

Atlantis® abutments —Clinical documentation

Atlantis abutments are a part of the digital implant solutions from Dentsply Sirona and deliver patient-specific prosthetic solutions for all major implant systems providing an excellent foundation for optimal function and esthetics.

Key features

- Atlantis abutments support cement-, screw-, and friction-retained implant restorations.
- Each abutment is individually designed with the patented Virtual Atlantis Design (VAD) software.
- The customized connection is available for all major implant systems.

Documentation

- Atlantis abutments have been evaluated in numerous randomized controlled trials¹⁻²⁶, clinical studies²⁷⁻⁶⁰, and case reports⁶¹⁻¹⁰¹.
- Esthetic outcome with titanium, gold-shaded titanium, and Atlantis Abutments in zirconia^{2, 4, 7, 15, 20, 22, 25, 26, 32, 35, 41, 51, 57, 66, 88, 102, 103}.
- Atlantis abutment with unique One-position-only indexing simplifies the abutment installation procedure for implant systems featuring the EV connection; OsseoSpeed EV^{2, 24, 31, 34, 36, 47, 81, 88, 91, 100, 104}, PrimeTaper EV and OmniTaper EV.
- Atlantis abutments are also documented with the Ankylos³, and Xive^{74, 83} as well as other implant brands^{64, 18, 39, 50, 62, 67, 68, 73, 75, 78, 85, 97, 99, 101}.

The scientific literature documents specific outcomes and prospective follow-up periods.

	< 2 years	2-5 years	6-10 years
Indication			
Single tooth	1-6, 16, 27, 30, 33, 34, 37, 42-44, 102	9, 10, 17, 21, 22, 29, 32, 50, 52-54, 56, 67, 104, 105	48
Fixed-partial denture (FPD)	45, 49	11, 90, 106	48
Patient-related outcome			
Patient satisfaction	16, 28, 34, 47	17, 29, 52, 53	48
Increased pink esthetic score	4, 5, 39, 51, 102, 107	32, 105	51
Maintenance of the papilla	2, 43	10, 35, 56, 103	
Maintained gingival zenith score	107	8	

Advantages of using Atlantis abutments

- High patient satisfaction^{17, 47, 48, 52, 53, 57}.
- Cost-effective and simplified treatment procedure reducing chair time^{87, 98}.
- Integrated workflows; digital planning, surgical guides^{72, 73, 82}, and digital impression techniques¹⁰⁰.

Conclusion

Atlantis abutments can deliver cost-effective treatment and easier implant restoration with high patient satisfaction in a digital implant workflow together with digital impression and guided surgery on multiple implant platforms.

