

Question: What implant surface provides the fastest integration time and is it of any clinical significance?

All the surface studies of the companies claiming faster integration with their new and improved surfaces, including Straumann's SLActive, Astra's Osseospeed, Nobel's TiUnite and 3i's Nanotite compare their new surfaces with their old surfaces. None compare to any other company's surfaces and none claim any clinical significance even to improvements over their prior surfaces. They all show some animal study showing slight increase in torque values in the first 3-6 weeks and or increased % of bone contact. Straumann still sells its SLA surface but at a lower price than its SLActive surface.

Tom Wilson, D.D.S of TX presented on 280 ITI implants placed in immediate extraction sockets and immediately loaded at the 2005 AO meeting. He documented 98% success. The question to be asked is, would he achieve a 99% success with SLActive, and then? Of course this is a rhetoric question as 1% difference on a clinical study would not be of statistically significant. Four of the five major companies are claiming faster healing as their "unique selling proposition" to differentiate their products from the competition. Only Zimmer Dental, the remaining company that is in the top five categories, offers a surface blasted with HA crystals which it calls MTX and is the same as RBM used by Lifecore and BioHorizons and Renew Biocares RBS, which stands for Resorbable Blast Media Surface.

Only Zimmer offers Dual Transition HA coated surfaces with a 3mm zone of a blasted surface at the top and with high density HA coating below. HA coating is a surface that has been well documented to improve the rate and strength of osseointegration as it is both hydrophilic and bioactive.

Straumann blasts with large grit Aluminum Oxide particles followed by acid etching with Sulfuric and Hydrochloric acid to remove the imbedded particles (SLA !V Sandblasted with Large grit followed by Acid etch).

SLActive, their "new and improved" surface, is the same but packages in a vial filled with sterile saline, claiming that this makes it hydrophilic, allowing blood to spread more rapidly over the surface.

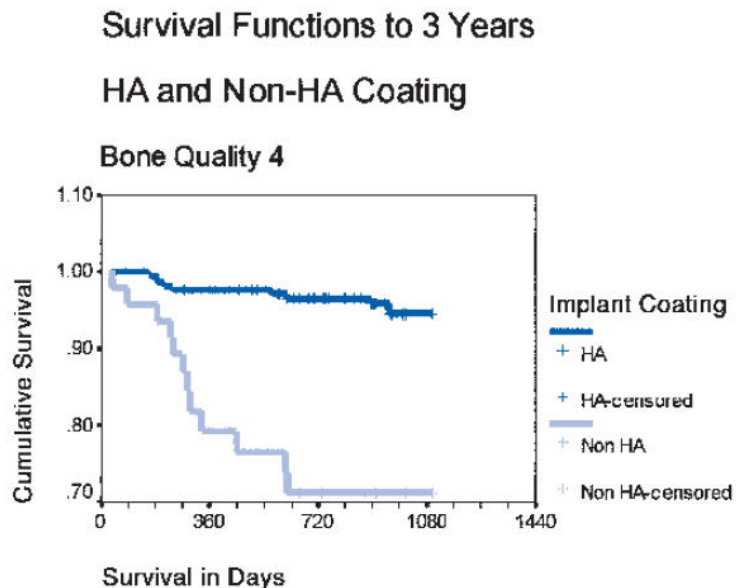
Astra blasted with Titanium Oxide particles and its "new and improved" surface then etches with HF to remove the imbedded TiO particles. While Astra claims that the Fluoride residue speeds osseointegration, studies demonstrating slight improvements over the blast surface alone acknowledge that any improvement may be due to the production of smaller etch pits rather than the Fluoride. The downside to both of these blast/etch processes is that the hard blast material rounds the threads and the etching needed to remove the imbedded blast material further rounding the threads, reducing self-tapping efficiency and load carrying capability of increased thread engagement. ScwPlant below transitioning from 2 to 4 threads compared to 1 to 3 threads for Astra provides faster insertion and deeper mini vs micro threads.

