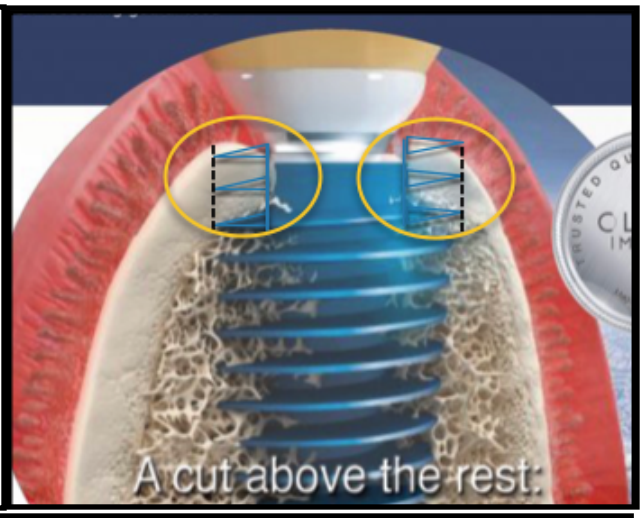
Analysis of the Shortcomings of the Megagen Implant System

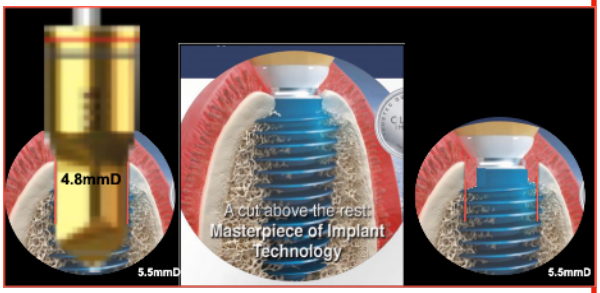
The Megagen Implant claims to be "A cut above the rest". A better description woud be"A cut through the crest".
The Megagen implants do not have vertical cutting grooves. As can be seen from the yellow circles with the path of the threads superimposed over the cortical bone, Megagen's fin-like threads will expand the cortical bone as it is threaded to place, creating a gap around the narrow neck of the implant that could allow down-growth of soft tissue, creating an infra-bony pocket. Studies show that engaging the cortical bone adds significantly to the intial stability.



Megagen claims that its AnyRidge design with threads wider than the neck of the implant will preserve crestal bone by eliminating initial contact of the narrow neck with the crestal cortical bone. **"Megagen's AnyRidge implant depends on cancellous bone, and NOT Crestal bone for initial stability." This is wrong-headed thinking. It is long proven and well understood that engagement of cortical bone by an endosseous implant assures stability.** Another study compared subcrestal to supracrestal placement and showed that "implants placed in a subcrestal position … showed statistically significanlty more bone loss."

This case shows 16 Legacy implants placed level with the crest of the ridge with no bone loss evident at uncovering. Megagen's design with a narrow neck and wide, deep threads for "maximum cortical bone preservation" is based on this false premise which unnecessarily sacrifices initial stability. If there is concern about high insertion torque in dense bone negatively effecting the cortical bone, then just use a crestal bone drill to open up the socket to the full diameter of the neck of the implant.

Megagen sells Cortical Bone Drills to facilitate insertion of the wide threads. The sharp threads may be self-threading in soft bone but it is not self-tapping in dense bone, especially through the cortical bone at the crest of the ridge. As you can see from the graphic below, a cortical bone drill of 4.8mmD is available to create the opening through the cortical bone for the insertion of a 5.5mmD implant, leaving an opening for the down-growth of soft tissue.



This study compared subcrestal positioning of implants concave neck with placement with the widest part of the implant level with the crest, sealing the opening. It concluded:
"The placement of implants with a hyperbolic convergent profile collar in the subcrestal position resulted in higher buccal bone resorption and more soft tissue recession."

