The**PULSE**

EUROPEAN ASSOCIATION FOR CRANIO - MAXILLO - FACIAL SURGERY

AI
and
US

www.eacmfs.org

The**PULSE**

NEWS**letter** July 2025

NICHOLAS KALAVREZOS
President EACMFS

Message from the **PRESIDENT**

Dear Colleagues and Friends,

It has been six months since our last newsletter when I outlined the five pillars of my Presidency in the years 2024-2026 including:
· Investment in our trainees
· Visibility of the Association through social media
· Research and education
· Equal gender representation
· Congress preparation

I am happy to report that by the time you read these lines, the very first Trainee EACMFS Conference would have been held in Naples with the gracious help and support of the Italian Association for Oral and Maxillofacial Surgery. Equally, I am sure that the Congress highlights will have become widely known through the various EACMFS social media platforms. Social media plays a key role today and is an area which I am very keen to support including short snap messages thus maintaining the ongoing interaction between the Executive Committee and the membership. Keep connected on Instagram, X, and YouTube and visit our dedicated educational platform – Maxflix!

Research and education are at the heart of EACMFS, and I would like to cordially invite all members, from residents to senior colleagues, to contribute by sharing ideas and experiences in 'hot topics' of our speciality. I am very keen for our Association to produce position papers which will give hallmarks of opinion in contested subjects, thus contributing to the wealth of knowledge related to oral and maxillofacial surgery. This 'bottom-up' approach will enhance harmonisation of the specialty across Europe whilst, in parallel, solidifying the EACMFS as an opinion leader in OMFS globally. A systematic analysis by one of our JTUS members on "early signs in head and neck sarcomas" is currently under vigorous validation and hopefully will become part of our maxillofacial/head and neck literature on a topic in which research has usually been dominated by other specialities.

Preparations for the 28th EACMFS Congress in Athens in September next year are well advanced with invitations for the keynote speakers already underway. I am delighted to report that renowned international experts covering a broad spectrum of our specialty have already accepted our call. I am certain that

the 28th Congress will be a memorable event combining the most up to date knowledge in all facets of OMFS in the idyllic environment of the Athens centre! More details on speakers and topics will be provided via our social media announcements, but in the meantime please save the dates -15-18 September 2026.

My pledge for equal gender representation remains high and will be reflected in the scientific programme of the Congress. This is not the reflection of a need for proportional gender representation but a factual reality representing the most dynamic part of our workforce currently: Women in OMFS. I have no doubt that under the dynamic leadership of the scientific committee spearheaded by our former President, Professor Klaus Wolff, with the wonderful support of the BAOMS President, Professor Kathy Fan, and the Deputy Editor in Chief, Professor Leo Vassiliou, equal gender representation will be prominent in the scientific programme. In that respect, I am heavily indebted to all three of them for their leadership, planning and hard work for the success of our forthcoming Congress.

Finally, I am grateful to all EACMFS members for their continuing support and sincerely welcome your ideas or specific requests to steer future developments within our organisation. This is your Association, and I therefore very much encourage engagement from all our members. Your support in the dissemination of EACMFS news and information through your National Fora would also be greatly appreciated.
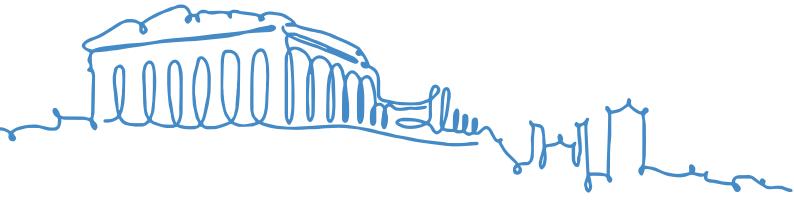
Our Speciality and our Association is stronger through our teamwork!

.....And as it has been reflected in our moto:

"From Foundation to Innovation:
Harnessing our (joint) Surgical Future!"

I look forward to seeing you in Athens next year if not before !

Kind regards

JAVIER GONZÁLEZ-LAGUNAS
Editor-in-Chief

BARCELONA calling

Dear Readers,

Welcome to the Summer issue of the EACMFS newsletter.

A scientific organisation like EACMFS cannot remain unaffected by the rapid growth of knowledge generated through artificial intelligence. We must acknowledge both the justified and unfounded concerns surrounding AI that are regularly highlighted in the media. Nor can we overlook the practical challenges that we are already facing as healthcare providers. Few technologies have sparked such widespread interest and excitement, and AI seems to offer almost limitless possibilities.

The Pulse is pleased to present a special issue dedicated to the role of AI in our field. We are fortunate to count among our contributors several trailblazers who have already been involved in utilising AI across the spectrum of oral and craniomaxillofacial surgery – from education in basic anatomy, to surgical simulation and navigation. Within healthcare settings, AI plays a pivotal role in predictive analytics, resource optimisation, and the real time monitoring of hospital activities. Equally important are the evolving discussions around AI-generated content: authorship, accountability, transparency and disclosure, and copyright and intellectual property.

I would like to extend my sincere thanks to all the authors who have contributed to this issue of The Pulse.

We have also highlighted recent activities that showcase the scientific vitality of our community – from a Microsurgery Cadaver Course in Germany to the inaugural Trainee Meeting in Italy. Whether it's a course, workshop, or Congress, EACMFS continues to offer high quality opportunities for professional development.

And of course, the regular columns contributed by our Executive Officers will keep you up to date on EACMFS activities, initiatives, and resources.

Another essential part of our communication strategy is Max-Flix. You may have noticed a recent decrease in its activity. Please rest assured that the platform is not inactive but is undergoing a comprehensive revision to improve its structure, functionality, and accessibility to our members. Following the Congress in Rome, we engaged in a constructive dialogue with a focus group of young surgeons, whose valuable input is helping to shape these improvements.

Finally, I would like to emphasise the collaborative spirit that underpins all initiatives undertaken by the EACMFS Executive Committee. We welcome your ideas and feedback. Please don't hesitate to reach out with suggestions for new projects.

Enjoy this exciting edition of The Pulse!

contents

July 2025

CHRISTOS PERISANIDIS
Education & Training Officer

The **ATHENS** report

Dear Colleagues and Friends,

The The European Association for Cranio-Maxillo-Facial Surgery (EACMFS) continues its unwavering commitment to excellence in surgical education, aiming to empower and inspire the next generation of Oral and Maxillofacial Surgeons across Europe. It is my pleasure to update you on our recent accomplishments and upcoming initiatives.

EACMFS Guest Scientific Session at ICOMS 2025: We are proud of the successful participation of EACMFS at the International Conference on Oral and Maxillofacial Surgery (ICOMS) 2025 in Singapore. Our guest scientific session attracted significant international attention and showcased cutting-edge advancements in our specialty.

Success of the 1st EACMFS Postgraduate Programme in Facial Plastic Surgery: The inaugural edition of our Facial Plastic Surgery Postgraduate Programme has exceeded expectations, drawing enthusiastic participation from talented senior residents and young specialists. The programme's success is greatly attributed to our esteemed Scientific Directors and distinguished international faculty, whose expert guidance has created a robust educational platform and received overwhelmingly positive feedback.

4th Edition of the Head and Neck Surgery: Oncology Programme: We are delighted to announce the successful launch of the fourth edition of our Head and Neck Surgery: Oncology Postgraduate Programme. Continuing its tradition of excellence, this year's programme has already shown strong attendance and enthusiastic responses reflecting its vital role in specialised surgical training.

