

# DENTAL TRIBUNE

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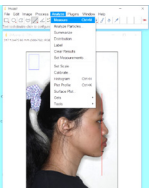
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## UNVEILING THE FUTURE

Dental 3D printing revolutionizes treatment with precision, speed, and innovation, transforming modern dentistry's future.

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## ZERO MERIDIAN NORMS IN MALAYSIAN MALAY FEMALES.

Photogrammetric analysis of Malaysian Malay females by Prof. Aina reveals a more anteriorly positioned soft tissue pogonion compared to Caucasian norms.

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## EARLY CORRECTION OF ANTERIOR CROSS BITE: A CASE REPORT

Early treatment of anterior crossbite prevents long-term dental damage in children.

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Patrick Loke, Executive Advisor (Shofu Asia Pacific)

# Leading by example

An interview with Patrick Loke, executive advisor of SHOFU Dental ASIA-Pacific.

Dental Tribune ASEAN

Patrick Loke, believes in leading by example and values the importance of collaboration, empathy, integrity and the pursuit of excellence. His dental journey spanning a 40-year career in the dental industry began with a Singapore dental group that had separate supplies and laboratory business. Working in such a diverse environment probably gave him an unique

insight into both the business and healthcare aspects of the industry. Loke also mentions that his educational background in the arts, marketing and management, equipped him with valuable skills that helped him in his professional growth in the dental industry.

More than 40 years ago, he joined Shofu Dental Asia Pacific under different entities, transitioning

from a partnership company to a branch office and finally to a private limited corporation, an independent subsidiary of Shofu Inc., headquartered in Kyoto, Japan. As of 2024, Loke has been with Shofu for over four decades. When he first joined, Shofu was a privately-owned business under the Shofu family. Over the years, he has worked with three Presidents from the Shofu family. The company, established in 1922, was listed on the Osaka Stock Exchange in 1989 and subsequently on the Tokyo Stock Exchange.

Loke's career is marked by several key milestones and achievements. He played an instrumental role in establishing numerous Shofu offices and

branches, including the Shofu branch office in Singapore in 1987, the Shofu Rep office in Shanghai in 1996, Shofu Dental Trading Co / Factory in Shanghai in 2003, Shofu Dental Asia-Pacific in Singapore in 2013, Shofu Dental India in Delhi in 2017, and the Shofu Dental Malaysia branch in Kuala Lumpur in 2017. His service to the dental industry includes serving as the President of the Singapore Dental Trade Association from 1992 to 1994 and as the Chairman of the Asia-Pacific Dental Industry Association from 1997 to 1999.

Loke also contributed to the creation of significant resources such as *A Clinical Guide to Direct Cosmetic Restorations with Giomer*, published by

Dental Tribune International in 2008, and the MiCD (Minimally Invasive Cosmetic Dentistry) Concept and Network in 2009, which is a holistic, patient-centric treatment approach that integrates minimally invasive treatment techniques with aesthetic dentistry to enhance smiles while considering the psychology, health, function, and aesthetics of the patient. Additionally, he has received numerous appreciation awards from regional institutions, including Philippine Academy of Esthetic Dentistry, Philippine Dental Association, Malaysia Dental Technologist Association, Singapore Dental Association, the Philippines Professional

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Shofu Asia Pacific team

Regulatory Board of Dentistry, Hubei Dental Society, Fujian Dental College, and Trisakti University, for his contributions in sharing knowledge in dental materials and lab technology. He has also been honoured with the Fellowship Award from the International Academy for Dental Facial Esthetics.

Throughout his career with Shofu, which involved extensive travel, he was fortunate to have the unwavering support of his family. His three loving daughters and his very understanding and supportive wife have stood by him as he climbed the career ladder within Shofu, from marketing manager to general manager, managing director, and executive chairman. Now, as the executive advisor, helping to guide the new management team, including Mr. Keisuke Minagawa, their new managing director for Shofu Dental Asia-Pacific

#### Vision and mission of Shofu

Shofu's vision and mission are rooted in a commitment to quality and excellence, aiming to offer proven products for better dentistry worldwide. They believe that beautiful teeth symbolize health and happiness. Their mission is to be one of the world's leading dental manufacturers, deeply involved in the field of dentistry, dedicated to our customers, employees, and shareholders, with an unwavering drive to progress and maintain our leading edge.

Looking ahead, Shofu's vision is evolving to meet the growing needs of the aging population

that retain more of their natural teeth. Shofu continues to develop bioactive products that meets aesthetic and functional needs while embracing trends in digital and AI driven healthcare. This commitment challenges us to innovate continuously, creating newer products and systems to align with advancing technology.

Shofu's operations and corporate culture are guided by core values of respect, ownership, and accountability. They foster an environment where employees can address problems openly and transparently, feel at home, and be proud of the company they work for. Passionate contribution from everyone is encouraged. Annual retreats for team building and training, further ensures a collaborative and innovative atmosphere.

#### Focus plans on Asia and globally

Shofu APAC's primary focus areas over the next few years will be digital dentistry, cosmetic dentistry, digital dental technology, and oral hygiene. It's not just about thinking and planning; implementing the right actions is crucial for growth. Shofu APAC is incredibly fortunate to have a strong marketing and operation teams whose passion and commitment drive our success in this region. Shofu tailors its products and services to meet the unique needs of different regions by listening closely to feedback from our dealers, customers, key opinion leaders (KOLs), and regional staff members. Although the core needs in dentistry are similar across

regions, we adjust our strategies according to each area's economic conditions and trends. Shofu sees significant growth potential in the APAC region, particularly in China, India, Indo-China, and the Middle-East Education Initiatives Shofu APAC has long been committed to enhancing dental education and training. In 2009, they supported the launch of the MiCD Concept and Network, aiming to elevate dental education and training. Seven years ago, they established a training centre in Kuala Lumpur to offer technical and clinical hands-on training for dentists and dental technicians. Additionally, Shofu collaborates with regional institutions like The Dental Academy to support continuing education for dental professionals.

