An interview with

Paul Gange

» Bachelor of Science in Business Administration, John Carroll University, OH, USA.
» Founder and President of Reliance Orthodontic Products, INC.
» Featured speaker worldwide.

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I have been blessed to have had the opportunity of knowing Paul A. Gange for a long time and becoming a good friend of his. Paul is the founder and President of RELIANCE ORTHODONTIC PRODUCTS, INC. He holds a B.S.B.A. in marketing – from the John Carroll University. Paul has had a career in the orthodontic industry that spans over three decades. He has been directly involved with the development of orthodontic adhesives, sealants and cements for over thirty-four years. Some of the highlights of his successful career include: the development of the first "No Mix" adhesive, the advancement of newest bonding adhesives and techniques, as well as the development of many of the products that you use in your everyday bonding procedures both direct and indirect. Paul Gange has also been a guest speaker in numerous study clubs, universities, continuing education courses and Regional Component meetings in the United States, Canada, Europe and the Far East. Also, he has been guest lecturer with several leading clinicians worldwide. His publications include numerous journal articles and textbook chapters, and he holds several patents. Paul is married to Sharon, the Vice President at Reliance Orthodontic Products. Together, they started the business in 1982. They have two children, Paul Jr., who is the National Sales and marketing manager at Reliance and a daughter, Nicole, who is a first-year resident in the orthodontic program at Case Western Reserve University. Paul enjoys golf, horse racing, exercising at the gym, spending time with my family and being a part of solving orthodontic bonding problems within the greatest industry in the world. There is nobody more qualified to answers questions on adhesives. Thank you Paul for making our lives so much easier! I also would like to thank our select group of interviewers.

Eustaquio Araujo – interview coordinator

Conheço Paul A. Gange há um bom tempo e nos tornamos bons amigos. Paul é fundador e presidente da *Reliance Orthodontic Products* e tem bacharelado em Administração de Empresas, na área de Marketing, pela *John Carroll University*. A carreira de Paul na indústria ortodôntica já ultrapassa três décadas. Ele tem se envolvido diretamente com o desenvolvimento de adesivos, selantes e cimentos ortodônticos por mais de 34 anos. Alguns dos destaques de sua bem-sucedida carreira incluem: o desenvolvimento do primeiro adesivo "No Mix", o avanço dos mais novos adesivos e técnicas, bem como o desenvolvimento de vários dos produtos que usamos em nossos procedimentos diários de colagem, tanto direta quanto indireta. Paul Gange também já foi palestrante convidado em inúmeros clubes de estudo, universidades, cursos de educação continuada e *Regional Component Meetings* nos Estados Unidos, Canadá, Europa e Extremo Oriente. Além disso, também já foi palestrante convidado em eventos para vários clínicos de destaque no mundo todo. Suas publicações incluem inúmeros artigos em revistas científicas e capítulos de livros, e ele também é detentor de várias patentes. Paul é casado com Sharon, a vice-presidente da *Reliance Orthodontic Products*: juntos, iniciaram o negócio em 1982. Eles têm dois filhos, Paul Jr., que é gerente de marketing e vendas nacionais da empresa; e Nicole, que está no primeiro ano de residência no curso de Ortodontia da *Case Western Reserve University*. Paul gosta de *golf*, corrida de cavalos, de malhar, de passar momentos com a família e de contribuir para a solução de problemas relativos à colagem em Ortodontia, dentro da maior indústria do ramo no mundo. Não há outra pessoa mais qualificada para responder perguntas sobre adesivos. Obrigado, Paul, por facilitar tanto nossas vidas! Também gostaria de agradecer ao nosso seleto grupo de entrevistadores.

