

Ask the Expert
Dr. Linda Greenwall
Greenwall Dental





Before you start whitening treatment, you need to do an examination to exclude pathology. So we need to check. What are we dealing with here? What's going on before we rush in?

Dr. Greenwall is a Prosthodontist and Specialist in Restorative Dentistry. She lectures in the UK and internationally on tooth whitening, aesthetic dentistry and practice management. As well as running a multidisciplinary private practice in Hampstead, London, where she works with a specialist team in the practice (endodontist, periodontist, implant surgeon, oral surgeon and orthodontist), she is a founder member and past Chair of the British Dental Bleaching Society (2008-2013), past chair of the Alpha Omega Society (2012/13), Editor-in-Chief of the journal *Aesthetic Dentistry Today*, and is past President of the Metropolitan London Branch of the British Dental Association (2015/2016). In March 2016 she was awarded the FMC Award for Outstanding Contribution to Dentistry.

Her first book, *Bleaching Techniques in Restorative Dentistry*, won the award for Best New Dental Book in 2001 – the new edition of this book, *Tooth Whitening Techniques*, was published in May 2017. Her book *Success Strategies for the Aesthetic Dental Practice* was published by Quintessence in 2011 together with Practice Management Consultant Dr. Cathy Jameson. She has written many papers for scientific journals.

In June 2017 she was honored by the Queen in her birthday honors to receive the British Empire Medal for her Service to Dentistry in the UK and Abroad. The medal ceremony was held on 17 November 2017 at the Tower of London and then she attended the Garden Party at Buckingham Palace in 2018. In 2011, Dr. Greenwall established the Dental Wellness Trust Charity which has the motto “Oral Health through Dental Wellness. The charity runs innovate oral health programs to the less fortunate Communities and reaches 15,000 children daily in the townships of South Africa as well as oral health programs with refugees and in the UK they are working in schools in Luton, London and Paddington.

Dustin Burleson:

I'm so excited to have Dr. Linda Greenwall on the program today. Dr. Greenwall, thanks for being here. I got to listen to your presentation at the British Orthodontic Society Conference last fall. And you were one of the rare presenters. When you were on stage, everyone was taking notes, so I reached out and your assistant was grateful enough to connect us. And I just want everyone to kind of learn a little bit about who you are and your career and how you've gotten to where you are today and what sort of practice you do and what you teach.

Dr. Linda Greenwall:

OK, great. Thanks so much. So I trained in Johannesburg at Wits Dental School. And my father was a dentist. My grandfather, a dentist. My uncle's a dentist. My uncle was a teacher of radiology at Columbia Dental School in New York. And my passion was to come and work in the US. However, I started with my master's degree in conservative dentistry, and so we did that and a specialist in restorative. So I did that at Guy's Hospital and I was researching the toxicity of dental amalgams because in the eighties and the early late eighties, everybody was concerned that the dentists were poisoning them because of their mercury fillings.

So I looked at this to see if it was valid and who was complaining about being toxic from their fillings. And I did a lot of research on this, and as I was about to do my study, a clinical study the professor said, No, we're not gonna study this. And I was fuming with him because I had a lot of information about this topic and he said, "Go and find another subject." So I went back to the library,

and we still had paper copies of journals in those days. And I saw this journal, which is Quintessence Publications and Professor Van Hayward and Harald Heymann from the US from North Carolina, Chapel Hill. They had published in 1989 one of the first cases of tooth whitening as we know it today. And, the the photograph on the front of the journal was the upper teeth were white and the lower teeth were yellow, and I looked at this photo, I thought, "How can that be?" And I wasn't convinced.

Anyway, I took this article to my professor and I said, I'd like to research this and he was OK, you go, girl, you go do this because it was very new. This is 1990. It was very new. Nobody in the UK was researching this information, and I started my journey then and it's been a bit of my life's passion, and everything keeps changing and moving. But there's a whole lot of new techniques that the old techniques are very valid now.

