

# Marginal bone maintenance with Astra Tech Implant System<sup>®</sup>

The OsseoSpeed implant (Astra Tech Implant System) is designed to maintain marginal bone. Features such as Conical Seal Design (internal conical implant-abutment connection) and MicroThread (minute thread on the implant neck) reduces the peak stress in the marginal bone and transfers the load deeper down in the bone. A meta-analysis concluded that the Astra Tech Implant System shows a mean marginal bone loss of 0.3 mm, which is much better results than the standard norm<sup>1</sup> (standard norm: 1 mm bone loss during the first year, and an annual bone loss of less than 0.2 mm thereafter<sup>2</sup>).

## Transparent systematic literature search

To confirm these data a global and systematic literature search was conducted, applying the following inclusion criteria:

- Prospective studies with OsseoSpeed implants
- Bone level changes read from periapical intraoral radiographs
- ≥ 10 patients, followed for ≥ 1 year

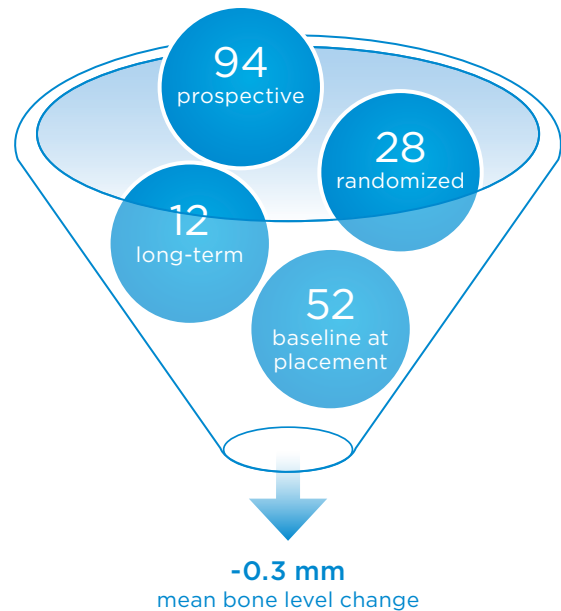
In total, 94 publications fulfilled the inclusion criteria. Prospective data from >4000 patients with >8000 OsseoSpeed implants is summarized here. No restrictions for inclusion was set with respect to type of restoration, loading protocol or surgical approach, however, block augmentation or larger graftings were excluded from the analysis, data shown in the table.

Overall mean marginal bone level changes are small for the Astra Tech Implant System, averaging at -0.3 mm after 5 and 10 years of follow-up.

## Conclusion

The scientific literature presenting bone level data around the OsseoSpeed implant (Astra Tech Implant System) is extensive and shows remarkably well maintained marginal bone levels in both short and long-term perspective.