National Trainee Representatives (NTRs) Active Engagement: Under the dynamic leadership of our Trainee Representative, Dr Lara Watson, all NTRs have now been allocated to themed work groups (education, research, social media, MaxFlix, events, and membership). This structure ensures that trainee perspectives feed directly into every new educational initiative and provides a clear pathway for leadership development within the Association.

1st EACMFS OMFS Trainee Conference in Naples: In June 2025, we welcomed attendees to the inaugural EACMFS OMFS Trainee Conference in Naples, organised in conjunction with the Italian Society of Maxillofacial Surgery (SICMF). This landmark event provided trainees with invaluable opportunities for networking, professional development, and collaborative learning.

28th EACMFS Congress, Athens 2026: Finally, preparations for the 28th EACMFS Congress in Athens (15-18 September 2026) are proceeding with great enthusiasm. We eagerly anticipate this flagship event, where we aim to deliver an exceptional scientific programme that highlights recent innovations, fosters international collaboration, and inspires professional excellence within our community.

Thank you all for your continued support and dedication.

EUROPEAN ASSOCIATION FOR CRANIO MAXILLO FACIAL SURGERY

BECOME A MEMBER

Join today and start enjoying the many valuable benefits offered to the EACMFS Members.

Benefits

Member-Types

Online application form

SATHEESH PRABHU
Secretary General

OXFORD minutes

As we get ready for our summer break, it is a great opportunity to reach out to my colleagues through this newsletter. It was great to see a successful congress of the International Association in Singapore. European Representation within the congress was significant along with some excellent scientific contribution. The new ideas and technologies were impressive and I can only see more progress within the speciality. Athens will be another opportunity to update ourselves and Dr Kalavrezos and the team are working extremely hard in organising the conference. The great working relationship between IAOMS and our organisation continues to help in co-ordinating these events. The plan of having the congresses in alternate years continues to help the speciality for annual update.

It is important to recognise the research related to immunotherapy in Head & Neck Cancer at this stage. Our speciality has adapted well to serve aging population, dealing with new diseases like MRONJ, embracing new technologies like guided surgery or virtual planning, I am sure our speciality will have an important role in the changing landscape in Head & Neck Cancer. There will be more opportunities to do research to deliver the newer treatments safely to our patients who will be immensely benefitted by all this.

The association currently has highest number of membership so far. Our secretarial team is tirelessly working on promoting the benefits of the membership, especially trainee membership during various conferences and events. The strength of the association is in its membership and more importantly providing value for money for the membership.

I hope that you will have a wonderful summer and break from work to recuperate and re-charge.

28th EACMFS CONGRESS

15-18 September 2026
ATHENS - GREECE

EACMFS 2026
ATHENS - GREECE

From Foundation to Innovation: Harnessing our Surgical Future

EUROPEAN ASSOCIATION
FOR CRANIO - MAXILLO - FACIAL SURGERY

**European Association for
Cranio - Maxillo - Facial Surgery**

www.eacmfs.org

www.eacmfs-congress.com

UPDATE ON 28th EACMFS CONGRESS SCIENTIFIC PROGRAMME

LEO VASSILIOU

Deputy Chair Scientific Committee

Dear Friends and Colleagues,

We are proud to share that work for the preparation of the 28th EACMFS Congress in Athens 2026 has already made significant progress.

The President of the Association, Nicholas Kalavrezos, alongside the Scientific and Organising Committees and the rest of the EACMFS Executive Committee, have already set the basis for an exceptional scientific event.

Set against the cultural backdrop of Athens, a vibrant hub of history, innovation, and academic excellence, the congress will merge scientific excellence with artistic inspiration.

The venue, the iconic Athens Music Hall (Megaron), in the heart of Athens, offers not only state-of-the-art conference facilities but a unique environment where science and the arts meet in perfect harmony – an ideal setting to shape the future of our Specialty.

The 28th EACMFS Congress theme is "from Foundation to Innovation" and specific gravity will be given to all new technologies that play pivotal roles in advancing the forefront of our Speciality:

- Artificial Intelligence,
- Advanced Optical Diagnostics,
- Tissue Engineering,
- Cutting edge 3D planning,
- Robotic Surgery.

The Congress delegates will be able to engage in a rich programme of keynote lectures, interactive symposia, poster sessions, workshops, panel discussions, and scientific debates.

The Scientific Programme is structured around four dynamic axes that represent the core thematic pillars of our science:

1. Oncology & Salivary Glands– Reconstruction – Facial Transplantation- Tissue Engineering
2. Craniofacial & Orthognathic Surgery – Facial Aesthetics- Regenerative Medicine
3. Trauma & Secondary Reconstruction and Rehabilitation– Temporomandibular Joint
4. Implantology – Biomaterials- PSI- Navigation & Robotics -Education & Mentorship

The above will be hosted in four large and impressive halls of the Music Hall, designed to foster in-depth dialogue, cutting-edge research presentations, and interdisciplinary collaboration.

With 40 keynote speakers already confirmed, and over 35 Symposia scheduled to cover all breakthrough aspects of our thriving Speciality, the 28th Congress of the EACMFS will be one of major scientific events and a once in a lifetime experience.

Masterclasses led by internationally renowned surgeons, researchers, and educators will offer exclusive sessions with unparalleled access to expertise and practical knowledge.

With multiple tracks running concurrently, and satellite rooms hosting Guest Societies and free papers from all over the world, all colleagues will have the opportunity to tailor their experience to their personal professional interests and aspirations.

The Congress will be a landmark in the history of the EACMFS, combining a thrilling scientific programme covering the thriving forefront of our specialty. It will be an unmissable event.

In the next issues, we will continue to broadcast news regarding the developing organisation of Athens 2026, in order to keep you posted with the exciting upcoming scientific events and discussions.

EUROPEAN ASSOCIATION FOR CRANIO MAXILLO FACIAL SURGERY

SCHOLARSHIPS AND AWARDS

EACMFS is delighted to offer various prizes and awards to provide educational support and also to allow the opportunity for trainees to visit centres outside their own departments. Advice on all applications is available from the Secretariat of the Association.

ELIGIBILITY AND APPLICATION GUIDELINES

Please note that only one application for a Congress Scholarship or Travelling Scholarship is permitted each year. However, applications may also be submitted for concurrent consideration for the KLS-Martin Fellowship.

EACMFS membership should precede all applications by a minimum of one year and applicants should reside/work within the confines of Europe.

Junior Trainee Undergraduate Student Members on a European tra ning pathway and Specialist Trainee Members (plus those who have successfully completed training as specialists within three years of the date of application) are eligible.

KLS-Martin Fellowship Awarded by EACMFS – €5000

One scientific Fellowship per year for Head & Neck Oncology, Orthognathic Surgery or Trauma Management is available to support and enhance scientific training and education in the field of CMF.

The visitation should commence within 12 months of the award date.

The Fellowships are awarded by the Endowments Committee based upon scientific and educational criteria.

