AdDent INCORPORATED

Thermally Assisted Polymerization

By Dr. Josh Friedman and Larry Clark

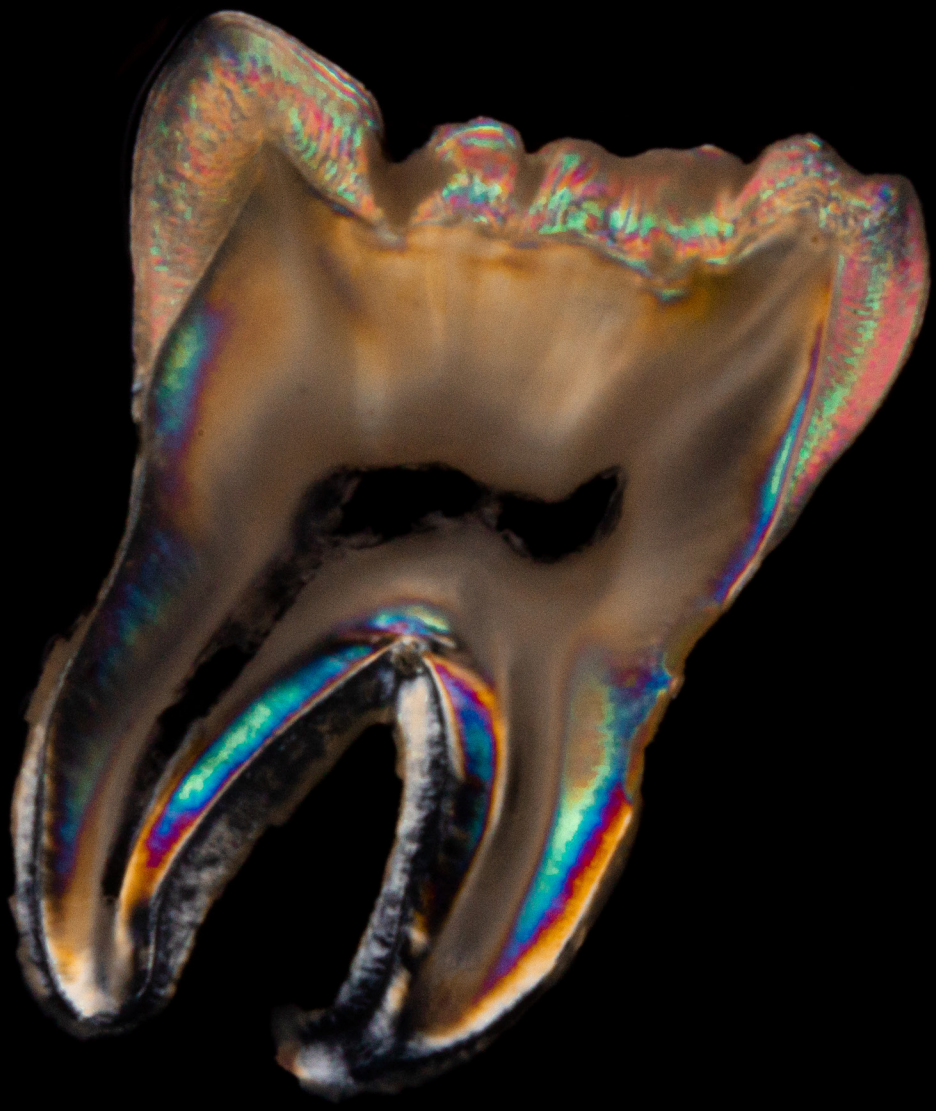


Photo courtesy of Dr. Danny Obando-Solano

What Is Thermally Assisted Polymerization? Why Should I Warm My Composite Before Placement?

The following is the transcript of a virtual program presented by Dr. Joshua Friedman and Larry Clark at the IAACD Esthetic Summit 2021.

Video available at:
https://www.youtube.com/watch?v=tX1WbXXbClo

Dr. Josh Friedman

Larry Clark

LC: Hello everybody my name is Larry Clark I'm a longtime dental materials geek. I love dental materials and I love anything that makes them better. I'm privileged today to be with my great friend doctor Joshua Friedman, who is the Founder and President of AdDent, Inc. here in the United States. He is also the founder of the Demetron Corporation and was a research scientist at NYU. He has two degrees, one in electrical engineering and he's a dentist, so we can trust him. We're so glad to be with you today.

JF: Thank you for that kind introduction, Larry. It's a pleasure to be talking to you from Colorado and I hope things are nice in Maine. I'm excited to be here to talk about the advantages of preheated composite and look forward to answering any questions when we finished.

LC: Great well let's get on with it. Josh I'm going to run through all the items that we're going to cover today and let's get with it. Well everybody, we're going to cover a lot of things that are very important for all of us to know.

Why We Warm Composites

Expected Results and Questions

- **Increase the flow of composites**
- **Higher of monomer conversion (Cure)**
- **Decrease the time of cure**
- **Less micro leakage**
- **Increase the depth of cure**
- **Reduce Shrinkage stress**
- **Repeated Warming issues?**
- **Effects on the pulp?**
- **Clinical Applications**
- **The Future**
- **More information**

LC: We're going to cover today, the reasons why we warm composites and what you can expect as results and then there's going to be a great time for questions. We're going to try and answer some of these questions in advance. We're going to talk about the obvious, increase flow of the composites that warming brings, we're going to talk about higher conversion rates of the monomer or sometimes what's called the cure, we're going to talk about decreasing the time of the cure, time savings. We're going to talk about less microleakage the number one reason for restoration restorative materials failure, we're going to talk about the increase of depth of cure with your curing lights, we're going to talk about reducing shrinkage stress and all the things that are happening from a chemistry standpoint when you're polymerizing your composites.

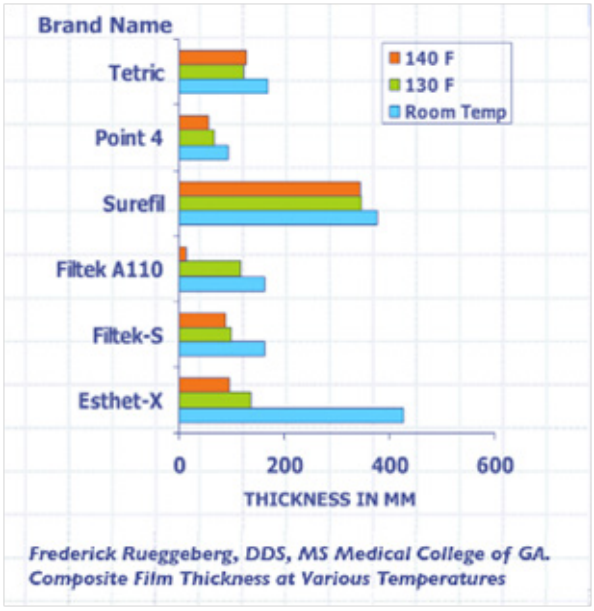
One of the questions we get often is, does it hurt to reheat our composites that we're using? Is their effect on the pulp and what are all the clinical applications I can use my warming devices for? Of course, we like to talk about the future and we're going to show you some things that are coming for the future.

So, Josh we're going to start with the first area and that'll be increase flow of composites.

