

Pascal Magne: 'It should not be about aesthetics but tooth-conserving dentistry'

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Pascal Magne, lecturer in adhesive and aesthetic dentistry at the University of Southern California in the USA, on biomimetics, mentorship and the future for the profession.

What led you to study dentistry?

I originally wanted to study medicine but changed my mind when I saw my brother (the best dental ceramist in the world!) doing amazing things with porcelain. As a college student, I decided to spend a week watching my own dentist at work during summer break and I was amazed by the meticulousness of the work. I was particularly impressed by endodontics and the small instruments. Ironically, endodontics is one of the aspects of our profession that I abandoned early on in my career....

What have you been most proud of in your career to date?

I try not to be too proud of anything I do but I would say I am most proud when I see my students' eyes brighten as they discover what is possible with today's materials and techniques. It is fantastic when they are able to reproduce what we have taught them. 'Little Pascal' inside me jumps with joy when my students get excited about their achievements as a result of our teaching.

How has biomimetic research changed restorative dentistry?

I believe biomimetic research is the logical evolution of research in our profession. The real definition of the term 'biomimetic' in the field of restorative dentistry is the study of the structure, function and biology of the tooth organ as a model for



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associate professor at the Minnesota Dental Research Center for Biomaterials and Biomechanics, University of Minnesota. After those two years of research in the US, Pascal returned to Geneva and assumed the position of senior lecturer in the Division of Fixed Prosthodontics and Occlusion until his departure for USC in February 2004. He has co-authored the book *Bonded porcelain restorations in the anterior dentition – a biomimetic approach* which has been translated into twelve languages and is considered as one of the most outstanding books in the field of adhesive and aesthetic dentistry.

the design and engineering of materials and equipment to restore or replace teeth. We need to go back to the source: the natural tooth; but unfortunately a lot of the time and money spent on materials research is not going in this direction. There is a lot of 'zircomania' – a quest for strength – whereas, in fact, there is nothing close to zirconia in the structure of a tooth.

Biomimetic research is changing dentistry in such a way that apparently 'weak' materials are used synergistically to simulate enamel and dentin. After all, enamel is extremely brittle (more brittle than glass) and dentin is certainly not wear resistant; yet, together perfectly bonded they can make a tooth that can withstand stress and function for a lifetime. How do you explain that? This

is synergy! What I call the 'dental trinity' – enamel, dentin and the dentino-enamel junction – should be the model used and today we can realistically approach this model with the structured use of porcelain/ceramics, composite resin and enamel/dentin bonding agents. Adhesive dentistry is the cornerstone in this process. I believe biomimetic research will also allow us to develop better solutions for tooth replacement. Currently, dental implants are not biomimetic *per se* because of the lack of periodontal ligament and extreme stiffness etc. They are indirectly biomimetic only because the neighbouring teeth are not altered by the procedure. We are looking at solutions to make implants more biomimetic through the use of more compliant materials;¹ even

adhesive techniques for bonding to implant abutments can be very useful.²

What is your number one piece of advice to dentists fitting bonded restorations?

You need good isolation (this is very important, ideally use a rubber dam) and you need to know the materials, products and procedures well. A checklist is really useful, just as pilots do before flying! You should read sound unbiased literature before choosing products. Manufacturers do not always want to sell the best product but rather the most convenient one. Today, many new products have been developed under the pressure of the market – often with one company starting a new trend which all other companies must follow with competing products even if this trend does not yield the best performance. It is business-driven. It happens a lot.

Secondly, I would say that dentists need to get as much training and experience as possible because we know that the ‘operator factor’ is even more critical than the choice of the product and technique. This is also why, as an academic, I want my students to have as much experience as they can get with the materials and techniques that are going to represent their ‘daily bread’ when they start their practice. Today we can no longer ignore that adhesive dentistry is this daily bread.

There is much debate at the moment around the ethics of cosmetic dentistry, for example in the recent *BDJ* Opinion article ‘Ethical issues, dilemmas and controversies in ‘cosmetic’ or aesthetic dentistry. A personal opinion’ (*BDJ* 2012; 212: 365–367) – what are your views?