Eustaquio Araujo – coordenador da entrevista

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Do you have a product for root (dentinal) sensitity in adult orthodontic bonding where there is gingival recession and the cementum is abraded? Donald R. Oliver

Assure/Assure Plus universal bonding resins will bond to dentin and cementum. Simply acid etch the dentin or cementum for 45 seconds with 37% phosphoric acid, rinse and blot dry. Do not desiccate. Apply two coats of Assure/Assure Plus, stroking over each coat several times to insure even and complete penetration. Light cure the Assure/Assure Plus for 10 seconds, apply bracket with paste and cure. The reason for not desiccating the dentin or cementum surface after rinsing the acid and light-curing the Assure/Assure Plus before placing the bracket is to prevent sensitivity under the composite paste.

What are you recommendations in terms of removal of esthetic brackets and why there is so much more bracket failure when we use them? José Mauricio Barros Vieira

Bracket failure with ceramic brackets can be caused by two things. 1) Handling the base of the bracket with naked or gloved fingers before applying the paste to bracket base, which will contaminate the chemical treatment on the base —if there is one present. 2) Operator not mechanically working the adhesive paste into the base effectively. If a plastic base bracket is used, the base should always be conditioned with Plastic Conditioner and dried before applying the adhesive paste.

In order to facilitate the removal of ceramic brackets at debonding time, the operator needs to warm the bracket in order to induce ductility into its base. Warming the bracket base by having the patient hold warm water in his/her mouth or carefully touching the base with a warm metal instrument with create flexibility in the base and slightly ease removal.

Is there a specific bonding material that you recommend for molars? The technical difficulties increase due to the access and moisture? José Mauricio Barros Vieira

No matter where Paul Jr. or I lecture, if we pose the question *"Where do you experience the most bond failure?"*, the answer is always premolars and molars. Why? Obviously with premolars the bracket is placed close to the gingiva and moisture is always an issue. However, here are the steps the clinician can take —mechanically and chemically— to insure an initial strong bond on posterior teeth:

1) Place the bracket on the stone model in the approximate position it will be on the tooth to determine if the base is flush to the buccal surface. If not, adapt the base. The better the fit, the better the bond.

2) Lightly roughen the buccal surface with a diamond or green stone.

3) Acid-etch the enamel for 30 seconds, rinse and dry thoroughly.

4) Apply one coat of Assure, Assure Plus or Solo, stroke over several times, lightly dry with air and IMMEDIATELY place the bracket with paste. That is the key.

The interface between the Assure and paste on bracket base must be chemically clean, with no condensation or contamination. If the teeth are prepared in advance, then the operator placing the bracket should dab a little more Assure on the enamel and dry before placing the bracket on the premolar or molar. The Assure will negate any damage done by condensation or contamination.

Is there any necessary preparation for bonding on ceramic crowns? Is the same conventional adhesive recommended? José Mauricio Barros Vieira, Cristiana Vieira de Araujo

Bonding to porcelain is no longer just bonding to porcelain. The clinician now has to be concerned with zirconia. Assure Plus is the latest generation of universal bonding resins that will bond to all surfaces: wet or dry, normal or atypical enamel, composite, zirconia, gold, amalgam and acrylic without additional primers, and to porcelain with Porcelain Conditioner (silane).

The question is identifying porcelain or zirconia? Generally, if the gingival margin looks like a normal, vital tooth and the crown is relatively new, the surface is probably zirconia. If the gingival margin appears dark, the crown is probably PFM. How do we bond to each?

Porcelain

1a) Sandblast (microetch), rinse and dry. If intraoral microetcher is not available, roughen with a fine diamond.

2a) Apply one coat of Porcelain Conditioner (silane), allow to soak in for 60 seconds, then lightly dry.

3a) Apply one coat of Assure Plus, stroke over a few times, lightly dry and light-cure for 10 seconds. Apply bracket with paste and cure. If a light-curing paste is used, double the normal light-cure time as the light will not penetrate or reflect off the porcelain like in enamel. If Assure Plus is not available, after 'step 1a'

the porcelain surface has to be etched with Porc Etch (hydrofluoric acid) for 4 minutes, rinsed and dried before 'step 2a'. Porcelain conditioner (silane) should not be used past expiration and it should be kept refrigerated as it will deteriorate quicker at room temperature.

