

# To Load, Expose or Submerge?

---

*A Study of Primary Stability and Treatment Outcome*

Paul A. Schnitman DDS, MSD  
Wellesley Hills, Massachusetts, USA



A New Wave in  
Implant Therapy

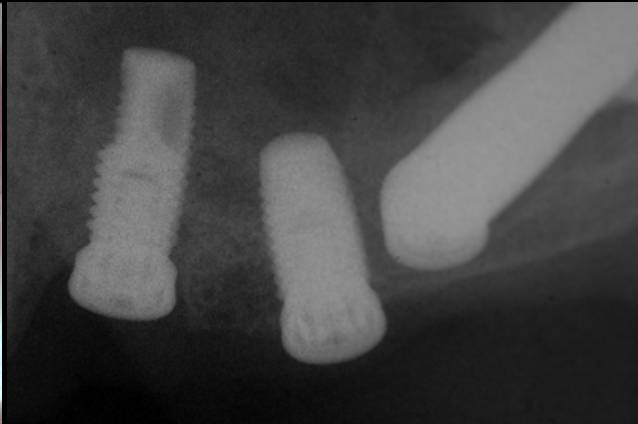


*San Diego*

24<sup>TH</sup> ANNUAL MEETING  
February 26-28, 2009

# To Load, Expose or Submerge?

---



# Evolution of Immediate Loading with Two-Stage Implants

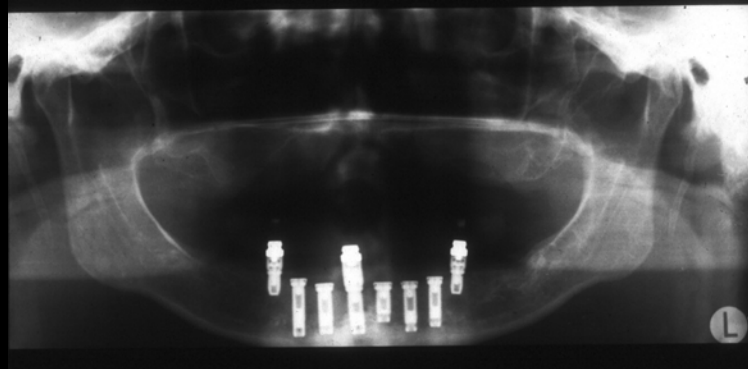
---

## Possibility

1990 Schnitman

1994 Henry

1995 Bernard  
Salama



*all articles 'et al'*

# Evolution of Immediate Loading with Two-Stage Implants

## Possibility

1990 Schnitman  
1994 Henry  
1995 Bernard  
Salama

## Reality

1997 Chiapasco  
Tarnow  
Piatelli  
Schnitman  
Balshi  
Ericsson

1998 Nowzari  
Levine  
Gomes  
Kupeyan  
Wöhrle  
1999 Brånemark  
Randow  
Cooper

*all articles 'et al'*



# Evolution of Immediate Loading with Two-Stage Implants

## Possibility

1990 Schnitman  
1994 Henry  
1995 Bernard  
Salama

## Reality

1997 Chiapasco  
Tarnow  
Piatelli  
Schnitman  
Balshi  
Ericsson

1998 Nowzari  
Levine  
Gomes  
Kupeyan  
Wöhrle

1999 Brånemark  
Randow  
Cooper

*all articles 'et al'*

## Refinement

2000 Gatti  
Ericsson  
Jaffin  
Szmukler-Moncler  
Kinsel  
Maló  
Kan  
Horiuchi

2001 Jo  
Cooper

2001 Røynesdal  
Chaushu  
Columina  
Ganeles  
Chiapasco  
Payne  
Petersen  
Chow  
Balshi  
Testori  
Grunder