I totally agree with the controversy and I am not a big fan of the words ‘aesthetic’ or ‘cosmetic’ (the etymological root of which means decoration!). Those aesthetic aspects should not be the driving force of the treatment but a part of its outcome, like the ‘cherry on the cake’. The driving force, as described in our book *Bonded porcelain restorations – a biomimetic approach*,³ should be the utmost respect for biology first and foremost (keep the pulp alive!), then

Dr Pascal Magne will be giving a day-long seminar in Central London on the 26 October 2012 entitled ‘No post no crown restorative dentistry – a biomimetic approach’. The seminar meets the educational criteria set by the GDC for verifiable CPD (6 hours) and is certified by the British Dental Association. A discounted fee is available for BDA members. For further information or to book a spot, go to the event webpage: <http://www.bda.org/events/1063-bda-seminarno-post-no-crown-restorative-dentistrya-biomimetic-approach26-october-2012london.aspx> or call 020 7563 4590.

the emulation of the natural function and mechanics of teeth with materials that reproduce the function of enamel, dentin and the dentinoenamel junction. There is no better word for me but to call it a ‘biomimetic approach’ or ‘bio-emulation’. It happens that materials that best simulate enamel and dentin are available in ‘white’, so why not also obtain the advantage of a beautiful tooth-like restoration. No patients would disagree. Adhesive dentistry today is capable of producing continuity between ceramic/polymers and the tooth and above all allows us to save a lot of intact tooth structure (adhesion replacing retention and resistance form). It would be foolish to ignore the bonding techniques now available and keep cutting off precious enamel and dentin. In summary, it should not be about aesthetics but tooth-conserving dentistry. We also have to acknowledge that patients will usually consult with their dentist when ‘it hurts’ or ‘it looks bad’. As a result, the aesthetic concerns of the patient have the advantage of getting the individual into the dental chair, which then allows us to help them with other aspects that they might have overlooked, such as caries or periodontal problems.

You are involved in teaching and providing a large number of courses – what do you think makes an effective dentistry teacher?

I believe that an effective dentistry teacher should be infected with passion and knowledge and must be absolutely contagious with this passion and knowledge! Teaching must not only be based on science but also on common sense and experience. A teacher must not hide anything, especially failures. Dentists taking a course given by such a teacher should feel empowered to provide their patients with more conservative and

durable treatments with their new abilities. Ideally, this kind of teacher should also be a role model with regard to his/her personal life. It is not uncommon to succeed at work at the cost of your personal life. This is the difference between just having success and being a successful human being. I am not saying that I am a successful human being but this is what I strive for. Albert Einstein once said ‘*I want to know God’s thoughts, the rest are details*’.

What is the future for dentistry?

The first term that comes to my mind is minimally-invasive. But I also believe restorative dentistry will evolve exactly as we see the rest of our life evolve....if you have a smartphone you know what I mean. The use of CAD/CAM and technology will grow, and I hope for the best, meaning that it should be used only as an additional tool in our armamentarium and not as an excuse to treat more. I believe we will stop using posts, crowns, metal alloys and intentional endodontics – this has already happened for many of us who believe in the biomimetic approach. My hope is that technology will make better treatments accessible to more patients, with a reduction in the need for root canal treatments and crown-lengthening. I see an increase in the diagnosis of diet-related problems and better differential diagnostics between wear and erosion-related lesions. Those cases will force us to strive for the most tooth-preserving solution (keeping the pulp alive and using non-retentive preparations). In summary I would say for the future ‘less is more’ ie minimally-invasive dentistry. We will learn to think differently: think biomimetic, think bonding.

If you were not a dentist what would you do?

As I was born in the city of La Chaux-de-Fonds, where visionary architect Le Corbusier was born, I may have studied

architecture. Even though as a child I was always telling my mother '*I want to become a potter*'! Above all, remember this quote from the Bible: 'In his heart, a man plans his course, but it is God who determines his steps' (Proverbs 16:9).

What advice would you give to a young dental researcher starting out?

That's an easy one: I strongly believe

in mentorship. My advice to a young researcher is to choose one (or several) mentor(s), a kind of 'dental father'. I know it is not easy to find but it is worth the search. I am blessed in my career to have three mentors: my clinical mentor Professor Urs Belser (University of Geneva), my research mentor Professor William Douglas (University of Minnesota) and my brother Michel (University of 'Life'), also my spiritual brother. Of course, the most

important of my mentors is my God.

Interview by Ruth Doherty,
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