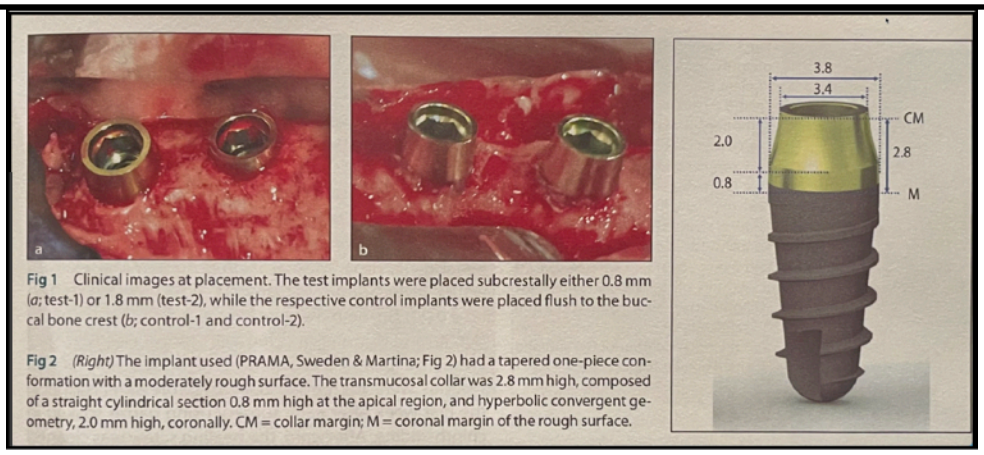
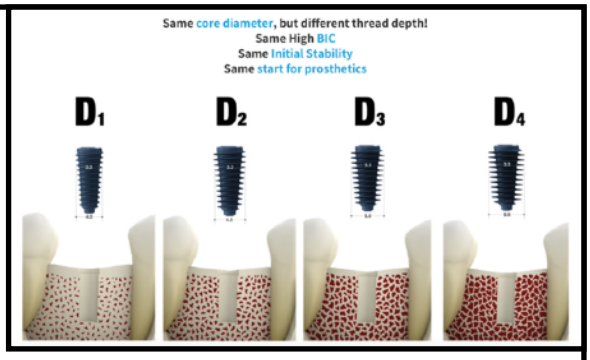


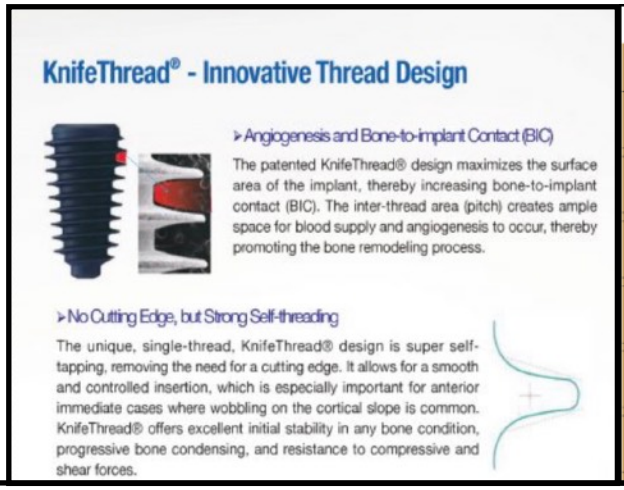
Fig 1 Clinical images at placement. The test implants were placed subcrestally either 0.8 mm (*a*; test-1) or 1.8 mm (test-2), while the respective control implants were placed flush to the buccal bone crest (*b*; control-1 and control-2).

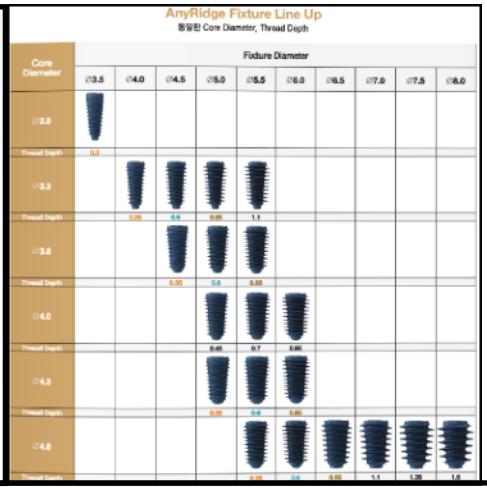
Fig 2 *(Right)* The implant used (PRAMA, Sweden & Martina; Fig 2) had a tapered one-piece conformation with a moderately rough surface. The transmucosal collar was 2.8 mm high, composed of a straight cylindrical section 0.8 mm high at the apical region, and hyperbolic convergent geometry, 2.0 mm high, coronally. CM = collar margin; M = coronal margin of the rough surface.

Megagen
uses the same Platform and same inner core of the implant for implant diameters from 3.5mmD to 5.5mmD and the thread diameter increases. The theory behind the design is that the thread depth increases as the density of the bone decreases.
This is in contrast to most other implant companies insertion protocol for a tapered implant. They follow a soft-bone/hard bone surgical concept first published by Niznick 2000, that varies the diameter of the final drill based on the density of the bone. To achieve insertion in dense bone without use of a bone tap by preparing a socket almost as wide as the diameter of the implant. That way, only the tips of the threads engage dense bone and full seating can be achieved. In soft bone the final drill undersizes the socket so that insertion compresses the bone and increases its density and the stability of the implant.