It was an orthodontist who in 1968 started using the technique we know as whitening. To this day, his name was Bill Klausmeier, and he noted that the children's gums were swollen after they had their braces and during their braces. So he developed this program to put in hydrogen peroxide gel into the children's retainers to heal the gums. And then he noticed not only were the gums healed, but actually the teeth are whiter.

Now, many chance discoveries happen like this when you are researching one thing that you discover something else, which is even more interesting and takes you on that direction the same as with the COVID vaccine because they were looking at viruses and cancer. The same with

the way they invented penicillin. They were looking at something else the same way they looked at dental implants. They were looking for osteology for bone, and they discovered they couldn't remove the implants, and it took them on a different direction.

So that's how he discovered this treatment. And he started telling his friends in the North Carolina area and one led to the other. And then there was a study group, and they told Professor Van Haywood, who started to research and actually discovered, that it has a lot of validity. So it was done as a treatment for healing the gums of children after their braces, aged 13 to 15. And was very successful. And we still use those healing techniques with the products, the special products. To this day, we use the retainers more and more to be able to do this.

So that's a little bit on how I got involved with all of this. And what we did was, we took blood and we spun it into the teeth. We took wisdom teeth, and we spun it into the teeth. And then I measured to see whether or not this technique works because we were a little bit skeptical. In the beginning, we didn't think it works, and we tested 10 different products that were currently on the market. And then I connected with Professor Van Hayward, who is an amazing man, and many people may know him. And what is really amazing about him, which is very special, And Harold Hayman they are generous with their time, and they're very kind to share the information, and that makes a true humanitarian and a really good human being.



It was an orthodontist who in 1968 started using the technique we know as whitening.

And so we connected at the Chicago Midwinter meeting. I took my one of my sons. I have four sons, and my eldest son was eight and we went on an expedition to Chicago and Van Haywood. We got to know him really well. He's a really true friend, and we started learning and learning and lecturing together. But there's so much knowledge to be done. Now what happens is that most dentists and sometimes orthodontists they think that the subject of whitening is a little bit fluffy. And so they make it up. Well, not the orthodontist, of course, but some general dentists, they don't really understand whitening because it was considered a fluffy subject and not a scientific subject. And can I show you, Dustin, that there are thousands of hundreds of thousands of research articles on teeth whitening.

First of all, we had to look at the safety. Then we had to look at the efficacy and the mode of how it transports through the tooth. And we had to understand whether this was valid. Was it safe? What was inside, what was doing the whitening, what happens to the gums, et cetera, et cetera. And so we looked at all those aspects, and we continue to look at it. But the really great news is that if

you use the right products that contain carbamide peroxide, those products are healing for the gums. And as you as we've just said, children during their braces, their oral hygiene is poor. It's not good. And it builds up plaque, and this results in many other problems. So the right product, which is a carbide peroxide product meaning it's normally known as a nighttime product, are much more effective than a day product.

Dustin Burleson:

Yes, I see that with a lot of orthodontists and patients maybe in the United States that want instant results or faster results. But the longevity of that whitening effect is not as long. And then I see a lot of orthodontists that maybe don't understand. Well, you demonstrated as we move teeth orthodontically through the bone and drag the blood supply with it that heme collects in the tooth. And I had a client say, I think I think maybe my camera settings are off because a lot of these patients' teeth look more yellow, more orange.

Dr. Linda Greenwall:

Yes they are. And they a little bit yellow to orange, actually, because it's the orange color is the hematin and the iron inside from the bleeding. And again, many orthodontists don't know that. So, I think that because of this new knowledge, maybe orthodontists should be warning the patients that the teeth could discolor. There's a few reasons.

So as we mentioned about the blood, the hematin inside as they're doing micro movements onto the periodontal ligament. The other aspect is that the children yes, the

oral health is poor and the oral hygiene. So the plaque sticking onto the braces on those anterior teeth causes again because of the poor oral hygiene and the teeth are porous and the children are dehydrated and they're not drinking enough water. The teeth pick up the plaque, and that's another reason. So you've got the extrinsic cause, which is the plaque retention on the teeth and the intrinsic cause, which is the bleeding leads to the discoloration, and often we see a beautiful ortho result, but the teeth are orange, and so it's important to discuss that with the patient.