# Evolution of Immediate Loading with Two-Stage Implants

## Possibility

1990 Schnitman  
1994 Henry  
1995 Bernard  
Salama

## Overall Survival Across All Reports (n=35)

Patients	689
Implants	2329
Failures	79
Survival	96.6

## Refinement

2000 Gatti  
Ericsson  
Jaffin  
Szmukler-Moncler  
Kinsel  
Maló  
Kan  
Horiuchi  
2001 Jo  
Cooper

2001 Røynesdal  
Chaushu  
Columina  
Ganeles  
Chiapasco  
Payne  
Petersen  
Chow  
Balshi  
Testori  
Grunder

# Evolution of Immediate Loading with Two-Stage Implants

---

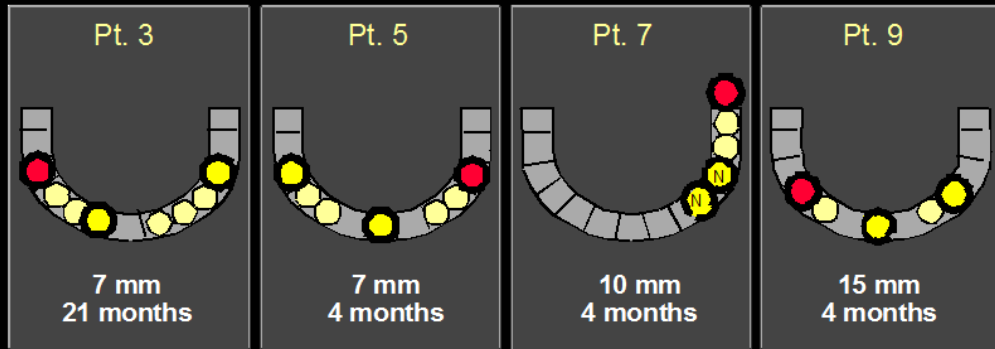
Ten-year Results for Brånemark Implants  
Immediately Loaded with Fixed Prosthesis  
at Implant Placement

Schnitman P, Wöhrle P, Rubenstein J,  
DaSilva J, Wang N. IJOMI 1997

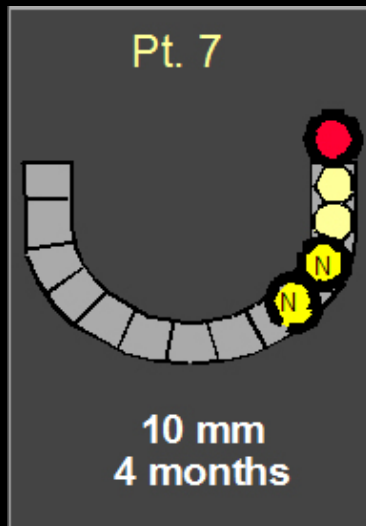
**84.7% survival**

# Evolution of Immediate Loading with Two-Stage Implants

---



# Evolution of Immediate Loading with Two-Stage Implants



## Implant Survival for Partial Bridges and Single Teeth by Site (Patients = 181)

	Implants	%
Anterior Maxilla	159 (7)	95.6
Posterior Maxilla	35 (3)	91.4
Anterior Mandible	64 (1)	98.4
Posterior Mandible	36 (1)	97.2
Total	294 (12)	95.9

# Empirical Protocol for Loading Decision

---

Pre-operative bone density

CT Scan

Intra-operative primary stability

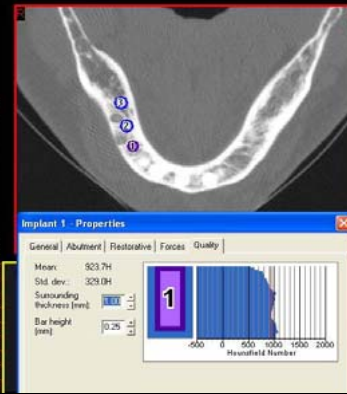
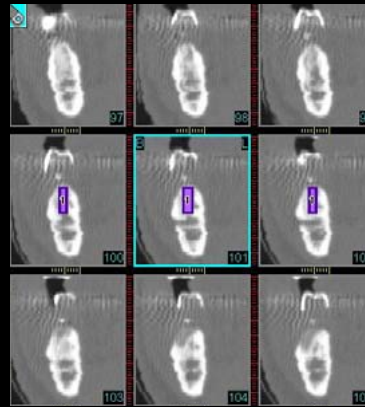
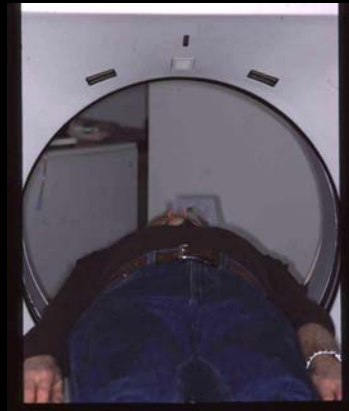
Seating torque (ST)