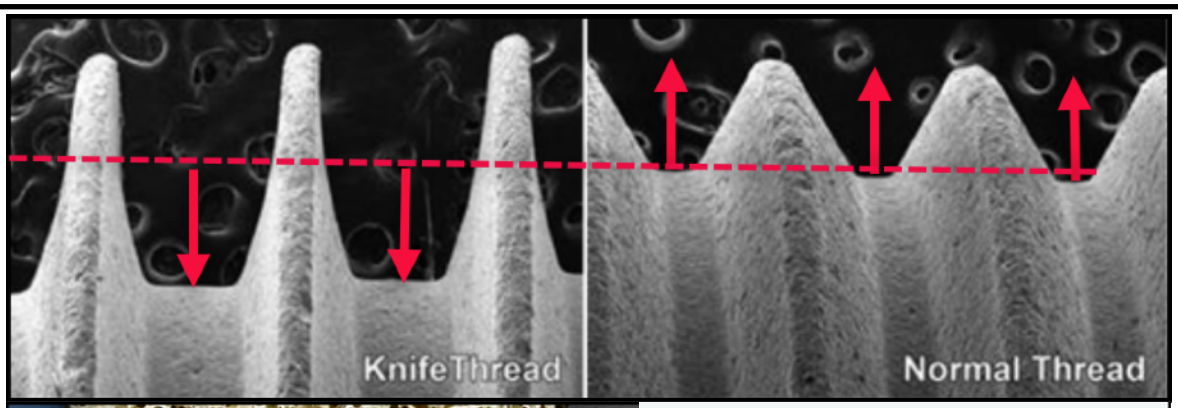


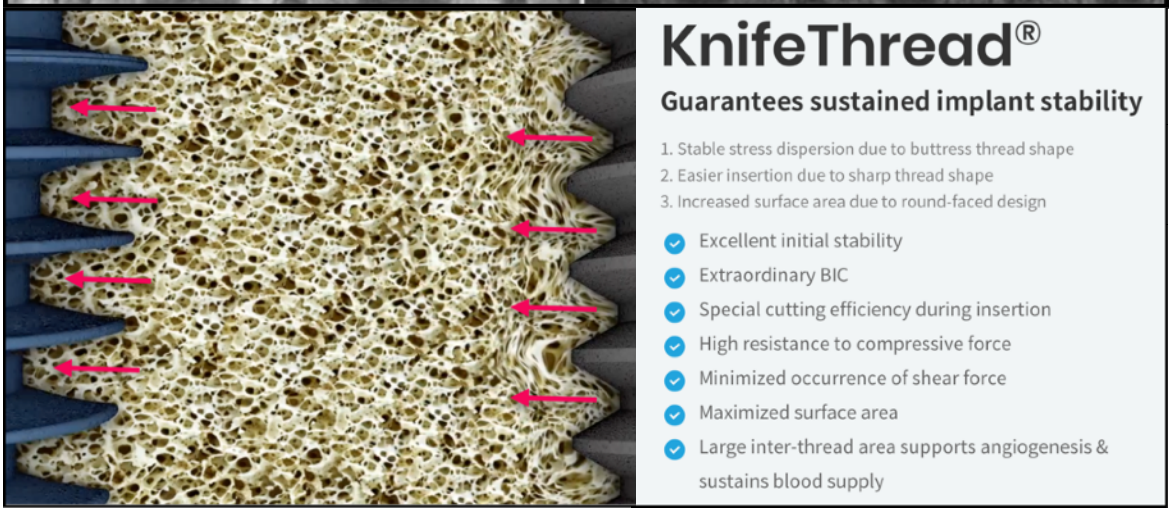
The depth of the Megagen KnifeThread varies with the diameter of the implant. In soft bone, deep threads leave space for the soft bone to be compressed into rather compressing the soft bone. In dense bone, without a bone tap or self-tapping grooves, only the tips of the threads can engage bone, reducing initial stability achieved with self-tapping threads.