References

1. Brandenberg FD, Sailer I, Fehmer V, et al. Randomized controlled clinical pilot study of all-ceramic single-tooth implant reconstructions: clinical and microbiological outcomes at one year of loading. *Clin Oral Implants Res* 2017;28(4):406-13. [Abstract](#)
2. Fernandes D, Nunes S, et al. Effect of customized healing abutments on the peri-implant linear and volumetric tissue changes at maxillary immediate implant sites: A 1-year prospective randomized clinical trial. *Clin Impl Dent Rel Res* 2021;E-pub Aug doi:10.1111/cid.13044. [Abstract](#)
3. Koutouzis T, Adeinat B, Ali A. The influence of abutment macro-design on clinical and radiographic peri-implant tissue changes for guided, placed, and restored implants: A 1-year randomized controlled trial. *Clin Oral Implants Res* 2019;30(9):882-91. [Abstract](#)
4. McGuire MK, Scheyer T, Ho DK, et al. Esthetic outcomes in relation to implant-abutment interface design following a standardized treatment protocol in a multicenter randomized controlled trial- A cohort of 12 cases at 1-year follow-up. *Int J Periodontics Restorative Dent* 2015;35(2):149-59. [Abstract](#)
5. Schepke U, Meijer HJ, Kerdijk W, Raghoebar GM, Cune M. Stock versus CAD/CAM customized zirconia implant abutments – clinical and patient-based outcomes in a randomized controlled clinical trial. *Clin Implant Dent Relat Res* 2017;19(1):74-84. [Abstract](#)
6. Thoma DS, Sailer I, Muhlemann S, et al. Randomized controlled clinical study of veneered zirconia abutments for single implant crowns: Clinical, histological, and microbiological outcomes. *Clin Implant Dent Relat Res* 2018;20(6):988-96. [Abstract](#)
7. Büchi DL, Sailer I, Fehmer V, Hammerle CH, Thoma DS. All-ceramic single-tooth implant reconstructions using modified zirconia abutments: a prospective randomized controlled clinical trial of the effect of pink veneering ceramic on the esthetic outcomes. *Int J Periodontics Restorative Dent* 2014;34(1):29-37. [Abstract](#)
8. Cooper LF, Reside G, DeKok I, et al. A 5-Year Esthetic RCT Assessment of Anterior Maxillary Single-Tooth Implants with Different Abutment Interfaces. *Int J Oral Maxillofac Implants* 2021;36(1):165-76. [Abstract](#)
9. Cooper LF, Stanford C, Feine J, McGuire M. Prospective assessment of CAD/CAM zirconia abutment and lithium disilicate crown restorations: 2.4 year results. *J Prosthet Dent* 2016;116(1):33-9. [Abstract](#)
10. Eisner B, Naenni N, Husler J, et al. Three-year results of a randomized controlled clinical trial using submucosally veneered and unveneered zirconia abutments supporting all-ceramic single-implant crowns. *Int J Periodontics Restorative Dent* 2018;38(5):645-52. [Abstract](#)
11. Esquivel-Upshaw J, Mehler A, Clark A, et al. Peri-implant complications for posterior endosteal implants. *Clin Oral Implants Res* 2015;26(12):1390-6. [Abstract](#)
12. Esquivel-Upshaw JF, Clark AE, Shuster JJ, Anusavice KJ. Randomized clinical trial of implant-supported ceramic-ceramic and metal-ceramic fixed dental prostheses: preliminary results. *J Prosthodont* 2014;23(2):73-82. [Abstract](#)