Nowadays, you also even see it in Invisalign as well. So it's a discussion that needs to be had. Not every child's teeth are orange after their braces, so those are the more susceptible. And there's another good research study to be had. I think it depends on the amount of movement that's required within the tooth.

Dustin Burleson:

Yes, I tend to see and this is anecdote, but I tend to see it more frequently in extraction cases where we've moved teeth a great distance and you were the first to kind of highlight that. I think a lot of people, a lot of orthodontists, as you said, aren't aware. I should highlight that and mention to listeners and viewers that your textbook "Tooth Whitening Techniques" is in its second edition and it's really a comprehensive resource.

I'm curious, what are some updates you've seen since the first edition? Like you said, my dad was a general dentist, and I remember when whitening came out in the eighties and he was very skeptical of it. And then you look at, you

know, all the research has been done. Yours is a big component of that. One thing I learned from you over in London is that in the United States we're recommending too short of a duration of whitening. We're often recommending just a few weeks at home at night and you say that's just not enough. Can we dig into that a little bit?

Dr. Linda Greenwall:

Yes, so the bleaching companies and the manufacturers think that it's only a two week treatment. And what we've learned is that two weeks it's only getting started, and a basic case actually takes 4 to 6 weeks. A basic case means that there is no restorative dentistry required. And just general shade, maybe an A3 general color shade and you move across and you do the upper teeth. Always the secret to success. I mean, there are lots of secrets which I know we want to share. But the secret is separating out the whitening and doing the upper teeth first. Only whiten the upper teeth. So if you're going use it in retention when you're using the retainers, just do the upper teeth. Because the patients forget. They develop amnesia of the color, and they tell you it's not working because the upper and lower teeth are white at the same time. So you have to separate out, and so we do two weeks and we review the patient, bring them back to see the color, and then when we have our photo with the upper teeth white and the lower teeth yellow. That's our success on the clinical photos. Then we keep going and going and going.

Van Haywood taught me that you look at the whites of the eye versus the color of the tooth to see where we are with the whitening as we go along. There are a lot of scientific

measurements now and color and special apps. We have Vita have got an amazing shade eye which can be used as well to check the color. So there's a lot of scientific research, but as a general look, we look at the whites of the eyes and the color of the teeth, especially on these children.

The next thing is that Kevin Donnelly, who is, I think he's in Texas. He is a pediatric dentist, and he's done a lot of research on the whitening strips for kids. So we we brought him over to the UK to ask him about his research on whitening for kids. Because many dentists are worried about whitening for kids. We've discovered also from the research that if you've got a large pulp, so we're talking about a teenager. They just finished braces. They have a large pulp. Whitening works very, very well. And just because there's a large pulp doesn't mean that they're going to be more sensitive. So we take them on a journey. We assess that, but I recommend my general dentists to take a post op radiograph after ortho. I know the orthodontists take a panoramic x-ray before starting, but we like to see a post op periapical radiograph. We want to see what's going on with the upper roots. What's going on with the lower? What's going on at the periapical areas? We want to see if there's any widening of the periapical ligaments and we want to see the status because often it's a side effect.

We know you have a flattening of the roots and you have a little bit of resorption, maybe two millimeters. We want to know what are we dealing with before we start whitening. And the reason for this is that, let's say and it does happen and I can't tell you the percentage I will look

it up. How many teeth devitalize during ortho? I'm sure there's loads of studies on this, but we do see it occasionally, and we want to know what are we dealing with before we do whitening? And the reason for this is that if you take the oxygen from the bleaching gel and you put it into an anaerobic area, that area will flare up. Suddenly, push the oxygen inside the area flares up. It needs a root canal, which it was gonna need a root canal anyway, but it doesn't settle so quickly, and so it takes a few visits.