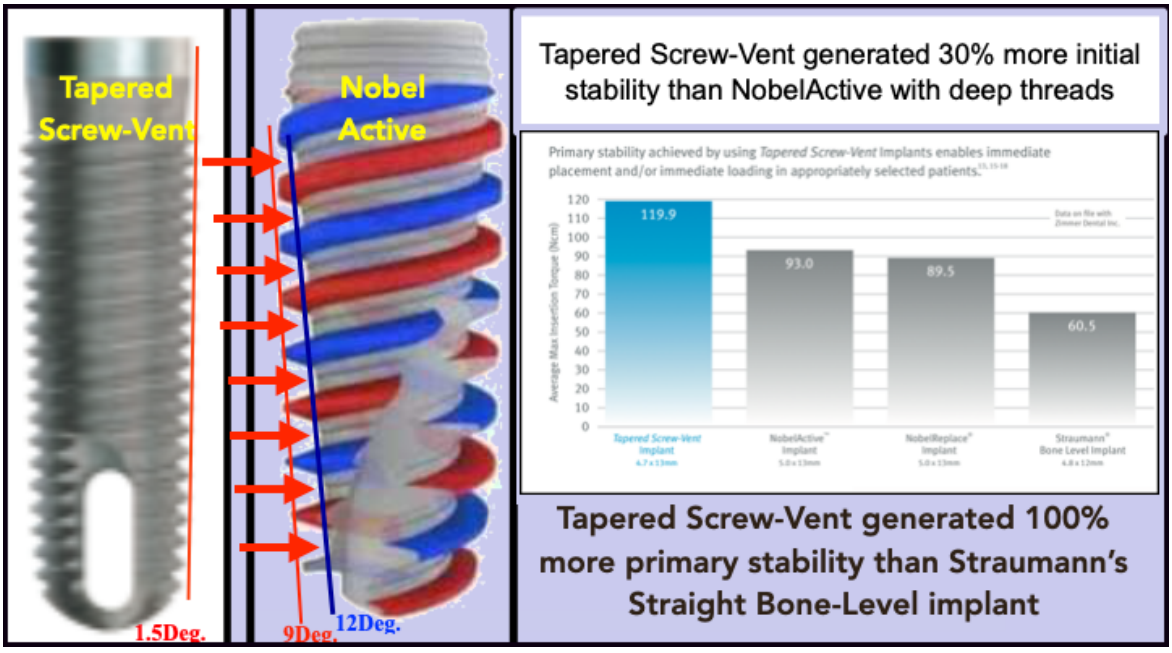




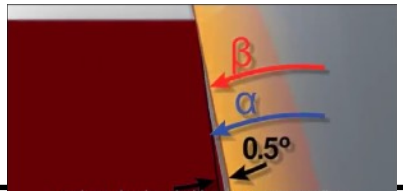
Megagen implant design is based on the theory that deep, knife edged threads will cut their way into bone without the need for a self-cutting groove or a bone tape, and will increase initial stability and ultimately surface area. The fallacy in this logic is that increased stability in soft bone is achieved by compressing the bone to improve its quality (the whole theory behind the popular Densah drill system). In fact, as proven in a comparative study by ZimVie between the Tapered Screw-Vent (TSV) and the NobelActive with deeper threads, the TSV generated 120Ncm of initial torque compared to 93Ncm with the NobelActive because its deep threads created a space for the soft bone to move into rather than being compressed.

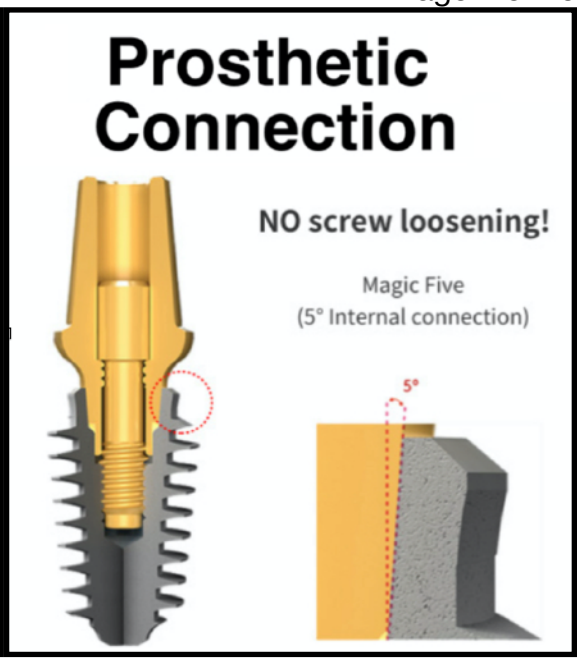




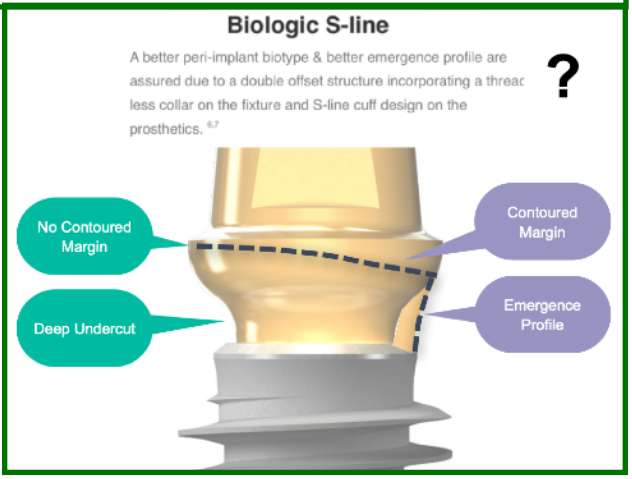


The Megagen Conical Connection is at 5 degree from the vertical. For conical connections to be effective at sealing the opening to the internal shaft, the mating abutment bevel needs to be 0.5-1.0 degrees greater as measured from the vertical so that the first contact is at the opening of the shaft. This drawing is not representative of an actual implant-abutment connection. This drawing from the Keystone Paltop implant more accurately represents how an abutment interfaces with a conical connection and demonstrated why steeper angled interfaces does not add to the contact area and therefor to the stability.

