The effect of casein phosphopeptide-amorphous calcium phosphate on chemical-induced enamel erosion: an in vitro study with ESEM analysis

I. Converti[1,*,†], A. Palermo[2,†], A. Mancini[3], M.E. Maggiore[3], G.M. Tartaglia[4], E. Ferrara[5], F. Lorusso[6], A. Scarano[6], I.R. Bordea[7], I. Tesoro[8], Y. De Mola[8], C. Sforza[4], C. Maspero[4], M. Farronato[4], M.G. Cagetti[4], A. Patano[3], S. Ceci[3], A. Corriero[9], D. Hazballa[3], A. Gnoni[10], A. Semjonova[3], K. Ferati[11], A. Bexheti-Ferati[11], M.F. Coscia[10], R. Del Prete[3], E. Xhajanka[12], T. Pustina-Krasniqi[13] and G. Malcangi[3,*]

[1]Division of Plastic and Reconstructive Surgery, Mater Dei Hospital, Bari, Italy; [2]College of Medicine & Dentistry of Birmingham, Birmingham, United Kingdom; [3]Interdisciplinary Department of Medicine, University of Bari "Aldo Moro", Bari, Italy; [4]UOC Maxillo-Facial Surgery and Dentistry, Department of Biomedical, Surgical and Dental Sciences, School of Dentistry, Fondazione IRCCS Ca Granda, Ospedale Maggiore Policlinico, University of Milan, Milan, Italy; [5]Complex Operative Unit of Odontostomatology, Hospital S.S. Annunziata, Chieti, Italy [6]Department of Oral Science, Nano and Biotechnology and CeSi-Met University of Chieti-Pescara, Chieti, Italy [7]Department of Oral Rehabilitation, University of Medicine and Pharmacy "Iuliu Hatieganu", Cluj-Napoca, Romania; [8]Freelance, Bari, Italy; [9]Unit of Anesthesia and Resuscitation, Department of Emergencies and Organ Transplantations, Aldo Moro University, Bari, Italy; [10]Department of Basic Medical Sciences, Neurosciences and Sense Organs, University of Bari "Aldo Moro", Bari, Italy; [11]Faculty of Medicine, University of Tetovo, Tetovo, Macedonia; [12]President of Dental School, Medical University of Tirana, Rruga e Dibrës, Tirana, Albania; [13]Universiteti I Prishtines "Hasan Prishtina", Prishtine, Kosovo

† These authors contributed equally to this work as first authors.

AIM: Chemical exogen acids effect can be considered in terms of the loss of hard tissue of teeth or potential loss. When the remineralization does not antagonize the demineralization, the dissolution of hard tissues arises. Significant among physical processes is degeneration in enamel structure due to the chemical processes of acidification and alkalinization. There are also several underlying determinants of enamel erosion. The enamel erosion induced by chemical exogen acids causes the dissolution of the hard tissues of teeth. The aim of this study was to analyze the erosive effect of three different soft drinks on the enamel surface and the potential remineralizing effect after applying casein phosphopeptide-amorphic calcium phosphate.

MATERIALS AND METHODS: Fifteen human third molar teeth specimens were analyzed to assess the effects of the topical cream containing 10% w/w casein phosphopeptide-amorphic calcium phosphate (CPP-ACP) nanocomplexes on enamel teeth lesions. Morphological characterization of teeth was performed using Environmental Scanning Electron Microscope (ESEM). In addition, the surface of specimens was examined before and after immersion into three recipients containing three different soft drinks and after the remineralization process for comparison.

RESULTS: Environmental Scanning Electron Microscopy analysis showed enamel morphology alterations after acidic soft drink exposure and superficially repair of teeth enamel after remineralizing treatment.

CONCLUSION: This in vitro study demonstrated that the casein phosphopeptide-amorphic calcium phosphate treatment was effective in remineralizing demineralized subsurface lesion enamel in vitro after having caused alterations by exogen acids.