And it's very frustrating for endodontists because they normally do one-visit endo, and it can be alarming for patients who didn't know that. So that is why many dentists don't know this either. If you if you put in the widening gel into an anaerobic area, it flares up, so we need to know before we need to. That's why the UK Law and the European law is quite strict, But the UK law says first treatment cycle: you need to before you start treatment. You need to do an examination to exclude pathology. So we need to check. What are we dealing with here? What's going on before we actually rush in?

So, yeah, and that leads to another discussion about beauty therapists and their treatments and their kind of whitening and what's going on. It's very different to what we're talking about, long lasting, effective, predictable whitening in a safe environment at the dentist.

Dustin Burleson:

It's a really important point. And at the university where I teach, we take pre and post orthodontic periodical radiographs. But I don't think a lot of dentists in private



If you take the oxygen from the bleaching gel and you put it into an anaerobic area, that area will flare up. So it's very important to take a periapical radiograph prior to whitening to assess the health of the area and rule out any pathology.

practice do. As you mentioned, they'll take a panoramic radiograph, but that is not detailed enough to show what we need to see. I've shown so many residents and so many dentists, your instagram page to show even parents and patients who say I have this. You know it's either MIH molar incisor, hypo mineralization or decalcification from orthotic treatment. And they've been told by the dentist or orthodontist here in the United States is nothing we can do besides putting, you know, a full veneer or full bonding.

I say, "Wait, wait, there there is something else you can do." Can we talk about resin infiltration? Can we talk about those cases that do need some restorative care in addition to whitening? What have you seen? What are you currently teaching? What's working well?

Dr. Linda Greenwall:

Sure. A little while ago, we're talking. About 20 years ago, we started noticing that many of the children had white marks. It starts with a white spot on the front tooth, but

actually the condition is called MIH. Molar incisor hypomineralization. And this develops in the embryo when the cell is starved of oxygen. That's where the developing front teeth and the and the first molars are developing. Um, there is somehow some reason why the cell is starved of oxygen. So instead of being incorporated normal mineral, calcium and phosphate, sometimes we think it's albumin actually is incorporated. Too much protein is incorporated, particularly on the molar teeth that results in them not being mineralized properly. That's why the term hypomineralized.

But when the teeth are and often the baby teeth are totally fine. And when this comes to the secondary teeth on the first molars, they call them cheese-like molars because they peel, they just peel out in layers. It's also called post eruptive breakdown. It can be very dramatic, and it happens very, um, very quickly. Now, in the UK, it's one in eight children have this, um, it's 1.5 to 1.8 million. We did our own calculations. We worked out how many kids in the UK, which is 14 million. And if it's one in eight, what the percentage is, but we need to work out. Why is it that so many children now have this condition globally?

We know globally, 880 million children have this and personally, and we still need a lot more research on this. I think it's to do with the toxic world that we live in now. So we know there's over 100 reasons why you get this. And we know that, um, anything that happens prenatally Perinatally around the time of the birth or postnatally in the 1st 3 to 7 months. But even up to three years can affect the teeth and affect, and white marks results. So sometimes we again we may see on Instagram where the

patient's got a little white mark, and then they could do a bonding to match the white mark. So they're both similar instead of doing the resin infiltration.

Resin infiltration is a technique whereby the tooth where there's a white spot, let's talk about a small little white lesion on the front tooth. That's what the patients notice, and that it's a three step technique resin infiltration and uses hydrochloric acid 15%. Hydrochloric acid is placed onto the tooth for a period of two minutes, then alcohol is used as a test, not for drinking, not for drinking for under eighteens or under 21 in the US. It's just a little test the alcohol to see whether you can recreate the refractive index of the enamel, so you make the tooth more porous. You put on the alcohol as a test, and then you see whether it's ready to receive the resin.

