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Dr Scott D. Ganz

Editor-in-Chief



## The next dental frontier: Materials

**Dentistry is forever changing** in an attempt to provide improved care for our patients. Researchers are constantly looking to find faster, more accurate, cost-effective, simple and beneficial methods, protocols, technology and products for the industry. Patients with dental caries can expect to be restored with a state-of-the-art filling material which is expected to mitigate the decay process and resist the forces of mastication while mimicking the aesthetics of the natural teeth. It is not always an easy task to match the shade, texture and shape of a natural maxillary central incisor requiring a full-coverage crown or porcelain laminate veneer. When teeth are to be extracted, it is advantageous to preserve the bony architecture to maintain the width and volume of the alveolus with autologous bone or bone material from other sources. The choice of material utilised can affect the healing time, maintenance of bone volume and quality of newly generated bone. Biological barriers and membranes can facilitate healing and are available in assorted sizes, shapes and materials, such as collagen, pericardium and new amnion-chorion membranes. Material choice is important in all these examples.

When patients are missing or will be missing natural teeth, an implant-supported restoration may be an appropriate treatment alternative. The dental implant usually fabricated from titanium could alternatively be made from ceramic (zirconia) materials. Most dental laboratories have become very experienced in new digital protocols to facilitate a model-less workflow in place of physical impressions used to create physical stone models in analogue protocols. The digitally designed

restorations can then be fabricated from a variety of different materials available through dental laboratory technicians. The evolution of CAD/CAM technology has continued to offer improved materials for crown and bridge dentistry, as well as dental implant abutments and screw-retained and cement-retained crowns through full-arch monolithic zirconia.

With the advent and adaptation of 3D printing by dental laboratories and in-house printing by clinicians, we are truly limited only by our imagination in terms of design, aesthetics and functionality. However, the devices we use are one part of the equation. Perhaps the area of most important research and development has been the actual materials that we use every day. We live in extremely exciting times for the dental industry, as these materials offer improvement over conventional analogue fabrications. Can 3D-printed restorations be used for both transitional and long-lasting restorations for natural teeth and implants? How can we compare CAD/CAM-milled restorations to those printed using stereolithography? Will the deciding factor be the enhanced properties of the materials used? This provides some food for thought. Material science may just be the new frontier for dentistry, forever changing how we treat our patients.

Enjoy this latest edition of **digital**. We hope that you will continue to engage, learn and prosper.