Periotest (PTV)

Resonance frequency (ISQ)

# Empirical Protocol for Loading Decision

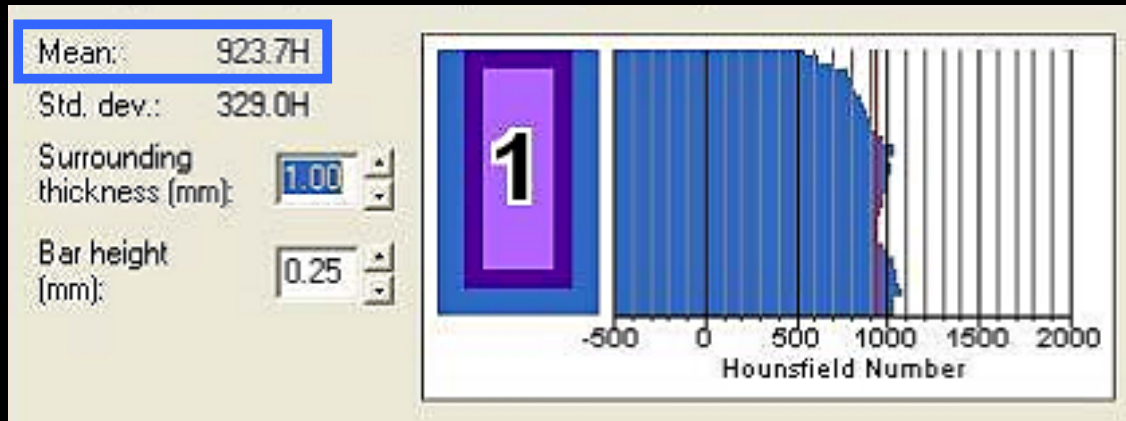
Pre-operative bone density  
CT Scan



*Schwarz M, Rothman S, Rhodes M, Chafetz N. JOMI 1987*  
*Norton M, Gamble C. COIR 2001*

# Empirical Protocol for Loading Decision

Pre-operative bone density  
CT Scan

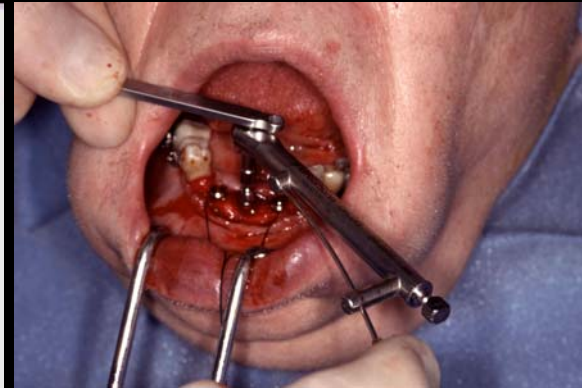
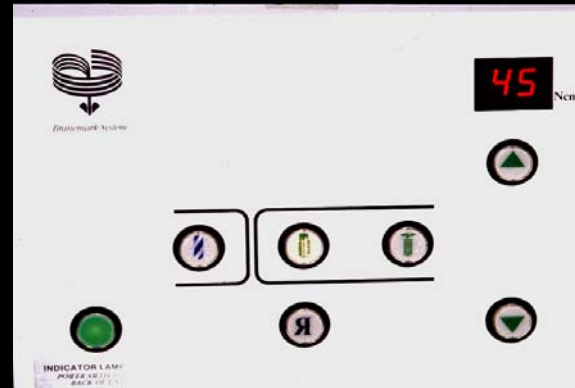