DEADLINE: 30th JUNE (ANNUAL)

Hugo Obwegeser Travelling Scholarships

These scholarships (up to a maximum of €2000) are designed to encourage travel to other countries to enhance education and training. Visitations should be a minimum of two weeks and details of training centres across Europe may be found in the Blue Book on our website:
https://www.eacmfs.org/information/ training-guidelines/teaching-centers/

DEADLINE: ROLLING

Congress Scholarships - €500

These scholarships offer significant support for trainee members to participate in our biennial Congresses.

https://www.eacmfs.org/prizes-and-awards/john-lowry -congress-scholarship/

https://www.eacmfs.org/prizes-and-awards/the-helene-matras-scholarship- pending/

DEADLINE: 30th JUNE (CONGRESS YEARS ONLY)

28th EACMFS CONGRESS

15-18 September 2026
Pre-Congress day: 14 September

ATHENS - GREECE

SO, WHAT CAN AI DO FOR CRANIOMAXILLOFACIAL SURGERY

By Stefaan Bergé and Shankeeth Vinayahalingam

Craniomaxillofacial (CMF) surgical procedures are often complex and require high precision due to the intricate anatomy of the head and face, as well as the significant functional and aesthetic implications.

In recent years, Artificial Intelligence (AI) technologies have emerged as transformative tools in the field of medicine, offering new avenues for enhancing surgical practice. The combination of advanced imaging technologies and AI is set to transform the field of oral and CMF surgery.
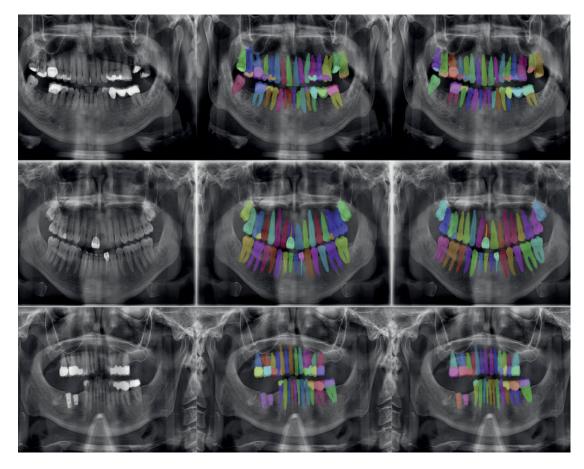
AI-driven solutions, such as machine learning, computer vision, and deep learning algorithms, are revolutionising the approach to CMF surgeries by facilitating more accurate diagnoses, predictive planning, and real-time assistance during procedures.

AI applications span various subspecialties within the field, significantly impacting surgical workflows. Its integration is enhancing precision, improving patient outcomes, and revolutionising preoperative planning in several critical areas, such as:

Dentoalveolar Surgery
Implantology
Traumatology
Oncology
Craniofacial Surgery
Orthognathic and Feminisation Surgery
Monitoring outcomes

DENTOALVEOLAR SURGERY

The practice of surgical removal of third molars remains controversial. There is a general consensus that surgical removal is indicated in cases of diseased third molars, where pain or pathology are obvious. In cases of asymptomatic third molars, however, while many clinicians recommend extraction of asymptomatic third molars based on the risk of future complications, others suggest a more conservative approach, advocating for retaining third molars in the absence of pathology.

Overview of multi-class segmentations of OPG's: left the original OPG's, in the middle the manual segmentation and on the right the automatic segmentation (AI).

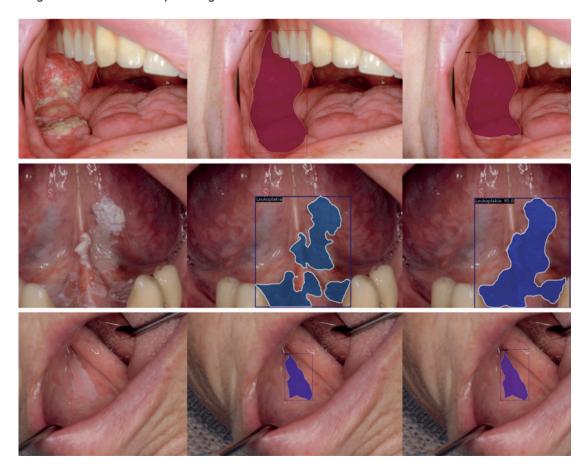### ● Indication for Third Molar Removal

The decision to remove a third molar is influenced by various factors, including the patient's anatomy, health, age, dental status, and radiological data, such as a high-quality orthopantomogram (OPG) radiograph. This decision is complex, requiring the integration of clinical and radiological information. AI models can help clinicians and patients make more accurate, evidence-based recommendations, reducing subjectivity and personal bias.

The proximity of the inferior alveolar nerve (IAN) to the lower third molars presents a significant challenge in dentoalveolar surgery, as improper management can lead to the occurrence of nerve damage and subsequent sensory disturbances of the lower lip and chin following the removal of the third molars. Traditionally, the detection of nerve proximity to these molars has been accomplished through OPG, where further investigation may be required using a cone beam computed tomography (CBCT). AI, particularly deep learning algorithms, has shown promise in automating the detection of nerve proximity, offering improved accuracy, efficiency, and consistency.

IMPLANTOLOGY

Dental implantology is widely used to replace missing or damaged teeth, with implants commonly used for single-tooth replacement and in cases of trauma and oncology. Despite the benefits, many dental surgeons do not consistently use computer-assisted implant (CAI) planning guides. CAI is crucial as it allows for the precise planning of implant placement, considering both functional and aesthetic needs, and visualising critical anatomical structures like the IAN and maxillary sinus. Currently, implant planning remains a manual process, where the intended implant site is evaluated by the user, usually the technical physician. While CAI provides advanced planning and navigation during surgery, the diagnostic and planning phases are often time-consuming and costly. AI could streamline planning, improve the workflow and reduce costs, ultimately making CAI more accessible for widespread use in clinical settings.

Where the success of AI has been moderate in bone measurements for placement of implants, the systems for detecting anatomical landmarks have proven valuable. A critical step in implant planning is accurately identifying the mandibular canal and its variations. AI models have shown consistency in segmenting the maxillary sinus, aiding three-dimensional (3D) model creation for diagnosis and treatment planning.

Examples of correct oral squamous cell carcinoma, leukoplakia, and oral lichen planus predictions. The left column is the input image, the middle column is the reference annotation, and the right column is the prediction.

AI-powered surgical navigation systems enhance implant placement by offering real-time guidance based on pre-surgical planning and visualising the implant's position using augmented reality (AR). This technology improves precision, reducing risks like vital structure perforation or implant misalignment.

The growing number of dental implant brands and types, coupled with the increasing variety of prosthetic components, has made it increasingly challenging to accurately identify the correct Dental Implant System (DIS), even for experienced clinicians. Recent studies highlight the promising potential of AI in DIS detection, with models achieving high accuracy rates of 93.8%-98% using two-dimensional (2D) radiographs, such as periapical or OPGs.
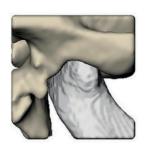
TRAUMATOLOGY

Automatic detection of craniofacial fractures is one of the primary applications of AI algorithms in traumatology. Using CT and CBCT scans, AI models can accurately detect fractures in the zygoma, mandible, and nasal bones. By improving diagnostic efficiency, AI allows clinicians to focus more on treatment planning and surgical intervention.