Increase Flow

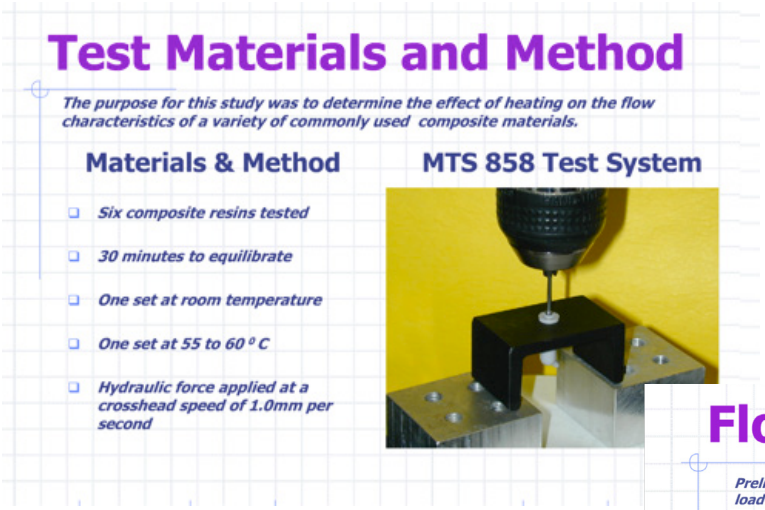
The Main Focus

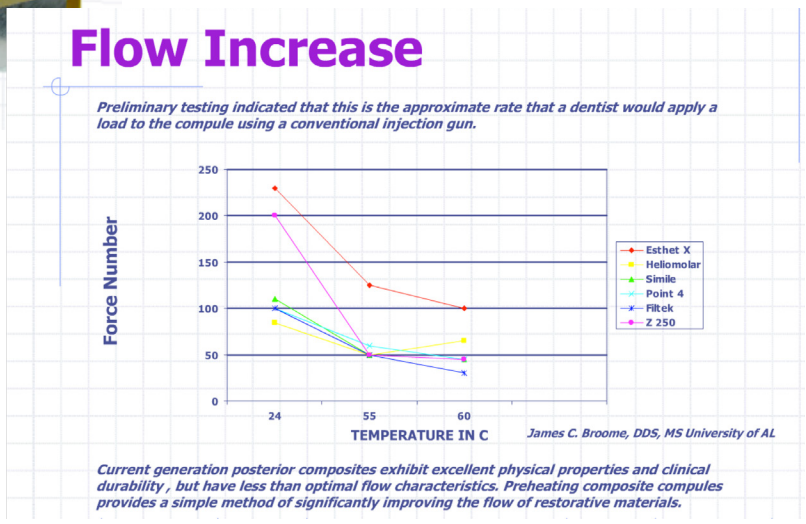
- Tetric: 27% more flow
- Point 4: 29% more flow
- Surefil: 7% more flow
- Filtek A110: 7% more flow
- Filtek-S: 39% more flow
- Esthet-X: 68% more flow
- Heliomolar: 47% more flow



JF: So here's a study by Dr. Fred Rueggeberg which looked at the flowability of different materials at varying temperatures. The two temperatures were room temperature and also 140° and 130°F, and what they found was that some of the materials have greater flow than others for example Esthet-X had a 68% greater flow while the Surefill had a 7% flow, but we see that all of them had a greater flow with heat but some more than others. The way they do this test is they take a glass slab that's heated, and they press it on a sample of the material and then composite extrudes along the edge and it forms a circle. They can measure the circle and since they know the volume of the material, they can calculate the thickness.

Ease of Dispensing





JF: Here's another study that looked at flow from a different point of view. If you have experienced dispensing heavy-body composites in a syringe and how difficult it sometimes can be, I remember asking a dentist if it was difficult, but he says no I don't have a problem with it, I just get into my assistant. Well of course the assistant would have a problem if that were the case. In any event this was done by Dr. James Broom at the University of Alabama. He looked at the effect of force required to extrude material at different temperatures. He found similar results as Fred Rueggeberg, that when the material is warm it's much easier to dispense and that's what we're seeing in this graph. The force goes down as the temperature goes up.

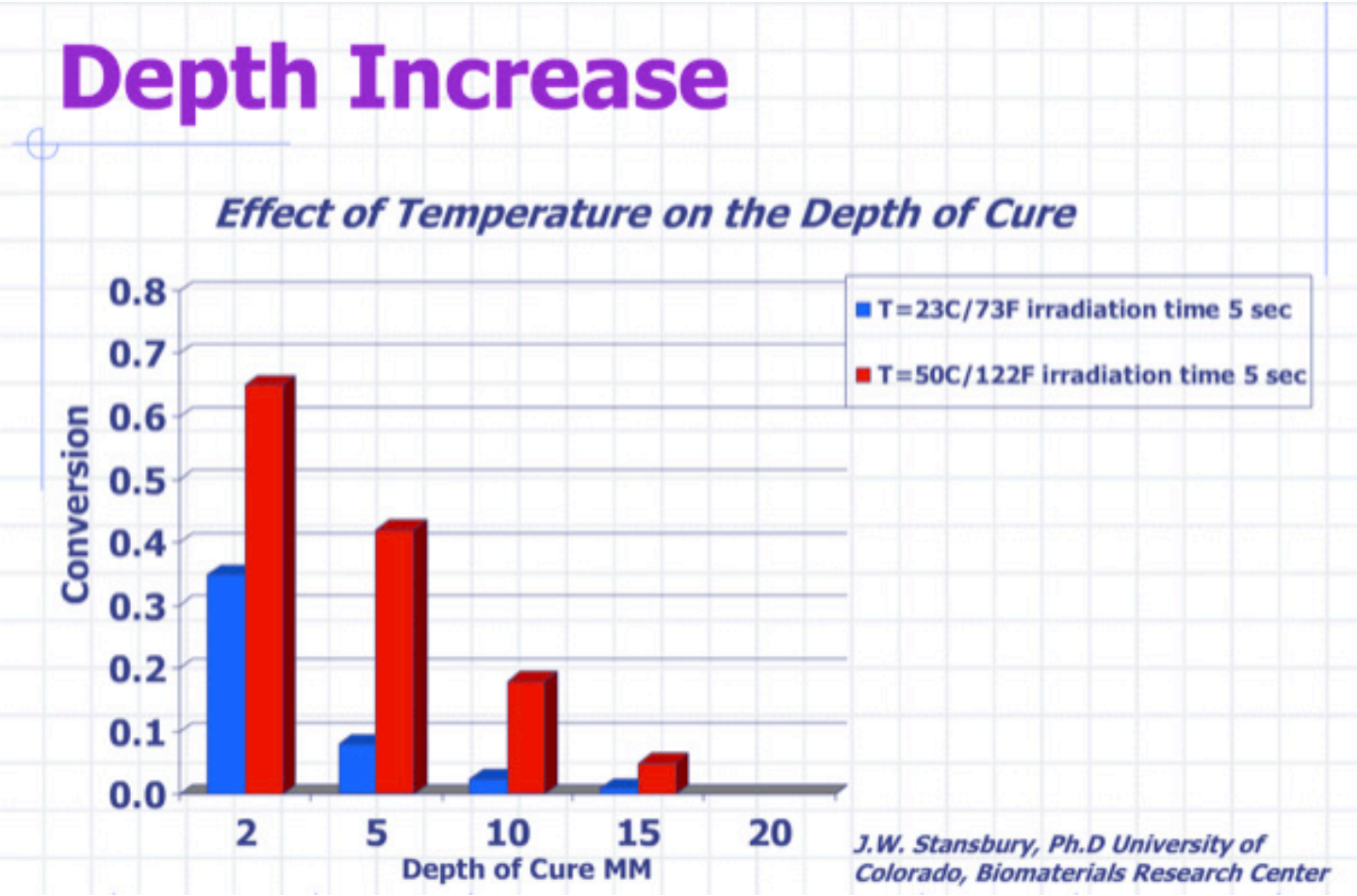
LC: So Josh you know just listening to you, I'm kind of wondering if some dentists might be thinking that with a warming device like the Calset, they would be able to decrease the use of a flowable composite. Would this take the place in many cases of a flowable composite?

JF: That's true Larry, we'll see this in another slide but basically what happens is when you use the flowable, yes it does adapt better to the walls of the preparation, but you also know is that flowables shrink much more than composites do. So what you're trying to do by creating a better adaptation you're losing once you polymerize the material because the material is going to shrink. You don't have that condition when you use warm composite and we'll see this in the next slide.

LC: I appreciate that Josh let's go there now.

