

# Ankylos<sup>®</sup> implant system – Clinical documentation

## Well documented, reliable and safe

- More than 17,000 patients followed up to 20 years
- 97% implant survival rate after 5 years or more of follow-up
- Stable bone levels after 5 to 12 years of follow-up<sup>1-8</sup>

## The TissueCare Concept behind the clinical success

The Ankylos implant system is scientifically and clinically proven to maintain hard and soft tissue over time, with excellent esthetics and high patient satisfaction<sup>1,9-16</sup>.

This is achieved by the unique combination of the following features:

- SoftTissue Chamber – subcrestal placement in combination with the horizontal offset creates the chamber supporting stable soft tissue and bone
- Friadent plus surface – microstructured surface on the implant shoulder
- One-fits-all TissueCare connection – one conical implant-abutment connection
- Progressive Thread – transferring the load to the apical parts of the implant

## Clinical results

Published data shows that placement of Ankylos implants is safe and predictable in both jaws, for indications such as:

	No. of patients	No. of implants	Reference
Immediate loading	>2000	>5500	6-14, 16-38
Single tooth	>1700	>2300	9, 10, 14, 19-22, 27-29, 37, 39-48
Fixed prosthesis	>900	>2800	6, 8, 10, 11, 14, 17, 18, 23-25, 31, 32, 36, 49-51
Overdenture	>500	>180	1, 4, 12, 13, 16, 30, 33, 34, 38, 52-59
Extraction sockets	>500	>900	18-22, 25, 34, 35, 37, 60

Further topics<sup>61-63</sup> and concepts, such as intra-oral welding<sup>18, 23-26</sup> and implant stability<sup>5-8, 22-26, 31, 32, 36, 38, 39, 59, 64-69</sup> are also well documented. Bone level evaluation show stable results<sup>17, 19, 27, 29, 41, 49, 68, 70-72</sup>.

The conometric concept<sup>11, 25, 50</sup> with friction-retained restorations, has also been evaluated with the Ankylos implant system, showing promising results.

## Conclusion

Extensive literature evaluating over 55,000 implants, shows safe and predictable treatment outcomes for the Ankylos implant system, with >97% implant survival rate after 5 years or more of follow-up<sup>1-4, 6-8, 31, 33, 34, 43, 44, 46, 57, 73-77</sup>.

To read more Scientific Reviews please see:  
[www.dentsplysirona.com/implants/science](http://www.dentsplysirona.com/implants/science)