*Schwarz M, Rothman S, Rhodes M, Chafetz N. JOMI 1987*  
*Norton M, Gamble C. COIR 2001*

# Empirical Protocol for Loading Decision

---

Intra-operative primary stability  
Seating torque (ST)

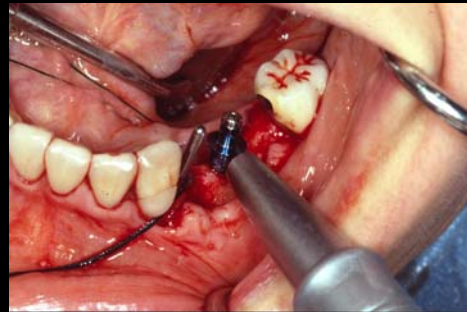


*Friberg B, Sennerby L, Gröndahl K, Bergström C,  
Bäck T, Lekholm. COIR, 1999*

# Empirical Protocol for Loading Decision

Intra-operative primary stability

Periotest (PTV)



-7

-3



-2

-1

more stable

less stable

*Olivé J, Aparicio C. IJOMI, 1990*

# Empirical Protocol for Loading Decision

---



Intra-operative primary stability

Resonance frequency (ISQ)

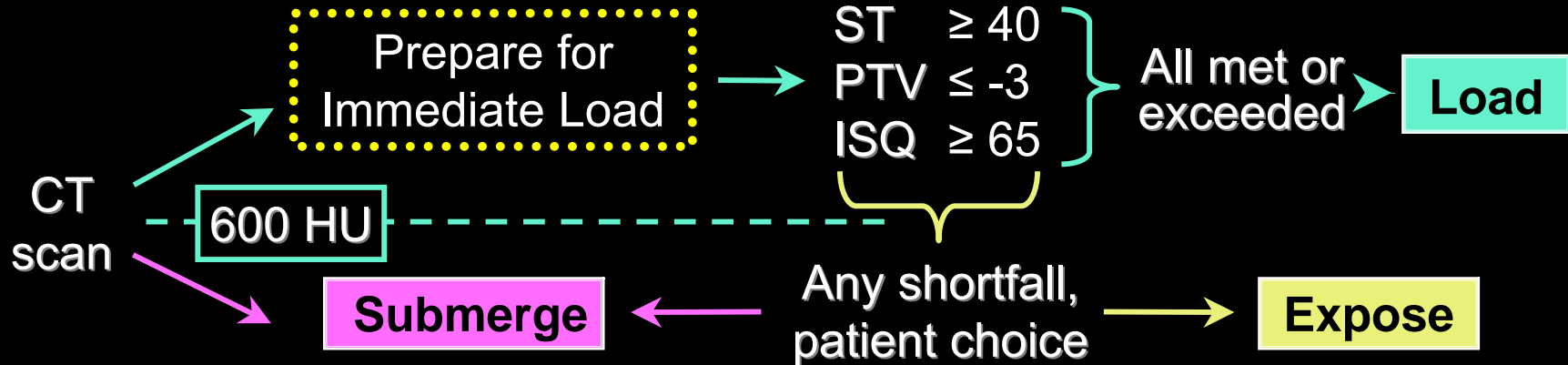
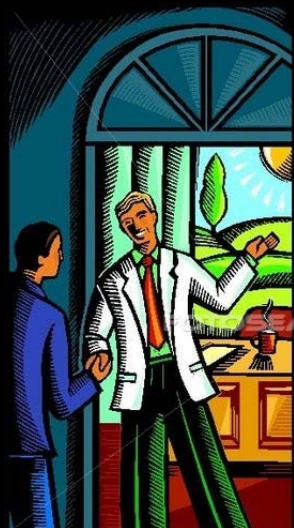