Less Microleakage

Major Cause of Composite Failure



JF: This was a study by Dr Stansbury at the University of Colorado. They used something called FTIR there's a big name for Fourier Transform Spectroscopy. They do that because it shows them the exact amount of conversion. They look at the computer screen and they see a curve that shows how much the material has been polymerized, so by using that technique and heating the materials they found that both of these two advantages take place. You're curing deeper at that same high level of conversion with increased temperature, so bottom line, increasing temperature increases conversion and it indicates a greater depth of cure, and that's what we are seeing this graph.

LC: So, for any dentist that is concerned about depth of cure with their polymerization light, regardless of what type, a big advantage.

JF: Absolutely and as we'll see in another slide it's not just a question of increasing the curing light power. That doesn't always give you the best result, we'll talk about. Again there are other advantages of preheating which we'll discuss.

Effect of Pre-Heating on Depth of Cure and Surface Hardness of Light-Polymerized Resin Composites

"Results indicate that there was an increase in hardness as the temperature of the composite was increased from 70˚F to 140˚F for both composites for either the top or the bottom."

Muñoz, C., Bond, P. R., Sy-Muñoz, J., and Tan, D.
American Journal of Dentistry, Vol. 21, No. 4, August 2008

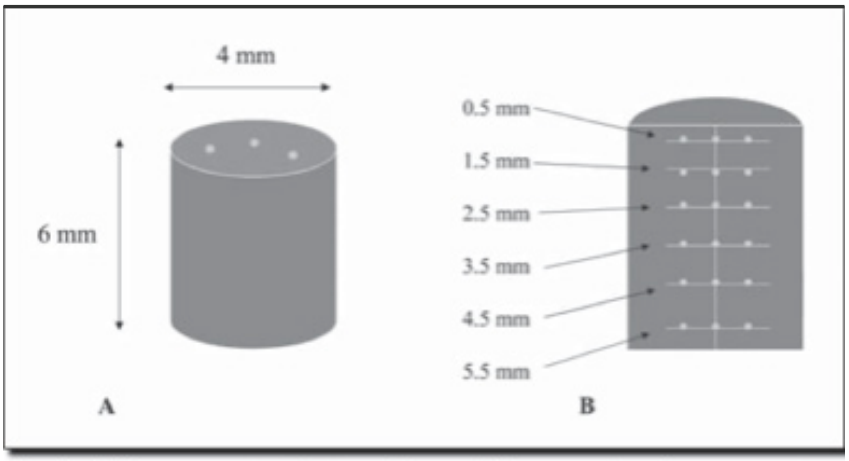


Fig. 1. **A**.Measurements at the top surface and **B.** cross sectional measurements.

JF: Another way to get the depth of cure is to measure the amount of hardness at different depths. So, in the right-hand corner (of the slide) we see a sample that's 6 millimeters in depth and what they do with this is light cure it from the top. Then they measure the hardness at these different levels, at 1.5, 2.5 down to 5.5 millimeters. You know that the composites are going to be hard at the surface. It's easy to test but you don't really know what's happening at the bottom and that's the critical part. By doing this kind of a test they split this sample in half and they can take hardness measurements of the sample at different depths. They found that they had much higher bottom hardness when it was cured, with a heated composite, and they did that both with a L.E.D. light and with a halogen light. So again, from another point of view if you're looking at hardness that certainly correlates with monomer conversion and it's nice to know that your material is fully hardened. It's obvious that harder material is going to be stronger. It's not going to fracture as easily. It's not going to allow materials to leech and it's not going to wear as much. So, all those things together gives us better performance and of course reduced sensitivity for the patient, due to fully polymerized monomer.

LC: Thank you, Josh

Increases Depth of Cure

Moore Confidence When Curing

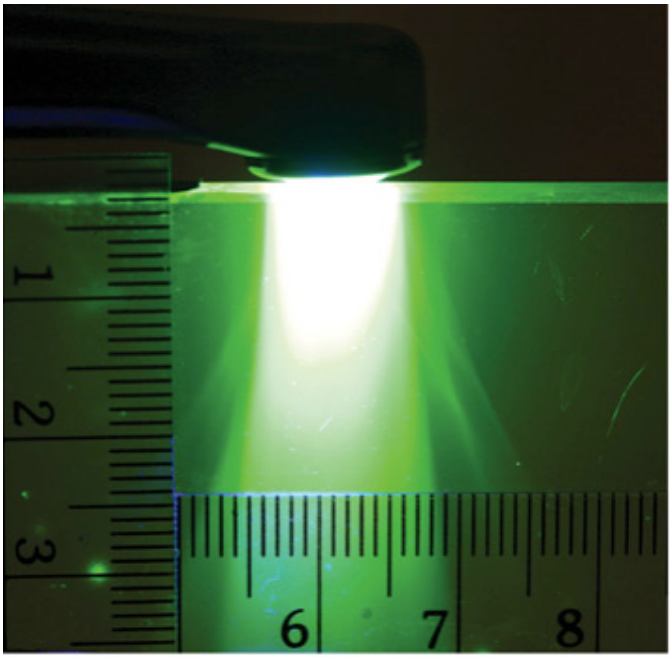


Image 1 of 9 Figure 1 The collimation of the light can drastically affect the power at depth.

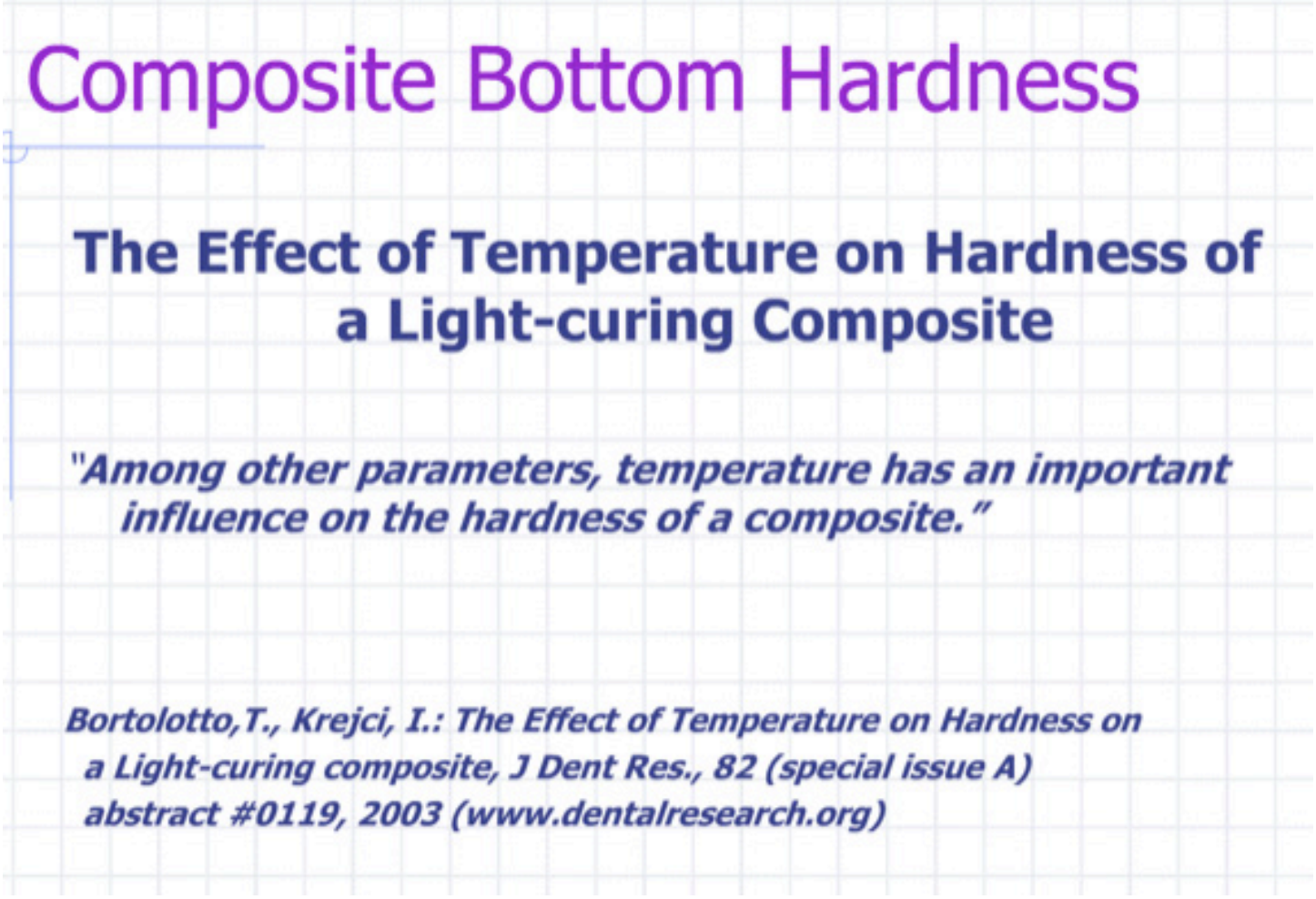
Ivoclar research looked at the refractive index of the monomer and found it increases with the increasing of temperature resulting in increased depth of cure.
P. BURTSCHER, IVOCLAR AG, Schaan, Liechtenstein, and V. RHEINBERGER, Ivoclar Vivadent AG, Schaan, Liechtenstein