To further support continuing education, Shofu brings reputable speakers and trainers

to the region to share their expertise with local dentists and dental technicians. They also provide materials and accessories to help organizers run their programs and workshops effectively. Long-term partnerships and collaborations with educational institutions such as International Medical University, The Dental Academy, Malaysian Dental Technologist Association, Philippines Association of Eesthetic Dentistry, and Asian Association of Aesthetic Dentistry highlight Shofu's commitment towards advancing dental education and training.

#### Leadership in dental materials

Shofu has been a trailblazer in dental materials since 1922, setting itself apart with groundbreaking innovations that have revolutionized the industry. Known for their iconic

dental abrasives like 'Brownies' and 'Greenies' and Dura White Stones, Shofu has consistently led the way. They were the first in Japan to develop porcelain teeth in the 1920s, the pioneering creators of Spherical Amalgam Alloy in the 1960s, and the developers of true Opalescence in Porcelain in the 1980s. These landmark achievements have distinguished Shofu from its competitors for over a century. Shofu's most innovative products, such as their advanced abrasives, true Opal Porcelain, Spherical Amalgam, and bio-active restoratives featuring the proprietary S-PRG technology "Giomer," have had a significant impact on the dental industry. Shofu adheres to rigorous quality standards and stringent manufacturing protocols, meeting all global medical device requirements like ISO, GMP, CE, FDA, and JIS. Additionally, Shofu collaborates with a vast network



Interview with Patrick Loke



of Key Opinion Leaders (KOLs) worldwide to gain insightful feedback and maintain the excellence of their products.

Team and contributions

In the bustling headquarters of Shofu in Kyoto, Japan, and across its numerous international offices and manufacturing plants, the heartbeat of success resonates through its dedicated

beyond work are acknowledged and addressed promptly. This holistic approach not only enhances productivity but also cultivates a deep sense of loyalty and commitment among the team members.

One of the hallmarks of Shofu's team culture is their annual retreat, a cherished tradition where employees gather to strategize, bond, and rejuvenate.



team. Embodying the ethos of Japanese teamwork, Shofu cherishes harmony and collective effort over individual pursuits. This cultural cornerstone not only defines their operational philosophy but also underscores their global achievements. Across Shofu Dental Asia-Pacific, collaboration thrives as a cornerstone of innovation. Through modern channels like social media, the team fosters a dynamic environment where ideas flow freely and creativity flourishes. Valuing the personal well-being of their employees, Shofu ensures a supportive workplace where concerns

Here, amidst team-building exercises and open discussions, ideas are born and challenges are met head-on. This collaborative spirit extends beyond mere teamwork; it creates a familial bond between the employees and management, ensuring that every voice is heard and every contribution valued.

In essence, Shofu's success story is not just about products and markets; it's about the people who form its backbone. Their commitment to teamwork, innovation, and mutual respect fuels Shofu's journey towards continued excellence

in the global dental industry. When asked why many dental companies did not succeed in South Asia and S.E.A, Patrick shared a valuable insight that the dental business is very personal. He mentioned that companies fail because they do not understand this very essence of the dental business and also may not have the right people to understand the market.

Future outlook for 2025

As the Asia-Pacific region continues its dynamic growth, Shofu Dental Asia-Pacific stands poised to embrace the future with a vision that's both bold and inspiring. With evolving consumer preferences leaning towards cosmetic and digital dentistry, Shofu is setting new benchmarks, determined to distinguish itself from the competition. The company is not just responding to change; it is leading the charge, innovating and pushing boundaries to redefine the standards of dental care.

Looking ahead to the next five to ten years, Shofu envisions a landscape where dental materials are not only aesthetically superior but also stronger, bioactive, and user-friendly. This vision is already taking shape through a decade of relentless research and development. Shofu's commitment to innovation ensures that their products will continue to enhance the quality and functionality of dental care, making treatments more effective and accessible.

In 2025, the industry will witness the continual rise of Dental Service Organizations (DSOs) and Dental Management Service Organizations (DMSOs), alongside a surge in digital dentistry and laser dentistry. Consumers are also increasingly gravitating towards natural oral hygiene solutions. These trends promise to transform the dental industry, and Shofu is ready to

lead this revolution, aligning its strategies to meet these emerging demands.

The future holds exciting challenges for Shofu, much like it does for the entire dental industry. With the advent of artificial intelligence, every aspect of dentistry—from clinical practices and lab work to product development, marketing, and education—will undergo significant transformations. Shofu is not just preparing for these changes; it is embracing them with open arms, ensuring that it remains at the forefront of innovation and excellence in dental care.

As Shofu continues to pave the way forward, its journey is a testament to the power of vision, perseverance, and a commitment to enhancing lives through better dental care. The future is bright, and Shofu is ready to shine even brighter, transforming challenges into opportunities and setting new standards for the world of dentistry.

Shofu's Expansion Plans: A conversation with Mr Kei Minagawa, the current Managing Director of Shofu APAC Shofu's journey of expansion in the Asia Pacific and global markets is not just a strategic move but a testament to its commitment to growth and innovation. Recently, Shofu opened a state-of-the-art manufacturing facility near Hanoi, Vietnam, reflecting its proactive approach to meeting escalating production demands and bolstering regional sales. This expansion underscores Shofu's dedication to enhancing operational efficiency and ensuring seamless delivery of its renowned dental products across Asia.