13. Ferrari M, Cagidiaco MC, Garcia-Godoy F, Goracci C, Cairo F. Effect of different prosthetic abutments on peri-implant soft tissue. A randomized controlled clinical trial. *Am J Dent* 2015;28(2):85-9. [Abstract](#)
14. Ferrari M, Tricarico MG, Cagidiaco MC, et al. 3-year randomized controlled prospective clinical trial on different CAD-CAM implant abutments. *Clin Implant Dent Relat Res* 2016;18(6):1134-41. [Abstract](#)
15. Gil MS, Ishikawa-Nagai S, Elani HW, et al. A prospective clinical trial to assess the optical efficacy of pink neck implants and pink abutments on soft tissue esthetics. *J Esthet Restor Dent* 2017;29(6):409-15. [Abstract](#)
16. Guljé FL, Raghoebar GM, Vissink A, Meijer HJ. Single crowns in the resorbed posterior maxilla supported by either 6-mm implants or by 11-mm implants combined with sinus floor elevation surgery: A 1-year randomised controlled trial. *Eur J Oral Implantol* 2014;7(3):247-55. [Abstract](#)
17. Gulje FL, Raghoebar GM, Vissink A, Meijer HJA. Single crowns in the resorbed posterior maxilla supported by either 11-mm implants combined with sinus floor elevation or 6-mm implants: A 5-year randomised controlled trial. *Int J Oral Implantol* 2019;12(3):315-26. [Abstract](#)
18. Hosseini B, Byrd WC, Preissler JS, et al. Effects of antibiotics on bone and soft-tissue healing following immediate single-tooth implant placement into sites with apical pathology. *J Oral Implantol* 2015;41(5):e202-11. [Abstract](#)
19. Jacobs BP, Zadeh HH, De Kok I, Cooper L. A randomized controlled trial evaluating grafting the facial gap at immediately placed implants. *Int J Periodontics Restorative Dent* 2020;40(3):383-92. [Abstract](#)
20. Kraus RD, Epprecht A, Hammerle CHF, Sailer I, Thoma DS. Cemented vs screw-retained zirconia-based single implant reconstructions: A 3-year prospective randomized controlled clinical trial. *Clin Implant Dent Relat Res* 2019;21(4):578-85. [Abstract](#)
21. Kraus RD, Espuelas C, Hammerle CHF, et al. Five-year randomized controlled clinical study comparing cemented and screw-retained zirconia-based implant-supported single crowns. *Clin Oral Implants Res* 2022;E-pub feb 28 doi:10.1111/cir.13913. [Abstract](#)
22. Laass A, Sailer I, Husler J, Hammerle CH, Thoma DS. Randomized controlled clinical trial of all-ceramic single-tooth implant reconstructions using modified zirconia abutments: Results at 5 years after loading. *Int J Periodontics Restorative Dent* 2019;39(1):17-27. [Abstract](#)
23. Schepke U, Meijer HJ, Vermeulen KM, Raghoebar GM, Cune MS. Clinical bonding of resin nano ceramic restorations to zirconia abutments: A case series within a randomized clinical trial. *Clin Implant Dent Relat Res* 2016;18(5):984-92. [Abstract](#)
24. Starch-Jensen T, Bruun NH. Patient's perception of recovery after sinus membrane elevation and blood coagulum compared with 1:1 mixture of autogenous bone graft and deproteinized porcine bone mineral. Secondary outcomes from a single-blinded randomized controlled trial. *Clin Oral Implants Res* 2021;E-pub Oct 6 doi:10.1111/cir.13866. [Abstract](#)
25. Thoma DS, Brandenberg F, Fehmer V, et al. Randomized controlled clinical trial of all-ceramic single tooth implant reconstructions using modified zirconia abutments: Radiographic and prosthetic results at 1 year of loading. *Clin Implant Dent Relat Res* 2016;18(3):462-72. [Abstract](#)