* *Corresponding author:*
Dr Ilaria Converti
Division of Plastic and Reconstructive Surgery,
Mater Dei Hospital,
10 v. Samuel F Hahnemann, 70125, Bari, Italy
e-mail: ilaria.converti@gmail.com

0393-974X (2022)
Copyright © by BIOLIFE, s.a.s.
This publication and/or article is for individual use only and may not be further reproduced without written permission from the copyright holder.
Unauthorized reproduction may result in financial and other penalties
DISCLOSURE: ALL AUTHORS REPORT NO CONFLICTS OF INTEREST RELEVANT TO THIS ARTICLE.

Keywords: enamel erosion; dental erosion; hydrogen ions; environmental scanning microscope; demineralization

Dental erosion can be defined as the chemical dissolution of tooth minerals resulting in the loss of hard tissues but without the involvement of bacteria. Chemically-induced enamel erosion is a multifactorial condition and is recognized as being triggered by exogen acid exposure. Several diet agents have been associated with enamel erosion. The consumption of the adverse diet causes characteristic abnormalities of hard tissues of teeth, primarily with the dissolution. It is well known that this lesion results from the dissolution of the tooth by extrinsic or intrinsic acids or chelator acids when the surrounding aqueous phase is undersaturated concerning tooth minerals (1-7). The exogen acid introduction in the oral cavity is the leading cause of dental erosion as a result of a chemical reaction between hydrogen ions in the acid with dental hydroxyapatite Ca10 (PO4)6(OH)2 that promote the release of mineral ions (Ca2+, OH) and PO4 3– (8-9).

Furthermore, the enamel demineralization causes a substantial decrease in microhardness (10-17), increasing the vulnerability of the surface to mechanical impacts (18). The enamel erosion influences the occurrence of cervical lesions. Indeed, when the enamel is exposed to chemical insult, a process defined as "softening" begins, consisting of the loss of a mineral layer extending a few micrometres below the surface (19). In the early stages, this process is reversible. If the softening evolves, it results in complete loss of enamel. The high consumption of acidic beverages as diet components in childhood explains the most prevalence of these lesions among children (18-21). The consumption of acidic drinks has changed through the decades, increasing exponentially (22-26). There is strong evidence that the chemical composition and properties of the demineralizing solution are implicated in the dental erosive process caused by acidic drinks (27-30). Indeed, conventional soft drinks also consist of titratable acidity and chemical preservatives. In addition to lower PH value, these agents increase the erosive potential of these beverages. In other risk factors, this phenomenon is associated with a high incidence and progression of dental erosions, mainly in children and adolescents (31-33); this may compromise the dentition and lead to expensive restorations in adulthood (34-37). Therefore, interest in early child development and recognition of its lifelong impacts grows. Preventive measures to counteract enamel erosion are imperative.

One result, in recent years, has been a substantial increase in numerous treatment regimens, including a new formulation of toothpaste containing casein phosphopeptide – amorphous calcium phosphate (CPP-ACP), which studies in vitro have demonstrated to be effective in inhibiting cariogenic activity and reducing demineralization of the altered tooth surfaces. The casein phosphopeptide – amorphous calcium phosphate (CPP-ACP) is a bioactive agent with a base of milk. It has been demonstrated that the anti-cariogenic property of CPP-ACP due to its ability to stabilize calcium and phosphate in an amorphous state, also due to the presence of two cluster sequences in CPP, Ser (P)-Ser (P)-Ser (P)-Glu-Glu from casein (38-41). Moreover, ACP separates from CPP in an acidic environment, thereby enhancing salivary calcium and phosphate concentrations (39-43). Furthermore, CPP can become constant with the level of ACP in saliva by inhibiting the precipitation of calcium and phosphate and stabilizing the calcium level. Our study aimed to analyze the potential remineralizing of paste containing casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) after demineralization process induced by exogen acids, using a well-known chemical process. Three predisposing factors (soft drinks) were selected based on available data present in the literature (44-52).

