

*What you should
consider when choosing
grafting material*

When choosing graft material, dentists often follow the lead of their favorite key opinion leader. This eBook offers basic principles for evaluating regenerative materials with specific focus on autologous options.

Why Do We Graft

As one dentist said during a grafting conference:

"we dentists, create defects and wounds as part of our every day work. It's our responsibility to heal those defects in an attempt to bring the site as close as possible to what nature had originally intended".

A lot of what we do as dentists is **wound healing, defect treatment** or **restoration of sites**. Today, with dental implants, grafts and membranes our ability to achieve results is greater than ever before. Here we will focus on restoration of bone and alveolar augmentation.

Why Do We Graft?

When we extract a tooth, we create a wound and a defect. The larger or more traumatic the extraction, the bigger the defect. Left untreated, many of the defects that we create will not heal sufficiently. Some extraction sites will appear to have been regenerated but often they are not. They fill with connective tissue, soft tissue and some bone. This is also true for indications other than extraction sockets. If we don't make sure that the alveolar bone heals correctly, we basically "cover up" the wound that was created. Prosthesis over that extracted site would look worse over time. The bone itself at the site might continue to resorb, an implant placed at the site might start to expose and the overall aesthetics could be compromised.

Why Do We Graft?

We use bone grafts in order to restore a wounded site properly. We use bone grafts to augment bone that was already previously resorbed. We expect the bone graft to help us accelerate wound healing, assist in bone volume generation and to provide a scaffold for the restorative prosthetic that is planned. Ideally, we would want to see restoration of site dimension, facilitation of vascularization that will “feed” the site, support the normal replacement resorption process of healthy bone, and eventually, after all of the above has been achieved, have the graft replaced by bone.

Before



After



What Do We Look for in Grafts?

Biocompatibility



We want the bone graft to help in the wound healing process and in the restoration process of alveolar bone. At the very basic level, we need the graft to be accepted by the body and by the site. For example, if we see substantial inflammation after a grafting procedure, this is due to a level of non-acceptance or even rejection of the graft. Even though some inflammation is actually recommended for wound healing, a more pronounced inflammatory reaction is a sign of non-acceptance. This will become especially exaggerated in cases where patient is a smoker, diabetic or medicated.

Bio-activity



We want the graft to communicate with the site. This means that the graft would trigger either passively or actively certain remodeling and regenerative processes that will result in formation of bone. Lack of communication of this sort will not result in a regenerative process but instead will induce development of connective tissue and cementum in an attempt of the body to isolate such foreign material.

What Do We Look for in Grafts?

Osteoinductive:

We want the graft to provide the environment for faster regeneration. If not for that, then why would we want to use grafts at all? Faster regeneration of bone can take multiple forms: The graft can simply provide a scaffold or a platform on which bone cells can cling and scale to create new bone. We refer to such graft characteristics as osteoconductive. Some grafts can influence faster osteoblastic response in which case more bone cells will form. Such graft characteristic is referred to as osteoinductive. Very few grafts on the market can claim that they are truly osteoinductive.

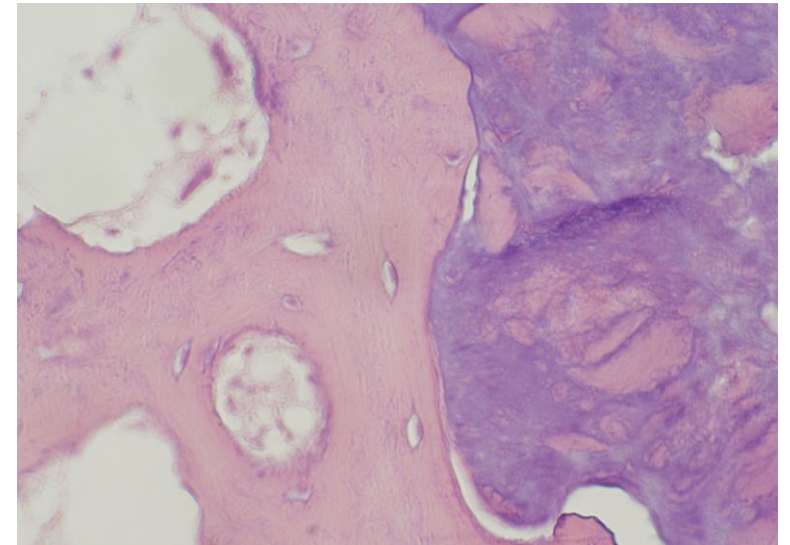
Osteoconductive:

We want the bone graft to sustain the site structure and remain active until such time that the site can sustain itself independently. For example, once we get mature bone and replacement resorption kicks in, we know that the bone will be resilient. The graft has to be in place for sufficient length of time in order to get to that advanced stage. If the graft resorbs or disappears before the newly regenerated bone matures (lamellar bone), in such cases the site will not have sufficient maintenance and the immature bone (woven bone) will be resorbed as well.