26. Thoma DS, Brandenberg F, Fehmer V, et al. The esthetic effect of veneered zirconia abutments for single-tooth implant reconstructions: A randomized controlled clinical trial. *Clin Implant Dent Relat Res* 2016;18(6):1210-17. [Abstract](#)
27. Schepke U, Gresnigt MMM, Browne WR, et al. Phase transformation and fracture load of stock and CAD/CAM-customized zirconia abutments after 1 year of clinical function. *Clin Oral Implants Res* 2019;30(6):559-69. [Abstract](#)
28. Guljé FL, Raghoebar GM, Vissink A, Meijer HJ. Single restorations in the resorbed posterior mandible supported by 6-mm implants: a 1-year prospective case series study. *Clin Implant Dent Relat Res* 2015;17 Suppl 2:e465-71. [Abstract](#)
29. Neumeier TT, Reddy M, Geurs N, Hill J, Neumeier H. Longitudinal Study of Dental Implants in HIV Positive Patients. *J Prosthodont* 2021;E-pub Sep 9, doi:10.1111/jopr.13421. [Abstract](#)
30. Knobloch LA, Larsen P, McGlumphy E, et al. Prospective cohort study to evaluate narrow diameter implants for restoration of a missing lateral incisor in patients with a cleft palate: One-year results. *J Prosthet Dent* 2021;E-pub May 27 doi:10.1016/j.jprost.2021.03.030. [Abstract](#)
31. Levin BP, Chu SJ. Changes in peri-implant soft tissue thickness with bone grafting and Dermis Allograft: A case series of 15 consecutive patients. *Int J Periodontics Restorative Dent* 2018;38(5):719-27. [Abstract](#)
32. Noelken R, Moergel M, Kunkel M, Wagner W. Immediate and flapless implant insertion and provisionalization using autogenous bone grafts in the esthetic zone: 5-year results. *Clin Oral Implants Res* 2018;29(3):320-27. [Abstract](#)
33. Guljé FL, Raghoebar GM, Erkens WA, Meijer HJ. Impact of crown-implant ratio of single restorations supported by 6-mm implants: A short-term case series study. *Int J Oral Maxillofac Implants* 2016;31(3):672-5. [Abstract](#)
34. Donker VJJ, Raghoebar GM, Jensen-Louwerse C, Vissink A, Meijer HJA. Monolithic zirconia single tooth implant-supported restorations with CAD/CAM titanium abutments in the posterior region: A 1-year prospective case series study. *Clin Implant Dent Relat Res* 2022;E-pub Jan 24, doi:10.1111/cid.13069. [Abstract](#)
35. Lops D, Parpaila A, Paniz G, et al. Interproximal papilla stability around CAD/CAM and stock abutments in anterior regions: A 2-year prospective multicenter cohort study. *Int J Periodontics Restorative Dent* 2017;37(5):657-65. [Abstract](#)
36. Norton MR. The influence of low insertion torque on primary stability, implant survival, and maintenance of marginal bone levels: A closed-cohort prospective study. *Int J Oral Maxillofac Implants* 2017;32(4):849-57. [Abstract](#)
37. Schepke U, Lohbauer U, Meijer HJ, Cune MS. Adhesive failure of Lava Ultimate and lithium disilicate crowns bonded to zirconia abutments: A prospective within-patient comparison. *Int J Prosthodont* 2018;31(3):208-10. [Abstract](#)
38. Lops D, Bressan E, Parpaila A, et al. Soft tissues stability of cad-cam and stock abutments in anterior regions: 2-year prospective multicentric cohort study. *Clin Oral Implants Res* 2015;26(12):1436-42. [Abstract](#)