MATERIALS AND METHODS

Fifteen third human molar teeth were included in the study. All were extracted for orthodontic reasons, and written informed consent was obtained from all participants to use their teeth for scientific purposes. Inclusion criteria were teeth caries lesions free. Biological samples were handled by one of three different procedures before ESEM (Environmental Scanning Microscope Quanta 200, FEI Company, Philips Electron Optics, Eindhoven, Netherlands) observation. Analysis of specimens for

morphological characterization was performed using an ESEM, set in low vacuum mode (120 Pa), at pressures that were ca. 0.6 Torr lower than the pressure of maximum brightness. The ESEM technology allows the analysis of biological samples in their natural state and without metal coating (Danilatos 1988, Goldstein et al. 1992, Johnson et al. 1993). The instrument allows a resolution of 3.0 NM @ 30kV, with a high signal to noise ratio both in high/low vacuum and ambient mode. The acceleration voltage (200V÷30 KV) and the filament current (up to 2μA) are constantly adaptable. Stehr and Oestlund (2000) showed that ESEM is an essential tool in studying the surface condition and acceptable machining deformations without the risk of artefacts in specimen preparation. This microscope was equipped with the following facilities: SED Everhart-Thornley secondary electrons detector, LFD (large field secondary electrons detector, GSED (secondary gaseous electrons det., in ESEM mode), BSED/CLD detector for fotocathodoluminescence electrons, Thermostatic Peltier heating/cooling stage (20°-5°C) (in ESEM mode) with external chiller, Eucentric goniometer stage with R = 360° continuous and repeatability: 2μm, Digital video recording.

Preparation protocol for ESEM

Before the treatments, samples were handled by the following procedure: (1) the teeth specimens were thoroughly cleaned of all residual debris with mechanical instruments and then stored in physiological saline solution for three weeks; subsequently, each sample was mounted on stubs with double-adhesive. No metallization of the samples was necessary. (2) The teeth were untreated to evaluate the enamel surface before the effect of exogen acids; (3) the chamber conditions were set at 5° and 6.0 Torr (humidity in the specimen chamber was about 85%); and (4) the samples were observed and photographed. Therefore, after undergoing ESEM observation, all specimens were divided into three groups and then immersed in different acid solutions for thirty minutes a day for 7 days to simulate a typical daily assumption of soft drinks. In Group A, each specimen was immediately washed with normal saline and then immerged into individual containers of Coca Cola (having phosphoric acid) with PH 2,53. After washing with normal saline in group B, the teeth were placed into containers of RED BULL (having citric acid) with PH 3,41. Samples of Group C were rinsed with sterile saline and then immersed into individual containers of orange juice (having citric acid about 0.2-0.004 M) with PH 3.5. Subsequently, each sample was treated with casein phosphopeptide-amorphic calcium phosphate for three minutes for 10 days to evaluate the remineralizing effectiveness. After each treatment, the teeth specimens were cleaned and washed with distilled water and then stored in normal saline until further treatment was stored in physiological saline solution up to the time they were analyzed. Therefore, morphological analysis was performed. Samples were analyzed using secondary electrons with SS Detector (Solid Stake detector) or LFD (Large Field Detector).

RESULTS

In vitro morphological ESEM evaluation

The images obtained from the treated samples at different conditions were compared with images observed after treatment with casein phosphopeptide-amorphic calcium phosphate. Before the treatments, samples were handled by the following procedure: to prepare these samples, (1) the teeth specimens were thoroughly cleaned of all residual debris with mechanical instruments and stored in physiological saline solution for 3 weeks; (2) the deposition of a conductive layer on the specimens was not necessary. Samples were mounted on stubs with double adhesive. The teeth were untreated to evaluate the effect of the exogen acids on the enamel surface; (3) the chamber conditions were set at 5°C and 6.0 Torr (humidity in the specimen chamber was about 85%); and (4) the samples were observed and photographed using an SR stereomicroscope (Carl Zeiss AG, Oberkochen, D-73446, Germany). The images obtained from the treated samples in different solutions were compared with images observed after treatment with casein phosphopeptide-amorphic calcium phosphate. Teeth were examined at magnifications of (×100, ×250, ×500 and ×1000) with the ESEM. All teeth specimens were shown at the ESEM about the same appearance.