Refractive Index	20°C	60°C	100°C
1.537	4.3 ± 0.03	5.2 ± 0.09	5.5 ± 0.06
1.524	5.0 ± 0.07	5.3 ± 0.07	5.7 ± 0.08
1.497	5.6 ± 0.04	4.2 ± 0.10	3.5 ± 0.06
1.470	3.1 ± 0.13	2.4 ± 0.03	2.0 ± 0.05

JF: Increased depth of cure was done by the researchers at Ivoclar. They looked at something called refractive index. They found that the refractive index of the composite material increases as the material is heated and that's what this data is showing here, and that in effect. This also causes the increase depth of cure. If the light can get down into the material because the refractive index is higher that's just another way of confirming that we're getting greater depth of cure.

LC: It is also a real compliment to the overall aesthetics of the material too because the increased monomer conversion is allowing more light to penetrate into the material so it gives it more depth. Would you agree with that?

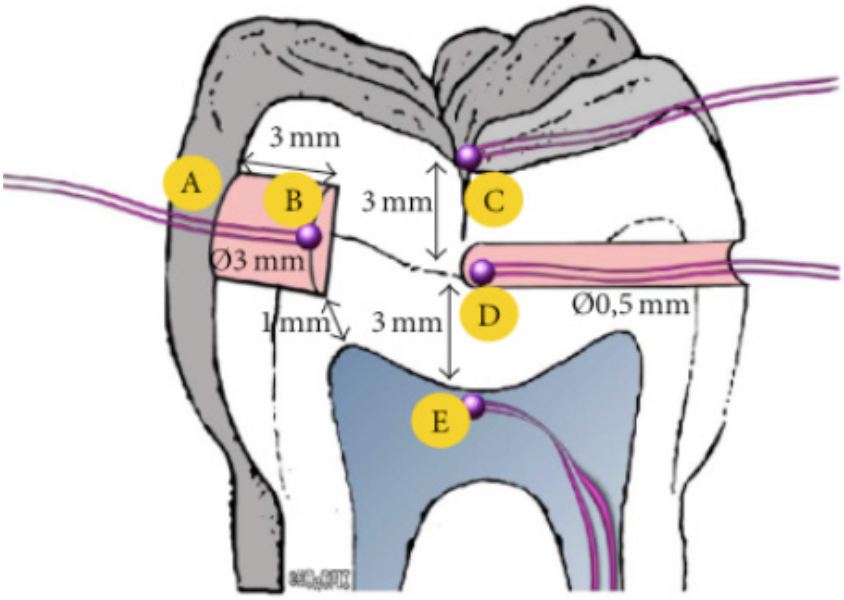
JF: Yes, and it gives it a more optically clear material, more life-like material. I think most people realize that when materials are cured they do lighten a little bit, if you've ever experienced that you'll know it and that's all part of this polymerization process. I think we haven't talked about color stability but that's also part and parcel of greater polymerization. Material is stronger, it's not going to degrade, and it's not going to change in shade as much as something that wasn't cured as well.



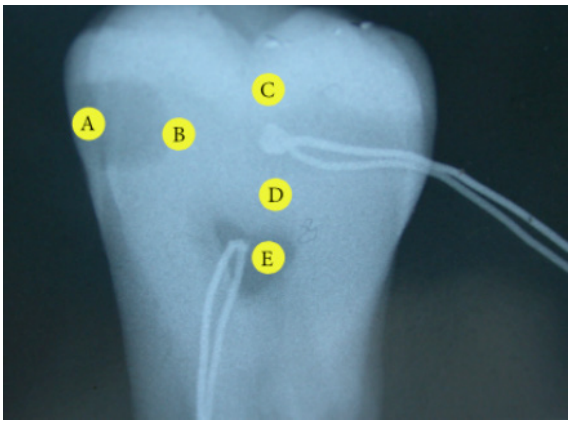
JF: There are a number of researchers that have looked at the effect of preheated material. This study was done by Dr. Krejci at the University of Geneva, he found what other people have also found. That is when you heat the material you get greater bottom hardness and with all the advantages that we've discussed before.

Effects on the Pulp

Can Warming Affect The Pulp?



- **"At each stage of the restorative process, there was no significant increase in in-vitro intrapulpal temperature rise when using pre-heated composite compared to that at room-temperature.**
- **Daronch, Rueggeberg, Hall, Holmes, Moss, and De Goes.**



JF: Some people have asked the question what effect would heated composite have on the dental pulp. This was studied and looked at in detail. The picture to the left shows the thermocouples placed at different locations on the tooth. What they found was there no significant increase or a very minor increase. They found a greatest increase in temperature was with the heat generated by the curing light that polymerizes the material. Even if you have an L.E.D light and maybe you haven't thought about it, but L.E.D. lights do also put out a lot of heat. If you doubt that, just try putting it on your fingernail for five or 10 seconds and see how it feels.

Repeated Warming

Can Repeated Warming Harm My Composites?

TABLE 4. MONOMER CONVERSION OF ROOM TEMPERATURE AND REPEATED OR EXTENDED-HEATED COMPOSITE [MEAN (SD)].

	Room Temperature	Repeated (10×)	Extended (24 hours)
Esthet•X	53.6 (0.9)	54.0 (0.6)	53.9 (0.4)
Supreme	53.5 (0.6)	52.3 (0.8)	53.7 (0.5)
Prodigy	58.4 (0.3)	58.0 (1.5)	58.7 (0.6)

Within a row, there were no statistically significant differences among conversion values for the different heating conditions ($p > 0.05$). $N = 5$ specimens per experimental condition.

"Under extreme conditions of tmerpature storage and cycling imposed during this testing, it can be concluded that exposure of sealed compules to such thermal insults does not degrade their ability to polymerize." MÁRCIA DARONCH, DDS, PhH-D*FREDERICK A. RUEGGEBERG, DDS, MS† LINDA MOSS‡,MARIO FERNANDO DE GOES, DDS, MS, PhD

LC: Thanks Josh, actually the most common questions I'm asked is how many times can you reheat the composite and does something happen to the composite overtime with repeated heating?

JF: Well that's a good question and it was answered by a study by Dr. Rueggeberg. Basically they took material and repeated heating and cooling for 10 times and then when they found that after 10 times the amount of conversion they get is identical to what they did before the 10 times of heating and cooling. They realized the fact that there isn't any damage to the material. Just parenthetically, you know we make a heating device designed for syringes and it only heats up the front about 20% of the syringe so you don't really even heat the whole contents of the syringe. Even so you're not going to damage anything by using that syringe repeatedly.