What Do We Look for in Grafts?

These are then the four basic principles on which to evaluate the quality of the grafts we use:

1. Minimal interference with the healing process - **biocompatible graft**
2. Communication between graft and bone – **bioactive graft**
3. Induction of regeneration and healing – **Osteoinductive graft**
4. Site maintenance for the long term – **Strong scaffold** and slow resorbing graft



Extractions – “To Graft or Not To Graft?”

Extraction sites typically result in partial or bulk loss of buccal bundle bone and vertical dimension. Many studies have shown that the extraction site will continue to resorb over 3-6 months post extraction due to functional loss. The literature strongly advocates to graft every extraction site in order to preserve the alveolar ridge from ongoing resorption as well as to facilitate proper site healing.

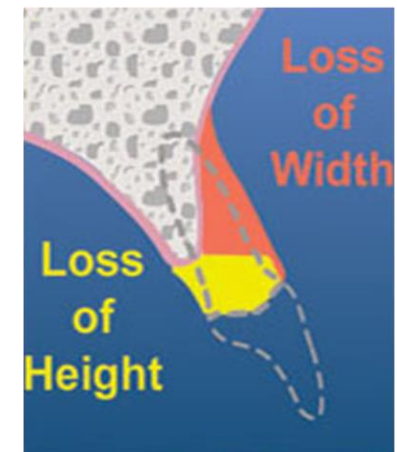


Inform your patient that bone loss will likely occur. Explain the grafting option. Certainly, in cases where implants are planned, it is important to explain the value of regenerating sufficient bone at the site to sustain implant integration and long-term stability. Don't delay socket grafting for the time of implant placement. Rebuild the site right after the extraction. Delayed options will only create a larger defect and slow down the healing.



Socket resorption
post extraction

**3-6 mm loss of width and
2-3 mm loss of height,
3-6 month after extractions**



Extractions – “Use the Extracted Tooth as Autologous Graft”

There are multiple graft options for socket grafting. However, the most natural one is to use the extracted tooth itself as the source of the graft. We discuss the option of autologous dentin grafting later in this eBook.



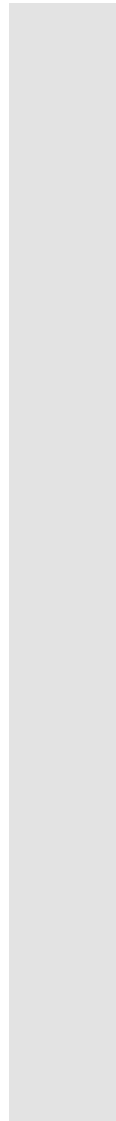
Are Autologous BONE Grafts the Preferred Grafts?

The simple answer is YES. Autologous grafts possess at least three of the four basic principles and sometimes all four. Autologous grafts are by definition biocompatible and bioactive. Since autologous grafts are harvested fresh, they contain growth factors, BMPs and stem cells that make them especially osteoinductive. The site will not see autologous bone as a foreign material and therefore will not be seen as a foreign body. Autologous grafts will induce a better transformation of M₁ to M₂ macrophages and will speed up regeneration and healing.



Are Autologous BONE Grafts the Preferred Grafts?

However, there are a number of downsides for the autologous bone option. Harvesting autologous bone requires a secondary harvest site. This is a second wound that we will form, a wound that is susceptible to complications, infection, maybe additional pain for the patient and a wound that will require healing as well. If we apply a scraping technique in order to harvest bone, we expose the harvest site to higher risk of infection and the resulting quantity of scraped bone is typically very small. Furthermore, autologous bone grafts would resorb rather quickly especially if it's harvested by means of scraping or if it's of a more cancellous type bone.



Benefits of Using Autologous DENTIN as Graft Material

Autologous dentin graft is a bone substitute that is derived from freshly extracted teeth. It is produced by grinding down an extracted tooth into particulate of appropriate size using dedicated equipment. Since we utilize the patient's own extracted tooth for this procedure, it is viewed as another type of autologous graft. The rationale of using autologous dentin graft is simple. A tooth has almost the same composition as bone. It is comprised of higher density HA (Hydroxyapatite) and Collagen Fiber type I rich with BMPs growth factors and stem cells. This is the same make up as bone.