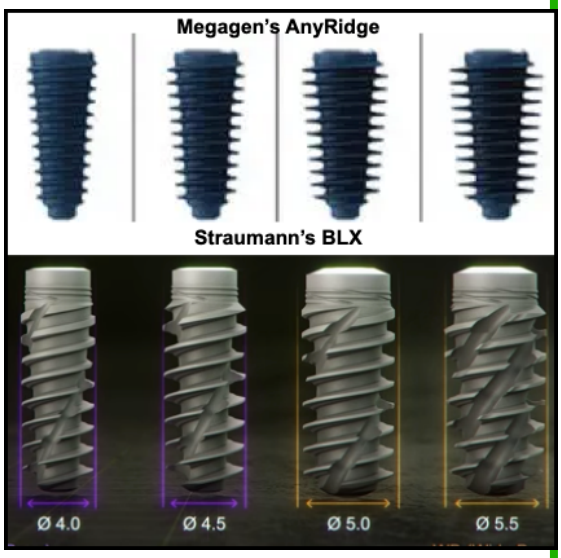


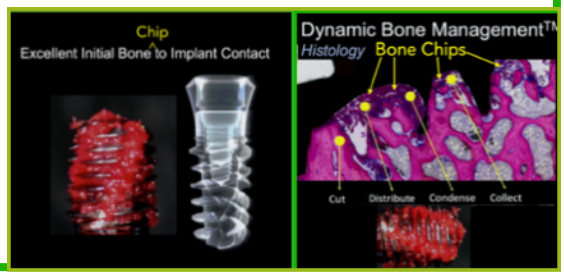


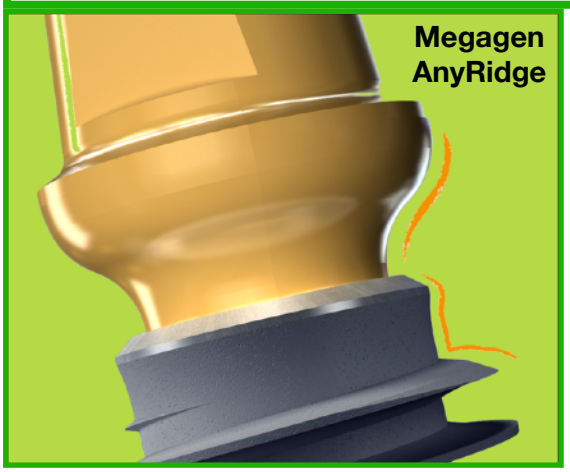
Megagen's AnyRidge implants are available in diameters ranging from 3.5mmD to 8mmD as measured to the outside diameter of the threads. The neck and core diameters remain the same for implants 3.5mmD through 5.5mmD but increase in size with the 6.0mmD to 8.0mmD implants. All Megagen AnyRidge implants have the same implant/abutment interface. Using a single platform over this wide a range of implant diameters compromises the emergence profile and provide questionable strength with the use of the same small neck diameter of abutment is used on the 3.5mmD implant in the esthetic zone as the 8mmD implant recommended for molar restorations. As can be seen below (L), use of a single abutment platform is not conducive for a natural emergence profile and the abutments for cementable restoration do not have a contoured margin. If recession takes place and the margin of the pre-parable abutment needs to be lowered, the steep undercut below the abutment's height of contour will not allow such adjustments.



The BLX from Straumann, introduced in 2019, follows a similar concept and design to the Megagen AnyRidge Implant. For implants 3.5mmD to 5.5mmD, the diameter of the threads increases without any corresponding increase in the diameter of the necks. The result is that in soft bone, the threads expand the crestal opening and in dense bone, a large diameter drill is needed to open the socket to accommodate the wide threads. In either situation, a gap is created at the opening with a loss of contact with cortical bone. Both systems offer a single conical connection, Straumann's being 7 degrees while Megagen's 5 degrees. This creates an undesirable emergence profile as the width of the exposed shoulder increases with each diameter of the implants. The implants differ in that the AnyRidge implant does not have a self-tapping cutting groove whereas the BLX, which unlike the AnyRidge, is basically a straight implant for the first 12mm, has bi-directional cutting grooves that create bone chips in soft bone rather than compressing the bone contribute to stability. Both systems compromise initial stability due to the narrow necks not engaging cortical bone and the deep threads creating room for bone chips rather than compressing soft bone.







