

Marginal bone maintenance and Astra Tech Implant System™

The design features of a dental implant system are crucial to the long-term marginal bone stability. Optimal biomechanical bone stimulation from the implant and the stable seal of the implant-abutment interface will help maintaining the marginal bone, and thereby the long-term function and esthetics of the implant treatment.

The peer-reviewed published scientific documentation on the maintenance of the marginal bone supporting Astra Tech implants is extensive. Several thousands of Astra Tech implants have been carefully evaluated by radiographs in clinical trials with a follow-up period of up to 12 years.

Studies reporting on the frequency distribution of marginal bone level changes in periodontally compromised patients, show that between 64-88% of the implants had ≤ 1.5 mm change after 3-10 years¹⁻⁴.

From studies presenting mean values of marginal bone level changes, it can be concluded that very small bone level changes occur around Astra Tech implants during the first year in function, around 0.3 mm. On average, bone levels at 5 years follow-up are maintained at 0.3 mm. Figures from two prospective studies (10⁵ and 12⁶ years) reports bone level changes of on average 0.5 mm. Thus, the Astra Tech literature shows remarkably well maintained marginal bone levels in the long-term perspective.

The table below shows published articles reporting from a minimum of 10 patients on radiographically measured mean marginal bone level changes adjacent to Astra Tech implants after a minimum of 1 year in function. All studies have good results in regard to the current standard for success for radiographically evaluated implant outcomes⁷⁻⁹ (i.e. less than 1 mm bone loss during the first year and less than 0.2 mm annually thereafter).

Additionally, a meta analysis concluded that Astra Tech implant system perform even much better than the presently accepted success criteria¹⁰.

First author	Mean MBL ^a change (mm)	Follow-up period (years)	No. of patients	Restorations ^b	Implant survival (%)	Loading ^c
<i>Prospective studies</i>						
Vroom et al. 2009 ⁶	0.2	5-12	20	OD	100	3
Gotfredsen 2009 ^{5 n}	0.75 [#]	10	20	S	100	3
Rasmusson et al. 2005 ¹¹	1.27	7	36	F	96.9	3
Arvidsson et al. 1998 ^{12 i}	0.26	5	107	F	98.7	3
Cecchinato et al. 2008 ^{13 j}	0.11 [#]	5	84	F	no info	3 ▪
Cooper et al. 2008 ¹⁴	+ 0.09	5	59	OD	95.9	2 ▪
Davis and Packer 1999 ¹⁵	0.15 [#]	5	25	OD	92	3
Gotfredsen et al. 2000 ¹⁶	0.20	5	26	OD	100	3
Gotfredsen et al. 2001 ¹⁷	0.37 [#]	5	50	F	97.6	3
Gotfredsen 2004 ^{18 o}	0.30 [#]	5	20	S	100	3
Kahnberg et al. 2005 ¹⁹	1.60 ^{#*}	5	22	F	97	3
Makkonen et al. 1997 ²⁰	0.48	5	33	F, OD	98.7	3
Palmer et al. 2000 ^{21 h}	+ 0.12 [#]	5	15	S	no info	3
Wennström et al. 2004 ²²	0.41	5	51	F	94.1	3
Wennström et al. 2005 ²³	0.11	5	40	S	97.4	3
von Wowern and Gotfredsen 2001 ²⁴	0.47	5	22	OD	100	3
Åstrand et al. 2004 ^{25 d}	0.26 [#]	5	33	F	98.4	3
Gotfredsen 1997 ²⁶	0.60	up to 5	32	OD	98.5	3
Steveling et al. 2001 ²⁷	0.90	up to 5	17	F, S	100	2
Weibrich et al. 2001 ²⁸	1.50 [*]	up to 5	107	F, OD	95.9	no info
Arvidsson et al. 1992 ^{29 m}	0.01 [§]	3	55	F	98.1	3
Collaert and De Bruyn 2008 ³⁰	0.72	3	25	F	100	1 ▪
Cooper et al. 2007 ^{31 f}	0.42	3	54	S	94	2 ▪
De Bruyn et al. 2008 ³²	1.20	3	25	F	100	1 ▪
Engquist et al. 2002 ^{33 e}	0.24 [#]	3	33	F	98.9	3
Lee et al. 2007 ³⁴	0.38 [#]	3	17	F	100	3
Palmer et al. 2005 ³⁵	0.13	3	19	F	no info	3