### Sampled features for publications included in the analysis



First author	Mean MBLC <sup>a</sup> mm	Radiographic baseline <sup>b</sup> (months from IP)	Follow-up period (years)	No. of patients <sup>c</sup>	Restorations <sup>d</sup>	Implant survival rate (%) <sup>e</sup>
<b>Five years or more follow-up</b>						
Windael et al. 2018 <sup>3</sup>	-0.49	0	10	25	F	100
Raes et al. 2018 <sup>4</sup>	-0.49 /+0.98	0	8-10	23 /16	S	100 /93.8
Berberi et al. 2014 <sup>5</sup>	-0.19 /-0.21	0	5	18	S	100 /90.9
Boven et al. 2017 <sup>6</sup>	-0.23	3	5	25	OD	97
Boven et al. 2015 <sup>7</sup>	-0.37 <sup>#</sup>	3	5	26	OD	99.1
Cooper et al. 2014 <sup>8</sup>	+0.10 /+2.06	1 to 3	5	58 /55	S	98.3 /94.6
Cooper et al. 2014 <sup>9</sup>	-0.18 <sup>s</sup>	0	5	19	S	95.6
Donati et al. 2015 <sup>10</sup>	-0.28 <sup>#</sup>	3	5	149	S	97.5
Galindo-Moreno et al. 2017 <sup>11</sup>	-0.15	0	5	69	S	95.9
Lops et al. 2013 <sup>12</sup>	-0.30 <sup>#</sup>	5	5	85	S	100
Mertens et al. 2011 <sup>13</sup>	-0.09 <sup>#s</sup>	0 to 2	5	17	S, F	97
Schliephake et al. 2012 <sup>14</sup>	-0.08 <sup>#</sup>	0	5	44	F	100
Slot et al. 2016 <sup>15</sup>	-0.51 <sup>#</sup>	3	5	50	OD	99.6
Temmerman et al. 2019 <sup>16</sup>	-0.09	6	5	48	OD, F	96.5
Thoma et al. 2018 <sup>17</sup>	-0.15 <sup>#</sup>	6	5	101	S	99.3
Toljanic et al. 2016 <sup>18</sup>	-0.44	0	5	51	F	93.2
<b>Two to four years follow-up</b>						
Güncü et al. 2016 <sup>19</sup>	-0.70	3 to 6	4	24	S	100
Arora et al. 2017 <sup>20</sup>	+0.26 <sup>#s</sup>	0	3	30	S	100
Barewal et al. 2012 <sup>21</sup>	-0.22	0	3	40	S	97.5
Basler et al. 2018 <sup>22</sup>	-0.04	4	3	23	S	no info
Berberi et al. 2014 <sup>23</sup>	-0.27 <sup>s</sup>	0	3	20	S	100
Clelland et al. 2016 <sup>24</sup>	+0.20 <sup>#</sup>	5	3	18	F	98.8
De Bruyn et al. 2013 <sup>25</sup>	-0.40 /+1.56	0	3	58 /55	S	98.3 /94.5
Galindo-Moreno et al. 2017 <sup>26</sup>	-0.33 <sup>s</sup>	0	3	59	S	100
Geckili et al. 2011 <sup>27</sup>	-0.88	0	3	52	OD	100
Hadzik et al. 2018 <sup>28</sup>	-0.28 <sup>#</sup>	0	3	30	S	no info
Han et al. 2018 <sup>29</sup>	-0.04	0	3	45	S	95.8
Hosseini et al. 2013 <sup>30</sup>	-0.22	8	3	59	S	100
King et al. 2016 <sup>31</sup>	-0.23	0	3	38	S	96.8
Kutan et al. 2015 <sup>32</sup>	-0.89 <sup>#</sup>	3	3	28	S	100
Maiorana et al. 2015 <sup>33</sup>	-0.09	0	3	69	S	95.9
Palmer et al. 2012 <sup>34</sup>	-0.10 <sup>#</sup>	4	3	29	S	96.6
Pieri et al. 2014 <sup>35</sup>	-0.22	6	3	50	S	100
Pohl et al. 2017 <sup>36</sup>	-0.44	0	3	101	S	100
Sanz et al. 2014 <sup>37</sup>	+0.25 <sup>#s</sup>	0	3	93	S	98.9
Tabrizi et al. 2013 <sup>38</sup>	-0.75	3	3	33	S	100
Tabrizi et al. 2016 <sup>39</sup>	-0.42 <sup>#</sup>	3	3	23	F	100
Temmerman et al. 2015 <sup>40</sup>	-0.18	4	3	28	S, F, OD	100
Thor et al. 2014 <sup>41</sup>	-0.57	0	3	51	F	95.7
Zadeh et al. 2018 <sup>42</sup>	-0.19	0	3	95	F	97.6
Collaert et al. 2011 <sup>43</sup>	-0.11	0	2	25	F	100
Emami et al. 2016 <sup>44</sup>	-0.40 <sup>#</sup>	0	2	18	OD	91.7
Ferrari et al. 2015 <sup>45</sup>	-0.49 <sup>#</sup>	8	2	47	S	100
Göcken-Röhlig et al. 2010 <sup>46</sup>	-1.17 /-1.36	4	2	10	OD	100
Koutouzis et al. 2015 <sup>47</sup>	-0.31 <sup>#</sup>	0	2	29	S	100
Lee et al. 2016 <sup>48</sup>	+0.06	0	2	14	S	100
Mumcu et al. 2012 <sup>49</sup>	-0.43 <sup>#</sup>	6	2	48	OD	100
Noelken et al. 2014 <sup>50</sup>	+0.89 <sup>#s</sup>	0	2	20	S, F	100
Pieri et al. 2012 <sup>51</sup>	-0.60	6	2	25	F	96.8
Raes et al. 2015 <sup>52</sup>	+0.06 <sup>#</sup>	2	2	85	S	96.5
Schiegnitz et al. 2017 <sup>53</sup>	-0.30	0	2	184	S	99.2
Vervaeke et al. 2013 <sup>54</sup>	-0.11	0	2	25	F	100
Vervaeke et al. 2018 <sup>55</sup>	-0.37 <sup>#</sup>	3 to 4	2	25	OD	100