Simultaneously, Shofu is intensifying its research and development initiatives in Europe, focusing particularly on advancing digital dentistry.

This strategic investment aims to leverage cutting-edge technologies and insights from European dental experts to drive innovation and maintain Shofu's competitive edge in the global market.

Looking ahead, Shofu's global expansion plans include scaling up its workforce, with a keen focus on hiring top talent across Europe and Asia over the next five years. This proactive approach not only supports Shofu's ambitious growth trajectory but also reinforces its commitment to excellence in customer service and product innovation worldwide.

In emerging markets, Shofu is forging ahead with robust strategies, including collaborative clinical research with local dental institutions and partnerships with prominent organizations like FDI (World Dental Federation). These initiatives are pivotal in strengthening Shofu's presence and building trust within these rapidly evolving markets.

Despite the promising outlook, Shofu acknowledges the challenges ahead, particularly in navigating global labour shortages and ensuring optimal operational conditions. Addressing these challenges requires innovative recruitment strategies, leveraging personal recommendations, online platforms, and social media to attract and retain top-tier talent crucial for sustaining growth.

As Shofu continues to expand its global footprint, its unwavering commitment to innovation, quality, and customer satisfaction remains steadfast. With a clear vision and proactive strategies in place, Shofu is poised to overcome challenges, capitalize on opportunities, and lead the way in revolutionizing the dental industry worldwide.





# Unveiling the future: The thrilling evolution of dental 3D printing

Dr Jesus Paolo Pangilinan, Philippines



Image: Dr. Jesus Paolo

In the realm of dentistry, a groundbreaking revolution has taken center stage—one fueled by the transformative power of dental 3D printing. As we delve into this exciting landscape, we uncover a tapestry of innovation, hope, and limitless possibilities that are reshaping the very fabric of modern dental care.

Embracing the digital era, dental 3D printing emerges as a beacon of progress, breathing life into patient smiles through the artful integration of cutting-edge technologies. From the meticulous digitization of patient teeth to the seamless fusion of diagnostic parameters, this revolutionary approach ushers in a new era of precision and efficiency in treatment planning and delivery. With each scan and design click, we embark on a journey guided by the unwavering principles of dental excellence, crafting treatment plans with finesse and envisioning their execution in vivid detail.

The evolution of 3D printing technology stands as a testament to human ingenuity and

perseverance. Harking back to the days of exorbitant costs and lengthy production times, we now stand on the brink of a new age—one characterized by enhanced screen resolutions, user-friendly workflows, and a diverse palette of resins that strike a harmonious balance between strength, efficiency, versatility, and reliability.

Previous applications of 3D printing may have been limited, but the horizon now stretches endlessly before us, offering boundless opportunities for innovation. From crafting aligner models with surgical precision to formulating durable crown and bridge resins infused with ceramic fillers, the potential for advancement knows no bounds. With each technological leap, we inch closer to a future where temporary dentures transform into resilient, lifelike creations that can withstand the rigors of everyday life.

The benefits of 3D printing in dentistry are as varied as they are profound, offering swift production times that defy con-

vention and bridge the gap between treatment plans and their real-world implementation. Imagine a world where patients can witness the birth of their restorations in a mere 24 hours or even during a single appointment—a testament to the transformative power of technology in modern dental care. And let us not forget the joy of educational models, tailored to individual cases and designed to enrich our clinical acumen with engaging, hands-on experiences.

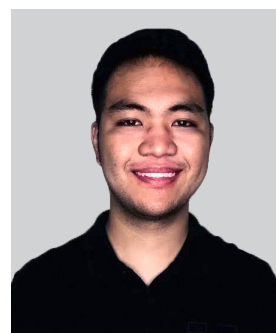
Dispelling common misconceptions, we shed light on the accessible nature of 3D printing, which need not be shrouded in complexity or exclusivity. As we navigate this digital frontier, we underscore the pivotal role of human expertise, emphasizing that success in 3D printing hinges not solely on technology but on the skill and discernment of the practitioner. While wizardry and artificial intelligence may assist in workflow optimization, the soul of dentistry—the art of decision-making and design—remains firmly ensconced in the

capable hands of the dentist.

Venturing into the future, we are met with a landscape teeming with promise and potential—where every clinic, from Malaysia to the world, stands on the cusp of producing chairside miracles. I extend an invitation to join me on this odyssey of discovery, where the adventure in Digital Den-

tistry unfolds with each passing moment, beckoning us toward a golden age of innovation. As we set forth on this thrilling journey, let us embrace the excitement, hold fast to hope, and approach the horizon with a spirit of objectivity and unwavering determination. The future awaits—let us embark on this exhilarating odyssey into the heart of modern dentistry together.

## About the author



Dr Jesus Paolo Pangilinan

He earned his Doctor of Dental Medicine degree from the University of the East, Manila, and furthered his studies in Orthodontics at the Biomechanical Institute of Orthodontics. He also completed a mini-residency in Clear Aligner Therapy with Dr. Sandra Tai.

Currently, he's pursuing a Master's in Orthodontics at the University of the East-Manila.

A pioneer in Digital Dentistry, Dr. Pangilinan teaches Digital Orthodontics in the Philippines, Malaysia, and Myanmar.