GEN5™

PARAGON
IMPLANT COMPANY

40 YEARS OF INNOVATION

NIZPLANT™

* Includes Overdenture Attachment Components

40 YEARS OF INNOVATION

37 PATENTS - 4 SPECIFIC TO GEN5

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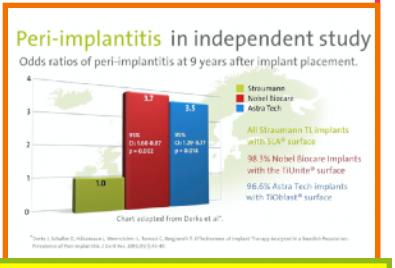
RESEARCH SUPPORTS REDUCTION OF PERI-IMPLANTITIS BY USING A HYBRID DESIGN SURFACE WITH THE IMPLANT-ABUTMENT JUNCTION SUPRA-CRESTAL
Applies to Straumann's TLX implant and Paragon's GEN5 implant BUT not the BLX

Dr. Niznick Article: AO News Vol.33 No. 2, 2022:

"Dr. Buser cites a Swedish 10-year study comparing three implants: Astra, NobelBiocare and Straumann's Tissue Level implant, claiming the latter exhibited significantly less peri-implantitis. Assuming part of the smooth neck of the Straumann TL implant was inserted in bone, this would give it a hybrid bone interface. It also adds the variable that the implant-abutment connection would be supra-crestal… [which] is at least as important a factor in minimizing peri-implantitis as a hybrid surface."

Dr. Michael Dard, Prof. NYU Interview:

1. Explains peri-implantitis and
2. Discusses results of the Derks et al study

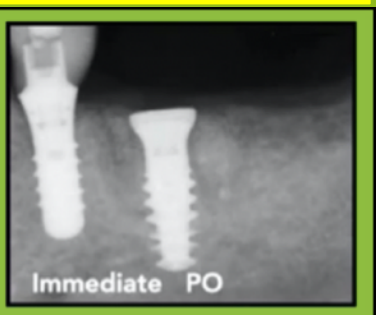


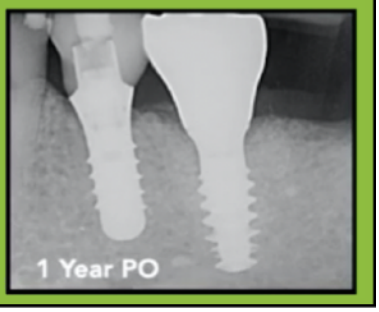
Video Lecture and interview of Dr. Daniel Buser, explaining importance of Hybrid Surface and how he partially submerges smooth neck of "Tissue Level" Implants

Dr. Daniel Buser explains insertion of Straumann's "Tissue Level" implant with 1.8mm of its 2.8mm smooth neck sub-crestal, leaving 1mm and the implant-abutment junction, supra-crestal.

Buser Quote on Straumann's Website:
"The Future of Implant Dentistry is with neck designs combining a smooth surface in the trans-mucosal area with a micro-rough surface inside the bone. As the Derks study showed, moving the micro-gap away from the bone and having a smooth surface in the peri-implant sulcus reduces the risk of peri-implant complications." Derks 9 Year Comparative Study

PARAGON'S GEN5 IMPLANT HAS A 2.5mm ANODIZED, SMOOTH NECK, CONFIGERED TO BE 1mm SUPRA-CRESTAL





Influence of Implant Placement Depth and Soft tissue Thickness on Crestal bone Stability Around Implant with and Without Platform Switching

This case control study measured early crestal bone changes around sub-crestal placed platform-switched implants surrounded by thin soft tissue and compared them with regular, matching-platform implants placed in a supra-crestal position and surrounded by thick soft tissue. After 1 year, mean bone loss was 0.28 mm (SD:0.36 mm; range: 0.1-1.63 mm) in the control group and -0.6 mm (SD:0.55 mm; range: 0.05-1.8 mm) in the test group. Platform-switched implants placed in a subcrestal position in vertically thin soft tissues showed statistically significantly more bone loss than non-platform-switched implants placed supra-crestal with vertically thick tissues.