Overview of 3D condyle reconstructions; left: original 3D condyle reconstruction; middle: AI-backed 3D condyle reconstruction; right: 3D reconstruction of the segmentation outputs

HEAD AND NECK ONCOLOGY

● Pathomics
AI is transforming histology through whole slide imaging (WSI), which digitises histopathological slides at high resolution. This allows pathologists and researchers to analyse images without losing the slide's intricate morphology. The transition from traditional microscopy to digital platforms
The integration of AI into WSI also promotes the standardisation and objectivity of histological evaluations. AI models trained on large, annotated datasets provide consistent and reproducible outcomes, ensuring that results are more reliable. Furthermore, AI's ability to analyse vast amounts of data uncovers patterns and insights that might be overlooked in manual reviews, offering new perspectives on disease mechanisms and personalised treatment strategies.

● Radionomics

Radiological imaging is vital in diagnosing, treatment planning, and monitoring head and neck cancers. Techniques such as ultrasound, CT, magnetic resonance imaging (MRI), and positron emission tomography (PET) scans provide detailed insights into tumor anatomy and pathology, helping clinicians assess disease extent, evaluate lymph node involvement, and predict treatment responses. Accurate imaging is essential for determining the appropriate therapeutic approach and monitoring ongoing disease progression.

Deep learning algorithms can process large imaging datasets with remarkable speed and accuracy, assisting radiologists in detecting tumors, characterising lesions, and predicting outcomes by identifying patterns that may be missed by humans.

Additionally, AI helps standardise imaging interpretations, reducing variability between radiologists, particularly in the complex anatomy of the head and neck.

● AI-assisted image analysis

In head and neck oncology, physical examination is the primary diagnostic tool, with radiological imaging serving to complement the clinical assessment. The gold standard for diagnosing head and neck cancers remains clinical examination followed by biopsy. Early detection is crucial, as tumors diagnosed at early stages often require less invasive treatment. An AI model utilising a visual transformer has demonstrated a sensitivity and specificity of 0.99 in detecting head and neck cancers from digital clinical photographs. When combined with the visual inspection of a primary healthcare worker, this approach is expected to achieve near-perfect accuracy. Early detection through this enhanced diagnostic method can reduce delays in diagnosis, leading to earlier intervention, less invasive treatments, and ultimately higher survival rates.
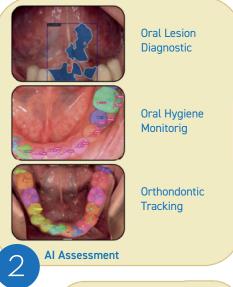
CRANIOFACIAL SURGERY

● Craniosynostosis screening and early detection

Early detection of craniosynostosis, a condition where the skull bones fuse prematurely, is crucial for timely intervention and preventing potential developmental complications. Recent advancements in AI have enabled the use of photographs for early detection. This approach enhances early diagnosis, allowing for faster intervention, less invasive endoscopic interventions and improved patient outcomes.

● Preoperative implant planning

In conventional craniofacial surgery, cranial implants are often designed manually based on the patient's preoperative imaging, usually CT scans. Surgeons and technical physicians use these images to create the implant design, either by hand or using computer-assisted techniques. While these methods can provide functional implants, they are time-consuming and dependent on the user's expertise. Additionally, the manual nature of these processes can introduce. Recent advances in AI offer the possibility of automating the implant design process, producing reliable reconstructions with significantly smoother surfaces in various sizes, as well as offering customisation of cranial implants.

1 Telephotos

Oral Lesion Diagnostic

Oral Hygiene Monitorig

Orthondontic Tracking

2 AI Assessment

3 Teleconsulting

AI-powered web applications for efficient referrals and remote monitoring in oral health

ORTHOGNATHIC AND FEMINISATION SURGERY

Virtual surgical planning (VSP), particularly 3D preoperative treatment planning and surgical outcome simulation, is currently the gold standard in orthognathic surgery. Important steps in this process include the identification of cephalometric landmarks and the segmentation of skeletal structures from (CB)CT scans. Both of these steps are still performed manually, which can be time-consuming and prone to error. However, orthognathic surgery is undergoing a revolution with the integration of AI, which enhances precision and streamlines the planning process. These technologies have led to significant improvements in both the efficiency and effectiveness of these complex procedures.
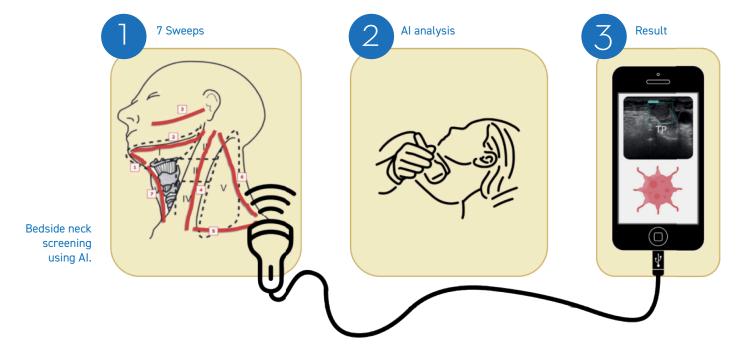
The identification of cephalometric landmarks and the segmentation of skeletal structures in (CB)CT scans have seen a massive improvement with recent advancements in deep learning models. In the last couple of years, research groups have focused on developing CNNs for these tasks, with accuracy levels comparable to expert clinicians. The use of AI significantly reduces the time burden associated with completing tasks. Processes based on CNNs can be completed up to 100 times faster than traditional methods. Even when manual adjustments are needed, AI still dramatically shortens overall processing time, thereby improving workflow efficiency and allowing clinicians to dedicate more time to higher-level decision-making and patient care.

AI tools have been created to predict postoperative soft tissue profiles and assess the impact of surgery on facial appearance, considering factors such as gender, age, and the surgical approach.

APPLICATIONS OF AI IN PATIENT RECOVERY AND OUTCOME PREDICTION

The role of AI in CMF surgery does not end with the procedure itself, but AI is also of great value in the postoperative phase. Monitoring the healing process is crucial for detecting complications, such as infection, malunion of bones, or issues with the positioning of osteosynthesis material in traumatology and orthognathic surgery. AI-driven systems can automatically analyse postoperative images, like dental single tooth x-rays, OPGs and CBCTs to detect early signs of future problems that may require intervention.

Also, machine learning models can analyse large datasets of patient outcomes, identifying patterns that help predict how individual patients will respond to surgery. By factoring in elements such as age, bone density, and previous treatments, AI can assess the likelihood of complications and forecast recovery times, enabling surgeons to create more personalised and effective treatment plans.

1   7 Sweeps
2   AI analysis
3   Result

Bedside neck screening using AI.

FINAL STATEMENT

As a profession, OMFS should be ready and willing to warmly adopt AI among other technologies. If we were able to integrate AI in our daily workflow and combine it with other techniques such as robot-assisted surgery and augmented reality, we really do have the potential to improve OMFS profoundly within the next decade. Internationally well-established OMFS-networks are mandatory to reach this goal, since big data collections are the base for these intriguing facilities. EACMFS could and should play a facilitating role in realising these necessary developments.

What is ARTIFICIAL INTELLIGENCE in simple words?

Artificial intelligence is a field of science concerned with building computers and machines that can reason, learn, and act in such a way that would normally require human intelligence.

What is MACHINE LEARNING in simple words?

Machine learning (ML) is a subset of artificial intelligence (AI) that enables systems to learn and improve from data without being explicitly programmed. It involves using algorithms to identify patterns in data, make predictions, and make decisions autonomously.

What is DEEP LEARNING in simple words?

Deep learning is a subset of machine learning that uses artificial neural networks to learn from data. Artificial neural networks are inspired by the human brain, and they can be used to solve a wide variety of problems, includi-ng image recognition, natural language processing, and speech recognition.