# The journey of a paediatric craniofacial surgeon

Prof. Firdaus Hariri, Malaysia

Life is a journey, not a destination. And in Firdaus' case, it is a sacred journey; from dentistry to paediatric craniofacial surgery. Firdaus Hariri graduated from dentistry in Universiti Malaya and his call to serve as a dental surgeon began in 2004 when he was posted to Sarawak, a state located in the region of East Malaysia in northwest Borneo. Throughout his two-and-a-half year, he developed special interest and passion in providing dental services to children with special needs, mostly children affected by cerebral palsy and Down syndrome.



At the same time, he saw young children with unique features, asymmetrical faces with deranged jaws with some of them would require a breathing tube. Those are the children born with complex congenital craniofacial disorders such as Treacher Collins syndrome, Pierre Robin Sequence, Hemifacial Microsomia and Syndromic Craniosynostosis, among others.

"Dentistry is about treating teeth but I started to wonder why these children were this way. I felt sad and thought that I could be doing more to help. Seeing the children inspired me to find a specialty where I can do more to improve their quality of life. My early experience prompted me on the path to where I am today."

The 46-year-old professor at Universiti Malaya's Faculty of Dentistry has four degrees to his name, both dental and medical degrees, master degree in molecular medicine and a master in oral maxillofacial surgery from The University of Hong Kong (HKU). Throughout the years in the field of oral and maxillofacial surgery, he developed a special interest in paediatric craniofacial disorder and reconstructive surgery, a subspecialised area focusing in children born with structural defects involving the skull, face and jaw regions.

Dr. Firdaus's first involvement in reconstructive craniofacial surgery was in 2009. Together with his mentor, the late Professor Lim Kwong Cheung of HKU, and a group of Malaysian maxillofacial surgeons, they successfully performed a 16-hour operation on a 16-year-old girl diagnosed with Crouzon syndrome, which is a genetic disorder characterised by early fusion of multiple cranial sutures.

"It was a surgery that changed the girl's life and became one of the reasons why I chose this path."

Together with his senior colleagues in neurosurgery, genetics, otorhinolaryngology, ophthalmology, anaesthesiology and oral maxillofacial surgery, the life changing experience has inspired Firdaus to establish a craniofacial multidisciplinary group at Universiti Malaya Medical Centre (UMMC) in 2015. And 9 years later, the multidisciplinary team has expanded by the inclusion of other specialties including paediatric dentistry, orthodontics, as well as hand and orthopaedic microvascular surgery.

However, as the team leader of the only comprehensive craniofacial clinical-research

multidisciplinary team in Malaysia, there was a moment when he started to ask himself on how to further improve the children's growth and development not just from the surgical perspective.

"I want to give my best to help these children to grow up like other normal children. What else



can we do to help them?"

All these questions inspired Firdaus to seek new knowledge to find an in-depth answer in order for his team to further improve the management and provide a holistic evidence-based approach. A strategic establishment of Oro-Craniofacial Research and Surgical (OCReS) group at the Faculty of Dentistry Universiti Malaya was given the green light to strengthen the nation's craniofacial research field which focuses on the development and improvement of interventions through the comprehensive exploration in fundamentals of craniofacial growth, cell and genome.

Dr. Firdaus' research during his master in molecular medicine was on advanced metagenomic field which looks into the biodiversity of gut microbiome in children with syndromic craniosynostosis. The results from his study have been expanded to further explore and improve patient's dietary well-being and their behavioural

development.

Due to the degree of severity in skeletal discrepancy among the children with craniofacial syndromes, Dr. Firdaus often required to integrate a tissue engineering technique known as distraction osteogenesis as part of the surgical intervention. This technique allows significant gradual bone lengthening and expansion which are very important in children with increased intracranial pressure, severely bulging eyes and obliterated nasopharynx or oropharynx.

"Each child is special in their own way. We had an eight-month infant diagnosed with Crouzon syndrome who had a very soft skull and since we didn't want the pins to puncture his brain, we had to create a headgear that looked like a helmet."

The craniofacial surgery is now considered as a subspecialized area that would require comprehensive ecosystem. Apart from post-surgery recovery and potential serious complications, challenges include parental support system as well as financial aspect as certain intervention would end up with a hefty bill that could come up to more than USD10,000. On top of that, Malaysia's geographical challenges between Peninsular and East Malaysia has driven Dr. Firdaus and other surgeons from the Ministry of Health Malaysia to help establish a multidisciplinary craniofacial unit in Likas Women and Children Hospital, Kota Kinabalu, Sabah.

"The way forward is via research. Our team actively

conduct research on various craniofacial aspects comprising of fundamentals, clinical, application, innovation, morphological, quality of life, and parental support, among others."

Dr. Firdaus and his team has now published more than 70 publications including scientific papers, book chapters, guidebook for parents and guardian, as well as consistently presenting in scientific conferences internationally.

"Financially, there is a Welfare Department with the university's hospital, good people and non-governmental organisations willing to help. But we must ensure the fund is adequate for treatment and for research conduct. I hope that we can create an international collaboration with any interested organization who would want to make a difference in this world."

Firdaus remains close to all his 'little angels' and their family. He attended birthday parties, visit their homes, active involvement by supporting association such as Apert Syndrome Association Malaysia and even attended the wedding of his very first craniofacial patient, a girl with Crouzon syndrome. As a pioneer, Firdaus has made it his mission to get the right message across to people and hope more young surgeons will embark on a career as a craniomaxillofacial surgeon. Firdaus said his efforts are a way of doing something impactful, a sacred journey, not just for the patients and their family but also for dental and medical fraternity, and most importantly, for humanity.