First author	Mean MBLC <sup>a</sup> mm	Radiographic baseline <sup>b</sup> (months from IP)	Follow-up period (years)	No. of patients <sup>c</sup>	Restorations <sup>d</sup>	Implant survival rate (%) <sup>e</sup>
<b>One year follow-up</b>						
Barbier et al. 2012 <sup>56</sup>	-0.21 s	6	1	20	F	100
Bashutski et al. 2013 <sup>57</sup>	-0.50 #s	0	1	24	S	92
Cooper et al. 2010 <sup>58</sup>	-0.40 /+1.30	1 to 3	1	60 /55	S	98.3 /94.5
Cooper et al. 2015 <sup>59</sup>	-0.22	0	1	48	S	100
D'Haese et al. 2013 <sup>60</sup>	-0.47	0	1	26	F	88.6
Donati et al. 2008 <sup>61</sup>	-0.32 #	0	1	151	S	97.4
Ettl et al. 2016 <sup>62</sup>	-0.81 #	0	1	29	OD	95.2
Galindo-Moreno et al. 2012 <sup>63</sup>	-0.07	0	1	69	S	95.9
Ghoveizi et al. 2013 <sup>64</sup>	-0.24 #	no info	1	10	S	no info
Guljé et al. 2011 <sup>65</sup>	-0.10	0	1	12	OD	96
Guljé et al. 2013 <sup>66</sup>	+0.04 #	< 2	1	95	F	98.6
Guljé et al. 2015 <sup>67</sup>	-0.14	4	1	21	S	100
Guljé et al. 2014 <sup>68</sup>	-0.10	4	1	41	S	100
Guljé et al. 2016 <sup>69</sup>	-0.13	< 1	1	37	S	100
Han et al. 2016 <sup>70</sup>	-0.20	0	1	45	S	95.8
Hosseini et al. 2011 <sup>71</sup>	-0.09 #	7	1	36	S	100
Kim et al. 2010 <sup>72</sup>	-0.06 #	3 to 6	1	12	F	100
Koutouzis et al. 2011 <sup>73</sup>	-0.19	0	1	18	S	95
Lee et al. 2014 <sup>74</sup>	-0.09 #	3 to 6	1	76	S	100
Lyngstadaas et al. 2015 <sup>75</sup>	-0.65 #	0	1	37	F	98.6
Malmström et al. 2016 <sup>76</sup>	-0.13 #	3	1	30	S, F	98.8
Marcelis et al. 2012 <sup>77</sup>	-0.13	0	1	29	S	no info
Noelken et al. 2014 <sup>78</sup>	-0.54	0	1	65	S	100
Norton 2017 <sup>79</sup>	-0.13 s	3	1	22	S	100
Pieri et al. 2012 <sup>80</sup>	-0.38 #	0	1	20	F	98.7
Piero et al. 2012 <sup>81</sup>	-0.36	4	1	15	S, F	100
Raes F. et al. 2013 <sup>82</sup>	-0.18 /+0.66	0	1	23 /25	S	100 /96
Raes F. et al. 2011 <sup>83</sup>	-0.25 /+0.80 #	0	1	23 /16	S	100 /93.8
Rismanchian et al. 2011 <sup>84</sup>	-0.48	0	1	10	F	100
Schepke et al. 2017 <sup>85</sup>	+0.09 #	3	1	50	S	100
Schickaglia et al. 2015 <sup>86</sup>	-0.30 #	0	1	101	S	100
Schickaglia et al. 2016 <sup>87</sup>	-0.40 #	0	1	30	OD	96.5
Simmons et al. 2017 <sup>88</sup>	-0.21 #	0	1	27	S	93.3
Slot et al. 2013 <sup>89</sup>	-0.25 #	3	1	50	OD	99.7
Slot et al. 2014 <sup>90</sup>	-0.22	3	1	25	OD	98
Stanford et al. 2016 <sup>91</sup>	-0.05 #	2	1	120	S, F	96.9
Temmerman et al. 2017 <sup>92</sup>	-0.01	5 to 8	1	48	F	99.3
Toljanic et al. 2009 <sup>93</sup>	-0.50	0	1	51	F	96
Tsuda et al. 2011 <sup>94</sup>	+0.10 s	0	1	10	S	100
Vercruyssen et al. 2014 <sup>95</sup>	-0.03 #	3 to 4	1	60	F, OD	100
Zhou et al. 2016 <sup>96</sup>	+0.08	2	1	45	F	100

