 80-84

59. Perry J, et al: Energy Expenditure and Gait Characteristics of a Bilateral Amputee Walking with C-Leg Prostheses Compared with Stubby and Conventional Articulating Prostheses. *Arch Phys Med Rehabil* 2004; 85: 1711-1717.

60. Schmalz T, Blumentritt S, Jarasch R. Energy Expenditure and Biomechanical Characteristics of Lower Limb Amputee Gait: Influence of Prosthetic Alignment and Different Prosthetic Components. *Gait Posture*. 2003; 16: 255-263.

German language publications / Deutschsprachige Publikationen

1. Blumentritt S, Bellmann M: Potentielle Sicherheit von aktuellen nicht-mikroprozessor und mikroprozessor-gesteuerten Prothesenkniegelenken. Orthopädie-Technik 2010, 61 (11): 788-799.

2. Drerup B, Wetz HH, Tiemeyer K, Stüling St: Langzeitergebnisse mit dem C-Leg-Kniegelenksystem: Qualitätskontrolle der Indikationsstellung der Klinischen Prüfstellen. Med Orth Tech 2010, 130 (2): 7-16

3. Blumentritt S, Braun J, Bellmann M, Schmalz T: Zur Indikation des Kniegelenksystems C-Leg bei der prothetischen Versorgung Amputierter mit kurzen transfemoralen Stümpfen. Med Orth Tech 2009, 60 (5): 62-74

4. Bellmann M, Schmalz T, Blumentritt S: Funktionsprinzipien akuteller Mikroprozessor-gesteuerter Prothesenkniegelenke. Orthopädie-Technik 2009, 60 (5): 297-303

5. Drerup B, Wetz HH, Bitterle K, Schmidt R: Langzeitergebnisse mit dem C-Leg – Ergebnisse einer retrospektiven Studie. Orthopädie-Technik 2008, 59 (3): 169-174

6. Wühr J, Linkemeyer L, Drerup B, Wetz HH: Vergleichende klinische und biomechanische Prüfung elektronisch gesteuerter Kniepassteile für Oberschenkelprothesen. Orthopädie-Technik Nr. 2008, 59 (3): 162-168

7. Greive H, Lindig R, Rieger M, Heine U: Sozialmedizinische Beurteilung des MDK Westfalen-Lippe bei der Versorgung Oberschenkel-Amputierter mit dem mikroprozessor-gesteuerten C-Leg. Orthopädie-Technik 2008, 59 (3): 176-178

8. Wetz HH, Hafkemeyer U, Drerup B: Der Einfluss des C-Leg Kniegelenk-Passteiles der Fs. Otto Bock auf die Versorgungsqualität Oberschenkelamputierter. Eine klinisch-biomechanische Studie zur Eingrenzung von Indikationskritierien. *Der Orthopäde.* 2005; 34(4):298, 300-314, 316-319.

9. Schmalz T, Blumentritt S, Jarasch R: Leistungsfähigkeit verschiedener Prothesenkniegelenke beim Treppabgehen von Oberschenkelamputierten. Orthopädie-Technik 2002, 53 (7)

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