Yi et al. 2001 ³⁶	0.21	3	43	F	100	3
Norton et al. 2002 ³⁷	0.45 ^{#*}	2-3	17	S, F, OD	88.6/96.8	3
Gotfredsen et al. 1993 ³⁸	0.31	2	20	OD	97.5	3
Kahnberg 2009 ³⁹	0.56 [*]	2	26	S	100	3
Karlsson et al. 1998 ⁴⁰	0.24	2	50	F	97.7	3
Karlsson et al. 1997 ⁴¹	0.31	2	47	S	100	3
Palmer et al. 1997 ^{42 h}	0.00	2	15	S	100	3
Cecchinato et al. 2004 ^{43 k}	0.17	2	84	F	no info	3 ▪
Collaert et al. 2002 ⁴⁴	0.70	1-2	25	F	100	2 ▪
Cooper et al. 2001 ^{45 s}	0.40	1	52	S	96.2	2 ▪
Donati et al. 2008 ⁴⁶	0.31 [#]	1	151	S	94.5	1 ▪
Norton 2004 ⁴⁷	0.40	1	25	S	96.4	1 ▪
Kemppainen et al. 1997 ⁴⁸	0.13	1	37	S	97.8	3
Nordin et al. 1998 ⁴⁹	0.05	1	10	F	100	3
Thor et al. 2005 ⁵⁰	0.50 [*]	1	19	F	98.7	3
Toljanic et al 2009 ⁵¹	0.5	1	41	F	96	1 ▪
Van de Velde et al. 2009 ⁵²	0.75	1	25	F	100	1 ▪
Veltri et al. 2008 ⁵³	0.30	1	12	F	100	3
Retrospective studies						
Norton 2006 ⁵⁴	0.65	up to 7	54	S	99.4	3 ▪
Hallman et al. 2005 ⁵⁵	2.40 [*]	5	11	F	94.5	3
Wennström et al. 2004 ⁵⁶	0.40	5	45	F	no info	3
Koutouzis and Wennström 2007 ⁵⁷	0.45 [#]	5	38	F	no info	no info
Eliasson et al ⁵⁸	0.09	up to 5	16	F	no info	2&3 ▪
Norton 2001 ⁵⁹	0.63 [#]	4-7	13	S	no info	no info
Norton 1998 ⁶⁰	0.42	2	33	S	no info	3
De Kok et al. 2006 ⁶¹	0.31 [#]	1-2	28	S	no info	1 ▪
Warren et al. 2002 ⁶²	0.36	1-2	48	F	no info	3
Fermgård and Åstrand 2008 ⁶³	0.40	1	36	S, F	96	2
Kwon 2009 ⁶⁴	0.16	1	17	S	No info	3

Scientific Review

Documentation on marginal bone maintenance

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^a Mean marginal bone level change reported: measured from baseline (implant placement or loading) to the end of the follow-up period; # the bone level change is presented for different subgroups and a new mean have been calculated;

* implants were placed in grafted or augmented bone or immediately placed in extraction sockets; [§] median is reported

^b S= single tooth; F= fixed restoration; OD= overdenture

^c 1= immediate load; 2= early load; 3= conventional load; ▪ = 1-stage surgery

^{d,e} Report on the same material

^{f,g} Report on the same material

^{h,i} Report on the same material

^{j,k} Report on the same material

^{l,m} Report on the same material

^{n,o} Report on the same material

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