LC: You really thought that through. I really appreciate that because I think most people assume the heaters are heating the entire syringe. Thank you, Josh

Less Microleakage

Major Cause of Composite Failure

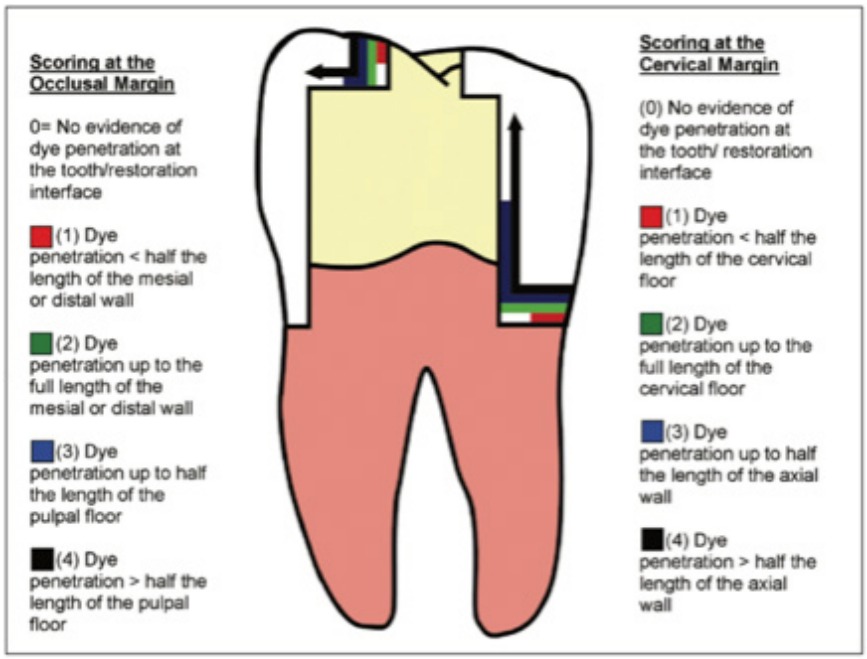


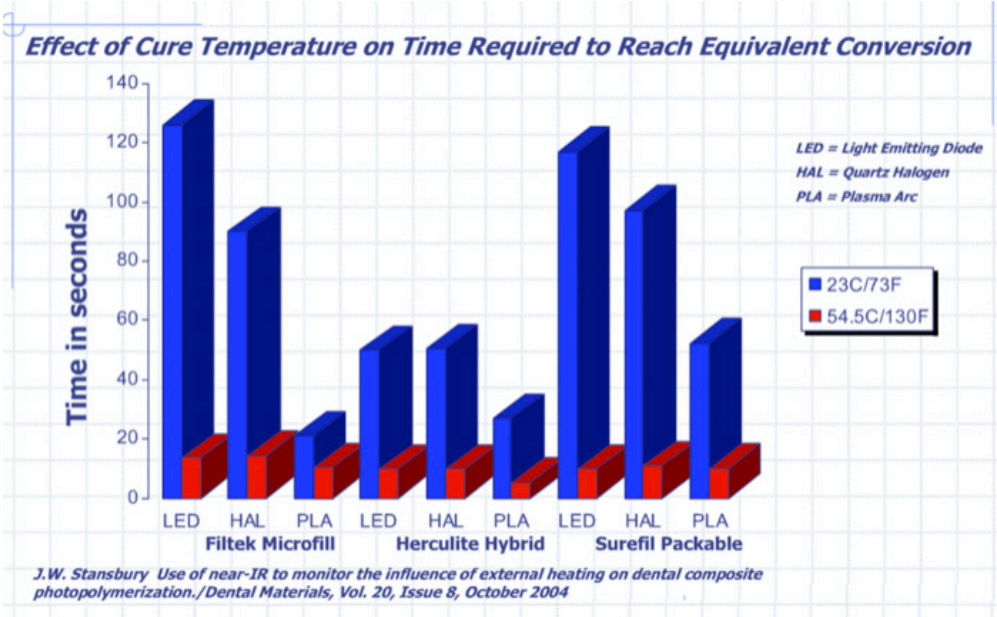
Figure 1: *Method used to score microleakage. The distance that the fushin dye penetrated is indicated by the red, green, blue and black zones. The scores (1 to 4) associated with these distances are show in the sidebars.*

"The Preheated treatment resulted in significantly less micro-leakage at the cervical margin compared to the flowable resin liner treatment. Preheating the composite was shown to valuable in reducing micro leakage in the more sensitive cervical margins." Operative Dentistry, 2008, 33-1, 72-78
Reduces marginal staining especially when cementing veneers or anterior restorations
Reduces gap formations as a result of shrinkage

JF: So here we're looking at this study by Wagner and others and they wanted to find out more about microleakage. What they did was they took three different extracted teeth and these are three different conditions in the extracted teeth. So the first condition was they put in a flowable liner and cured it in layers,2mm layers and that's condition number one. Second condition was they used no flowable liner and cured it in layers and that is condition #2. Condition #3 is when they used a warm composite with no flowable liners. Now what they do in a die study is they soak the material overnight in a red dye and then they section the teeth. They look to see where the red is penetrating into the restoration. What they found was pretty obvious, that the condition #3 which used to preheated composite had the least amount of leakage. So why is that? Well as we said before when you use a flowable you're using it to get adaptation, but we know about flowable is that they are less heavily filled and they're going to shrink more. With the case of a composite, it doesn't turn it completely into a flowable but it becomes much more flowable like and at the same time it doesn't shrink as much as a flowable. So that gives us the best possible use of the composite and also eliminates another product that you have to keep in the office.

LC: That sounds good Josh thanks.

Decrease in Curing Times

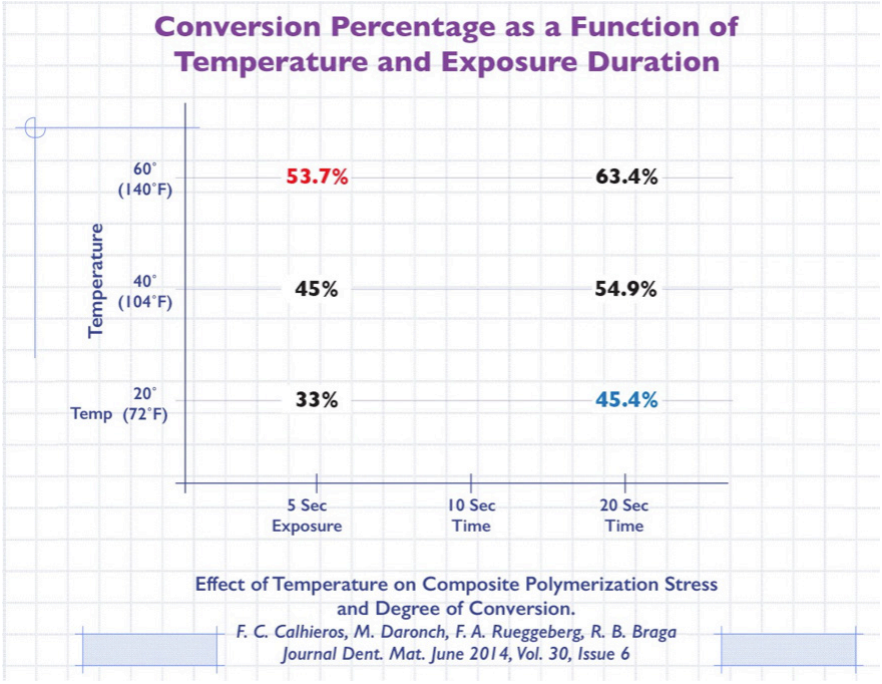


- **Even if you use a weak curing light, if the composite is preheated you will get an enhanced filling material**
- **Warming makes a properly converted composite possible**