*Meredith N, Alleyn D, Cawley P. C O I R, 1996*

# Empirical Protocol for Loading Decision

Pre-operative selection

Intra-operative selection



# Implantation and Restoration

---

**Implant type:** straight walled/external hexagon

**Preparation:** diameter undersized 1-1.25 mm based on density

**Countersink:** minimal

**Tapping:** rare and 3mm short of apex

**Restoration:** screw retained provisional

**Loading:** determined by lowest common denominator in a restorative site

# Retrospective Analysis

---

Consecutive patients requesting immediate loading

Sites other than anterior mandible

**Treatment period** 1999-2003

**Implants** 58

**Patients** 18

# Results

---

51 implants osseointegrated at 4-6 months

7 implants failed in < 6 months

Overall survival = 88%



# Correlation Between CT and Intra-op Stability Measures

---

Measure	N	r	P value
ST	58	.72	< 0.0001
PTV	57	.70	< 0.0001
RFA	18	.64	= 0.0036

*and then there was skewing . . .*

Outcomes	S	S		S	S	S		S	S	S		S	F		S	S		S	S	S	S	S	F	S		S	S	S	S	S	S	S	S	F	S	S	S	S	S	F	F	S										
Loading Condition	IL	IL		IL	IL	IL		E	E	E		E	IL		IL	S		S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S									
RFA	69	69		72	72	70		NA	81	79		NA	NA		NA	68		NA	65	58	64	68	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA							
PTV	-5	-4		-6	-6	-5		-5	-5	-5		-5	-5	-3		-3	-1		-3	-1	-2	-2	-3	-1	-2		-1	0	0	-3	-2	-5	-3	-5	-4	-3	2	-1	-1	-2	-3	-1	-1	4	1	NA*	0	0	-2	-3		
ST	45	45		40	45	45		30	30	35		20	25	40		30	40		40	20	15	20	20	15	20		30	15	15	35	25	30	25	20	30	25	20	25	15	15	30	30	15	15	20	20	20	30	20	35		
HU	1314	1222		1052	890	817		815	831	887		846	750	763		689	618		864	662	488	698	525	551	550	337	527		694	513	367	469	537	506	457	513	383	423	358	371	283	435	470	656	380	164	390	354	189	247	233	573
Site	#19	#21		#29	#30	#31		#31	#29	#30		#19	#30	#5		#8	#9		#13	#19	#14	#5	#7	#29	#30	#4	#5		#10	#12	#13	#6	#4	#5	#6	#7	#10	#11	#12	#13	#4	#5	#7	#10	#12	#13	#8	#30	#2	#3	#4	#5
Implant No.	1	2		4	5	6		8	9	10		14	15	16		18	19		21	22	27	28	29	30	31	32	33		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58



# Mean Measurements by Treatment Group and Outcome

		Pre-operative			Intra-operative								
Outcome		CT scan (HU)			Seating torque (Ncm)			Periotest (PTV)			RFA (ISQ)		
		N	Mean±SE	Range	N	Mean±SE	Range	N	Mean±SE	Range	N	Mean±SE	Range
Immediate Loaded	Survival	7	983±83	722~1314	7	44±1	40~45	7	-4.6±0.4	-4~-6	5	70±1	69~72
	Failed	1	618	618	1	40	40	1	-3	-3	0	NA	NA
Exposed	Survival	6	803±29	689~887	6	28±2	20~35	5	-4.5±0.4	-3~-5	2	80±1	79~81
	Failed	0	0	-	0	0	-	0	0	-	0	-	-
Submerged	Survival	27	480±23	189~698	27	24±1	15~40	26	-2.0±0.3	1~-5	9	63±2	52~68
	Failed	5	268±36	164~358	5	20±3	15~30	5	0.0±1.0	4~-2	2	61±3	58~64
Total		46	579±38	164~1314	46	27±1	15~45	45	-2.5±0.3	-6~4	18	67±2	52~81