#### Table text

<sup>a</sup> MBLC, marginal bone level change in mm, from radiographic baseline to the end of the follow-up period (value for healed sites /extraction sockets).

<sup>b</sup> IP = implant placement (0 is defined as <48 hours since surgery)

<sup>c</sup> Number of patients at study start (patients having implants in healed sites /extraction sockets).

<sup>d</sup> Restoration, S = single tooth; F = fixed restoration; OD = overdenture.

<sup>e</sup> Cumulative implant survival rate (value for healed sites /extraction sockets).

# Value has been presented for different or different time periods, and a *mean change* value has been calculated; or a mean change have been interpreted from tables or graphs

s Value at implants placed in a mix of extraction sockets and healed sites.

## References

1. Laurell L, Lundgren D. Clin Implant Dent Relat Res 2011;13(1):19-28. [Abstract](#)
2. Albrektsson T, et al. Int J Oral Maxillofac Implants 1986;1(1):11-25. [Abstract](#)
3. Windael S, et al. Clin Implant Dent Relat Res 2018;20(4):515-21. [Abstract](#)
4. Raes S, et al. Int J Periodontics Restorative Dent 2018;38(3):337-45. [Abstract](#)
5. Berberi AN, et al. Front Physiol 2014;5:29. [Abstract](#)
6. Boven GC, et al. J Oral Rehabil 2017;44(12):988-95. [Abstract](#)
7. Boven GC, et al. J Craniomaxillofac Surg 2015;43(9):1758-62. [Abstract](#)
8. Cooper LF, et al. Int J Oral Maxillofac Implants 2014;29(3):709-17. [Abstract](#)
9. Cooper LF, et al. Int J Periodontics Restorative Dent 2014;34(4):477-86. [Abstract](#)
10. Donati M, et al. Clin Implant Dent Relat Res 2015;17(3):425-34. [Abstract](#)
11. Galindo-Moreno P, et al. Clin Oral Implants Res 2017;28(12):1584-91. [Abstract](#)
12. Lops D, et al. Int J Oral Maxillofac Implants 2013;28(1):281-7. [Abstract](#)
13. Mertens C, Staveling HG. Clin Oral Implants Res 2011;22(12):1354-60. [Abstract](#)
14. Schliephake H, et al. J Clin Periodontol 2012;39(2):188-95. [Abstract](#)
15. Slot W, et al. J Clin Periodontol 2016;43(12):1180-87. [Abstract](#)
16. Temmerman A, et al. J Dent Res 2019;98(1):84-90. [Abstract](#)
17. Thoma DS, et al. J Clin Periodontol 2018;45(12):1465-74. [Abstract](#)
18. Toljanic JA, et al. Int J Oral Maxillofac Implants 2016;31(5):1164-70. [Abstract](#)
19. Guncu MB, et al. Clin Oral Investig 2016;20(9):2467-73. [Abstract](#)
20. Arora H, et al. Clin Implant Dent Relat Res 2017;19(4):694-702. [Abstract](#)
21. Barewal RM, et al. Int J Oral Maxillofac Implants 2012;27(4):945-56. [Abstract](#)
22. Basler T, et al. Clin Oral Implants Res 2018;29(5):499-507. [Abstract](#)
23. Berberi AN, et al. J Contemp Dent Pract 2014;15(2):202-8. [Abstract](#)
24. Clelland N, et al. Int J Oral Maxillofac Implants 2016;31(5):1135-41. [Abstract](#)
25. De Bruyn H, et al. Clin Oral Implants Res 2013;24(2):217-23. [Abstract](#)