Benefits of Using Autologous DENTIN as Graft Material

But at the same time, autologous DENTIN graft overcomes all the deficiencies of autologous BONE graft and provides even greater inherent benefits:

- Harvesting is done from an extracted tooth and processing takes place outside of the oral cavity.
- Dentin and enamel are tougher than cortical bone and therefore provide an excellent scaffold, hence osteoconductivity.
- Dentin resorbs very slowly and therefore provides long term site support and facilitates a good environment for the natural replacement resorption process. It will maintain the site dimensions for many years both horizontally as well as vertically and therefore great for augmentation procedures and GBR.
- Dentin contains good amounts of BMPs and growth factors that aid in the regeneration process to form new bone relatively quicker than most grafts, hence osteoinductive.

Benefits of Using Autologous DENTIN as Graft Material

Dentin is known to undergo ankylosis which is fusion of dentin and the existing site bone. This creates a very strong biological connection between the dentin graft particulate and the bone and provides fast stability of the entire site to facilitate healthy healing. Ankylosis type bonding is only observed when autologous materials are used and looks similar to what we see with a re-implanted tooth.

A single tooth, dependent on the type of tooth it is, can produce anywhere between 0.5cc – 2.5cc, therefore provides ample amount of graft.

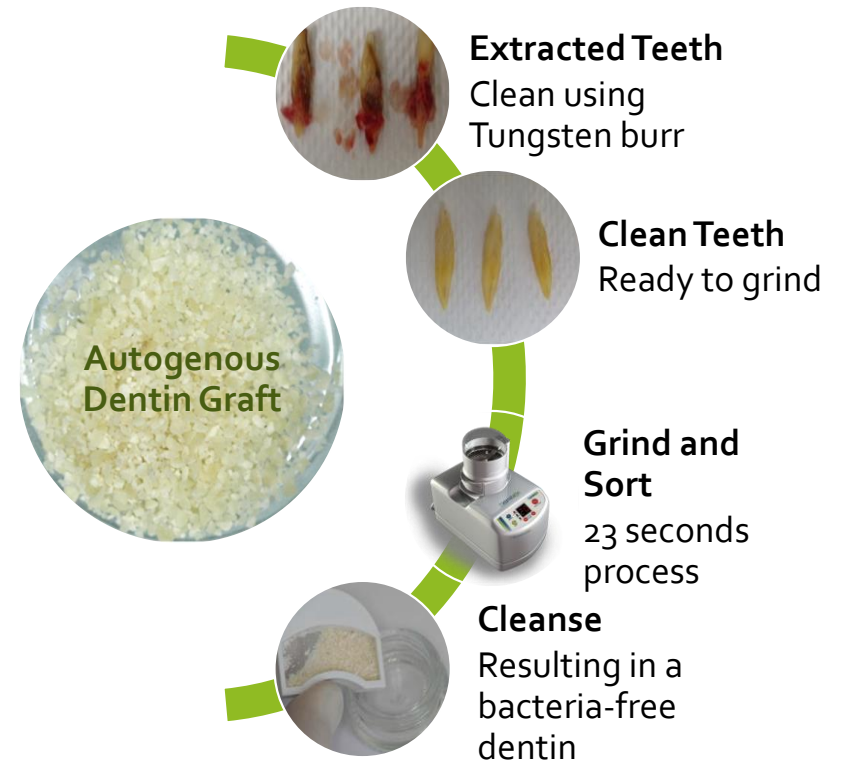
Unlike autologous bone, autologous dentin does not require a secondary harvesting site and therefore eliminates morbidity, risk and pain associated with that secondary procedure.



How is Autologous Dentin Graft Produced?

The process starts once a tooth has been extracted per indication for extraction. Using a handpiece, the tooth is mechanically cleaned to remove any soft tissue and foreign material that might be embedded in the tooth. The tooth is then dried and processed in a device called '**Smart Dentin Grinder**'

which mills the tooth and sorts the resulting particles into two separate compartments for two different particle size ranges. The particulate is then sterilized using a special cleanser, a process that takes 5 minutes, followed by a wash process that takes 3 minutes. The end result is dentin graft ready for use.



What are Patients Saying About Dentin Grafting?