## References

1. Eerdekens L, Schols M, Coelst L, Quirynen M, Naert I. A 5-year prospective study on cone-anchored implants in the edentulous maxilla. *Clin Implant Dent Relat Res* 2015;17 Suppl 2:e621-32. [Abstract](#)
2. Hasegawa M, Hotta Y, Hoshino T, et al. Long-term radiographic evaluation of risk factors related to implant treatment: suggestion for alternative statistical analysis of marginal bone loss. *Clin Oral Implants Res* 2016;27(10):1283-89. [Abstract](#)
3. Joda T, Michelaki I, Heydecke G. Peri-implant bone loss of dental implants with platform-switching design after 5 years of loading: a cross-sectional study. *Quintessence Int* 2015;46(1):59-66. [Abstract](#)
4. Rinke S, Ziebolz D, Ratka-Kruger P, Frisch E. Clinical outcome of double crown-retained mandibular removable dentures supported by a combination of residual teeth and strategic implants. *J Prosthodont* 2015;24(5):358-65. [Abstract](#)
5. Romanos GE, Aydin E, Gaertner K, Nentwig GH. Long-term results after subcrestal or crestal placement of delayed loaded implants. *Clin Implant Dent Relat Res* 2015;17(1):133-41. [Abstract](#)
6. Romanos GE, Aydin E, Locher K, Nentwig GH. Immediate vs. delayed loading in the posterior mandible: a split-mouth study with up to 15 years of follow-up. *Clin Oral Implants Res* 2016;27(2):e74-9. [Abstract](#)
7. Romanos GE, Gaertner K, Aydin E, Nentwig GH. Long-term results after immediate loading of platform-switched implants in smokers versus nonsmokers with full-arch restorations. *Int J Oral Maxillofac Implants* 2013;28(3):841-5. [Abstract](#)
8. Romanos GE, Gupta B, Gaertner K, Nentwig GH. Distal cantilever in full-arch prostheses and immediate loading: a retrospective clinical study. *Int J Oral Maxillofac Implants* 2014;29(2):427-31. [Abstract](#)
9. Abboud M, Koeck B, Stark H, Wahl G, Paillon R. Immediate loading of single-tooth implants in the posterior region. *Int J Oral Maxillofac Implants* 2005;20(1):61-8. [Abstract](#)
10. Bressan E, Grusovin MG, D'Avenia F, et al. The influence of repeated abutment changes on peri-implant tissue stability: 3-year post-loading results from a multicentre randomised controlled trial. *Eur J Oral Implantol* 2017;10(4):373-90. [Abstract](#)
11. Bressan E, Lops D. Conometric retention for complete fixed prosthesis supported by four implants: 2-years prospective study. *Clin Oral Implants Res* 2014;25(5):546-52. [Abstract](#)
12. Eccellente T, Piombino M, Piattelli A, et al. Immediate loading of dental implants in the edentulous maxilla. *Quintessence Int* 2011;42(4):281-9. [Abstract](#)
13. Eccellente T, Piombino M, Piattelli A, Perrotti V, Iezzi G. A new treatment concept for immediate loading of implants inserted in the edentulous mandible. *Quintessence Int* 2010;41(6):489-95. [Abstract](#)
14. Esposito M, Bressan E, Grusovin MG, et al. Do repeated changes of abutments have any influence on the stability of peri-implant tissues? One-year post-loading results from a multicentre randomised controlled trial. *Eur J Oral Implantol* 2017;10(1):57-72. [Abstract](#)
15. Morris HF, Ochi S, Rodriguez A, Lambert PM. AICRG, Part IV: Patient satisfaction reported for Ankylos implant prostheses. *J Oral Implantol* 2004;30(3):152-61. [Abstract](#)
16. Shaarawy MA, Abolross EM. The effect of varying implant position in immediately loaded implant-supported mandibular overdentures. *J Oral Implantol* 2013;39(3):345-54. [Abstract](#)
17. Abboud M, Wahl G, Guirado JL, Orentlicher G. Application and success of two stereolithographic surgical guide systems for implant placement with immediate loading. *Int J Oral Maxillofac Implants* 2012;27(3):634-43. [Abstract](#)
18. Albiero AM, Benato R, Benato A, Degidi M. Use of Intraoral Welding to Increase the Predictability of Immediately Loaded Computer-Guided Implants. *International Journal of Periodontics & Restorative Dentistry* 2017;37(4):591-98. [Abstract](#)
19. Crespi R, Cappare P, Gherlone E. Radiographic evaluation of marginal bone levels around platform-switched and non-platform-switched implants used in an immediate loading protocol. *Int J Oral Maxillofac Implants* 2009;24(5):920-6. [Abstract](#)
20. Degidi M, Daprile G, Nardi D, Piattelli A. Buccal bone plate in immediately placed and restored implant with Bio-Oss((R)) collagen graft: a 1-year follow-up study. *Clin Oral Implants Res* 2013;24(11):1201-5. [Abstract](#)
21. Degidi M, Daprile G, Nardi D, Piattelli A. Immediate provisionalization of implants placed in fresh extraction sockets using a definitive abutment: the chamber concept. *Int J Periodontics Restorative Dent* 2013;33(5):559-65. [Abstract](#)