Zirconia

1b) Lightly sandblast with 50-micron particle size alumina oxide, rinse and dry.

2b) Apply one coat of Assure Plus, stroke over a few times, lightly dry and light-cure for 10 seconds.

3b) Apply bracket with paste and cure as described in 'step 3a'.

After removing the bracket from a zirconia or porcelain crown, remove the thin film of composite with a Renew polishing point and put a final shine on the surface with Restore diamond polishing paste using a rubber cup.

Adult patients usually have esthetic composite restorations that can compromise the success of the bracket bonding. What is your recommendation to further increase the adhesive strength in these situations?

Antonio Carlos de Oliveira Ruellas

To successfully bond to a composite restoration, the clinician should:

1) Roughen the surface with a fine diamond, not a carbide or green stone. A carbide or green stone will leave a smear layer and bonding to the smear layer rather than the true composite surface will result in a lower strength value.

2) Apply one coat of Assure/Assure Plus, stroke over a few times and lightly dry with air. Light-cure the Assure or Assure Plus for 10 seconds.

3.) Apply bracket with paste and cure. The reason for light-curing the Assure or Assure Plus separately is that the light will not travel through or reflect off a composite-restored surface like it does in enamel.

Lack and excess of adhesive between bracket and enamel can be harmful to the enamel surface. What are your recommendations in terms of removing excess and finishing the bonding, and application of some material for enamel protection after bonding?

Antonio Carlos de Oliveira Ruellas

A bracket should have a sufficient amount of paste buttered into the base so that when it is applied to tooth surface, positioned and pressed in its final position there is a small bead of excess around the periphery of the base on all four sides. That ensures that there is not a void under the base that can trap food and become a decalcified lesion. To further protect the enamel around the base of the bracket it is recommended to etch around the bracket base and place a thin coat of Pro Seal and light-cure for 10 seconds.

In which situations do you consider indirect bonding as first option and which indirect bracket bonding technique would you consider?

Antonio Carlos de Oliveira Ruellas,
Cristiana Vieira de Araujo

Indirect bonding is a stress free method for placing brackets chairside in their proper position and possible eliminating or minimizing the need to reposition brackets during the course of treatment. However, it is a very technique-sensitive procedure, from the fabrication of the tray to the delivery of the brackets into the mouth. There are two types of indirect bonding techniques: clean base and custom base. With clean base the brackets are bonded to a stone or print model with water-soluble cement that is washed from the bracket bases when the brackets are in the transfer tray. The brackets are then transferred into the mouth with a chemical or light-cure sealant/paste system. The drawback to this technique is the resultant composite flash around the periphery of the bracket base that is polymerized, which is difficult to remove and can trap plaque. Custom base is the most recent and popular indirect technique as the brackets are bonded to the stone or print model with a light- or heat-cure composite forming a custom base and then cured. After placement in a clear tray, they are delivered into the mouth with a light-cure flowable composite or a chemical-cure sealant, minimizing the amount of peripheral flash. The key to bond strength with this method of indirect bonding is to be sure the custom composite pad fits the anatomy of the specific tooth flush. With this in mind, it is imperative that there is not any tooth movement after the impression or scan of the dentition has been taken, which would adversely affect the fit between the custom base and the anatomy of the tooth. Reliance has a detailed step by step procedure for successful custom base indirect bonding, which can be obtained at the *website*: www.relianceorthodontics.com.