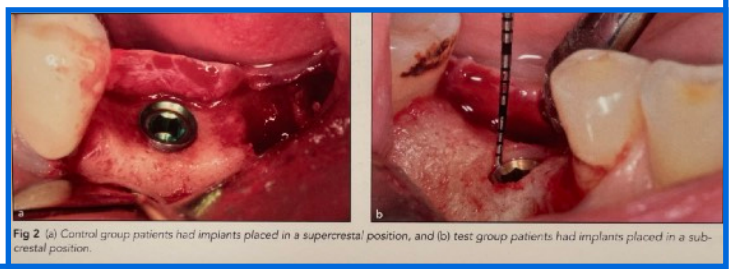
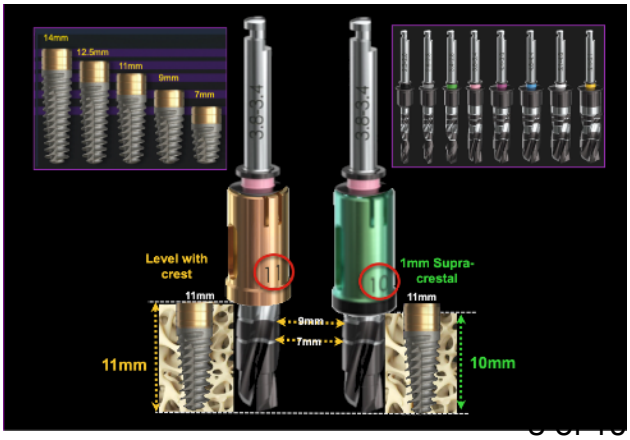
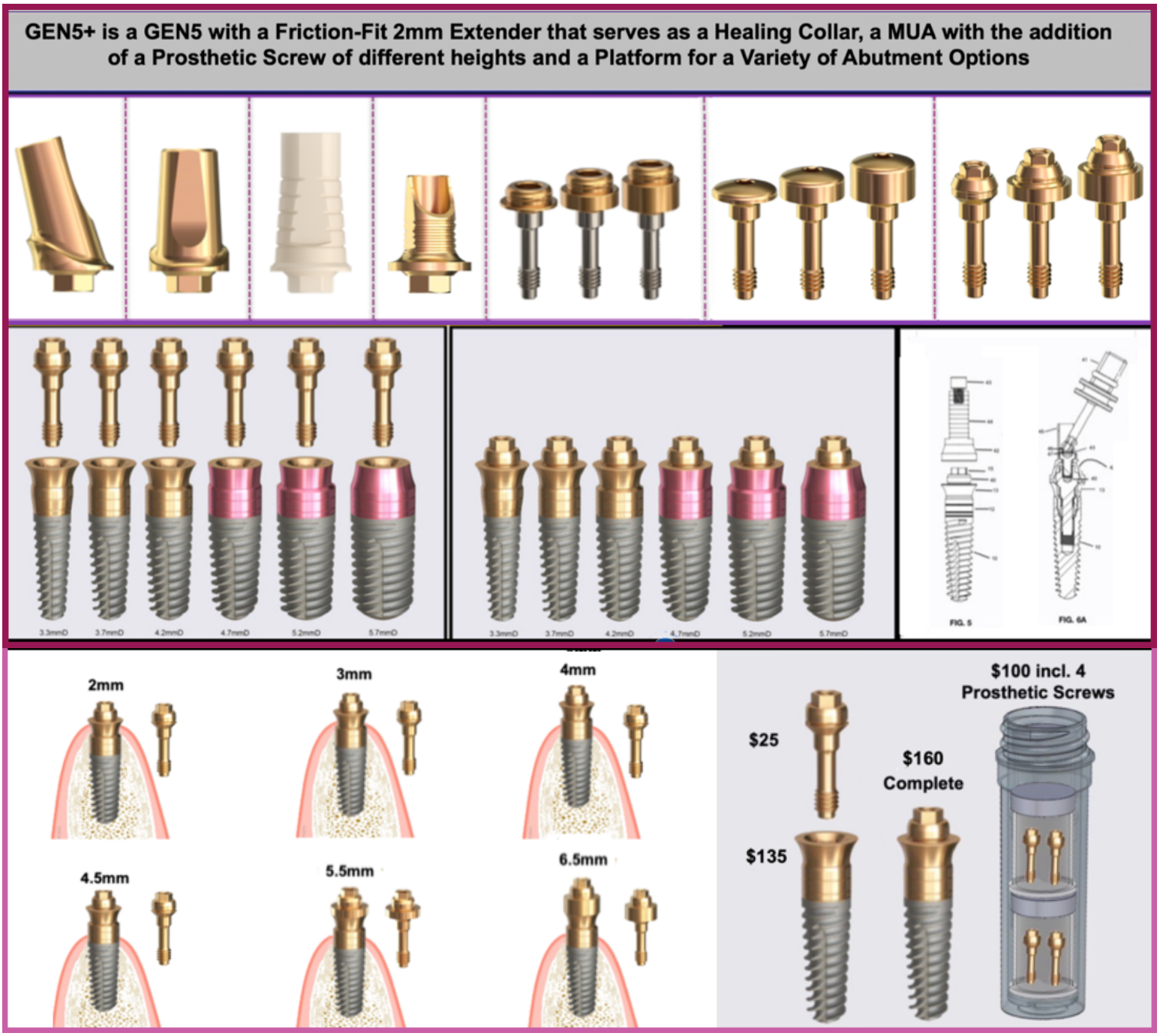


Fig 2 (a) Control group patients had implants placed in a supercrestal position, and (b) test group patients had implants placed in a sub-crestal position.