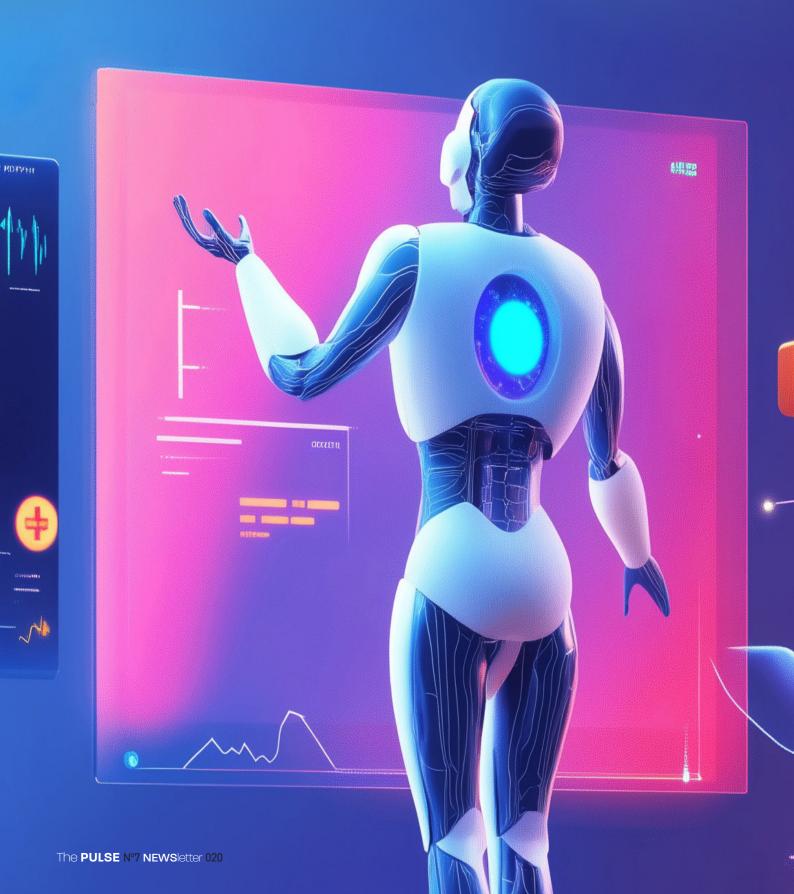### What is AUGMENTED REALITY in simple words?

Augmented reality is an interactive experience that enhances the real world with computer-generated perceptual information. Using software, apps, and hardware such as AR glasses, augmented reality overlays digital content onto real-life environments and objects.

TRANSFORMATIVE APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE MANAGEMENT

By Juan Antonio Hueto Madrid

Artificial Intelligence (AI) is increasingly central to modern healthcare management. No longer a futuristic concept, AI is now embedded in both clinical and administrative processes, driving improvements in efficiency, quality of care, and cost-effectiveness. Its defining capability lies in extracting insights from data to support anticipatory, informed decision-making. Technologies such as machine learning (ML), natural language processing (NLP), deep learning, and robotic process automation (RPA) have become integral to managing contemporary healthcare systems.

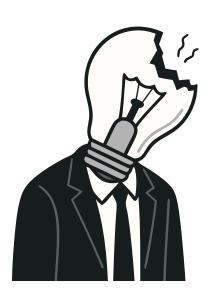While early AI adoption has generated enthusiasm, inflated expectations can sometimes obscure realistic outcomes. Nevertheless, when implemented thoughtfully, AI offers practical solutions for complex challenges in hospital and community care settings. In many cases, the presence of AI is not immediately apparent to end users, as it is seamlessly embedded within commonly used systems or new digital applications.

This article explores the integration of AI into healthcare management, presenting real-world applications and identifying key enablers and barriers.

AI encompasses a suite of technologies that mimic human cognitive functions. Defining intelligence itself is complex, and defining artificial intelligence is even more challenging, as it does not represent a single capability but rather a convergence of multiple technologies and computational strategies. ML is applied to detect trends in clinical and operational datasets. For example, it can identify seasonal fluctuations in hospital admissions or variations in treatment outcomes across departments, enabling better forecasting and resource planning. NLP is able to process free-text content like medical notes and discharge summaries, converting unstructured data into structured formats that enhance documentation, coding, and clinical decision-making. Deep learning excels at interpreting

medical images and signal data, while RPA automates routine administrative functions such as appointment scheduling and billing.

In management contexts, these capabilities enable demand forecasting, dynamic resource allocation, and real-time performance monitoring. For instance, converting unstructured documentation into structured datasets allows more accurate analyses and supports data-driven governance. However, these outcomes rely on the quality, completeness, and interoperability of input data. When integrated with EHRs or embedded into user-facing applications and platforms—often without the user being explicitly aware— or clinical dashboards, AI becomes a continuous process improvement instrument.

AI has shown measurable benefits in hospital operations. Predictive models estimate emergency department (ED) admissions based on variables like historical patterns and public events, allowing for optimised staffing and bed allocation. Real-time dashboards, enhanced with AI, track capacity metrics and patient acuity, facilitating rapid, evidence-based interventions. European and North American hospitals have documented reductions in ED wait times following such implementations.

Surgical scheduling is another domain benefiting from AI. Unlike traditional rule-based approaches, AI leverages large datasets to predict procedure durations and optimise the OR utilisation. In example, tools such as Bidea Avant's forward® platform integrate

historical and real-time data to manage operating room schedules proactively, helping organisations meet access targets and improve throughout.

Process mining technologies powered by AI are able to analyse clinical workflows via EHR audit trails. These tools can map care pathways, flag deviations from protocols, and highlight inefficiencies. Some hospitals utilising these insights have showed decreased diagnostic redundancy, improved protocol adherence, and up to 20% increases in workflow efficiency.

Outside hospital settings, AI will be essential to supporting new care delivery models and enabling more proactive, personalised, and scalable approaches to care. Its integration into digital health solutions allows for continuous monitoring and intervention, often in ways that are seamless and unobtrusive to the end user. As example, Cera a UK-based home care provider, uses AI to assess caregiver inputs and biometric data to anticipate patient deterioration, enabling early interventions and reducing hospital admissions by up to 70%. Sword Health applies AI-driven analytics in remote rehabilitation programs, maintaining patient adherence and optimising outcomes through real-time feedback.

Its defining capability lies in extracting insights from data to support anticipatory, informed decision-making

AI can be very useful in strategic planning by projecting demand for services, medications, and human resources. During the COVID-19 pandemic, AI tools analysed social media, mobility, and clinical data to forecast infection trends and ICU capacity, informing public health responses.

Reducing administrative overhead is another important application. Tools like Navina and Abridge automatically synthesise patient histories and transcribe consultations, improving documentation quality and reducing clinician workload. These tools enhance

provider-patient communication and alleviate cognitive burden.

In surgical disciplines, AI assists with preoperative risk stratification, intraoperative guidance, and postoperative monitoring. Robotic systems in high-precision fields like neurosurgery enhance accuracy, while predictive models support tailored follow-up strategies.

AI also strengthens financial operations. Fraud detection algorithms monitor transactions for anomalies. Revenue cycle tools improve coding precision and streamline claims workflows, reducing denials and improving cash flow.