22. Degidi M, Nardi D, Daprile G, Piattelli A. Nonremoval of immediate abutments in cases involving subcrestally placed postextractive tapered single implants: a randomized controlled clinical study. *Clin Implant Dent Relat Res* 2014;16(6):794-805. [Abstract](#)
23. Degidi M, Nardi D, Piattelli A. Prospective study with a 2-year follow-up on immediate implant loading in the edentulous mandible with a definitive restoration using intra-oral welding. *Clin Oral Implants Res* 2010;21(4):379-85. [Abstract](#)
24. Degidi M, Nardi D, Piattelli A. One abutment at one time: non-removal of an immediate abutment and its effect on bone healing around subcrestal tapered implants. *Clin Oral Implants Res* 2011;22(11):1303-07. [Abstract](#)
25. Degidi M, Nardi D, Piattelli A. The conometric concept: Coupling connection for immediately loaded titanium-reinforced provisional fixed partial dentures-a case series. *Int J Periodontics Restorative Dent* 2016;36(3):347-54. [Abstract](#)
26. Degidi M, Nardi D, Sighinolfi G, Piattelli A. Immediate rehabilitation of the edentulous mandible using Ankylos SynCone telescopic copings and intraoral welding: A pilot study. *Int J Periodontics Restorative Dent* 2012;32(6):e189-94. [Abstract](#)
27. Donovan R, Fetner A, Koutouzis T, Lundgren T. Crestal bone changes around implants with reduced abutment diameter placed non-submerged and at subcrestal positions: a 1-year radiographic evaluation. *J Periodontol* 2010;81(3):428-34. [Abstract](#)
28. Koutouzis T, Neiva R, Nair M, Nonhoff J, Lundgren T. Cone beam computed tomographic evaluation of implants with platform-switched Morse taper connection with the implant-abutment interface at different levels in relation to the alveolar crest. *Int J Oral Maxillofac Implants* 2014;29(5):1157-63. [Abstract](#)
29. Koutouzis T, Neiva R, Nonhoff J, Lundgren T. Placement of implants with platform-switched Morse taper connections with the implant-abutment interface at different levels in relation to the alveolar crest: a short-term (1-year) randomized prospective controlled clinical trial. *Int J Oral Maxillofac Implants* 2013;28(6):1553-63. [Abstract](#)
30. May D, Romanos GE. Immediate implant-supported mandibular overdentures retained by conical crowns: A new treatment concept. *Quintessence Int* 2002;33(1):5-12. [Abstract](#)
31. Romanos GE, Gaertner K, Nentwig GH. Long-term evaluation of immediately loaded implants in the edentulous mandible using fixed bridges and platform shifting. *Clin Implant Dent Relat Res* 2014;16(4):601-8. [Abstract](#)
32. Romanos GE, Malmstrom H, Feng C, Ercoli C, Caton J. Immediately loaded platform-switched implants in the anterior mandible with fixed prostheses: a randomized, split-mouth, masked prospective trial. *Clin Implant Dent Relat Res* 2014;16(6):884-92. [Abstract](#)
33. Romanos GE, May S, May D. Treatment concept of the edentulous mandible with prefabricated telescopic abutments and immediate functional loading. *Int J Oral Maxillofac Implants* 2011;26(3):593-7. [Abstract](#)
34. Romanos GE, May S, May D. Immediate loading of tooth-implant-supported telescopic mandibular prostheses. *Int J Oral Maxillofac Implants* 2012;27(6):1534-40. [Abstract](#)
35. Romanos GE, May S, May D. Implant-supporting telescopic maxillary prostheses and immediate loading. *Clin Implant Dent Relat Res* 2014;16(3):412-8. [Abstract](#)
36. Romanos GE, Nentwig GH. Immediate functional loading in the maxilla using implants with platform switching: five-year results. *Int J Oral Maxillofac Implants* 2009;24(6):1106-12. [Abstract](#)
37. Sethi A, Kaus T. Immediate replacement of single teeth with immediately loaded implants: Retrospective analysis of a clinical case series. *Implant Dent* 2017;26(1):30-36. [Abstract](#)
38. Wittwer G, Adeyemo WL, Wagner A, Enislidis G. Computer-guided flapless placement and immediate loading of four conical screw-type implants in the edentulous mandible. *Clin Oral Implants Res* 2007;18(4):534-9. [Abstract](#)
39. Al-Hashedi AA, Taiyeb-Ali TB, Yunus N. Outcomes of placing short implants in the posterior mandible: a preliminary randomized controlled trial. *Aust Dent J* 2016;61(2):208-18. [Abstract](#)
40. Doring K, Eisenmann E, Stiller M. Functional and esthetic considerations for single-tooth Ankylos implant-crowns: 8 years of clinical performance. *J Oral Implantol* 2004;30(3):198-209. [Abstract](#)