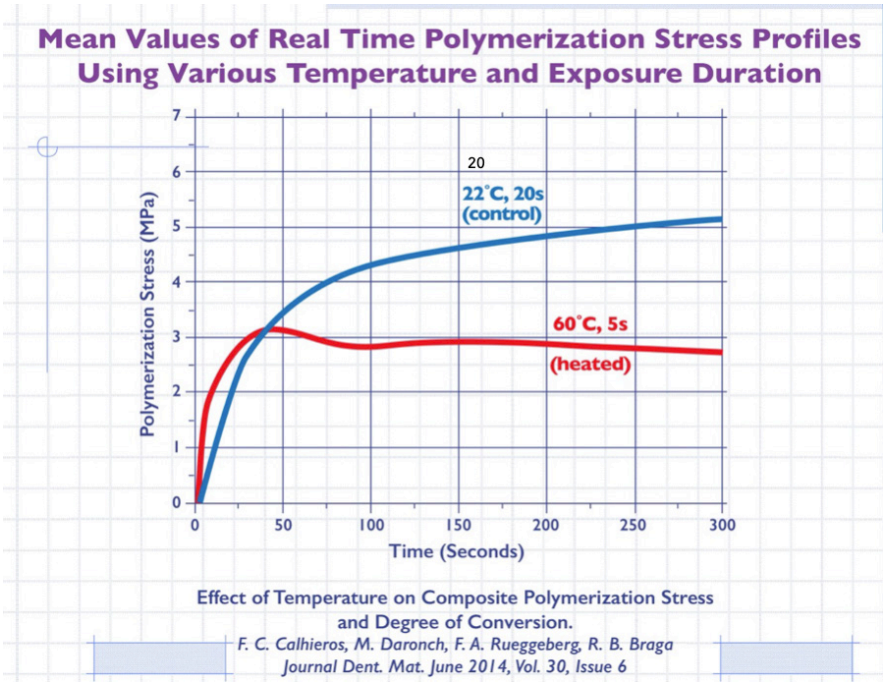
JF: This was an interesting Study by Dr. Stansbury at the University of Colorado. They took three different curing lights, a weak light -this was an early on weak L.E.D light, a medium powered Halogen light and a very high powered Plasma Arclight. They looked at three different class of materials, a microfill, a hybrid and a packable. At room temperature which is shown in blue, 23°C, we see what we would normally expect, that with a weak light it would take longer to cure, in this case it's 120 seconds, and these cures are based on FTIR technique that I talked about earlier so it's cured to a probably greater degree than most clinical materials. The same thing with halogen that took about 90 seconds and of course the Plasma Arclight as you can see had the shortest your time at 20 seconds. That's at room temperature. The other materials followed in a similar manner, they all cured at shorter times with a more powerful light or saying it the other way they took longer to cure with a weaker light. Interestingly enough, look what happens when we heat the material, this material was heated to 54°C, and they all cured approximately the same. They cured in about 15 seconds on average, but what is that telling us? That's telling us that it's more important to heat the material than it is to use a weak or strong light. If you're worried about the intensity of your light, and we know they vary.

There was a study, years back where they looked at lights throughout the two large population Texas cities, they found huge difference between one office to another, and we see that even in universities. A close friend of mine who teaches at a university, went around, and tested the lights at the clinic and found differences. So, the point is that instead of just trying to have the most powerful light we should really be thinking about warming the material. Eliminating the need for worrying about your light and know that you are getting properly converted composites.

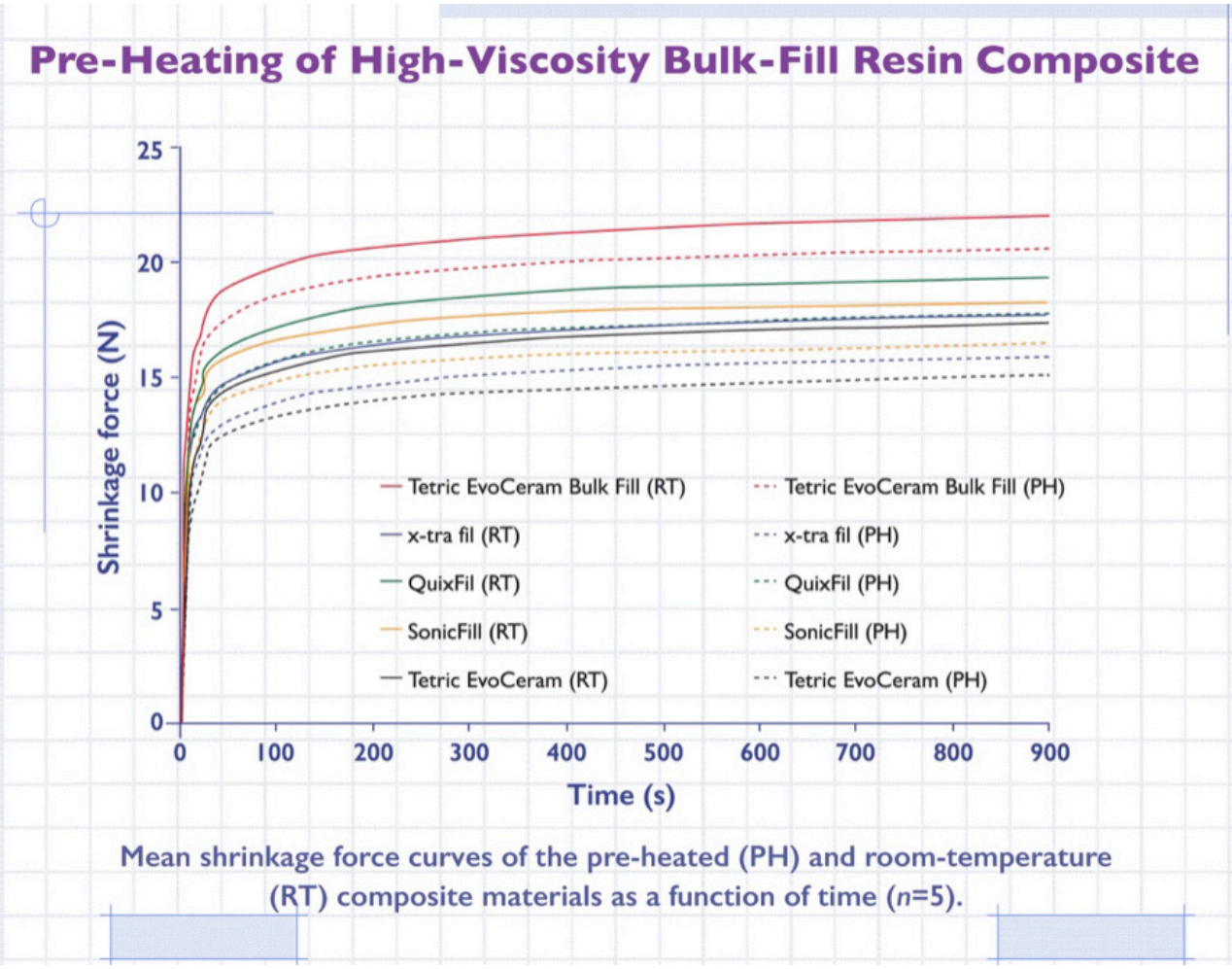
LC: You know this is a marketing person's dream come true to say you can cure, you can cure faster, and I just love where this conversation is going.



JF: This was a study by Dr. Braga and Dr. Rueggeberg on the effect of stress and temperature and the rate of monomer conversion. They took two different conditions one sample was cured for 20 seconds at room temperature you see that on the right, and another sample was cured for five seconds but it was warm, you see that on the left. Notice that the warm material had a 53.7% conversion and the material that wasn't warmed had a 45.4% conversion. So in curing less time we actually got more polymerization, that's really interesting and it's important. You might say well if I just cure longer, I can get higher conversion and that's true but something else is happening as we will see in the next slide.



JF: What's happened is the material that was cured at room temperature, has a pretty high stress level as you can see in the blue curve. The material that was heated in the red curve had much lower stress, so in effect, the cure for five seconds had less stress and it gave us higher monomer conversion. So that's a combination that's almost too good to be true, and why this research is so important.