Dr Scott D. Ganz  
Editor-in-Chief



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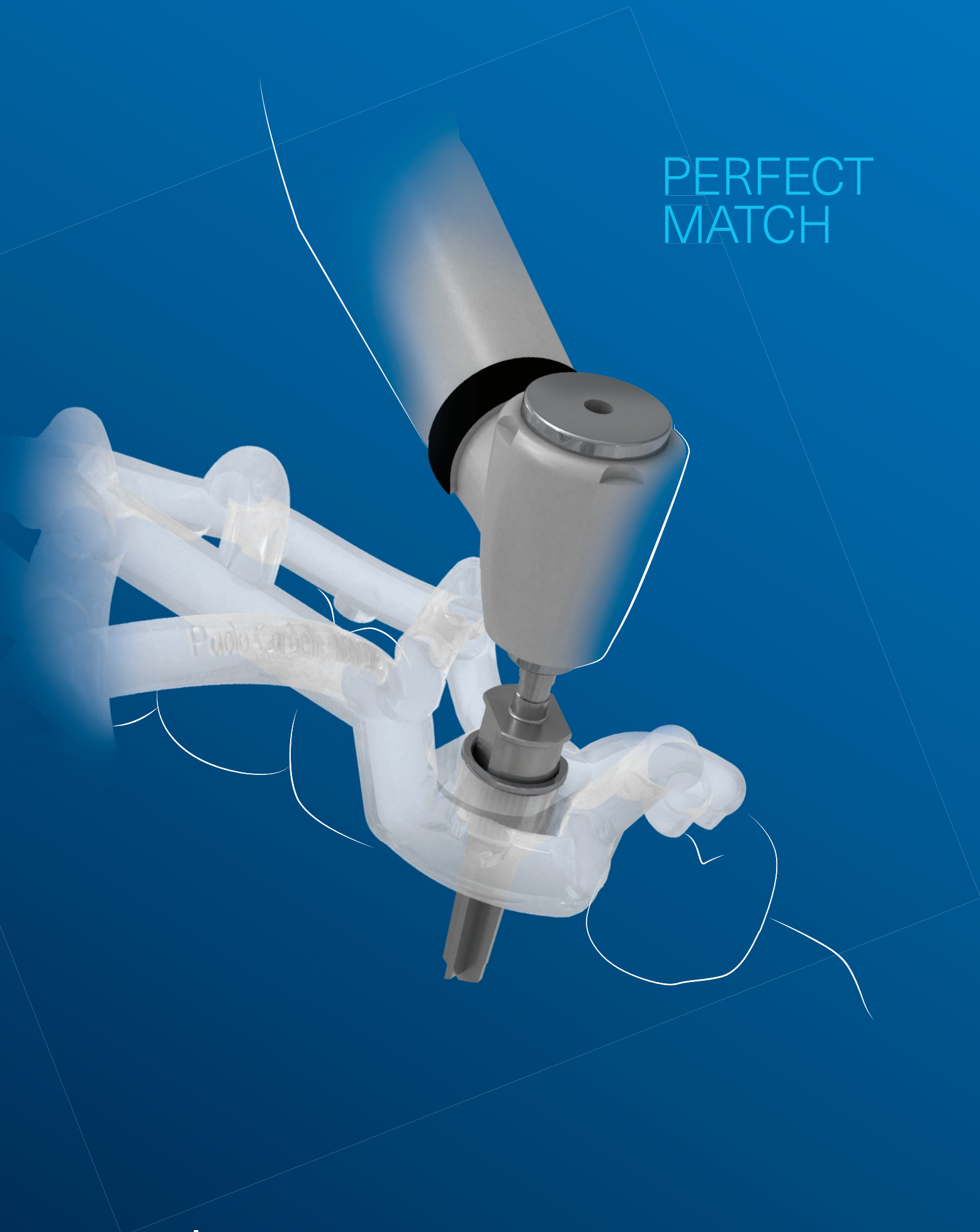
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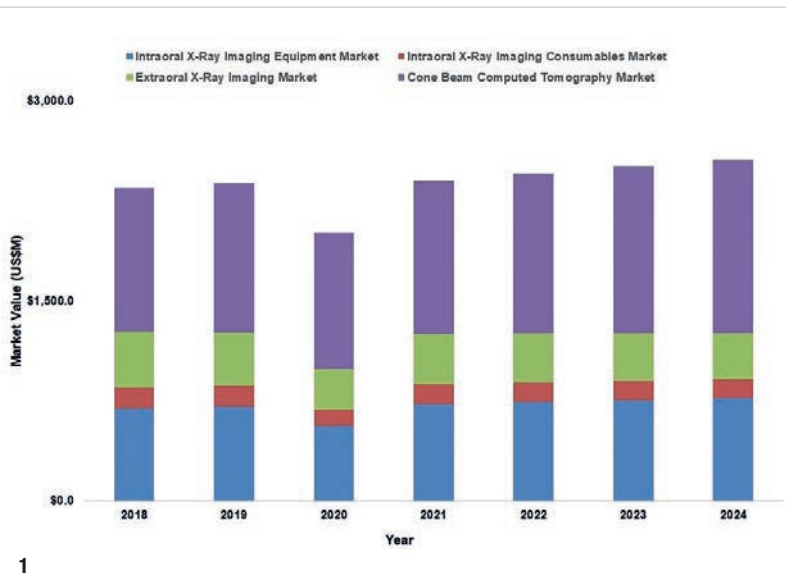
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# Dental imaging market: Product innovation to stimulate demand

Ali Shakerdargah & Dr Kamran Zamanian, Canada



**Fig. 1:** The total volume of global dental imaging procedures is increasing every year, and most of that growth is in the CBCT segment. (Image: © iData Research)

**Dental imaging** is a crucial part of oral care, and the volume of imaging procedures is predicted to increase as the global population ages and experiences more dental problems. According to the latest market insights from iData, harmful consumer behaviours and artificial intelligence (AI) are also expected to have an influence on the growth of the dental imaging market.

The global dental imaging market saw less than two million procedures performed in 2021, and the European market accounted for less than 400,000 of them. The total volume of procedures is increasing every year, and most of that growth is in the CBCT segment. As a result of the COVID-19 pandemic and the shutdown of dental offices, the total global market experienced a sharp decline in 2020 but had almost fully recovered by the end of 2021. Global market growth has been relatively steady in recent years as a result of product innovation and the ageing population.

## Innovation driving growth in dental imaging market

The CBCT market is the largest segment in the dental imaging market, followed by the intra-oral radiographic

imaging market. Most companies direct their funds towards research and development in the CBCT market owing to its leading position.

One of the main trends in the dental imaging market is a shift towards AI and data insights to improve patient care. AI-driven technology can provide a personalised dental solution that fully adjusts to the specific clinical needs of each individual patient.

Research and development in AI technology has taken place mostly in dental radiography, and this new technology is establishing its role as a smart assistant that brings dentists a number of benefits. These include, but are not limited to, being able to quickly and easily identify problems, having automated and more precise diagnostics for dental radiographs and receiving suggested treatment plans.

The use of AI technology in dental imaging is expected to grow rapidly and become one of the main drivers of the dental imaging market.

## Cosmetic usage boosting CBCT

Increased prevalence of harmful consumer behaviours, such as regular increases in sugar and fatty food consumption and inactivity, may result in dental caries. As a result, the overall volume of cosmetic procedures to restore normal oral and dental health is expected to rise.