26. Galindo-Moreno P, et al. Clin Oral Implants Res 2017;28(6):704-12. [Abstract](#)
27. Geckili O, et al. Int J Oral Maxillofac Implants 2011;26(2):319-24. [Abstract](#)
28. Hadzik J, et al. Biomed Res Int 2018;2018:4246874. [Abstract](#)
29. Han J, et al. Clin Implant Dent Relat Res 2018;20(1):34-42. [Abstract](#)
30. Hosseini M, et al. Clin Oral Implants Res 2013;24(10):1078-87. [Abstract](#)
31. King P, et al. Int J Prosthodont 2016;29(2):147-53. [Abstract](#)
32. Kutan E, et al. Clin Implant Dent Relat Res 2015;17 Suppl 2:e364-75. [Abstract](#)
33. Maiorana C, et al. Clin Oral Implants Res 2015;26(1):77-82. [Abstract](#)
34. Palmer RM, et al. Clin Oral Implants Res 2012;23(1):35-40. [Abstract](#)
35. Pieri F, et al. Int J Periodontics Restorative Dent 2014;34(6):825-32. [Abstract](#)
36. Pohl V, et al. J Clin Periodontol 2017;44(4):438-45. [Abstract](#)
37. Sanz M, et al. Clin Oral Implants Res 2014;25(3):321-7. [Abstract](#)
38. Tabrizi R, et al. Clin Oral Maxillofac Surg 2013;71(2):272-7. [Abstract](#)
39. Tabrizi R, et al. Br J Oral Maxillofac Surg 2016;54(7):731-5. [Abstract](#)
40. Temmerman A, et al. J Clin Periodontol 2015;42(3):311-8. [Abstract](#)
41. Thor A, et al. Int J Oral Maxillofac Implants 2014;29(3):642-9. [Abstract](#)
42. Zadeh HH, et al. Clin Oral Implants Res 2018;29(8):894-906. [Abstract](#)
43. Collaert B, et al. Clin Oral Implants Res 2011;22(10):1111-6. [Abstract](#)
44. Emami E, et al. J Dent 2016;50:30-6. [Abstract](#)
45. Ferrari M, et al. Am J Dent 2015;28(2):85-9. [Abstract](#)
46. Gökçen-Röhlig B, et al. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109(4):1-7. [Abstract](#)
47. Koutouzis T, et al. Int J Oral Maxillofac Implants 2015;30(4):900-8. [Abstract](#)
48. Lee PK, Siu AS. Int J Oral Maxillofac Implants 2016;31(6):1423-28. [Abstract](#)
49. Mumcu E, et al. Indian J Dent Res 2012;23(4):514-8. [Abstract](#)
50. Noelken R, et al. Clin Oral Implants Res 2014;25(2):214-20. [Abstract](#)
51. Pieri F, et al. Int J Prosthodont 2012;25(3):279-89. [Abstract](#)
52. Raes S, et al. Clin Oral Implants Res 2015;26(9):1086-90. [Abstract](#)
53. Schiegnitz E, et al. Clin Oral Implants Res 2017;28(6):721-26. [Abstract](#)
54. Vervaeke S, et al. Int J Oral Maxillofac Implants 2013;28(5):1352-7. [Abstract](#)
55. Vervaeke S, et al. J Clin Periodontol 2018;45(5):605-12. [Abstract](#)
56. Barbier L, et al. Clin Oral Investig 2012;16(4):1061-70. [Abstract](#)
57. Bashutski JD, et al. J Periodontol 2013;84(12):1747-54. [Abstract](#)
58. Cooper LF, et al. Int J Oral Maxillofac Implants 2010;25(6):1222-32. [Abstract](#)
59. Cooper LF, et al. Int J Oral Maxillofac Implants 2015;30(3):622-32. [Abstract](#)
60. D'haese J, et al. Int J Oral Maxillofac Implants 2013;28(1):205-15. [Abstract](#)
61. Donati M, et al. Clin Oral Implants Res 2008;19(8):740-48. [Abstract](#)