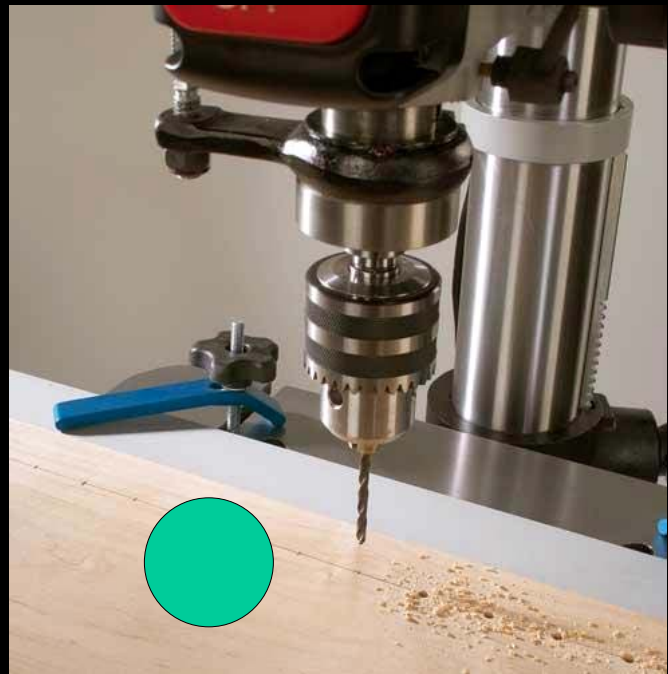
# Mean Measurements by Treatment Group and Outcome

Outcome	Pre-operative			Intra-operative					
	CT scan (HU)			Seating torque (Ncm)		Periotest (PTV)		RFA (ISQ)	
	N	Mean±SE	Range	N	Mean±SE	Range	N	Mean±SE	Range
Immediate Loaded									
Exposed									
Submerged	Survival	27	<b>480±23</b>				26	<b>-2.0±0.3</b>	
	Failed	5	<b>268±36</b>				5	<b>0.0±1.0</b>	
Total									
			(p = 0.0077)						(p = 0.0013)

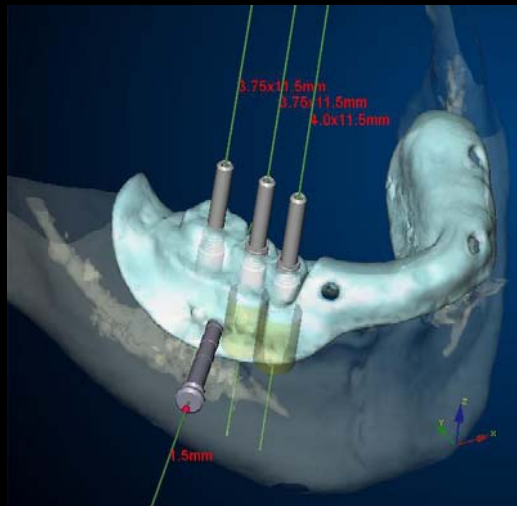
# Correlation Among Intra-op Primary Stability Measures

---

<u>Measure</u>	<u>N</u>	<u>r</u>	<u>P value</u>
ST - PTV	57	.64	< 0.0001
ST - ISQ	18	.59	< 0.0086
PTV - ISQ	18	.78	= 0.0001