Yet, effective AI deployment depends on data integrity. Inconsistent data formats, lack of standardisation, and siloed systems

significantly hinder scalability and the ability of models to generalise across settings. Moreover, the technical complexity and diversity of healthcare environments make seamless data integration a persistent challenge. Frameworks like openEHR play a pivotal role in promoting interoperability by defining standardised health data specifications, enabling better data exchange and more robust AI applications across institutions.

Ethical considerations are crucial. In the generalised deployment of AI in healthcare information systems, these considerations gain even more relevance. As AI becomes embedded in widely used digital tools and infrastructure, often operating behind the scenes, it is essential to ensure that models uphold transparency, fairness, and accountability. Continuous ethical review is necessary to align AI outputs with clinical integrity and patient trust. Models must be validated across diverse populations to avoid perpetuating bias. Tools like Explainable AI (XAI) will be necessary to make algorithmic decisions transparent and interpretable. Regulatory and governance structures must address accountability, privacy, and human oversight. Ethics committees and stakeholder involvement should be integrated early in development.

Successful AI integration also requires cultural adaptation. Many clinicians are skeptical of automated tools. Training, co-design, and pilot programs are essential for user engagement. Establishing multidisciplinary governance teams ensures alignment with clinical and organisational goals.

Future developments include expanding datasets via wearables and IoT, enhancing model privacy with federated learning, and enabling decentralised processing with cloud-edge architectures. Human-centered AI—designed to support rather than replace clinicians—will be key to achieving reliable, equitable care delivery.

In summary, AI offers transformative potential across the healthcare management spectrum. Its power lies in translating data into actionable insights, enhancing both operational and clinical decision-making. To harness this potential, leaders must invest in data quality, support interdisciplinary collaboration, and embed ethical safeguards throughout the AI lifecycle. Equally important is the need to train professionals to understand how AI systems work and to navigate their implications. A structured change management process is essential to ensure that AI adoption is aligned with organisational goals and that healthcare teams are prepared to adapt workflows, interpret outputs, and maintain trust in AI-assisted practices.

Note: The author has refined this document using OpenAI's GPT-4o algorithm in collaboration with a specialised agent in healthcare management to ensure accuracy, clarity, and domain relevance.

TRANSFORMATIVE POTENTIAL OF ARTIFICIAL INTELLIGENCE IN ORAL AND MAXILLOFACIAL SURGERY: CLINICAL ANCHORS AND RESEARCH HORIZONS
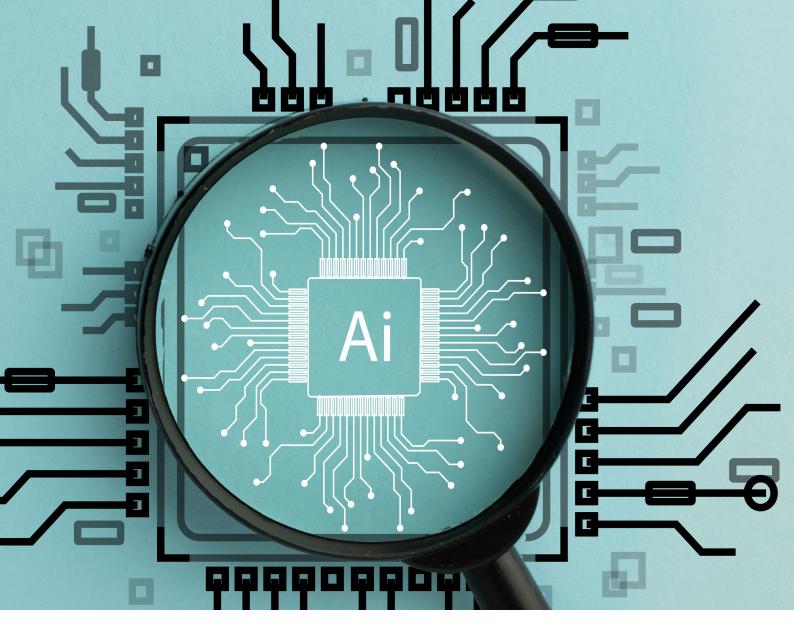
By Majeed Rana and Andreas Sakkas

Artificial Intelligence (AI) is currently transforming surgical disciplines through targeted advances in image processing, operative planning, and patient-specific reconstruction. Within the field of oral and maxillofacial surgery (OMFS), AI has been increasingly utilized to enable data-driven, individualized care across the perioperative spectrum. In this context, selected applications of AI in OMFS are presented and contextualized within translational research and clinical innovation efforts.

AI, defined as a computational paradigm simulating cognitive human functions, comprises technologies such as machine learning, deep learning, and computer vision. In contrast to administrative applications, the OMFS environment demands anatomically specific and image-based data interpretation. Here, AI provides significant benefits in preoperative precision, intraoperative assistance, and postoperative monitoring.

Particular emphasis has been placed on AI-driven imaging, segmentation, and 3D reconstruction for trauma management, orthognathic procedures, and oncological resection planning. Deep learning algorithms have enabled automated defect mapping and facilitated improved navigation in orbital and mandibular reconstructions. AI-enhanced datasets derived from CT and MRI

have been employed to support individualized implant design, a process routinely implemented in clinical workflows with over one hundred patient-specific orbital reconstructions completed to date. The integration of AI into virtual surgical planning represents a rapidly evolving application. Enhanced accuracy and efficiency have been achieved, particularly in the context of resections requiring selective laser melted implants. Generative modeling approaches have allowed for an improved fit and optimized functionality of patient-specific solutions.

In previous evaluations, AI-assisted segmentation demonstrated notable reductions in manual workload and enhanced reproducibility, especially in mandibular tumor diagnostics. Multimodal risk modeling, integrating variables such as nutritional status, oral microbiome data, and anatomical parameters, has been utilized to support outcome prediction in microvascular reconstruction. These methods are currently being assessed in clinical studies addressing CAD/CAM implant accuracy, AI-driven dysgnathia planning, and mixed-reality applications in surgical education.

The relevance of AI in personalized surgical interventions has been underscored in a position paper on maxillofacial surgery. Applications range from the restoration of traumatic defects to the correction of previous surgical outcomes and congenital anomalies.

Digital planning tools have been adopted to optimize not only anatomical reconstruction but also functional and psychosocial recovery. High-precision, biocompatible implants—produced using selective laser melting, polymer printing, and ceramic additive manufacturing—are tailored to individual morphologies and clinical scenarios in a dedicated 3D laboratory environment.

Within the RESORBM initiative, AI has supported the design and degradation modeling of molybdenum-based, resorbable implants for pediatric craniofacial reconstruction. These developments have been embedded within a broader innovation ecosystem comprising plasma-electrolytically polished implants, mixed-reality tumor boards, and AI-supported visualization of resection margins. Furthermore, the use of materials such as PEEK, PEKK, PPSU, and PE has been investigated to reduce postoperative imaging artifacts and improve bone–implant interface quality.