## About the author



Prof. Firdaus Hariri

Dean, Faculty of Dentistry, Universiti Malaya

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# Applied behaviour analysis-based intervention for patients with autism spectrum disorder

Dr Mas Suryalis Ahmad, Malaysia

Applied behaviour analysis (ABA)-based intervention is a therapy that centres on the concept of behaviour analysis and modification, which forms the basis of the Skinner's Behaviourism principles (Leeder, 2022)<sup>1</sup>. Understanding of the analysed behaviour and its function or purpose is integral to ensure formulation and execution of appropriate action or strategies, aimed at effectively allowing modification of one's behaviour into a desired one (Eckes et al., 2023; Gitimoghaddam et al., 2022)<sup>2</sup>.

One of the strategies used in ABA Based Intervention is reinforcement. Reinforcement may be in the form of positive reinforcement or negative reinforcement (Hernandez & Ikkanda, 2011)<sup>3</sup>. Positive reinforcement occurs through rewards given for achievements of desired behaviour. In contrast, negative reinforcement may involve punishment to ensure cessation of an undesired behaviour. A goal or desired behaviour for the person to achieve must be identified by the therapist at the beginning of the ABA Based Intervention therapy.

The A-B-C (Antecedents Behaviour-Consequences) step is as useful step in ABA Based Intervention as the therapist endeavour to understand, acknowledge and consider the person's current behaviour, so that effective strategies for improvements could be developed (Gitimoghaddam et al., 2022)<sup>4</sup>. The A-B-C allows understanding of why the current behaviour is happening, and how the different consequences could result in the person's behaviour (Gitimoghaddam et al., 2022)<sup>4</sup>. Descriptions of the A-B-C step are as follows:

- A - Antecedent - which refers to identification of what happens, that eventually leads to demonstration or acquisition of the target behaviour. An antecedent may be in the form of verbal (such as instruction or request), as well as physical or environmental prompts (such as object, light or sound).
- B-(Resulting) Behaviour

which refers to the individual's response (or lack of response) to the antecedent.

- C- Consequence- which refers to what happens after the behaviour. For example, the consequence may be a positive reinforcement in the form of physical or verbal praises for demonstration of positive behaviour. In contrast, negative reinforcement or no reaction may be given for undesired behaviour.

ABA Based Intervention has been recognised by the American Academy of Paediatric Dentistry as one of the techniques that is recommended for children with communication and/or behavioural difficulties, including Autism Spectrum Disorder (ASD) (Dentistry, 2022)<sup>5</sup>. In dentistry, ABA Based Intervention has been applied in a variety of ways, applying differing tools and techniques.

An example of where ABA Based Intervention is applied in dentistry is through rewarding a child if he/she behaves well during treatment (Chandrashekhar & J, 2018)<sup>6</sup>. Rewards can also be given if the person with ASD performs other desired goals, such as performing regular daily toothbrushing at home or avoiding unhealthy food that can cause dental problems. The eventual reward can be in the form of physical token, or simply by gestures such as verbal praise (Chandrashekhar & J, 2018)<sup>6</sup>. An example of how ABA Based Intervention is applied in dental practice using the A-B-C set is described in the scenario below:

With negative reinforcement-

- A - Antecedent - The dentist says 'Can you please open your mouth. I would like to check your teeth'.
- B - (Resulting) Behaviour - The child says 'No!', while turning his/her head left and right.
- C - Consequence - The dentist forces the child's mouth open- this can be perceived as a 'punishment' (negative reinforcement).

With positive reinforcement-

- A - Antecedent - The dentist

says 'Can you please open your mouth. I would like to check your teeth'.

- B - (Resulting) Behaviour - The child says 'No!', while turning his/her head left and right.
- C - Consequence - The dentist says 'OK... let's open until this chicken wakes up from sleep (Use an egg timer as an assistive tool).

To assist the person with ASD develops and acquires the desired behaviour, an assistive tool can be used to motivate the child. In this case. An egg timer is used to motivate the child that his/her request will be acknowledged. The sound made by the egg timer is also seen as a 'reward', as it indicates achievement of the desired goal. The egg timer can also be a distraction to divert the child's focus away from the procedure (Friedlander et al., 2006)<sup>7</sup>. Other examples of assistive tools are 'daily toothbrushing chart' and 'toothbrushing technique poster', which can be pasted on the wall (Friedlander et al., 2006)<sup>7</sup>. The use of these tools would be useful in assisting individuals with ASD to learn through memory, sequencing and visual prompts (Stevenson et al., 2021)<sup>8</sup>. Pasting these materials on the wall is also seen as a strategy to develop skills, knowledge and attitude, as some with ASD may exhibit poor oral hygiene behaviour due to lack of understanding on the proper techniques and required routine in toothbrushing (Friedlander et al., 2006)<sup>7</sup>.

A study in Saudi Arabia supported application of ABA Based Intervention in educating children with ASD about oral health using a custom-designed mobile application (Fageeh et al., 2021)<sup>9</sup>. Children with ASD learned step-by-step techniques in performing toothbrushing and flossing, read information on healthy diet, as well as watched demonstration and explanation of procedures that happen during regular dental visits. These were presented in the mobile application via videos programmed using Avatar technology, with incorporated voice modulations and subtitles in the local language. In this study, ABA Based Intervention

is applied through presentation of the teaching materials, which were broken down to be taught in components, and then eventually be built up again to help learners gain the overall picture. This approach also involves the use of structured sensory stimulation to maximise the learning potential and experience of a child with ASD (Stevenson et al., 2021)<sup>9</sup>. Positive

reinforcements were used as the child progresses through every stage of the learning process that were divided into the various components. It was found that children with ASD who underwent this activity demonstrated significant improvement in knowledge regarding oral hygiene practice (Fageeh et al., 2021)<sup>9</sup>.