So if you think of the white spot as an air bubble within the tooth, then you, um, want to seal it. So it's like a clear fissure seal for the poorest part of the white spot. That is how we look at it as a basic technique. And again, with resin infiltration, there's a basic case intermediate case and advanced case. Each one requires different treatment. Sometimes it's just a one stage. The resin is an unfilled resin, or it can be multiple treatments in the same appointment, depending on the severity of the lesion. And it may mean that they require after doing the resin infiltration anyway, even before there's a defective lesion, the labial surface is defected.

Many times it's pitted and rough and defective. There's chips out of it as well, or the whole incisal edge where the yellow and white mark is has chipped away. That was my

one of my recent Instagram posts, Greenwall Dental, by the way. And, basically, that enamel is defective, and it doesn't bond very well. So you're going to use your resin infiltration. You go straight on after doing resin infiltration with a composite bond, you no need to re-etch and re-bond because you've used hydrochloric acid as an etch, but you then go and you place the bonding over the tooth and you sculpt it. We're warning the patient if it's on the incisal edge that it can chip and break. And that's why the retainers are really so essential.

So, let's talk about timing. So let's say it's an in a patient with Invisalign. You're just finishing off the case. Let's backtrack a little bit. Don't do the whitening at the end of the Invisalign because then you want to do bonding and you want to do tidying up. We call it the icing on the cake. And sometimes if we want to do incisal edge bonding, it delays it by another six weeks. So what we recommend is that, let the patient get used to wearing the aligners and, minimize. Sometimes in the beginning there is a little bit of pain, so just manage it with them, used to it, wearing them for 20 hours a day and then a month.

Two is when you can start with the whitening. You would have done all your assessments and periapical assessments, et cetera, et cetera, and then you start with the whitening. The whitening will be from about 4 to 6 weeks, maybe longer, because of the the little buttons. Now the buttons are great for or changing the aligners and the retention buttons. It doesn't matter that there are buttons there. It won't mean that when you remove the composite from those bondings that you're going to have little yellow spots there. Not at all. The whitening goes in



The whitening will be from about 4 to 6 weeks, maybe longer with very gentle 10% carbamide peroxide gel.

between underneath and what we learned about the way the whitening works, it goes into the nerves of every single tooth within 5 to 10 minutes, and you cannot stop it. Just travels through. Which is why we come back to why it's so important to have the periapical areas all fine and well.

And, you know, they say, "Oh, well, it never happens to me." But when you have something that goes wrong, we learn a lot more than when it's all right every single time. So we need to be aware of what can happen. And so as we said so, you go to the second month for aligning with whitening, and then you take them through that time you're monitoring them and seeing them. It's very important to keep monitoring the patient. Bring them back two weeks later, then bring them back three weeks later. So if you're an orthodontist, who has fitted the aligner they've given the aligner is for month two. Then you're not planning to see the patient for another six weeks. Bring them back a little bit sooner, put them through hygiene and just review the color and just review the progress.

And then we also need to talk about a little bit later on management of sensitivity. Did I answer all your questions? The other thing is that coming back to the toxic world that we live in, we know that there's an impact of a product called BPA, is bisphenol A and BPA is found in plastics. It also was found in pacifiers. It's found in plastic water bottles, and it was also found in composites. And our new study is going to look at is it in retainers? And is it in the aligner? Is there any BPA whatsoever? Our laboratories have said absolutely no, but we still want to run some tests and just check it out.

So we actually work with the University of Paris, Professor Jean-Pierre Attal, and he's created a discoloration and tooth whitening clinic as the very first in the university. And I go and consult with them and we look at cases together. But he's very forward thinking into having this clinic for everybody who has all kinds of discoloration. And it's not just somebody for the high school prom that wants to whiten their teeth. This is significant problems with disease of enamel and dentine tetracycline staining. There's a whole lot of different things, and so the protocols need to be very precise, but managed very well. Again, you can do it through hygiene. I can send you for a handout how you would manage a hygienist protocol for whitening as you go along. I'm happy to send that to you.