39. Boon L, De Mars G, Favril C, et al. Esthetic evaluation of single implant restorations, adjacent single implant restorations, and implant-supported fixed partial dentures: A 1-year prospective study. *Clin Implant Dent Relat Res* 2020;22(1):128-37. [Abstract](#)
40. Wasiluk G, Chomik E, Gehrke P, et al. Incidence of undetected cement on CAD/CAM monolithic zirconia crowns and customized CAD/CAM implant abutments. A prospective case series. *Clin Oral Implants Res* 2017;28(7):774-78. [Abstract](#)
41. Noelken R, Neffe BA, Kunkel M, Wagner W. Maintenance of marginal bone support and soft tissue esthetics at immediately provisionalized OsseoSpeed implants placed into extraction sites: 2-year results. *Clin Oral Implants Res* 2014;25(2):214-20. [Abstract](#)
42. Levin BP, Wilk BL. Immediate provisionalization of immediate implants in the esthetic zone: a prospective case series evaluating implant survival, esthetics, and bone maintenance. *Compend Contin Educ Dent* 2013;34(5):352-61. [Abstract](#)
43. Borges T, Lima T, Carvalho A, Dourado C, Carvalho V. The influence of customized abutments and custom metal abutments on the presence of the interproximal papilla at implants inserted in single-unit gaps: a 1-year prospective clinical study. *Clin Oral Implants Res* 2014;25(11):1222-7. [Abstract](#)
44. Vera C, De Kok IJ, Chen W, et al. Evaluation of post-implant buccal bone resorption using cone beam computed tomography: a clinical pilot study. *Int J Oral Maxillofac Implants* 2012;27(5):1249-57. [Abstract](#)
45. Bressan E, Venezze AC, Magaz VR, Lops D, Ghensi P. Fixed conometric retention with CAD/CAM conic coupling abutments and prefabricated syncone caps: A case series. *Int J Periodontics Restorative Dent* 2018;38(2):277-80. [Abstract](#)
46. Fabbri G, Fradeani M, Dellificorelli G, et al. Clinical evaluation of the influence of connection type and restoration height on the reliability of zirconia abutments: A retrospective study on 965 abutments with a mean 6-year follow-up. *Int J Periodontics Restorative Dent* 2017;37(1):19-31. [Abstract](#)
47. Toia M, Galli S, Cecchinato D, Wennerberg A, Jimbo R. Clinical evidence of osseospeed EV implants: A retrospective study and characterization of the newly introduced system. *Int J Periodontics Restorative Dent* 2019;39(6):863-74. [Abstract](#)
48. Jensen-Louwerse C, Sikma H, Cune MS, Gulje FL, Meijer HJA. Single implant-supported two-unit cantilever fixed partial dentures in the posterior region: a retrospective case series with a mean follow-up of 6.5 years. *Int J Implant Dent* 2021;7(1):78. [Abstract](#)
49. Parpaioala A, Norton MR, Cecchinato D, Bressan E, Toia M. Virtual abutment design: a concept for delivery of CAD/CAM customized abutments - report of a retrospective cohort. *Int J Periodontics Restorative Dent* 2013;33(1):51-8. [Abstract](#)
50. Bompolaki D, Punj A, Fellows C, Truong C, Ferracane JL. Clinical performance of CAD/CAM monolithic lithium disilicate implant-supported single crowns using solid or predrilled blocks in a fully digital workflow: A retrospective cohort study with up to 33 months of follow up. *J Prosthodont* 2021;E-pub Apr 12 doi: 10.1111/jopr.13364. [Abstract](#)
51. Noelken R, Moergel M, Pausch T, Kunkel M, Wagner W. Clinical and esthetic outcome with immediate insertion and provisionalization with or without connective tissue grafting in presence of mucogingival recessions: A retrospective analysis with follow-up between 1 and 8 years. *Clin Implant Dent Relat Res* 2018;20(3):285-93. [Abstract](#)
52. Parpaioala A, Toia M, Norton M, et al. CAD/CAM implant abutments: Peri-implant hard and soft tissue response with up to 4 years of follow-up- A retrospective cohort study evaluation. *Int J Periodontics Restorative Dent* 2020;40(2):193-201. [Abstract](#)
53. Van Nimwegen WG, Goene RJ, Van Daelen AC, et al. Immediate implant placement and provisionalisation in the aesthetic zone. *J Oral Rehabil* 2016;43(10):745-52. [Abstract](#)
54. Noelken R, Geier J, Kunkel M, Jepsen S, Wagner W. Influence of soft tissue grafting, orofacial implant position, and angulation on facial hard and soft tissue thickness at immediately inserted and provisionalized implants in the anterior maxilla. *Clin Implant Dent Relat Res* 2018;20(5):674-82. [Abstract](#)
55. Barwacz CA, Shah KC, Bittner N, et al. A Retrospective, Multicenter, Cross-Sectional Case Series Study Evaluating Outcomes of CAD/CAM Abutments on Implants from Four Manufacturers: 4-Year Mean Follow-up. *Int J Oral Maxillofac Implants* 2021;36(5):966-76. [Abstract](#)
56. Borges T, Lima T, Carvalho AC, Carvalho V. Clinical outcome of inter-proximal papilla between a tooth and a single implant treated with CAD/CAM abutments: a cross-sectional study. *J Oral Maxillofac Res* 2012;3(3). [Abstract](#)