With the advances of different types of removable aligners, will the research in adhesives be affected? Cristiana Vieira de Araujo

Clear aligner therapy required two composite materials to be developed: One which would allow the clinician to bond a hook or a button directly to the aligner rather than to the enamel and a second shaded composite which would be painted in the inside of the aligner to give the appearance of a tooth when teeth were missing. Those two products were introduced a few years ago: Bond Aligner (BA) and Perfect A Smile (PAS). They are unique materials in that they will bond chemically to all clear aligner plastics and have the same modulus of elasticity as the plastic, so that when the aligner is flexed the BA and PAS will flex with it and not peel or flake off. In addition, the BA can be applied to the occlusal surface of an aligner to open the bite.

Paul, I understand that Pro Seal is effective in reducing white spot lesions. Is it more effective than say the Opal Seal, which addresses similar concerns? Donald R. Oliver

Since the inception of Reliance Orthodontic Products in 1982, I worked with clinicians worldwide to solve the problem of decalcification with fixed appliances. Initially, we added fluoride to the sealant and composite paste, but that was only marginally effective. We then added a significant amount of filler to the sealant that was placed on the whole facial surface of the tooth hoping that would extend the life of the sealant on the enamel. Again we had some success but only for a short period of time, 6-9 months, as acid, bacteria, carbonated beverages and power drinks would disintegrate the sealant and leave the enamel exposed and unprotected. In 2005, we developed Pro Seal, a filled, light-cured, fluoride releasing sealant with a modified catalyst system that allowed the sealant to be completely cured without porosity when light-cured. Since there was no porosity to the resin matrix when cured, acid, bacteria, carbonated beverages and power drinks could not penetrate the sealant and break it down. In essence, Pro Seal forms a clear plastic barrier on the enamel. Hence, Pro Seal will last on the exposed labial tooth surface for up to three years even under daily tooth brush abrasion. If the patient does not cooperate from a hygiene standpoint, the plaque will form on the Pro Seal, not into the enamel as decalcification. Opal Seal is a filled, fluoride releasing light-cure sealant that does not completely set regardless of how long it is light-cured. Consequently, it has porosity and is susceptible to attack from acid, bacteria, carbonated beverages etc., which is why it will and has been shown to last only 6-9 months on the exposed enamel surface. This means it has to be reapplied several times during the course of treatment. The absence of porosity when Pro Seal and LED Pro Seal are light-cured is the single reason why it will remain on the exposed labial tooth surface for up to three years even under daily tooth brushing. There are currently 15 university studies showing the efficacy of Pro Seal as a sealant and documenting these aforementioned statements.

LED Pro Seal is developed to be used with the LED light. It is reported that it yellows faster than the previous iteration of Pro Seal. What is your take on that concern? Donald R. Oliver

When Pro Seal was introduced to the marketplace in 2005, quartz tungsten-halogen lights were the only dental light-cure units available. They had high intensity in the 400-500 nanometer (wavelength of photon emitted) range. Pro Seal was formulated with TPO, a light activator that cures effectively in the 400-430 nanometer range. TPO unlike other light-cure catalysts is crystal clear and cures clear. Pro Seal, regardless of how it was applied and cured would always cure clear. Shortly after the introduction of Pro Seal, cordless LED lights were introduced into the dental industry and quickly became the light-curing device of choice. The LED lamps emit high intensity in the 440-480 nanometer range only, which meant Reliance had to introduce LED Pro Seal for those clinicians who only had LED lights in their office. LED Pro Seal utilizes a modified version of camphorquinone (CQ) that cures optimally at 468 nanometers. Unfortunately it is yellow in color. However, if LED Pro Seal is applied in a thin layer as recommended and light-cured properly, it will appear clear. Recently, broad wave technology LED lights have become popular to satisfy the need to cure composites with multiple catalysts. These lights have high intensity in the 400-500 nanometer range and will cure Pro Seal and LED Pro Seal. Eventually all cordless LED lights manufactured will be broad wave. Some current broad wave lights are Valo, Vivadent and Fusion. To summarize LED Pro Seal can be cured with any dental curing light, corded or cordless. Pro Seal should be cured with a halogen light or the aforementioned broad wave cordless LED lights.

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