Dustin Burleson:

In severe cases, I see a lot of MIH. It is very prevalent. And as an orthodontist, we were comfortable managing the mild cases with icon resident infiltration through DMG, which I think is out of Japan is a very nice company.

Dr. Linda Greenwall:

It's out of Hamburg in Germany. I've been there. It's a very, very great. They have a teaching centre there. They have their research center. They are very kind to share their knowledge. And we're always working together with DMG to look at the different products again. The way resin infiltration was discovered, it was done as interproximal lesions so early D1 and D2 lesions. They would like a clear interproximal fissure seal to seal that decay. And then they looked at the anterior lesion and go, "Wow, this is quite dramatic." What's possible?

And so we focus most of our attention now on the anterior lesions. But we're talking about a mild case that's just one tiny little white spot. Then you can take it through Now. In order to look at that, you can buy a little mini torch which is the size of a pen on Amazon for about \$4.99. This is our one of our secret weapons. We have lots of secret weapons, and this \$4.99 torch is a fluorescent torch, and the torch looks at "Is there any composite on the teeth prior to starting whitening?" Because there may be other bondings or all kinds of things, previous or all kinds of things. So we like to remove where we can the composite of the tooth to whiten the tooth.

But the next little piece of equipment is a white light. You know, we have blue lights for our curing, but it's a you change the top of the head and you use a white tip for your curing light, just a white one, and you trans illuminate behind the tooth because what we are trying to determine. And this is the research from Doctor Omar Marouane, not marijuana, but Marouane from Tunisia,

and he looked at where it's called trans illumination. So when you trans illuminate the mark and the lesion, it starts to give us more clarity of what we're dealing with. And sometimes the lesions are marked, or you may see them on my instagram. I showed it in the lecture.

Sometimes the lesions are much browner much deeper. It shows that it's more opaque, it's more difficult to deal with. And so when we when we look at the trans illumination and he's published a lot on this, um, we can send you the links to his articles. Um, most of my research is on my website, which is Linda Greenwald.com as well But when you when you trans illuminate, you can see the depth of the lesion that helps you. To understand is if the basic case is an intermediate case or advance when you see the different darkness is the different colour through the central incisor, we realize that this case needs multiple sessions of sandblasting etching. Sometimes we sandblast etch up to 4 to 7 times. Professor Jean Pierre Attal at the University of Paris had developed a new technique where sometimes you shave with a scalpel, the lid of the enamel lesion.

If you think of the lesion as a white box with an air bubble inside, then you there's a ceiling. There's the walls and the floor, and what we're trying to do is with the ceiling. You just open it up a little bit more so this is for an advanced lesion so you can penetrate more inside to get more porosity, open it up more so you can get the resin to go deeper. If you're gonna do any shaving of teeth or beveling, then you're obviously, uh, bound to do a composite. So the treatment plan is normally whitening, rein infiltration, and it may or may not need a composite



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bond, but you need to have a very good idea before you start so that you don't just add on the fee. Oh, OK, now we need a bonding. It needs to be part of your treatment plan. And just coming back to the toxic world that we live in. There was a river in Sweden where dioxin, an industrial chemical leaked into the river next to the river, was a factory. Um, and there was a factory leak, and the dioxin got into the breast milk and that was incorporated into the children. And that is from the toxin. So we are very interested in BPA. BPA and dioxin is an endocrine disruptor, so it affects your whole system and a lot more research is needed.

So we are about to start a research with Wits University about this looking at these endocrine disruptors. What does it do to your whole body? If you've got so many endocrine disruptors and chemical inside your system, does it only affect the teeth, or does it affect systemically? So, Dustin, there's a lot of reason, you know, I'm very passionate about this, and there's a lot of reason. There are a lot of questions that we don't know, But what we do know is the impact on these children. This is a big quality of life issue. And again, there's a lot of research on the quality of life impact for these children to have beautiful

straight teeth and the whitening and the resin infiltration with the bonding very minimally invasive.