JF: With the advent of the bulk fill materials, people have asked the question, does this pre-heating effect also extend to bulk fill material as it does with normal composites and the answer is it does. This was a study that looked at five different bulk fill composite materials the RT refers to room temperature in this graph and the PH refers to preheated. What we see here in every single case, for every single material, anytime the material was preheated the shrinkage force was less, and that even extended to Sonic fill which was designed to be vibrated. So I think it's pretty clear that whether using a normal composite or bulk fill composite you're still having advantages by preheating the material as shown by this study.

LC: Joshua mentioned Sonic Fill and it uses a vibratory mechanism to achieve flow, does it also have some of the other attributes of warming, you know like a higher degree of conversion things like that?

JF: No, that's a good point Larry, Sonic Fill was just designed to flow better into a cavity and hopefully adapt to the cavity walls, but it doesn't provide the advantages of heating, which also provides better flow, greater depth of cure, greater monomer conversion and as we see less shrinkage stress.

LC: And of course, with warming, you can warm any anybody's composite not just one manufacture's.

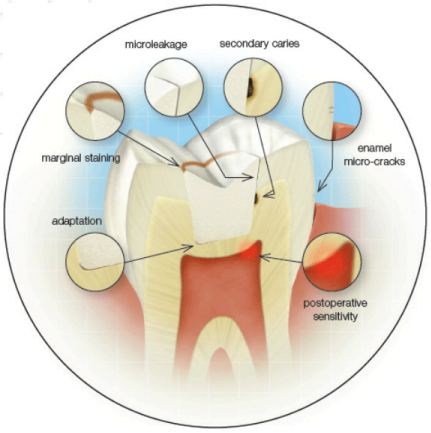
JF: All materials will flow more readily and have these advantages in the preheating application.

Polymerization Kinetics of Pre-Heated Composite

J. Dent Res 85(1):38-43, 2006, M. Daronch, F.A. Rueggeberg, M.F. De Goes, and R.Giudici

"Composite pre-warming enhanced polymerization rate and overall monomer conversion."

"This enhancement (Pre warming), is probably attained by increased molecular mobility.....allowing the system to reach higher limiting conversion before vitrification. Conversion at Rpmax increased with temperature, allowing more of the reaction to occur prior to vitrification than at room temperature."



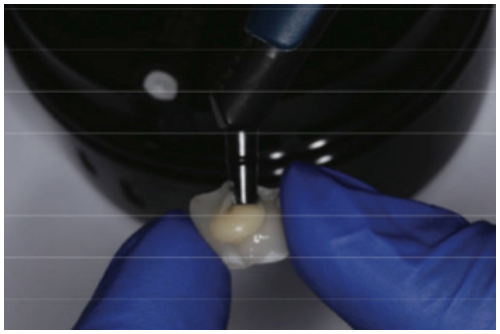
JF: So, what is taking place when materials don't cure all at one time, they cure in stages. The first stage of curing, up until a certain point is where a lot of these effects of stress take place. That point is called the vitrification point, and whatever conversion takes place prior to this point is the more critical one. If we can do something to the material prior to vitrification we can lower these stresses in that material, and that something happens to be heating. So we heat the material and the molecules have a chance to relax, flex about one another and form bonds that are more relaxed, in which case that's what's happening we're getting lower stress in that kind of situation.

LC: You know what's interesting about this diagram Josh is it sort of singles out everything we're talking about. This is a slide that's courtesy of 3M ESPE but it talks about everything microleakage, secondary caries, enamel microcracks, postoperative sensitivity, adaptation marginal staining.

JF: So yeah, I mean it's all true but I want to just explain how some of that comes about. You know when you have bonding agents that bond to enamel and the material shrinks, it's pulling those structures with it and so those structures can be deformed and when tooth structure is under stress you can just imagine what might happen when you bite down on one of those cusps, that's where critical fractures take place.

LC: You're right, let's get to the next slide because I think there's more interesting things to appear.

Clinical Applications



- **All restorative composite procedures**
- **Core Build-up**
- **Cementation procedures for crowns, inlays/ onlays and veneers**
- **Orthodontic Brackets**

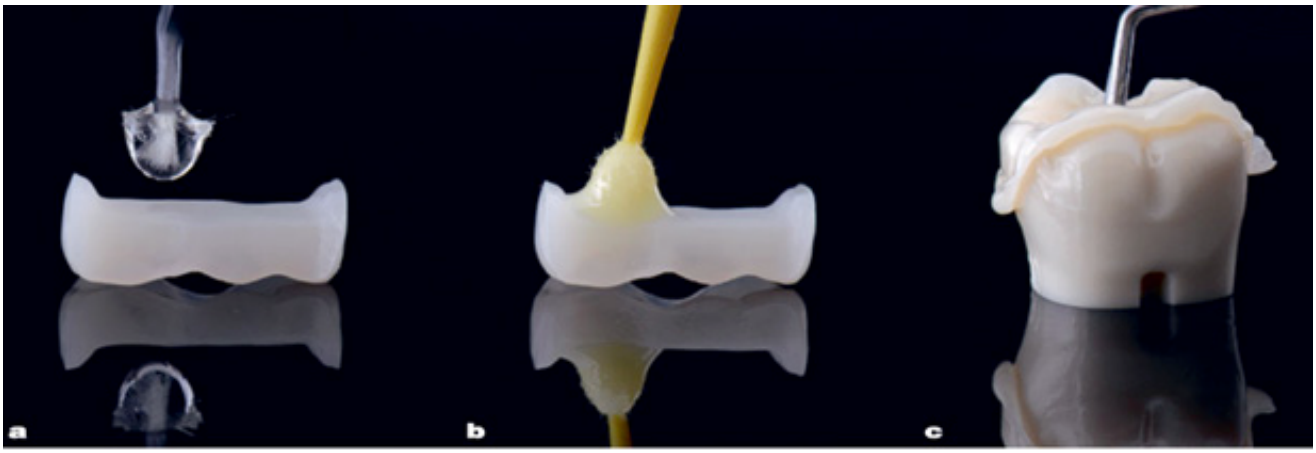


Fig 3 Luting for preheated restorative composite resin, step-by-step procedure (groups 1, 3, and **(a)** Silane application. **(b)** Adhesive coating. **(c)** Seating with Filtek Z100.

LC: From my history of dental materials, I've noticed that warming composite applications have expanded. In the beginning I just thought it was great for bulk filling and flowability and all that sort of thing. I've come to learn from reading articles from Pascal Magne and Greg Helvey and others making videos now showing it for cementation, and all kinds of stuff. Can you elaborate?

JF: Nowadays people are using composites for cementation because heated composite offers several advantages. They're going to flow as well as or close to luting cement but they're not going to shrink. So if you have a margin that has a microscopic space you'll have a filling you won't have a place where cement can leech out. Years back I spoke to a professor at the University of Zurich, where they use a lot of Cerec applications for inlays and onlays and they exclusively cement with heated light cured composite and they're doing that for the reasons I've just described. If for example, you're going to do a porcelain veneer. One technique is to warm the veneer with the composite in it and then place that

on the tooth, ofcourse after you've prepared it. What you will find is that the material extrudes around the margins of the restoration and cools rather quickly when it's outside the restoration, making it much easier to remove with an explorer. In effect you're getting a better bond, a stronger bond and you're reducing the time it takes to do you're bonding procedures.

LC: I read several articles about that and I was really impressed and in fact recently I saw an article where they compared the warming of composite to that of the use of a dual-cure cement which most dentists use in the posterior. I was astonished to see that the film thickness was better and the colors stability was always better.

JF: I actually I think that was the article by Pascal Magne that you're referring to and I think they also found out in that article that the crowns they were replacing seated better with using this technique.

LC: That was really impressive when I saw that, I also know that cementing veneers has always been a challenge. So, what you're saying is to clean up the gingival margins could be much easier with warm composites rather than flowable for example and again back to flowables, I think many dentists are using flowables for veneers and now back to the physical property aspect shrinkage stress and so on.

JF: You're absolutely right I think once you try the technique you'll realize that there's a lot shorter time it takes to do cementations with heated composite.