Another study in Indonesia reported the use of social story using picture cards that depicts the various steps of dental appointment procedures. Those who demonstrated desired behaviour (by giving cooperation during treatment) will be rewarded with verbal praises and tokens. In contrast, those who refused to follow instruction and/or cooperated poorly during dental treatment will have their reward withheld. It was found that this strategy resulted in significant improvements of children's behaviour at the dental clinic during the subsequent visits (Hidayatullah et al., 2018)<sup>10</sup>.

The use of ABA Based Intervention in dentistry has been associated with improved cooperation of patients with ASD in the dental chair (Dentistry, 2022)<sup>5</sup>, which could reduce the need for using physical restraint. The use of physical restraint in dentistry is controversial, as it has been associated to have caused negative implications on the person's psychological health and comfort (Malik et al., 2022)<sup>10</sup>. Successful chair-side treatment via the application of ABA Based Intervention may also avoid the need for pharmacological interventions such as sedation or general anaesthesia, which may have many life-threatening adverse effects (Akpinar, 2019)<sup>11</sup>. Furthermore, patients with ASD may have improved access to professional dental care, should they no lon-

ger be dependent on pharmacological interventions, which are very limited and costly (Alshatrat et al., 2020)<sup>12</sup>.

In my opinion, application of ABA Based Intervention in dental practice (and many aspects of daily living) is useful and effective. However, it must consider these aspects:

1. It is important to highlight the use of positive reinforcement in ABA Based Intervention for individuals with ASD to promote positive behavioural changes. Positive reinforcement also helps in ensuring that individuals with ASD are 'supported' rather than 'judged'. Besides, negative reinforcement through punishment may subject them to traumatizing learning experience that could further compromise their development (Damiano et al., 2015)<sup>13</sup>. In addition, identification of goal or desired behaviour for someone with ASD must take into account the person's current issues, difficulties and capability.
2. The goal should also involve agreement between the therapist and the child, or parents, so that it is feasible and achievable. The 'shared' agreement is also a sign of respect to the person's autonomy, as their opinion and involvement is being considered and valued during this process. Involving the parents also encourages 'smart partnership', as they help to ensure continuous monitoring, maintenance and support for the child. It was found that parents who play a proactive role in ABA Based Intervention produces positive improvements in acquisition of skills and behaviour in a child with ASD.
3. The developed goal must be made flexible. This means that it can be modified, should the child/person with ASD demonstrate difficulties in achieving it. Rather than focusing on the 'result', the therapist, alongside the child, parent and

other supportive partners or caregivers should also consider what happens during the ‘journey’. Incidents that happen during the journey can be compiled as important findings that could serve as useful information for future improvements and the child’s development. For example, the child may refuse to brush his/ her teeth because the type of bristles of the current toothbrush are too hard, causing hypersensitivity and discomfort. As such, parents would know to avoid that particular type of toothbrush in the future and look for alternatives.

4. A child/person with ASD may experience different difficulties. The ABA Based Intervention strategies should be personalised, according to the patient’s capability and progress. Acknowledging that every child has unique capabilities is important. Focus on developing their strength, rather than merely highlighting on their weakness. The child with ASD should be supported and monitored along their learning process, as they experience different challenges throughout the various phases of life.

5. The child’s environment should be enhanced by using assistive and innovative device designed to address the child’s specific needs.

6. Application of ABA Based Intervention may be time-consuming and requires training. It may not be practical for practitioners with hectic schedule or busy practice (Pinho, 2019)<sup>14</sup>.

7. It was argued that ABA Based Intervention may not be useful for patients with ASD without severe intellectual impairment, and those who require complexed dental treatment needs that involves invasive procedures. However, it can be integrated as a useful behavioural guidance strategy for many patients with ASD who require simple dental treatment and those without or with mild intellectual impairment (Hernandez & Ikkanda, 2011)<sup>3</sup>.

In conclusion, ABA Based Intervention may be a useful and effective strategy to assist child/person with ASD in many aspects of lives, including personal and professional dental care. Formulation and delivery of the intervention should be personalised, taking into account the individual’s unique capabilities. The intervention should also allow flexibility, be used alongside adjunct assistive device or tools, while involving other caregivers (such as parents) to collaborate as partners in promoting regular and continuous monitoring and support.

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# Zero meridian line norms in Malaysian Malay female adults

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**Objective:** To determine the measurement of the Malaysian Malay female adults to the soft tissue pogonion. The norm for evaluating soft tissue pogonion in relation to the is to be established.

**Materials and methods:** This cross-sectional study involved 128 pre-existing photographs of skeletal Class I Malaysian Malay females aged 19 to 40 recruited from the Orthodontic Clinic of Universiti Teknologi MARA (UiTM). Photogrammetric analyses of the soft tissue pogonion to Zero Meridian Line were performed with Image J software version 1.54d National Institutes of Health, Bethesda, Maryland, USA. The linear distance of soft tissue pogonion was compared with the Caucasian norms (0±2mm).

**Results:** The soft tissue pogonion to the ZML among Malaysian Malay females was 3.13 mm (4.63), significantly different from the norms of the Caucasian population (p<0.001).

**Conclusions:** Photogrammetric analysis of the Malaysian Malay female adults' soft tissue pogonion to the Zero Meridian Line exhibited more anteriorly positioned soft tissue pogonion compared to Caucasians, and the norm for the investigated population was established.