The enamel is more evident than the root to the rear-scattered electrons or the secondary electrons. Representative ESEM images of the retrodiffused electrons, at the low empty ESEM, of the teeth before treatment with the soft drinks were revealed. The ESEM image from Group A showed the regular enamel prisms' ends. The enamel surface was fairly

uniform, with longitudinal grooves and fracture lines. The morphological analysis showed a jagged root, specifically at the dental-enamel junction, and the level can be either jagged or uniform. The ESEM image from group A showed standard prisms' ends with few surface deposits and no surface enamel roughness after immersion into Coca Cola. The ESEM image from group B showed surface deposits with mild enamel surface roughness after casein phosphopeptide-amorphic calcium phosphate treatment. The ESEM image from group C showed low surface deposits and no surface roughness. The ESEM image from group D showed severe enamel surface roughness with no surface deposits. The ESEM showed deep fissures and damaged enamel prisms in the sample treated with Coca Cola. The ESEM image from Group B, treated with RED BULL, showed surface deposits with mild enamel surface roughness. The ESEM image from group C showed scarce surface deposits and no surface roughness. The ESEM image from group D showed severe enamel surface roughness with no surface deposits. After treatment with Coca Cola**,** at a magnification of 500×, the dental surface showed numerous extended fractures on the enamel, with more uniform portions and others more susceptible to the erosive action of the drink. The prisms were damaged, showing more eroded than the sheaths, with more uniform portions and others more susceptible to the effect of the drink. At a low magnification of 250x, before the treatment with Coca Cola, the surface of the enamel appeared sufficiently uniform, with some slight longitudinal groove and some lines of surface fracture. The root occurred at the ESEM with a frayed surface, especially near the amelo-cementitious junction and some fracture lines. The treatment with casein phosphopeptide-amorphic calcium phosphate revealed the almost total absence of scratches and groves, filled and levelled. After treatment with casein phosphopeptide-amorphic calcium phosphate, it was shown clearly how the level of the prisms of the enamel was settled, occluding the cavities produced by the erosive action of Coca Cola. After treatment with Red Bull, the ESEM sample presented an accentuated erosive damage; the surface was more eroded at the enamel level, with newly formed fracture lines. Taking as a reference the same surface, treated first with Red Bull and then with casein phosphopeptide-amorphic calcium phosphate, we noted slight improvements, especially on the enamel, with the presence of casein phosphopeptide-amorphic calcium phosphate deposits, which had the characteristic of chemically binding to it. Near the root, we saw the casein phosphopeptide-amorphic calcium phosphate bound to the surface, and the fracture lines occurred with less thickness than in the previous image. Before being treated with Red Bull, the surface had depressions of the prisms in specific sites; in others, the homogeneous glaze was observed. Near the amelite-cementitious junction, the appearance of the surface was frayed. In order to analyze an area of the larger surface at lower magnification, it is highlighted how the Red Bull does not have uniform effects on the prisms but produces irregular excavations. Analyzing at the same magnification, the same surface area, following the treatment with Red Bull and subsequently with casein phosphopeptide-amorphic calcium phosphate, we found how erosion defects were reduced, showing a more compliant surface. After the treatment with Red Bull, at a higher magnification, the enamel presented porous. The drink changed the appearance of the surface, producing irregular excavation of prisms and generalized microlesions. After the treatments with Red Bull and casein phosphopeptide-amorphic calcium phosphate, it was possible to notice the improvement of the enamel surface. The change in its appearance highlighted the reparative action of the casein phosphopeptide-amorphic calcium phosphate.

At a magnification of 500×, the casein phosphopeptide-amorphic calcium phosphate treated surfaces appeared covered by a uniform layer of material. Enamel micro-cavities are filled. Before being treated with 100% orange juice, the sample was presented to the ESEM with a fringed pattern near the enamel-cement junction, with marked soft wear at the level of the enamel, where longitudinal and horizontal furrows prevailed, associated with abrasions with hard materials, and a slight presence of prism depressions. The root, because of its composition more susceptible to external insults yet presented jagged already departing. There were numerous microfractures, particularly accentuated at the cement-enamel

junction and when the same site was brought to 500x magnification to better highlight erosion from the juice. Depressions of the prisms already present were noted but aggravated by the drink's erosive effect, which also damaged the formation of new furrows.