Future perspectives include the integration of AI into smart clinical infrastructure and interdisciplinary networks, thereby enabling real-time navigation, human-centered design, and personalized perioperative care pathways. AI-supported occlusion modeling in orthognathic procedures, natural language processing for patient-reported outcomes, and decision-support systems in tumor boards represent emerging opportunities. These innovations are expected to enhance surgical precision, patient autonomy, interprofessional collaboration, and long-term outcome monitoring.
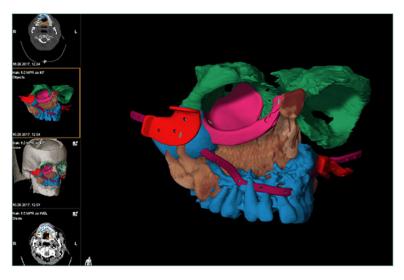

Figure 2. AI-assisted tumor segmentation and virtual reconstruction planning using Smart Shaper. Three-dimensional visualization of a complex midfacial reconstruction case following tumor resection. The tumor volume was segmented using AI-based tools (Smart Shaper) to ensure accurate delineation of pathological and anatomical structures. The resulting dataset enabled precise virtual planning of patient-specific implants (red and magenta), reconstruction plates (purple), and anatomical modeling of vascular and osseous structures (blue, green, and brown). This multimodal planning environment supports optimal implant fit, safe margin definition, and functional restoration through highly individualized surgical solutions.

AI in OMFS should be designed to address the unique anatomical, reconstructive, and psychosocial challenges inherent to the field, rather than replicating tools from administrative healthcare contexts. Supported by a foundation in computer-assisted surgery and translational innovation, further integration of AI is expected to strengthen evidence-based, patient-centered surgical care.

Figure 1. AI-assisted planning and reconstruction in facial feminization surgery. From left to right: Initial 3D craniofacial scan of the patient; AI-supported segmentation and analysis of craniofacial structures; virtual design of patient-specific implants targeting key anatomical regions for feminization (e.g., forehead, zygomatic arch, and mandible); postoperative result demonstrating the modified craniofacial contours. Artificial intelligence was utilized to guide bone modification and optimize implant morphology, contributing to a personalized, anatomically harmonized surgical outcome.

Are you an **EACMFS member**

Have you recently...

Participated in an **engaging course**?

Attended a **networking event**?

Achieved a **professional milestone**?

We would love to highlight our members on social media.
If you would like to share your experience, please email:
ewiner @eacmfs.org or **tag us** in your post.

ARTIFICIAL INTELLIGENCE IN MEDICAL PUBLISHING

By Leo Vassiliou

There is no doubt that Artificial Intelligence (AI) is already rapidly transforming medical publishing, by supplying a multitude of 'digital' tools that streamline processes, such as manuscript screening, content generation, and even conduction of systematic analyses and journal reviews.

The article discusses the current applications of AI for authors or editors and emphasises the need for judicial use of this powerful and extremely appealing emerging technology.

AI APPLICATIONS FOR AUTHORS

Most research usually starts with a comprehensive analysis of current knowledge on a particular topic or scientific hypothesis - the 'review of the literature'.
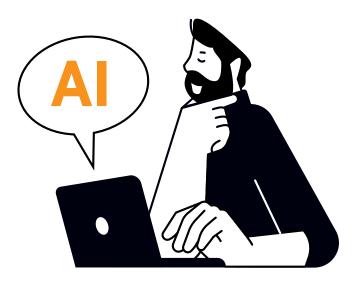
There have been broadly three key phases in this process:

- In the 1st phase during the late 19th and 20th century, medical writing, use of extensively detailed catalogues of publications (Index Medicus) prevailed. Collection of existing literature required a physical visit in a medical library for the quest of a precise reference via search through large index catalogues. When a required article was found, and only if the library held subscription to the relevant journal, a paid photocopy had to be produced in the library-based machine. Even a simple case-report could take days of work including travelling to different libraries and collecting article photocopies.

- The 2nd phase is the recent and, for many, still the current one. Online indexing, through large platforms such as the PubMed (1996 – onwards), allows the researchers choose keywords that introduced into the search engine and a selection of references is generated. Most journal articles are accessible online in a pdf format and can be downloaded to one's PC and/or reference manager programs. The literature review process using PubMed is still time consuming and can be influenced by a researcher's preferences, language, and biases.

- In the 3rd phase, which we are now embarking on, with the incorporation of AI, literature reviews become even easier, more complete and perhaps more objective, retrieving a broader, more extensive collection of references. The authors need to enter the correct keywords or instructions into the chatbot, and the results are rapidly generated.

As in the recent decades vast amount of scientific information has accumulated, AI literally comes as "deus ex machina", to assist with handling enormous pile of data, that in some popular topics is almost humanly impossible to process. AI can help not only to identify all the relevant information, but also to organize it in a structured fashion.

Different sets of AI digital 'tools' such as Data Analysis Tools and Large Language Models (LLMs) (ChatGPT and BioGPT) run rapid analyses, including statistics, of comprehensive databases, identify patterns and trends, and also assist with writing, manuscript editing and summarizing research results.

The evolution of AI is rapid and new applications keep constantly branching off. As I am writing this paper I received and advertisement from a reference manager company promoting novel machine learning software with enhanced capabilities, such as ensemble decision trees for classifications and regressions, conditional average treatment

effects, high-dimensional fixed effects for handling multi-category variables and editing applications for autocompletion, construction of templates and code organisation.

AI can streamline the workflow when writing a scientific article by managing references and ensuring compliance with journal standards. AI's multitude of applications includes generating scientific hypotheses, selecting appropriate endpoints, improving study protocols and translation of research findings into different languages and formats, enhancing accessibility and distribution of information.

AI APPLICATIONS FOR EDITORS

Integration of AI driven software into 'editorial manager' platforms has revolutionised efficiency and speed. Those offer rapid manuscript screening that help with easier

detection of data fabrication, duplicate submissions, similarity checks and plagiarism (iThenticate).

AI-based peer-review tools help editors identify appropriate reviewers for specific papers, based on reviewers' publications records, and previous reviewing history but also avoid ones that may risk conflict of interest (working in the same institution, or co-authored before).

Through predictive algorithms AI are able to 'issue' a final decision based on the reviewers' recommendations. It has been suggested that AI systems could potentially even replace the Editor-in-Chief... Queries about integrity, errata, and retractions could also be achieved by AI-based editorial software.

In the post-publication setting, the impact of articles and dissemination of information can be strengthened by automatic identification of the important highlights of published research, supporting faster implementation of new concepts or effective improvements in practice.

Press releases, visual abstracts, summary videos, and social media posts can all be created by 'Content Generation AI tools' and target appropriate readers groups.

CHALLENGES AND ETHICAL CONSIDERATIONS

Although there is some concern that systems like ChatGPT are used to actually write papers, arguably this may not always be a problem – under conditions, as discussed further in this article. Some submissions with good quality data may require heavy language editing or are of poor structure and AI can help overcoming these hurdles.

When comparing an AI-generated product with a human-made one, the principal question is 'which one is best?'.

The reality, that underpins AI, is that its products derive from the same computerised processes, cloud-based or not. The algorithms operated are the same and the output strictly depends on the quantity and quality of information fed to the robot. The process, for simplicity, can be parallelised with a maths calculator. The result will always be the same for a given ask.

In the context of medical publishing, this same 'clone', will be accessible through any device and will provide the same 'responses' for same keywords or hypotheses entered by any scientist from anywhere in the world.

From a philosophical viewpoint this is a mechanical and somewhat industrialised process. It lacks the personal flair or the originality that a human made product possesses. Medicine has advanced through scientific dialogue, independent thinking, arguments, disagreements, exchange of ideas, competition and debates, effectively through a dynamic intellectual fermentation, and in cases of pioneering discoveries the ability of some bright individuals to 'think out of the box'. AI, instead, with all its virtues, simplistically represents a repetitive 'robotic' streamlined process. What Artificial Intelligence still is not equipped with, is imagination. Fundamentally, imagination and ability to think 'out of the box' consist the 'soul' and driving force of high-end medical research and publishing.