**Keywords:** Aesthetic dentistry, Zero Meridian Line (ZML), Orthodontics, Malaysian Malay's norms.

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**Introduction**  
Orthodontists place significant importance on evaluating anteroposterior discrepancies to develop precise and tailored treatment plans. Both angular and linear measurements have been integrated into different analyses to assist the clinician in diagnosing anteroposterior (AP) discrepancies. The align-

ment and proportional harmony of facial features are essential in orthodontic and aesthetic practices, with the Zero Meridian Line serving as a fundamental reference in facial analysis to guide orthodontic treatment planning for optimal facial aesthetics. The zero meridian line was established in 1968 by Mario Gonzalez-Ulloa, a Mexican plastic surgeon[1]. He drew a line that was perpendicular to the Frankfort horizontal line.

The zero meridians are tangent and perpendicular lines to the nasion, which is the point of most significant depression in the midline of the nasal root. He suggested that in a face with perfect proportions, the soft tissue pogonion (the most prominent point of the chin) should be located on that line or just behind it.<sup>1</sup> It is utilized to evaluate the position of the mandible. The classification of chin retro positioning is as follows: grade I refers to a position less than 1 cm posterior to the meridian, grade II refers to a position between 1 and 2 cm, and grade III refers to a position more than 2 cm. Naini outlined the benefits of this line in terms of its user-friendliness and alignment with the idealized characteristics of classical, Renaissance, and neoclassical artistic standards.<sup>2</sup>

As a fundamental reference in facial analysis, it is crucial in guiding orthodontic treatment planning to achieve optimal facial aesthetics. However, there is a dearth of comprehensive studies focusing on specific populations, particularly in Southeast Asia. This research article addresses this gap by conducting a meticulous cross-sectional examination of the Zero Meridian Line in Malaysian Malay female adults. This study aims to provide valuable insights into the facial characteristics of this specific demographic group, adding depth to the comprehension of facial aesthetics across varied populations.

**Materials and methods**  
This cross-sectional investigation involved the examination of 128 extra-oral lateral photographs sourced from the non-growing

cohort of the Malaysian Malay populace, with subjects falling within the age range of 19 to 40 years. The photographs were systematically sampled from the archives of the Orthodontic Clinic at Universiti Teknologi MARA (UiTM) during the stipulated period extending from February 2022 to December 2022. Approval for this research project was granted by the UiTM Research Ethics Committee under the reference REC/11/2021 (MR/884). Written consent was diligently procured during the clinical review process, a crucial step that also involved the verification of Malay ethnicity among the participants. The pivotal task of determining the sample size for this study was executed using the G\*power software. The resulting computation dictated a requisite sample size of 128 individuals. The recruitment of the study cohort was conducted in adherence to a predefined set of criteria, ensuring a judicious selection process that aligns with the investigation's scientific rigor and ethical standards.

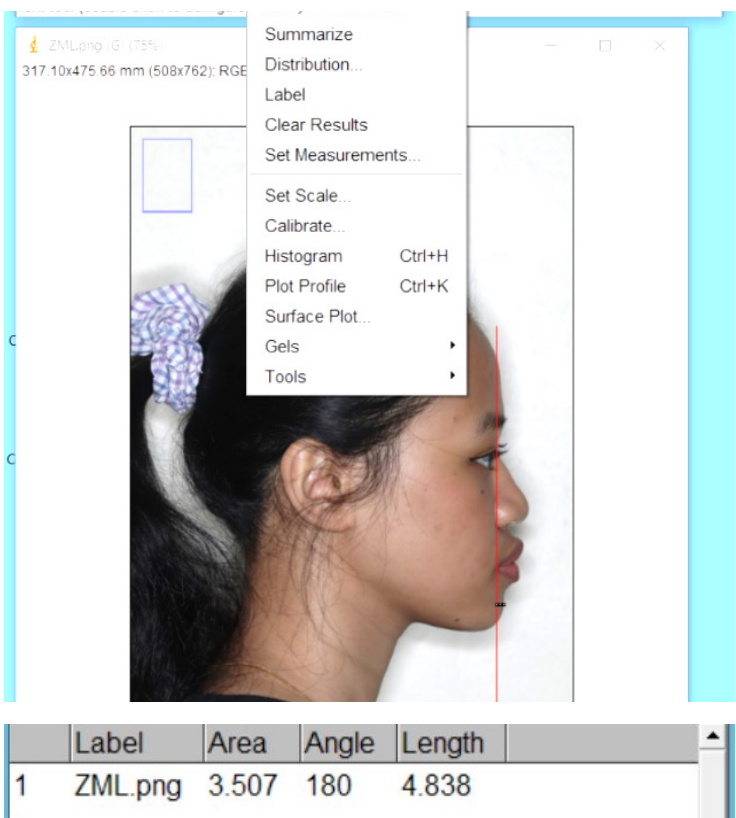
**Inclusion criteria**

- Class I dentoskeletal pattern.
- Permanent dentition with all teeth presents from upper lower 7 to 7.
- Optimal facial symmetry and proportionality denote the absence of pronounced facial asymmetry and craniofacial anomalies that may detrimentally impact overall facial harmony.
- Malay race with no interracial marriages in two generations predececess or.<sup>3,4,5</sup>

**Exclusion criteria**

- Previous orthodontic treatment.
- Previous maxillofacial/ plastic surgery.
- Lateral photos are not in natural head position (natural head position is the patient's head in an upright posture, and the eyes focus on a point in the distance, indicating the visual axis is horizontal). Radiographs with inadequate quality for analyses.