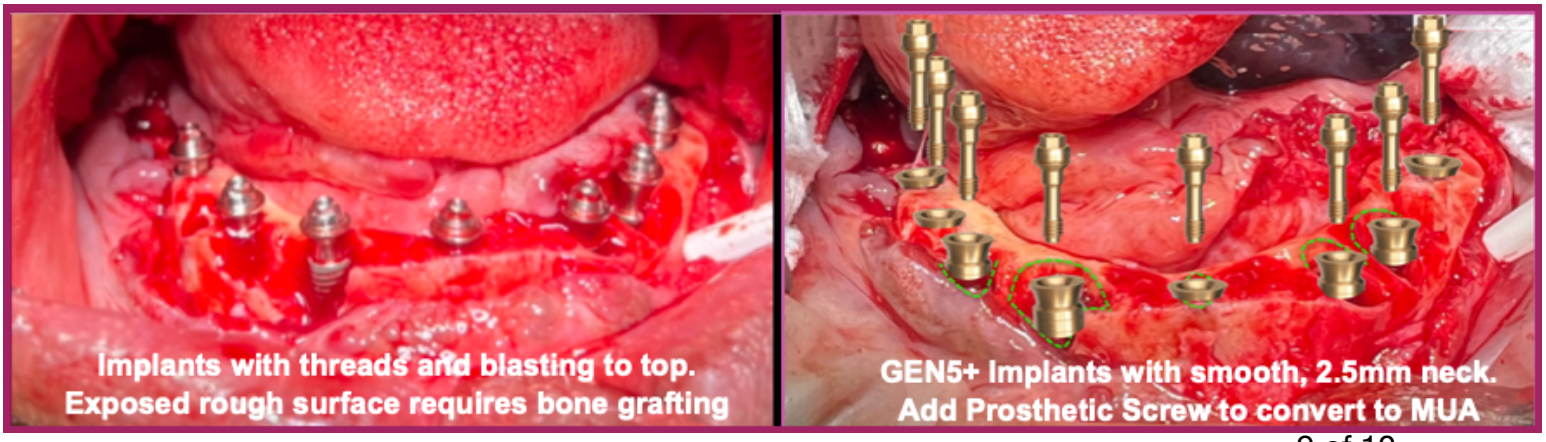
Paragon's GEN5™ , GEN5+ and NizPlant™ implants have the same implant body with a 2.5 mm machined, anodized neck. Depth gauge lines at 1 mm, 2 mm and 2.5 mm from the top (Pat. Pend.), along with 2 depths of drill stops, facilitate placement level with or 1mm above the crest of the ridge. The insertion depth control, in conjunction with the ability to varying the height of the prosthetic screw, minimizes the need and cost of maintaining an inventory of abutment heights. The GEN5+ offers the additional flexibility of a 2 mm friction-fit collar that can serve as the trans-mucosal collar of an abutment or be removed for abutment connection directly to the top of the implant for unprecedented vertical flexibility.

Each Paragon implant is 1 mm longer than the standard lengths of the respective Screw-Vent and Legacy implants. Paragon's surgical system includes two options of drill stops. One is for placement 1mm supra-crestal, which moves the implant-abutment junction away from the bone and and creates a 1mm supra-crestal zone of titanium for undisturbed soft tissue attachment when prosthetic components are attached and removed from the implant. The other drill stop positions the implant level with the highest point on the the ridge, usually on the lingual, leaving the smooth neck exposed if there is bone recession on the labial/buccal. The diameters of the drill stops and the freedom of rotation of the drills within the drill stops allow there use through surgical guide without the need for keys.





Simulated case (right) shows 8 GEN5+ implants replacing exposed implants (left). Little or no bone grafting needed because only smooth surfaces exposed. Attaching a Prosthetic Screw converts platform to standard MUA.

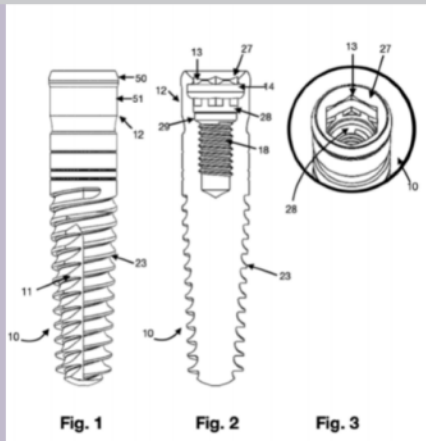


Patented Features of the 1-Piece NizPlant Implant with its Dual-Function Platform

NIZPLANT 1-PIECE IMPLANT WITH DUAL FUNCTION PLATFORM FUNCTION AS OVERDENTURE AND MULTI-UNIT ABUTMENT

NizPlant 1-Piece Locator Compatible Implant with Internal Threads

ABSTRACT:
A screw-type endosseous dental implant includes, near the top on the implant's external surface, a ridge projecting laterally, and an internally-threaded shaft with a lead-in, beveled opening, an internal wrench-engaging surface located below said lead-in, beveled opening, and, below said internal wrench-engaging surface and above said internal threads, an internal under-cut/groove forming a chamber configured to receive a snap attachment for retention of an over-denture.



NizLoc Attachments Engage both outside and inside of the NizPlant implant. The male projection can be removed to reduce the degree of retention.