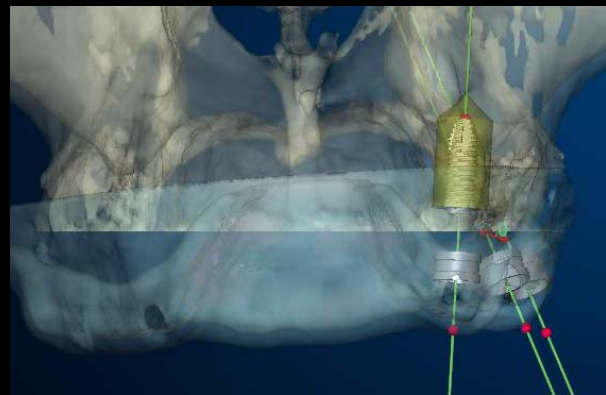
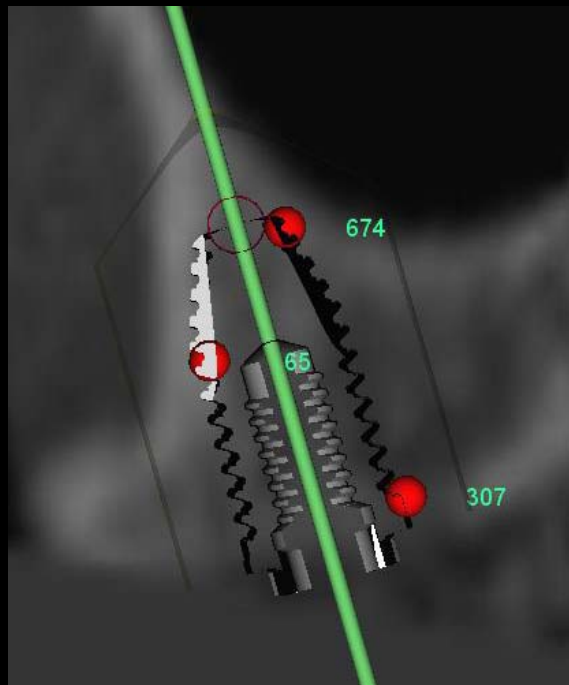
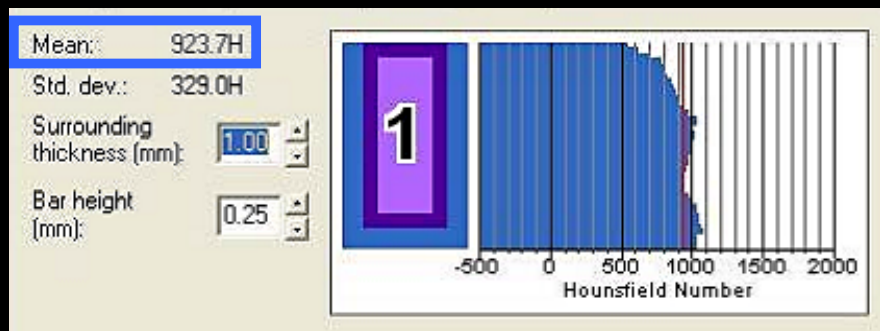


Diagnosis  
Precision  
Minimally invasive





# Mean area vs. Mean point



# Caveat . . .

---



*HU varies according to:*

Scanner type

Planning program

Exposure energy (kV)

*ISQ varies according to:*

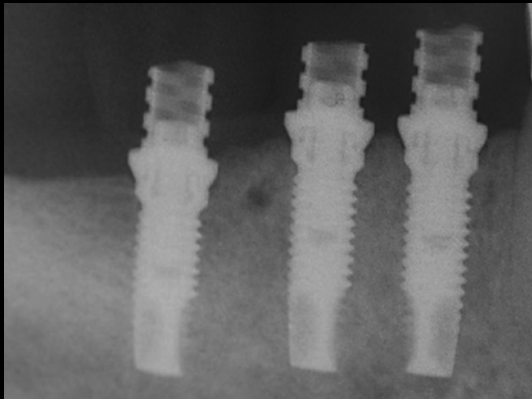
Instrument model

Height of implant above bone



# To Load, Expose or Submerge?

---



## *To Immediate Load:*

Undersize preparation

Minimize tapping

Match implant design to bone density

Splint when possible

Screw retain provisional

Eliminate occlusal and interproximal contact when possible



# “the Decision” – To Load, Expose or Submerge:

Free hand

**Pre-op CT screening**

Computer Guided

Mean Area HU 600 ↔ 800 (1000)

Mean Point HU 400 ↔ 500 (600)

**Intra-operative tests**

20 ↔ 40 (45)

Seating Torque unreliable

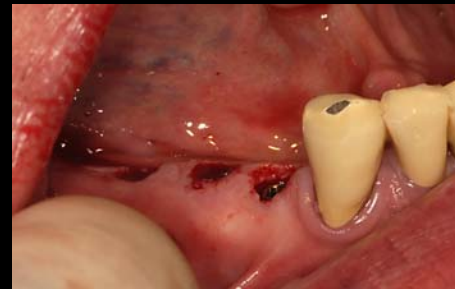
-1 ↔ -4 (-5)

Periotest Value impractical

59 ↔ 65 (70)

RFA (ISQ)

59 ↔ 65 (70)





Dentalimplantsof**boston**.com