DISCUSSION

It is generally accepted that the physicochemical properties of exogenous chemical soft drinks increase the risk of teeth enamel erosion. Reynolds and co-workers demonstrated that formulations of professionals containing casein phosphopeptide-amorphic calcium phosphate (CPP-ACP) could significantly affect the remineralizing process). (10-17, 53, 54) The authors found that increasing the duration of exposure to casein phosphopeptide-amorphic calcium phosphate increased the levels of calcium and phosphate ions and promoted the remineralization of enamel subsurface lesions *in situ* (55-61). Based on a comparison of the physicochemical properties of the various remineralizing agents, the authors showed the synergistic effect of 2% CPP-ACP in conjunction with 1100 ppm fluoride in reducing the enamel dissolution because of the formation of CPP-stabilized amorphous calcium fluoride phosphate, which results in the increased incorporation of fluoride ions into plaque (62-64). Similar findings have also been reported by Cai et al. in a randomized, controlled, double-blind trial showing that CPP-ACP significantly reduced the caries experience when the fluoride was added (65). The concentration employed in this study reflects the level of agent required to exert a clinically beneficial effect on the enamel surface when applied topically (66-68).

Furthermore, work is required on these systems to make a definitive comparison of the effect of solvent volatility and penetrant lipophilicity upon their penetration into the skin (34-39, 69). Microradiography of the remineralized lesions demonstrates that the 2% CPP-ACP paste generated homogenous remineralization of the lesion. This effect is attributable to the ability of the CPP to concentrate and fix the ions at the tooth surface in the correct molar ratio [Ca:PO4:F = 5:3:1]. In several different studies, the effectiveness of CPP-ACP technology has been demonstrated in promoting the levels the remineralization of enamel subsurface lesions via increasing the level of calcium and phosphate ions in supragingival plaque (70-78). Barbour *et al.* demonstrated that CPP-ACP bound to bacterial and produced a reservoir of bioavailable calcium ions (79). In another randomized clinical study, Lussi et al. examined 152 visible white-spot lesions on 60 incisors and canines immediately after orthodontic debonding (80). They were assigned to different remineralizing treatments, which comprised a tooth cream containing CPP-ACP with a fluoride dentifrice or a daily topical application of a 0.05% sodium fluoride mouthwash in conjunction with fluoride dentifrice (81-90). The lesions were observed, and the authors reported a significant difference between the treatment ($p < 0.01$), registering a regression of about 64% of white spots for the CPP-ACP group in comparison with the fluoride group, which reported a 23% of regression (91-134).

The present in vitro study demonstrated that the casein phosphopeptide-amorphic calcium phosphate treatment was effective in remineralizing demineralized subsurface lesion enamel in vitro after having caused alterations by exogen acids.

REFERENCES

1. Biesbrock AR, Gerlach RW, Bollmer BW, Faller RV, Jacobs SA, Bartizek RD (2001). Relative anti-caries efficacy of 1100, 1700, 2200, and 2800 ppm fluoride ion in a sodium fluoride dentifrice over 1 year. Community Dent Oral Epidemiol 29:382-389.
2. Santacroce L, Inchingolo F, Topi S, Del Prete R, Di Cosola M, Charitos IA, Montagnani M. Potential beneficial role of probiotics on the outcome of COVID-19 patients: An evolving perspective. Diabetes Metab Syndr. 2021; 15 (1):295-301.
3. Quaglia E, Moscufo L, Corsalini M, et al. Polyamide vs silk sutures in the healing of postextraction sockets: a split mouth study. Oral Implantology 2018; 11(2):115-120.
4. Rapone B, Ferrara E, Santacroce L, et al. Gingival Crevicular Blood as a Potential Screening Tool: A Cross Sectional Comparative Study. Int J Environ Res Public Health. 2020; 17 (20):7356.