62. Ettl T, et al. J Craniomaxillofac Surg 2016;44(9):1453-62. [Abstract](#)
63. Galindo-Moreno P, et al. Clin Oral Implants Res 2012;23(5):609-16. [Abstract](#)
64. Ghoveiz R, et al. J Dent (Tehran) 2013;10(2):155-63. [Abstract](#)
65. Guljé F, et al. Clin Implant Dent Relat Res 2011;14(Supplement 1):e59-e66. [Abstract](#)
66. Guljé F, et al. Clin Oral Implants Res 2013;24(12):1325-31. [Abstract](#)
67. Guljé FL, et al. Clin Implant Dent Relat Res 2015;17 Suppl 2:e465-71. [Abstract](#)
68. Guljé FL, et al. Eur J Oral Implantol 2014;7(3):247-55. [Abstract](#)
69. Guljé FL, et al. Int J Oral Maxillofac Implants 2016;31(3):672-5. [Abstract](#)
70. Han J, et al. Clin Oral Implants Res 2016;27(4):452-7. [Abstract](#)
71. Hosseini M, et al. Eur J Oral Implantol 2011;4(4):347-61. [Abstract](#)
72. Kim JJ, et al. Clin Oral Implants Res 2010;21(4):439-44. [Abstract](#)
73. Koutouzis T, et al. J Periodontol 2011;82(11):1556-62. [Abstract](#)
74. Lee DW, et al. J Prosthet Dent 2014;112(3):501-7. [Abstract](#)
75. Lyngstadaas SP, et al. Clin Implant Dent Relat Res 2015;17 Suppl 2:e594-600. [Abstract](#)
76. Malmstrom H, et al. Clin Oral Implants Res 2016;27(9):1093-8. [Abstract](#)
77. Marcellis K, et al. Clin Oral Implants Res 2012;23(8):999-1003. [Abstract](#)
78. Noelken R, et al. Clin Oral Implants Res 2014;25(1):3-9. [Abstract](#)
79. Norton MR. Int J Oral Maxillofac Implants 2017;32(4):849-57. [Abstract](#)
80. Pieri F, et al. Clin Implant Dent Relat Res 2012;14 (Suppl 1):e67-82. [Abstract](#)
81. Piero B, et al. Clin Implant Dent Relat Res 2012;14(5):682-9. [Abstract](#)
82. Raes F, et al. Clin Implant Dent Relat Res 2013;15(6):819-35. [Abstract](#)
83. Raes F, et al. J Clin Periodontol 2011;38(4):385-94. [Abstract](#)
84. Rismanchian M, et al. Clin Oral Implants Res 2011;22(12):1440-5. [Abstract](#)
85. Schepke U, et al. Clin Implant Dent Relat Res 2017;19(1):74-84. [Abstract](#)
86. Schincaglia GP, et al. J Clin Periodontol 2015;42(11):1042-51. [Abstract](#)
87. Schincaglia GP, et al. Int J Oral Maxillofac Implants 2016;31(2):448-58. [Abstract](#)
88. Simmons DE, et al. Int J Implant Dent 2017;3(1):16. [Abstract](#)
89. Slot W, et al. J Clin Periodontol 2013;40(3):303-10. [Abstract](#)
90. Slot W, et al. Clin Implant Dent Relat Res 2014;16(1):51-61. [Abstract](#)
91. Stanford CM, et al. Int J Oral Maxillofac Implants 2016;31(4):906-15. [Abstract](#)
92. Temmerman A, et al. Clin Oral Implants Res 2017;28(1):95-102. [Abstract](#)
93. Toljanic JA, et al. Int J Oral Maxillofac Implants 2009;24(3):518-26. [Abstract](#)
94. Tsuda H, et al. Int J Oral Maxillofac Implants 2011;26(2):427-36. [Abstract](#)
95. Verccruyssen M, et al. J Clin Periodontol 2014;41(12):1154-60. [Abstract](#)
96. Zhou J, et al. J Clin Periodontol 2016;43(3):298-304. [Abstract](#)

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