"When my dentist offered to use my own tooth for grafting a periodontal defect we were trying to overcome, it was a no brainer. Of course this became my top option since it is mine and I knew it would work the best", Ann-Marie



"I've had bone grafting done in the past and it failed. I became skeptical about bone grafts, but this (dentin grafting) I was willing to try again. It worked perfectly. I'm so happy", Susan



"WOW, that's amazing. This is what I want", Fred



"I'm a vegan and so this is in line with my lifestyle and principles. I couldn't bare the thought of having my dentist use cow bone in me. This is such a wonderful option and I'm so glad it was offered to me", Roberto



"I'm a diabetic. I was told that bone grafts typically would not work well for me. But autologous dentin has a chance. It worked great and we were able to place implants shortly after the grafting procedure", Andre'

What are Professionals Saying About Dentin Grafting?



"The Smart Dentin Grinder is a must have in your armamentarium for when you are extracting a hopeless tooth and immediately placing the dental implant. The results that I have seen using the patient's own teeth as a graft material have been excellent, exceeding my expectations." - Paul S. Rosen, DMD, MS, FACD



"The possibility to use autologous tooth as a graft for bone regeneration has contributed to open a new dimension in bone graft procedures. It is leading to achieve several benefit for our patients in a way that was not possible before, the synergy with other autologous procedures is also raising the safety, predictability and biologic capacity in this new domain." - Prof. Dr. Nelson R. Pinto



"Once in a while a new product comes along that not only changes your practice it changes your mindset. After using the Dentin grinder for the last few years we are setting a new standard in autogenous graft harvesting by increasing the quality and esthetic outcome of our case and decreasing the risk of infection and rejection." - Isaac D. Tawil DDS

What are Professionals Saying About Dentin Grafting?



"I ALWAYS PREFER TO FOLLOW THE NATURAL BIOLOGY OF MY PATIENTS. THAT'S WHY THE AUTOGENOUS DENTIN GRAFT IS SO POPULAR IN MY PRACTICE. IT'S PREDICTABLE WITH EXCELLENT LONG TERM RESULTS. FURTHERMORE, IT'S A GREAT MESSAGE FOR MY PATIENTS. I USE IT WHENEVER I CAN FOR ANY GRAFTING INDICATION." - PROF. ZIV MAZOR



"MY PRIVATE PRACTICE HAS BEEN USING THE KOMETABIO SDG FOR ABOUT TWO YEARS. IN SIX MONTH POST OP CBCTS, THE AUTOGENOUS DENTIN GRAFT IS IMPOSSIBLE TO DISTINGUISH FROM NATIVE BONE. MY SUCCESS IS MY PATIENTS SUCCESS! WHICH CREATES MORE REFERRALS, SO MORE GRAFTING AT AN INSIGNIFICANT COST." - DR. DANIEL C. DELROSE, DDS



"WE'VE INTRODUCED AUTOGENOUS TOOTH BONE GRAFT IN OUR CLINIC TO SERVE OUR PATIENTS' DESIRE TO USE THEIR OWN TISSUE INSTEAD OF FOREIGN MATERIALS. THE DENTIN GRAFT IS HANDLED THE SAME AS ANY OTHER SYNTHETIC OR ALLOGENEIC GRAFTS DURING SURGERY, AND ALLOWS US TO MAKE IT A HIGH QUALITY AND ROUTINE PROCEDURE IN OUR PRACTICE. THE RESULTS ARE A GAME CHANGER - WE CONSISTENTLY GET VITAL HARD BONE VERY QUICKLY." - DR. MANUEL WALDMEYER MED. DENT. SPECIALIST IN ORAL SURGERY

What are Professionals Saying About Dentin Grafting?



"The Smart Dentin Grinder is an exceptional addition to my armamentarium in providing effective and predictable autologous graft material whether it is a single extraction site or full mouth reconstruction." - Ara Nazarian DDS, DICOI



"I've just managed to save a patient from a sinus lifting by using the extracted molar. Combining with the dentin with the PRF I did not open any package of bone substitute or collagen membrane. Not to mention the bone quality and speed of the implant placement! In the end I guess I was more happy about the result than the patient himself" - Dr. Marius Leretter



"Great idea, so simple yet genius. The Smart Dentin Grinder turns the extracted tooth into an Autogenic particulate graft – an optimal bio active scaffold for the Socket Preservation. The healing results are excellent! The system is user friendly and holds its own alongside high finishing standards." - Gideon Hallel, DMD



"The Smart Dentin Grinder is a smart, effective and thought-after technology. The protocol is user friendly for specialists as well as for GP's. Our initial results are encouraging." - Prof. Nitzan Bichacho, DMD

Where to Learn More About Dentin Grafting?



For articles,
scientific research
papers and
publications:
<https://www.kometabio.com/scientific-background-and-reference>



*For clinical cases
and case studies:
<https://www.kometabio.com/clinical-cases>



*For videos and
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