41. Koutouzis T, Fetner M, Fetner A, Lundgren T. Retrospective evaluation of crestal bone changes around implants with reduced abutment diameter placed non-submerged and at subcrestal positions: the effect of bone grafting at implant placement. *J Periodontol* 2011;82(2):234-42. [Abstract](#)
42. Nentwig GH. Ankylos implant system: concept and clinical application. *J Oral Implantol* 2004;30(3):171-7. [Abstract](#)
43. Rinke S, Lattke A, Eickholz P, Kramer K, Ziebolz D. Practice-based clinical evaluation of zirconia abutments for anterior single-tooth restorations. *Quintessence Int* 2015;46(1):19-29. [Abstract](#)
44. Rinke S, Roediger M, Eickholz P, Lange K, Ziebolz D. Technical and biological complications of single-molar implant restorations. *Clin Oral Implants Res* 2015;26(9):1024-30. [Abstract](#)
45. Romanos GE, Nentwig GH. Single molar replacement with a progressive thread design implant system: a retrospective clinical report. *Int J Oral Maxillofac Implants* 2000;15(6):831-6. [Abstract](#)
46. Shim HW, Yang BE. Long-term cumulative survival and mechanical complications of single-tooth Ankylos Implants: focus on the abutment neck fractures. *J Adv Prosthodont* 2015;7(6):423-30. [Abstract](#)
47. Koutouzis T, Podaru A, Neiva R. Facial peri-implant soft tissue topography of posterior single implant-supported restorations and relationship to adjacent teeth: A retrospective analysis. *Int J Oral Maxillofac Implants* 2015;30(3):681-7. [Abstract](#)
48. Luo ZB, Zhang QB, Zhang ZQ, et al. Performance of coralline hydroxyapatite in sinus floor augmentation: a retrospective study. *Clin Oral Invest* 2013;17(9):2003-10. [Abstract](#)
49. Chou CT, Morris HF, Ochi S, Walker L, DesRosiers D. AICRG, Part II: Crestal bone loss associated with the Ankylos implant: loading to 36 months. *J Oral Implantol* 2004;30(3):134-43. [Abstract](#)
50. Degidi M, Nardi D, Sighinolfi G, Piattelli A. The conometric concept: Definitive fixed lithium disilicate restorations supported by conical abutments. *J Prosthodont* 2016;E-pub Oct 10, doi:10.1111/jopr.12548. [Abstract](#)
51. Romanos GE, Nentwig GH. Immediate versus delayed functional loading of implants in the posterior mandible: a 2-year prospective clinical study of 12 consecutive cases. *Int J Periodontics Restorative Dent* 2006;26(5):459-69. [Abstract](#)
52. Ahmad R, Abu-Hassan MI, Chen J, Li Q, Swain MV. The relationship of mandibular morphology with residual ridge resorption associated with implant-retained overdentures. *Int J Prosthodont* 2016;29(6):573-80. [Abstract](#)
53. Ahmad R, Abu-Hassan MI, Li Q, Swain MV. Three dimensional quantification of mandibular bone remodeling using standard tessellation language registration based superimposition. *Clin Oral Implants Res* 2013;24(11):1273-9. [Abstract](#)
54. Ahmad R, Chen J, Abu-Hassan MI, Li Q, Swain MV. Investigation of mucosa-induced residual ridge resorption under implant-retained overdentures and complete dentures in the mandible. *Int J Oral Maxillofac Implants* 2015;30(3):657-66. [Abstract](#)
55. Cepa S, Koller B, Spies BC, Stampf S, Kohal RJ. Implant-retained prostheses: ball vs. conus attachments - A randomized controlled clinical trial. *Clin Oral Implants Res* 2017;28(2):177-85. [Abstract](#)
56. Frisch E, Ziebolz D, Ratka-Kruger P, Rinke S. A new technique for retaining double crowns on implants via custom-positioned vertical screws. *Int J Prosthodont* 2014;27(6):577-8. [Abstract](#)
57. Frisch E, Ziebolz D, Ratka-Kruger P, Rinke S. Double crown-retained maxillary overdentures: 5-year follow-up. *Clin Implant Dent Relat Res* 2015;17(1):22-31. [Abstract](#)
58. Khalid T, Yunus N, Ibrahim N, Elkezza A, Masood M. Patient-reported outcome and its association with attachment type and bone volume in mandibular implant overdenture. *Clin Oral Implants Res* 2017;28(5):535-42. [Abstract](#)
59. Yunus N, Saub R, Tayeb Ali TB, Salleh NM, Baig MR. Patient-based and clinical outcomes of implant telescopic attachment-retained mandibular overdentures: a 1-year longitudinal prospective study. *Int J Oral Maxillofac Implants* 2014;29(5):1149-56. [Abstract](#)