57. Kim A, Campbell SD, Viana MA, Knoernschild KL. Abutment material effect on peri-implant soft tissue color and perceived esthetics. *J Prosthodont* 2016;25(8):634-40. [Abstract](#)
58. Ferrari M, Carrabba M, Vichi A, Goracci C, Cagidiaco MC. Influence of abutment color and mucosal thickness on soft tissue color. *Int J Oral Maxillofac Implants* 2017;32(2):393-99. [Abstract](#)
59. Esquivel-Upshaw JF, Mehler A, Clark AE, Neal D, Anusavice KJ. Fracture analysis of randomized implant-supported fixed dental prostheses. *J Dent* 2014;42(10):1335-42. [Abstract](#)
60. Ocelik V, Schepke U, Rasoul HH, Cune MS, De Hosson JTM. On the bulk degradation of yttria-stabilized nanocrystalline zirconia dental implant abutments: an electron backscatter diffraction study. *J Mater Sci Mater Med* 2017;28(8):121. [Abstract](#)
61. Al-Ardah AJ, Alqahtani F, Lozada JL. Three-year follow-up of a single immediate implant placed in an infected area: a new approach for harvesting autogenous symphysis graft. *J Oral Implantol* 2014;40(2):211-6. [Abstract](#)
62. Alhashim A, Kamel M, Brackett WW. Four-year follow-up of the rehabilitation of a mandibular arch with a cementable zirconia-reinforced fixed dental prosthesis: a clinical report. *J Prosthet Dent* 2012;108(3):138-42. [Abstract](#)
63. Alqahtani F. Full-mouth rehabilitation of severely worn dentition due to soda swishing: a clinical report. *J Prosthodont* 2014;23(1):50-7. [Abstract](#)
64. Alsayed HD, Alqahtani NM, Levon JA, Morton D. Prosthodontic rehabilitation of an ectodermal dysplasia patient with implant telescopic crown attachments. *J Prosthodont* 2017;26(7):622-27. [Abstract](#)
65. Barrero CH, Bencharit S, Petrola F. Case report: Screw-retained zirconia implant restoration. *J Oral Implantol* 2016;42(4):359-62. [Abstract](#)
66. Barwacz C, Hernandez MM. Direct extrinsic characterization maximizing esthetics of fixed interim restorations. *J Cosmetic Dentistry* 2013;29(1):122-31.
67. Bencharit S, Allen RK, Whitley D, 3rd. Utilization of demineralized bone matrix to restore missing buccal bone during single implant placement: Clinical report. *J Oral Implantol* 2016;42(6):490-97. [Abstract](#)
68. Bencharit S, Border MB, Mack CR, Byrd WC, Wright JT. Full-mouth rehabilitation for a patient with dentinogenesis imperfecta: a clinical report. *J Oral Implantol* 2014;40(5):593-600. [Abstract](#)
69. Cardo VA, Jr., Koschitzki E, Augenbaum N, Polinsky JL. Replacement of an implant and prosthesis in the premaxilla due to a malposition and prosthetic failure: a clinical case letter. *J Oral Implantol* 2014;40(6):751-4. [Abstract](#)
70. Farahani A, Zadeh HH. Adjunctive orthodontic applications in dental implantology. *J Oral Implantol* 2015;41(4):501-8. [Abstract](#)
71. Ganz S. Computer-milled patient-specific abutments: incredibly quality with unprecedented simplicity. *Implantology* 2003;2003:37-44.
72. Ganz SD. Use of stereolithographic models as diagnostic and restorative aids for predictable immediate loading of implants. *Pract Proced Aesthet Dent* 2003;15(10):763-71. [Abstract](#)
73. Ganz SD. CT-derived model-based surgery for immediate loading of maxillary anterior implants. *Pract Proced Aesthet Dent* 2007;19(5):311-8. [Abstract](#)
74. Happe A, Kunz A. Complex fixed implant-supported restoration in a site compromised by periodontitis: A case report. *Int J Esthet Dent* 2016;11(2):186-202. [Abstract](#)
75. Jackson BJ, Slavin MR. Treatment of congenitally missing maxillary lateral incisors: An interdisciplinary approach. *J Oral Implantol* 2013;39(2):187-92. [Abstract](#)
76. Keith JD, Jr. Localized ridge augmentation with a block allograft followed by secondary implant placement: a case report. *Int J Periodontics Restorative Dent* 2004;24(1):11-7. [Abstract](#)
77. Kerstein RB, Castellucci F, Osorio J. Ideal gingival form with computer-generated permanent healing abutments. *Compend Contin Educ Dent* 2000;21(10):793-7, 800-1. [Abstract](#)
78. Kois JC, Kan JY. Predictable peri-implant gingival aesthetics: surgical and prosthodontic rationales. *Pract Proced Aesthet Dent* 2001;13(9):691-8. [Abstract](#)
79. Levin BP. The dual function of a dermal allograft in immediate implant therapy. *Int J Periodontics Restorative Dent* 2015;35(4):507-13. [Abstract](#)
80. Levin BP. Framing the restorative result: How tissue augmentation and preservation maximizes implant therapy outcomes. *Compend Contin Educ Dent* 2018;39(7):458-66. [Abstract](#)
81. Levin BP, Wilk BL. The teamwork approach to esthetic tooth replacement with immediate implant placement and immediate temporization. *Compend Contin Educ Dent* 2015;36(9):682-8. [Abstract](#)