Traditionally, 2D dental imaging machines have been used as the main tool for capturing an image of the mouth prior to procedures; however, 2D machines have a huge limitation in depicting the shape and form of mouth,

“The dental imaging market has met growth expectations, and the volume of procedures presents an opportunity for manufacturers.”

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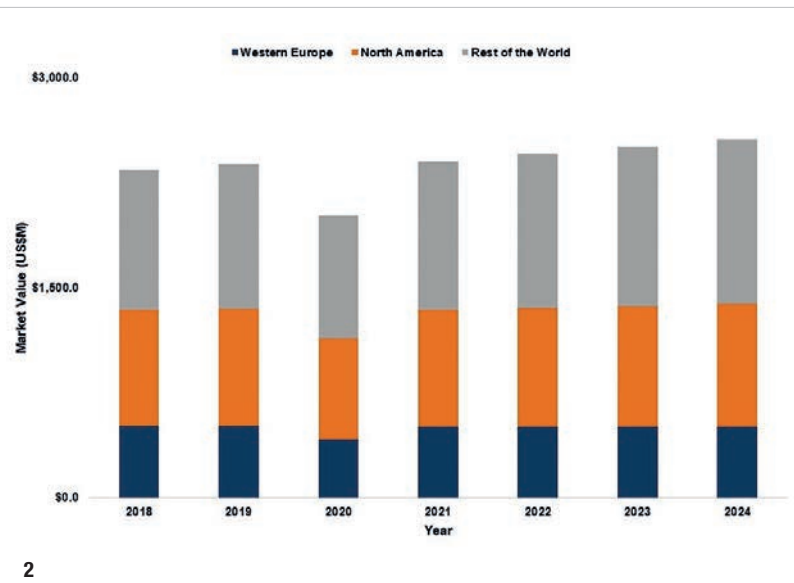
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[1] Semper-Hogg, W, Kraft, S, Stiller, S et al. Analytical and experimental position stability of the abutment in different dental implant systems with a conical implant-abutment connection Clin Oral Invest (2013) 17: 1017  
[2] Semper Hogg W, Zulauf K, Mehrhof J, Nelson K. The influence of torque tightening on the position stability of the abutment in conical implant-abutment connections. Int J Prosthodont 2015;28:538-41



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**Fig. 2:** In terms of value, Western Europe's dental imaging market trails behind that of North America. (Image: © iData Research)

as looking at a 3D object in 2D is not very accurate. Therefore, the complication rate of dental procedures was higher before the availability of 3D dental imaging tools.

The birth of CBCT scanners was a revolution in the dental industry, as it enabled dentists to capture 3D images and see the mouth from any angle. CBCT helps dentists to visualise the structures without the need of superimposition, and this advancement helps dentists to identify a patient's issues more clearly and to adopt a better treatment.

The use of CBCT in the dental industry is expected to increase as a result of the rise in need for cosmetic surgeries.

### An ageing population requires more dental imaging

Dental problems can occur at any time in life, but the probability of their occurrence has a strong positive association with advanced age. In other words, as you get older, you are more likely to have dental and oral problems. Age-related dental problems include, but are not limited to, periodontitis and root and coronal caries.

Globally, there has been a shift in population dynamics. For example, across Europe, a significant proportion of the population is now geriatric. People in this age category require more extensive dental care, for example for the provision of implants and overdentures or for the treatment of age-related conditions. As the number of people in this age bracket needing these procedures increases, dental professionals will require more advanced dental radiographic devices.

### COVID-19's impact on the dental imaging market

The global and European dental imaging markets experienced a steep decline in 2020; however, the effects of the COVID-19 pandemic on the dental imaging market are expected to vary by market segment. During the pandemic, non-essential visits to dental clinics were not possible, and this limited the ability of manufacturers to sell their products.

Crucially, the COVID-19 pandemic reduced the number of dental procedures in 2020, and this reduction was directly tied to respective countries' hospital and clinical prioritisations. Urgent procedures were performed, but patient safety necessitated meticulous preparation.

### Dental imaging market set to keep growing

The dental imaging market has met growth expectations, and the volume of procedures presents an opportunity for manufacturers to enter the market. The market is predicted to grow alongside the ageing population and the increase in number and significance of dental imaging product innovations.

Overall, the global dental imaging market was valued at less than US\$2.5 billion (€2.2 billion) in 2021, and the European market was valued at slightly above US\$500 million. The global market is expected to grow moderately, and the European market is expected to experience a slight decline.

### about



**Ali Shakerdargah** is a research analyst at iData Research. He develops and composes syndicated research projects regarding the medical device industry, publishing the Global Dental Imaging Market research report.



**Dr Kamran Zamanian** is CEO and founding partner of iData Research. He has spent over 20 years working in the market research industry with a dedication to the study of dental implants, dental bone grafting substitutes, prosthetics, as well as other dental devices used in the health of patients all over the globe.



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1. 80% of studies (4 of 5) show patients choose digital impressions over conventional (Chandran et al. 2019).

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