Claims of faster healing need to be viewed in the context of successfully accomplishing immediate loading. If one can achieve adequate initial stability to load the implant immediately, generally accepted as 35Ncm, what does it matter whether there is less of a fall-off in attachment strength at 3 or 4 weeks? If an implant is going to fail from overloading following immediate loading, it will occur within a week because of die-back at the interface. If 35Ncm of initial stability can not be achieved, and the implant is left to heal submerged or exposed, it certainly is not advised to load that implant in 3-6 weeks when the stability will be even less due to bone remodeling. One should therefore wait 8-12 weeks for osseointegration to take place before placing the implant in function if initial stability was inadequate to consider immediate loading

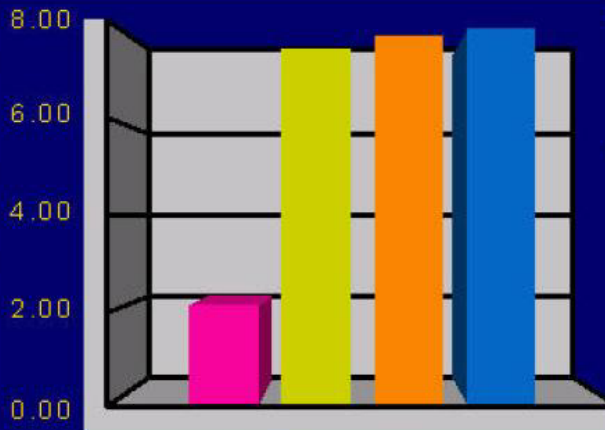
Therefore, what is more significant to early loading is being able to increase initial stability. An article in COIR by Shalabi demonstrated that inserting a tapered implant into an undersized socket increased initial stability as well as torque removal and bone attachment after osseointegration had been achieved.

Clinical and animal studies consistently achieved higher short and long term success in soft bone. In a study involving 3000 implants with different materials, surfaces and designs placed side-by-side. It compared both CP Ti and Ti Alloy etched with HF acid surfaces to HA coated implants. While the results need to be interpreted considering that acid etching alone smooths the surface, and no blasted surfaces were used, it still demonstrates the short and long-term success of HA coated implants in a number of adverse situations including soft bone, smokers, lack of initial stability and inexperienced surgeons with HA success being consistently high in all situations and qualities of bone. There was also no significant or greater long-term soft tissue complications associated with the HA coated implants compared to the uncoated implants that osseointegrated.

This study was conducted using Core-Vent Corporation implants that were acid etched with HF starting in 1986 but because of the results of the VA study (see chart below), Core-Vent switched to a rougher blasted surface called SBM for soluble blast media, which used soluble HA crystals as the blast media, eliminating the need for subsequent acid etching to remove imbedded particles, a process that further rounds the threads. Core-Vent continued to produce implants with HA coatings and still today, Zimmer uses the same surface used in the VA study as an option on some of its implants. HA coating not makes it more predictable to achieve osseointegration in all qualities of bone, it increases bone attachment strength and help maintain osseointegration for years to come. Chart below is from the VA Study conducted at 32 centers on almost 1000 patients using 3000 implants.



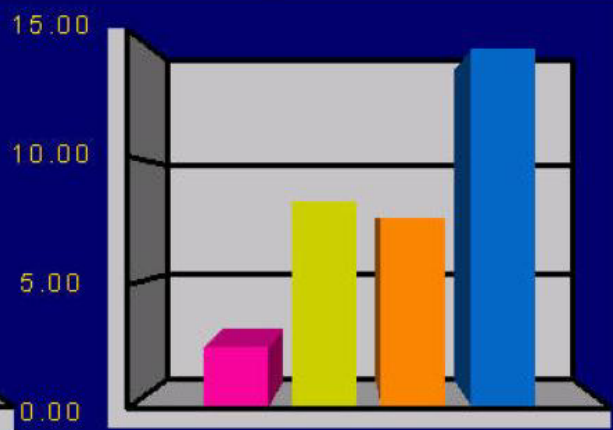
Removal Torques in (Psi)



1 Month

■ Acid Etched with HF/NO₃

■ Titanium Plasma Spray



2 Months

■ Resorbable Media Blast Surface

■ Hydroxylapatite

Torque Removal Analysis for Different Implant Surfaces in Dog Alveolar Bone. McCarthy S., Finger I., and Block M.: LSU Research Project.