It upsets me when I see these cases with white spots on Instagram and they go "No time." And the next minute there's eight veneers on a young person. I'm not saying it may not be necessary, but if you can be minimally invasive and not need to destroy healthy enamel, maybe as we said shaving off the little bit of the white lesion, this is so much better and much longer-lasting.

So coming back to the impact, the impact is huge for these children. Now we often see a lot of kids pre-ortho, and they've got these massive Class IIs. The teeth are dehydrated. They've got these brown marks on the front teeth, and they can't even contemplate ortho without getting those brown marks gone. So in terms of what is impacting the child, if that is what's the issue, and those children with the Class II Div. 1 the teeth are dehydrated, they're protrusive they're picking up stain, and they have enamel defects all in one recipe. Plus the poor oral hygiene gives those brown marks that you often commonly see so often we do this in two stages.

We do whitening first, and we've done whitening. Professor Van Haywood also recommend whitening for younger kids. But we've done it on kids at eight because they were severely impacted by the stripes of their teeth. So we do an initial treatment, then they go into Ortho, then after, or we pick up and we'll do the rest. So the one case that I posted recently, I'm happy to send it to you on the case notes, is we did it for the child before ortho and when the canines erupted, they were yellow. And then we

topped up the whitening because everything else was beautiful and white because we did that pre-ortho. Then we just whiten the canines.

But what we have to measure is "What is the impact on the child?" If there's no impact on the child, we leave it a little bit later. But if the child is severely impacted, if they're being teased at school, if they're bullied at school, if they don't want to go to school, then this is an issue that needs to be dealt with simply, in a minimally evasive way.

Dustin Burleson:

Yes, it's been really, incredibly rewarding for us. Parents are kind of shocked that we can get a lot of these white spots to go away after one or two treatments. And, like you said, it was really heartbreaking. To see a patient be told, you have to do porcelain veneers to get rid of these white spots, and it's just, I think it a lack of knowledge. So what would you say to a listener or viewer who's an orthodontist and wants to get engaged with, at least the more beginner cases or the simple cases? They're not more challenging or advanced. I know starting with your textbook, but also you have a wonderful online resource and teaching classes you provide. Could you talk about that? Are there things they can take?

Dr. Linda Greenwall:

It's now four years since covid. On the 20th of March 2020, all the UK dental practices were closed down. And so we had to, for three months, we had to kind of think out of the box. How can we teach this? So we developed little hampers and we did everything on Zoom and we and we teach online and in England. It's very cold and

dark in January, so we do a lot of online teaching. Nobody wants to leave their house. So we do online teaching. It works very well as online teaching, and we send them hampers and we're happy to send to the US. And we've done this quite frequently where we send the little hampers and then we run through the protocols.

There's certain things that you need to know and certain things for example, how much pressure you put on the tooth. You shouldn't push too too hard because you can cause flattening of the labial surface. So you have to do it just right and stage it and sequence it et cetera. And then there's some very good resources. There's a very good resource for parents, children, clinicians called www.theD3group.org. This was a white spot site to ask all kinds of questions. Because in the olden days, which is about 10-15 years ago, we used to see more fluorosis, especially you see more fluorosis in certain parts of the US. We don't see it as much because the message got through just enough fluoride, et cetera. But this is much more prevalent now, and we're dealing with it.

And here's the other thing. I say to the parents that it needs a lot more input at the dentist. You can't just, if a child has MIH on their molar teeth and they break down really rapidly. What we don't want to see is those children suffering from so much pain from their molar teeth. Sometimes they go on to hospital waiting lists, and by the time there's nothing to do except extract the 6's. So again it comes back to the orthodontists, orthodontists should be consulted at a very young age 6 or 7 to look at what's going on with the 6's? What's going on with the 7's if you extract the the 6's or the first molars. If you extract those,

can the second molar erupt through orthodontic intervention? So it's very much a discussion with the orthodontist on the very severe cases.