**Lateral photographs**  
All recruited female subjects were reviewed clinically in the Orthodontic Clinic of UiTM. Sample



with Class I skeletal patterns were identified through profile photos using a visual method looking at the distance between the soft tissue points A and B. During the review, patients consented to participate in the study and confirmed their Malay ethnicities by filling out a form. It consists of information about the patients and inquiries about their ancestors' Malay heritage going back at least two generations.<sup>3,4,5</sup> The widest length of the auricle was recorded with a digital caliper by two authors, and the mean of two readings was recorded. This measurement was recorded to calibrate the pre-existing records of their extraoral photographs. It acts as known distance/measurements during photo analysis with Image J software version 1.54d National Institutes of Health, Bethesda, Maryland, USA. The linear distance between the soft tissue pogonion to the Zero Meridian Line was computed for

all records (Fig 1).  
**Statistical data analysis**  
Data analysis was performed using IBM Statistical Package for the Social Sciences (SPSS) software version 29.0 (Chicago, IL, United States of America). The significance level was set at p < 0.05. The operator was trained, calibrated, and analysed for any errors by an expert orthodontist. Twenty photographs and radiographs assessed by the two operators were subjected to inter-operator and intraoperator class correlation (ICC) to determine reliability for consistency.<sup>6</sup> Descriptive statistics were calculated for all variables, including mean and standard deviations. Then, a one-sample t-test was performed to determine whether there was any statistically significant difference between the investigated cohort with Caucasian norms.





3.0 Results

Table 1 provides a comprehensive overview of the demographic characteristics of the study participants. The variables are the width of the auricle and the age of the participants.

Table 1: Demographics Data

Variables	Mean SD
Width of Auricle (mm)	73.67 (6.72)
Age (years)	30.27 (27.33)

Table 1: Demographics Data

Variables	Caucasian Norms	Test Population Mean (SD)	Mean Difference (95% CI)	t Statistics (df)	P Value
ZML	+2mm	3.13 (4.63)	1.12 (0.31, 1.94)	2.746 (127)	0.007
ZML	-2 mm	3.13 (4.63)	5.12 (4.31, 5.94)	12.51 (127)	<0.001
ZML	0mm	3.13 (4.63)	3.12 (2.31, 3.94)	7.629 (127)	<0.001

Table 2: Comparison of samples with Caucasian norms by One-Sample T-Test.

The value of ZML was significantly higher compared to Caucasian norms at various measurements: at 2mm, the mean difference was 1.12 mm (p = 0.007); at -2mm, the mean difference was 5.12 mm (p < 0.001); and at 0mm, the mean difference was 3.12 mm (p < 0.001).

	ICC (95% CI)	Strength of Agreement	P Value
Inter-examiner ICC	0.999 (0.999, 0.999)	Excellent	<0.001
Intra-examiner ICC	0.999 (0.998, 1.000)	Excellent	<0.001

Table 3 presents the results of the Intraclass Correlation Coefficient (ICC) analysis for the ZML measurement. The ICC was calculated using a two-way mixed effect model, absolute agreement, and single rater. It displayed an excellent agreement between the assessors.

Discussion

Gender significantly influences perceptions of healthcare and orthodontic treatment, with a noticeable trend of a higher percentage of females choosing orthodontic therapy compared to males. On average, girls express more concerns and considerations about aesthetics than boys.<sup>7,8</sup> Even without empirical evidence, more females believe their teeth are less attractive and perceive a greater need for dental treatment.<sup>9</sup> This investigation specifically focused on the Malaysian Malay ethnic group, despite Malaysia's diverse population comprising three major races. The lack of research on the ZML within this particular population underscores a significant gap in the existing body of knowledge.

Previous research has confirmed that photogrammetric analysis is a reliable method for accurately measuring linear and angular facial morphology characteristics through the implementation of reliability tests.<sup>10,11,12,13</sup> This research incorporates a reference object in each photograph, the size reference serving as a scaling factor during the analysis with ImageJ software, facilitating the compensation for disparities in distance and size.<sup>14,15</sup> The widest length of the auricle served as the reference point in measuring the lateral photograph data. It represents the length from supra-aurale to subaurale that would indicate the vertical distance from the highest point of the

auricle to the lowest point below the ear. Studies indicate that the vertical dimension of the auricle generally stabilizes in adulthood, commonly occurring in the late teens or early twenties<sup>[16]</sup>. This marks the conclusion of substantial vertical development in the auricle. Throughout this phase, the auricle's cartilage undergoes maturation and stabilization, decreasing the growth rate.<sup>17</sup> In this study, we chose to use the length of the auricle as a key measurement due to its stability in growth in our subjects' age range, as indicated by existing literature.<sup>18,19,20</sup>

Empirical evidence from this study leads to the rejection of the null hypothesis due to the significant difference observed between ZML and E-line measurements in Caucasians and the Malaysian Malay population. Specifically, the ZML for the studied population is 3.13 mm (4.63), indicating a more anteriorly positioned chin in Malaysian Malay females. This finding is inconsistent with a previous study on Central Gujarat females, where the ZML measured 0.2 mm for females with less pronounced chins than their male counterparts, who had a measurement of 0.8 mm.<sup>21</sup> However, the value is similar to the established average for Caucasians.<sup>1</sup> The observed differences may be attributed to the more posterior positioning of the forehead and nasion in the studied population compared to the Caucasian cohort. This highlights the frame-

work's ability to reveal variations in anatomical landmarks and provides insight into potential morphological distinctions.

The study's limitations, stemming from its restricted demographic focus, raise concerns about generalizability. Given the substantial variability in soft tissue and craniofacial growth across diverse age groups and genders, emphasizes the importance of incorporating individuals from diverse demographic backgrounds in research studies. To address this, future research should prioritize a more inclusive participant pool to enhance the robustness and external validity of the results.

Conclusion

The distances between the soft tissue pogonion to ZML in Malaysian Malay females were 3.13mm (±4.63), significantly different from Caucasians, and the norm for the investigated population was established.

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