82. Mandelaris GA, Vlk SD. Guided implant surgery with placement of a presurgical CAD/CAM patient-specific abutment and provisional in the esthetic zone. *Compend Contin Educ Dent* 2014;35(7):494-504. [Abstract](#)
83. Maridati PC, Cremonesi S, Fontana F, Ciccio M, Maiorana C. Management of d-PTFE membrane exposure for having final clinical success. *J Oral Implantol* 2016;42(3):289-91. [Abstract](#)
84. Martin R. Astra Tech OsseoSpeed™ 3.0S implant. Inside Dentistry 2010;6(4):2-4.
85. Mizumoto RM, Malamis D, Mascarenhas F, Tatakis DN, Lee DJ. Titanium implant wear from a zirconia custom abutment: A clinical report. *J Prosthet Dent* 2020;123(2):201-05. [Abstract](#)
86. Montana M. Treatment options for the edentulous arch. *Implants* 2015;3:4-10.
87. Nazarian A. Easier implant restoration: CAD/CAM generated implant abutments. *Contemporary Esthetics* 2007;5:44-48.
88. Noelken R. Immediate implant placement in the aesthetic zone using the OsseoSpeed® Profile EV implant. *Australasian Dental Practice* 2017;28(4):170-74.
89. Petrungaro P, Smilanich M, Jimenez E. Use of ceramic abutments in the esthetic zone to enhance implant esthetics. Inside Dentistry 2007;Feb:2-5.
90. Rojas-Vizcaya F. Rehabilitation of the maxillary arch with implant-supported fixed restorations guided by the most apical buccal bone level in the esthetic zone: a clinical report. *J Prosthet Dent* 2012;107(4):213-20. [Abstract](#)
91. Rosen A. Implant success: planning and impression material selection are key. *Compend Contin Educ Dent* 2018;39(3):12-14.
92. Schneider A, Kurtzman GM. Computerized milled solid implant abutments utilized at second stage surgery. *Gen Dent* 2001;49(4):416-20. [Abstract](#)
93. Silva F, Neiva R. LASSO GBR for lingual alveolar ridge augmentation. *SVOA Dentistry* 2021;2(1):10-14.
94. Steveling H, Gonzales JR. Immediate implant placement in extraction socket with an adapted implant the new astra tech implant EV in routine clinical practice. *International Journal of Dentistry and Oral Health* 2020;6(E-pub May, 11 10.16966/2378-7090.324):1-9.
95. Taylor TD, Klotz MW, Lawton RA. Titanium tattooing associated with zirconia implant abutments: a clinical report of two cases. *Int J Oral Maxillofac Implants* 2014;29(4):958-60. [Abstract](#)
96. Wadhwanji C, Rapoport D, La Rosa S, Hess T, Kretschmar S. Radiographic detection and characteristic patterns of residual excess cement associated with cement-retained implant restorations: a clinical report. *J Prosthet Dent* 2012;107(3):151-7. [Abstract](#)
97. Watkin A, Kerstein RB. Improving darkened anterior peri-implant tissue color with zirconia custom implant abutments. *Compend Contin Educ Dent* 2008;29(4):238-40, 42. [Abstract](#)
98. Whitesides L. Evaluation of the Atlantis abutment in implant restoration. Inside Dentistry 2006;Sept:98-99.
99. Whitesides LM. Solution for the challenging implant. *Dent Today* 2008;27(2):146, 48. [Abstract](#)
100. Wilk BL. Intraoral digital impressioning for dental implant restorations versus traditional implant impression techniques. *Compend Contin Educ Dent* 2015;36(7):529-33. [Abstract](#)
101. Yoda N, Zheng K, Chen J, et al. Bone morphological effects on post-implantation remodeling of maxillary anterior buccal bone: A clinical and biomechanical study. *J Prosthodont Res* 2017;61(4):393-402. [Abstract](#)
102. Barwacz CA, Stanford CM, Diehl UA, et al. Electronic assessment of peri-implant mucosal esthetics around three implant-abutment configurations: a randomized clinical trial. *Clin Oral Implants Res* 2016;27(6):707-15. [Abstract](#)
103. Cooper LF, Reside G, Stanford C, et al. Three-year prospective randomized comparative assessment of anterior maxillary single implants with different abutment interfaces. *Int J Oral Maxillofac Implants* 2019;34(1):150-58. [Abstract](#)
104. Noelken R, Pausch T, Wagner W, Al-Nawas B. Peri-implant defect grafting with autogenous bone or bone graft material in immediate implant placement in molar extraction sites-1- to 3-year results of a prospective randomized study. *Clin Oral Implants Res* 2020;31(11):1138-48. [Abstract](#)
105. Barwacz CA, Stanford CM, Diehl UA, et al. Pink esthetic score outcomes around three implant-abutment configurations: 3-year results. *Int J Oral Maxillofac Implants* 2018;33(5):1126-35. [Abstract](#)
106. Esquivel-Upshaw JF, Mecholsky JJ, Jr., Clark AE, et al. Factors influencing the survival of implant-supported ceramic-ceramic prostheses: A randomized, controlled clinical trial. *J Dent* 2020;103S:100017. [Abstract](#)
107. Cooper LF, Reside G, Stanford C, et al. A multicenter randomized comparative trial of implants with different abutment interfaces to replace anterior maxillary single teeth. *Int J Oral Maxillofac Implants* 2015;30(3):622-32. [Abstract](#)

To read more Scientific Reviews please see: www.dentsplysirona.com/implants/science