60. Zeren KJ. Use of Bone Morphogenetic Protein-2 in Molar Extraction Sockets for Immediate Implant Placement: A Prospective Case Series. *Int J Periodontics Restorative Dent* 2018;38(1):87-93. [Abstract](#)
61. Frisch E, Ratka-Kruger P, Ziebolz D. Increasing the width of keratinized mucosa in maxillary implant areas using a split palatal bridge flap: surgical technique and 1-year follow-up. *J Oral Implantol* 2015;41(5):e195-201. [Abstract](#)
62. Morris HF, Ochi S, Plezia R, et al. AICRG, Part III: The influence of antibiotic use on the survival of a new implant design. *J Oral Implantol* 2004;30(3):144-51. [Abstract](#)
63. Nogueira-Filho G, Pesun I, Isaak-Ploegman C, et al. Longitudinal comparison of cytokines in peri-implant fluid and gingival crevicular fluid in healthy mouths. *J Periodontol* 2014;85(11):1582-8. [Abstract](#)
64. Morris HF, Ochi S, Orenstein IH, Petrazzuolo V. AICRG, Part V: Factors influencing implant stability at placement and their influence on survival of Ankylos implants. *J Oral Implantol* 2004;30(3):162-70. [Abstract](#)
65. Morris HF, Winkler S, Ochi S. The Ankylos endosseous dental implant: assessment of stability up to 18 months with the Periotest. *J Oral Implantol* 2000;26(4):291-9. [Abstract](#)
66. Romanos G, Grizas E, Laukart E, Nentwig GH. Effects of early moderate loading on implant stability: A retrospective investigation of 634 implants with platform switching and Morse-tapered connections. *Clin Implant Dent Relat Res* 2016;18(2):301-9. [Abstract](#)
67. Romanos GE, Nentwig GH. Immediate loading using cross-arch fixed restorations in heavy smokers: nine consecutive case reports for edentulous arches. *Int J Oral Maxillofac Implants* 2008;23(3):513-9. [Abstract](#)
68. Woo IH, Kim JW, Kang SY, Kim YH, Yang BE. Narrow-diameter implants with conical connection for restoring the posterior edentulous region. *Maxillofac Plast Reconstr Surg* 2016;38(1):31. [Abstract](#)
69. Morris HF, Winkler S, Ochi S, Kanaan A. A new implant designed to maximize contact with trabecular bone: survival to 18 months. *J Oral Implantol* 2001;27(4):164-73. [Abstract](#)
70. Maier FM. Initial crestal bone loss after implant placement with flapped or flapless surgery—a prospective cohort study. *Int J Oral Maxillofac Implants* 2016;31(4):876-83. [Abstract](#)
71. Shin YK, Han CH, Heo SJ, Kim S, Chun HJ. Radiographic evaluation of marginal bone level around implants with different neck designs after 1 year. *Int J Oral Maxillofac Implants* 2006;21(5):789-94. [Abstract](#)
72. Degidi M, Dapirle G, Piattelli A. Marginal bone loss around implants with platform-switched Morse-cone connection: a radiographic cross-sectional study. *Clin Oral Implants Res* 2017;28(9):1108-12. [Abstract](#)
73. Frisch E, Ratka-Kruger P, Wenz HJ. Unsplinted implants and teeth supporting maxillary removable partial dentures retained by telescopic crowns: a retrospective study with >6 years of follow-up. *Clin Oral Implants Res* 2015;26(9):1091-7. [Abstract](#)
74. Jesch P, Jesch W, Bruckmoser E, et al. An up to 17-year follow-up retrospective analysis of a minimally invasive, flapless approach: 18 945 implants in 7783 patients. *Clin Implant Dent Relat Res* 2018. [Abstract](#)
75. Krebs M, Schmenger K, Neumann K, et al. Long-term evaluation of ANKYLOS(R) dental implants, part I: 20-year life table analysis of a longitudinal study of more than 12,500 implants. *Clin Implant Dent Relat Res* 2015;17 Suppl 1:e275-86. [Abstract](#)
76. Morris HF, Ochi S, Crum P, Orenstein IH, Winkler S. AICRG, Part I: A 6-year multicentered, multidisciplinary clinical study of a new and innovative implant design. *J Oral Implantol* 2004;30(3):125-33. [Abstract](#)
77. Rinke S, Ohl S, Ziebolz D, Lange K, Eickholz P. Prevalence of periimplant disease in partially edentulous patients: a practice-based cross-sectional study. *Clin Oral Implants Res* 2011;22(8):826-33. [Abstract](#)

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