We also to know that those cases don't numb up when you're doing restorative very well. So another way of doing this is you give the child a pre-med the night before, paracetamol and then the night the morning of. And so then you can give the local you have to predose them in order to do restorative. For many of these kids, I've been surprised the number of pediatricians in medicine that are not aware of MIH or they're too busy to talk to the parent and patient. They have a high in the USA, very high patient volume, I'm sure in the UK and Europe as well. Pediatricians are very busy and so often the parent in a new patient consultation, this is the first time they've been told what MIH is, that there are so many factors that can contribute to it and, and how it places their child at risk, particularly in severe cases.

So it's a uniquely-important area. And they need long term follow up because often if you get them if you get them quickly enough, they need early restorative intervention to keep those to keep those molar teeth. Because otherwise they need to be extracted if it's rapid. A few years ago I was at a conference in Russia, and a dentist in Co. A pediatric dentist in Copenhagen, was speaking to say that they had completely Eli eliminated Caries within the whole country in Denmark, and they were dealing with MIH on a massive, massive scale. So, they spoke about these children suffering. You can't even do a root canal. You can't get them none. It's a very severe impact, which means early or early intervention, early



But we have to measure what is the impact on the child? If there's no impact on the child, we leave it until a little bit later. But if the child is severely impacted, if they're being teased at school, if they're bullied at school, if they don't want to go to school, then this is an issue that needs to be dealt with simply, in a minimally evasive way.

prevention, early and lot of constant monitoring at the hygienist to notice and check everything. So, talking about pediatricians there's one more thing there is a popular drug for acne at the moment, which is called roaccutane or isotretinoin. And unfortunately, the teeth go grey when the children take it, and it has another long term impact.

So not only are we talking about the MIH and those medications and those we also have to ask patients which antibiotics were administered to the kids we even know Amoxil can cause staining on teeth. Now we thought it was only tetracycline. Now we know that roaccutane. There was a big study with the FDA that kind of pooled all the data of finding who had suffered from this. Pediatricians, dermatologists don't know this, but the teeth go grey. So we've just, one of our young patients had just finished orthodontic treatment. His teeth were grey

green. I was a bit. I was quite shocked. And, again we spoke to the mother. We explained the whole situation. That takes a lot of bleaching. That's not a two week. That's not a four week. That's not a six week. That's a few months.

So a lot of these kids we talk to the parents and the kids. It's called a journey. It's called the Smile journey, and it takes 2 to 3 months before we start seeing results with the final, the treatment, the other aspect, which again globally. I'm not sure why. Richard Simonson a long time ago did a lot of research on Foyle. It's not always so popular. And if we do see suspicious healing, maybe it's on the first molars, but never on the premolars and all that. So on these children who have MIH everything should be sealed as rapidly as possible. And because of the dentin and the de defects of the dentin and enamel we recommend glass ionomer seals. Glass ionomers were, I have to say, were invented in the UK. Although everybody else says in the beginning, they thought, Oh, no, no, not so far. But now in the US they do like glass ionomer. It's transitioned to be men very, very useful for these these kids historically.

Dustin Burleson:

Yes. I could talk all day to you about these topics. I'm so grateful for your time and your expertise and being so generous and sharing. I do want to make sure everyone gets a chance to learn about Greenwall Dental and see some of your beautiful cases and your educational resources. Any parting words on maybe for someone who says "I want to learn more."

Dr. Linda Greenwall:

Yeah. 10 years ago, I decided it was time to give back to dentistry. So I set up a charity called The Dental Wellness Trust, and we go on missions and we're always looking for dentists and orthodontists to come and help us wherever we are in the world, we can hear from our accent from South Africa. We go to South Africa, and there's not enough dentists to help. And we always need dentists, everybody to come and help us. We always go in February when the weather is really bad up in the northern part of the hemisphere. In the Southern Hemisphere, it's very lovely. So, yes. If you want to give back if you want to be involved, you wanna connect with us, we're happy for you to come and help us at any stage.

Dustin Burleson:

It's awesome. Linda, thank you so much for doing this. I really appreciate it.

Dr. Linda Greenwall:

Sure. Thank you.

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