LC: You know Josh a lot of people have shown much interest in the cementation aspect that we've been talking about using warm composites. Dr Troy Schmedding recently did a video showing how he integrated it into his practice and he uses it every day for all cementation procedures that he does I thought this would be a good time to show it so here we go…

Enhanced Crown Cementation Technique by Dr. Schmedding
https://www.youtube.com/watch?v=JYznx91sCH8

Cementation Procedure Using Warmed Composite

Dr. Troy Schmedding

View The video here:

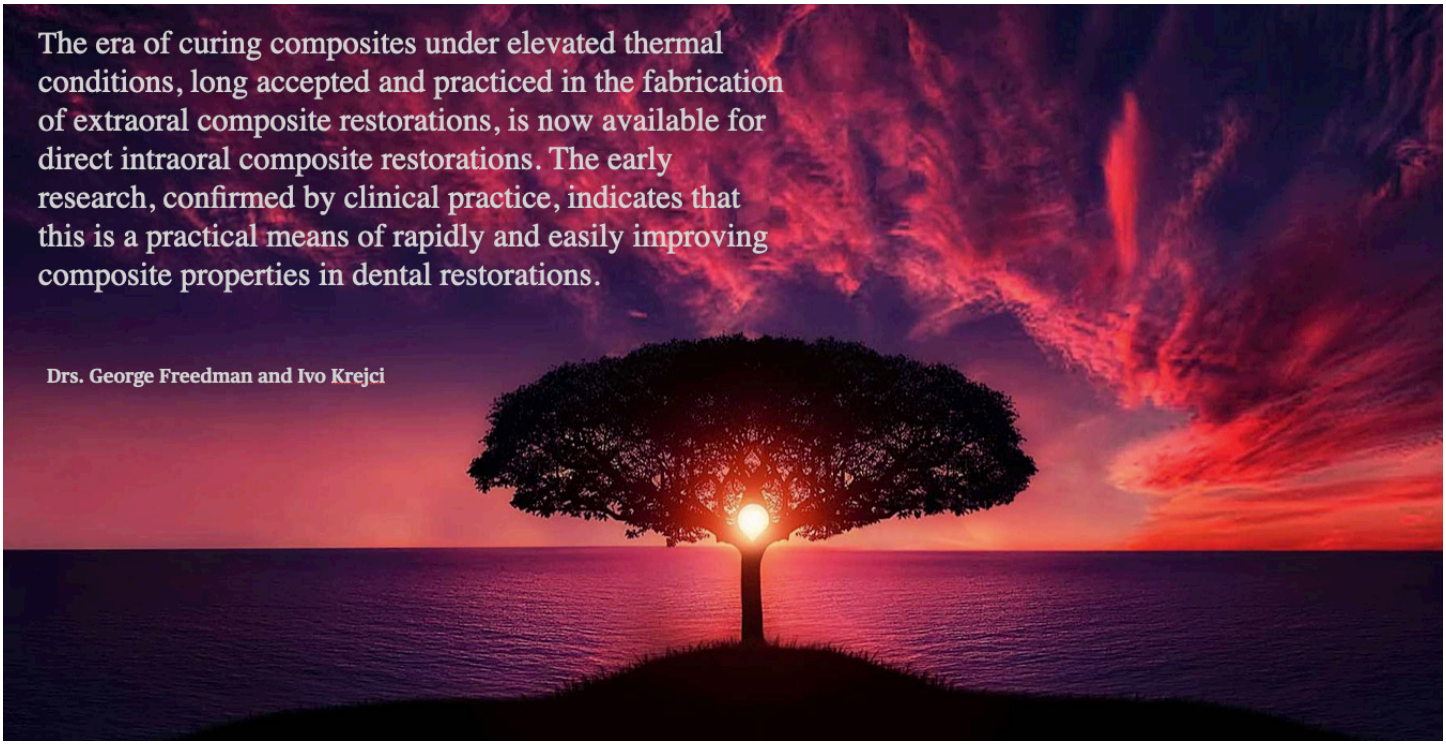
https://youtu.be/JYznx91sCH8

The Future
Will Be Right In Your Hand

LC: Since you and I become such good friends you've developed something that I'm tremendously excited by. Could you tell us more about Compex HD?

JF: We've developed the Compex HD and will be introducing it in the fall. It is a handheld rechargeable heated composite dispenser that will heat compules. It'll bring the temperature of the composite up to the desired level that we have which is 68° C, it'll bring the composite to the tooth and dispense it very close to that temperature. It'll be useful as it will go without recharging for over 100 applications, and it'll be easier to load or reload It'll become as ubiquitous as curing light. I believe down the road because more people are going to be using heated composite and this would be an easy way to go.

I want to thank everybody for listening to this program. I know there's going to be a section of time for questions and I'll be happy to answer them and I'll just turn the last slide over to Larry.



LC: Thank you Josh, there's two dentist researchers/lecturers that we both honor and respect doctor George Friedman and doctor Ivo Krejciefrom Switzerland and they had they did an article together. They're conclusion was that the era of curing composites under elevated thermal conditions, long accepted in practice and the fabrication of extra oral composite restorations, is now available for direct intraoral composite restorations. The early research, confirmed by clinical practice, indicates that this is a practical means of rapidly and easily improving composite properties in the dental restorations. I don't think anybody could have summarized everything we're saying today. Josh, what do you think?

JF: I think that's great and they're both respected the clinicians and researchers and it's nice to see more of them getting on board. There's been studies that we have on our website, which go back 20 years. They looked at the research on heated composite and found that it's been around.

I hate to say this, but I think composite manufacturers like to give the impression that you don't have to do anything to their material because the material is perfect the way it is, but that's not actually true. I mean heating has been around for way more than it's probably closer to 40 years and there's an article in 2020 by Lopez and colleagues that reviewed the published literature on heated composite since 1980. They concluded that preheating restorative materials is a simple, safe and effective procedure. I think we're looking at a future where heating composites and the means to do that are going to be very common. Just like curing lights were 20-30 years ago.

LC: I know some major manufacturers are really focusing on warming composites now and so there's sort of a revival coming and I'm excited by that. Thank you, Josh

LC: I too want to thank everybody that is viewing this educational piece that it's been a great honor to give. I want to let you know that not just this presentation but other presentations and over 60 research articles are available at the AdDent website which is listed at the bottom of the screen and Dr Friedman's email addresses kindly provided in case you have a question that you want to pose to him. We want to make sure that you know we're here for you. Mahatma Gandhi who's a hero of mine said, there is more to life than simply increasing its speed and so much about dentistry these days is about how fast we do everything. I was raised as how well we do everything and so with that said, I want you to know we're on your side. We know that you know it's about how well we do everything. We want to thank you for your attention today. We thank you for your kindness and listening and watching and we invite you to engage in warming of composites for the betterment of your patience. We thank you for this time take care everyone.

Resources: https://www.addent.com/calset-research-references/

Bios

MEET DR. FRIEDMAN, FOUNDER AND PRESIDENT

Dr. Joshua Friedman is the founder and President of AdDent Inc., as well as the founder of Demetron Research Corporation. He is a known pioneer in light-curing technology.

Dr. Friedman is a dentist, electrical engineer, and a former Assistant Research Scientist at NYU College of Dentistry.

Driven by a passion for creating products that resolve challenges for dentists, Dr. Friedman develops uniquely advanced, patented dental products. He has more than 30 patents with more pending.

MEET LARRY CLARK, CHIEF AMBASSADOR, AMBASSADOR MARKETING LLC.

Larry has 50 years of experience and education in the Dental Industry. Beginning in 1970 as an expanded duty dental assistant, his desire to help and solve dental issues has been primary in his work. Larry has worked in the retail and the manufacturing sectors in areas of sales, marketing, product development, research, education and Senior Management. Larry's desire is for the best patient outcomes, products that solve problems for dentists, and the reduction of dental disease.

AdDent, Inc.
43 Miry Brook Road, Danbury CT 06810 USA
Phone: 203-778-0200 | Fax: 203-792-2275
Email: info@addent.com | Website: www.addent.com