Medical publications with or without the use of AI must continue to be: Ethical, Truthful, and Maintain human oversight, responsibility and accountability

So where would we set agree to the line? Most medical journals request authors to disclose the use of AI in various stages of manuscript preparation and submission,

as long as this is happening with human oversight and control. AI cannot currently be listed or cited as author. AI is not permitted in creation or alteration of images and artwork. Restrictions apply to Editors and Reviewers specifically due to risk of confidentiality breach when uploading manuscripts or reviewer's reports onto AI machines. But, in reality, it is down to the individual scientist to set the barriers and limits and act ethically, as there are no current reliable methods to detect, or control, the degree of involvement of AI in any of the stages of manuscript preparation or review. Perhaps new AI tools that detect AI footprints need to be produced...

Perhaps a call for a consensus practice, or a form of central 'AI-governance' is becoming more relevant than ever.

Questions on how much AI could be permitted in medical publishing are the following:

- Authorship and Responsibility: How is authorship determined when AI is used in writing or editing?
- Accuracy and Integrity: How can we guarantee the accuracy and integrity of AI-generated content?
- Bias and Fairness: AI will only provide a 'product' based on the information that has been fed to it. AI algorithms are used can reflect biases present in the data they are 'fed' on, which can lead to skewed or non-representative results. How can we eliminate this risk?
- Transparency and Disclosure: Authors and publishers must be transparent about the use of AI in the publication process. But how can we check and verify this?
- Copyright and Intellectual Property: The copyright status of AI-generated content remains elusive. A tiny tweak in the wording of the question entered into AI may generate a substantially different response. Will the responsibility lie with the person who asks the question or the one who designed the software that gave the answer?

FUTURE PROSPECTS

AI technologies are constantly evolving, and new tools are emerging that can further enhance medical publishing.

With AI tools becoming more and more accessible and easy to use, the temptation of delegating more tasks to it resembles asking a 'genie' to give us the desirable.

Using this 'magical' digital assistance in improvement and augmenting quality, in comparison to the analogue equivalent of spending time and working hard feels difficult to compete. But everyone must be aware of the risk of de-skilling or losing the qualities we have acquired or yet to develop if we hand in the most important aspect of our science, its forefront, to computers. Machine-made versus human-made

Medical publications with or without the use of AI must continue to be:

Ethical,

Truthful, and

Maintain human oversight, responsibility and accountability.

AI is here to stay, nobody can change this, but it is important to address the ethical and practical challenges that it raises.

The future of medical publishing will likely involve a collaborative relationship between humans and AI, with AI tools assisting humans in performing tasks more efficiently and accurately.

By using AI responsibly and ethically, we can harness its power, in order to improve the quality and efficiency of medical research and knowledge dissemination, together with still keeping the ownership of our scientific front line.

87th

INTERNATIONAL
24 HOURS
MOONLIGHT
COURSE FOR
STEPWISE FLAP
RAISING

Than Just a Surgical Course

By Maria Webers and Jeff Berens

This was an exceptional flap-raising course for participants worldwide that, despite its tradition, is probably unique in this setting. Here we would like to give you a glimpse into this event showcasing some highlights.

In a special format, an extraordinary flap-raising training course took place in Aachen - Germany, where surgeons from 3 different continents (Europe, Asia and the Americas) came together. During intensive 24 hours, oral and maxillofacial surgeons had the opportunity to improve their reconstructive skills. They learned step by step the surgical techniques of raising eight different free flaps, under sleep deprivation, guided by Prof. Dr. Dr. Wolff, Prof. Dr. Dr. Hölzle, Mr. Mitchell, and Prof. Kanatas.

The Coursechairmen with 4.20.28 to go.

Course team & participants.

The course covered the following 8 free flaps:
▌Radial forearm flap
▌Upper arm flap
▌Anterolateral thigh flap
▌Fibula flap
▌Latissimus dorsi flap
▌Osteocutaneous scapula flap
▌Deep circumflex iliac artery flap
▌Rectus abdominis flap

Klaus Wolff, Frank Hölzle
and D. A. Mitchell in action.

Surgical challenges were discussed during and between the flap sessions, with participants practicing techniques on anatomical specimens, and personal experiences shared. The direct discussion with the experienced course instructors made it possible to obtain deeper insights and, even more important, practical tips. Targeting primarily junior surgeons and giving them the opportunity for networking, the course had more to offer than just classical medical knowledge.

Unlimited supply of coffee, energy drinks and food allowed them to survive this demanding course.

In order to keep the participants alert all night long, the entertainment program was as refreshing as it was varied. The course dinner was in Aachen's famous city hall, where 32 kings were crowned. As a midnight refreshment the participants were surprised with a small rock gig by the locally famous Unknown Artists.

In addition, participants enjoyed an energizing massage from the in-house physiotherapy team, tried their hand at axe and tomahawk throwing, and were treated to a surprise coffee break with sweets, served by a barista wagon just before the course ended.

The gathering of surgeons from all over the world enriches everyone with knowledge and expertise. Every participant passes on his personal experience, just like an Olympic torch.

Aachen statehouse after course dinner.

Midnight at course with torches.

We look forward to future Stepwise Flap Raising courses with great excitement!

FIRST TRAINEE'S MEETING IN NAPLES

By Lara Watson

This month has seen a milestone event for the EACMFS in terms of its trainee community. In the sun-soaked coastal city of Naples, the Association hosted its first ever dedicated trainee congress which took place alongside the national Italian congress for craniomaxillofacial surgery.

Trainee members from across the globe benefited from a rich agenda of education with a cutting-edge format including a series of live surgeries including open rhinoplasty, minimally invasive orthognathic surgery and superficial parotidectomy. In addition to this, the Association was thrilled to feature oral presentations from dozens of trainee members, providing a valuable opportunity to showcase their work on an international stage.

As an organisation dedicated to supporting the progression of its junior members, no fewer than 10 prizes were awarded for the best presentations to include sponsored attendance at the 28th EACMFS Congress which is due to take place in Athens in 2026. With trainee attendance growing year on year, this event is set to be the most trainee-focussed conference ever hosted by the EACMFS with an extension
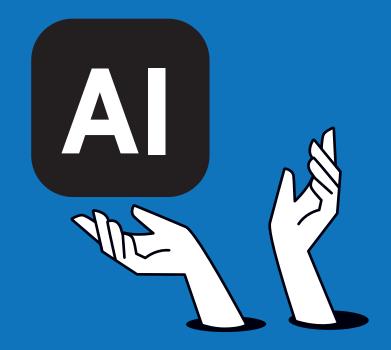
of the esteemed John Lowry session and a schedule of fantastic networking events for all attendees.

As the Trainee Representative for the EACMFS, it was a particular privilege to witness record high participation of female residents in the inaugural conference. This trend indicates promising societal shifts in the accessibility of surgical training globally and is a wonderful testament to the Association's commitment to improving equality and diversity within the specialty.

Congratulations again to the prize winners of the first EACMFS Trainee Congress in Naples. **I greatly look forward to the opportunity to connect with my fellow trainees in Athens in 2026!**

AI

The PULSE

NEWSletter

PO Box 85. Midhurst GU29 9WS. West Sussex. UK