5. Inchingolo F, Martelli FS, Gargiulo Isacco C, et al. Chronic Periodontitis and Immunity, Towards the Implementation of a Personalized Medicine: A Translational Research on Gene Single Nucleotide Polymorphisms (SNPs) Linked to Chronic Oral Dysbiosis in 96 Caucasian Patients. Biomedicines. 2020; 8(5):115.
6. Rapone B, Converti I, Santacroce L, et al. Impact of Periodontal Inflammation on Nutrition and Inflammation Markers in Hemodialysis Patients. Antibiotics (Basel). 2019; 8 (4):209.
7. Grassi FR, Rapone B, Scarano Catanzaro F, Corsalini M, Kalemaj Z. Effectiveness of computer-assisted anesthetic delivery system (STA™) in dental implant surgery: a prospective study. Oral Implantology 2017; 10:381-389.
8. Charitos IA, Ballini A, Bottalico L, Cantore S, Passarelli PC, Inchingolo F, D'Addona A, Santacroce L. Special features of SARS-CoV-2 in daily practice. World J Clin Cases. 2020; 8 (18):3920-3933.
9. Ballini A, Cantore S, Scacco S, et al. A comparative study on different stemness gene expression between dental pulp stem cells vs. dental bud stem cells. Eur Rev Med Pharmacol Sci. 2019; 23 (4):1626-1633.
10. Cantore S, Ballini A, De Vito D, et al. Characterization of human apical papilla-derived stem cells. J Biol Regul Homeost Agents. 2017; 31 (4):901-910.
11. Lorusso F, Postiglione F, Delvecchio M, Rapone B., Scarano A. The impact of diabetes on implant oral rehabilitations: a bibliometric study and literature review. Acta Medica Mediterranea 2020; 36: 3333.
12. Rapone B, Ferrara E, Corsalini M, Qorri E, Converti I, Lorusso F, Delvecchio M, Gnoni A, Scacco S, Scarano A. Inflammatory Status and Glycemic Control Level of Patients with Type 2 Diabetes and Periodontitis: A Randomized Clinical Trial. Int J Environ Res Public Health 2021 Mar 15;18(6):3018.
13. Rapone B, Corsalini M, Converti I, et al. Does Periodontal Inflammation Affect Type 1 Diabetes in Childhood and Adolescence? A Meta-Analysis. Front. Endocrinol. 2020; 11:278.
14. Rapone B, Ferrara E, Corsalini M, et al. The Effect of Gaseous Ozone Therapy in Conjunction with Periodontal Treatment on Glycated Hemoglobin Level in Subjects with Type 2 Diabetes Mellitus: An Unmasked Randomized Controlled Trial. Int. J. Environ. Res. Public Health 2020; 17 (15):54675.
15. Rapone B, Ferrara E, Santacroce L, Topi S, Gnoni A, Dipalma G, Mancini A, Di Domenico M, Tartaglia GM, Scarano A, Inchingolo F. The Gaseous Ozone Therapy as a Promising Antiseptic Adjuvant of Periodontal Treatment: A Randomized Controlled Clinical Trial. International Journal of Environmental Research and Public Health 2022; 19(2):985.
16. Corsalini M, Di Venere D, Carossa M, et al. Comparative clinical study between zirconium-ceramic and metal-ceramic fixed rehabilitations. Oral Implantology 2018; 11:150–160.
17. Grassi FR, Grassi R, Rapone B, Gianfranco A, Balena A, Kalemaj Z. Dimensional changes of buccal bone plate in immediate implants inserted through open flap, open flap and bone grafting, and flapless technique. A CBCT randomized controlled clinical trial. Clin Oral Implants Res. 2019; 30:1155-1164.
18. Inchingolo F, Tatullo M, Pacifici A, et al. Use of dermal-fat grafts in the post-oncological reconstructive surgery of atrophies in the zygomatic region: clinical evaluations in the patients undergone to previous radiation therapy. Head Face Med. 2012; 8:33.
19. Inchingolo F, Tatullo M, Abenavoli FM, et al. Severe anisocoria after oral surgery under general anesthesia. Int J Med Sci. 2010; 7 (5):314-8.
20. Inchingolo F, Tatullo M, Abenavoli FM, et al. Surgical treatment of depressed scar: a simple technique. Int J Med Sci. 2011;8(5):377-9.
21. Corsalini M, Di Venere D, Sportelli P, et al. Evaluation of prosthetic quality and masticatory efficiency in patients with total removable prosthesis: study of 12 cases. Oral Implantology 2018; 11:230–240.
22. Corsalini M, Di Venere D, Rapone B, Stefanachi G, Laforgia A, Pettini F. Evidence of signs and symptoms of Craniomandibular Disorders in Fibromyalgia patients. The Open Dent Journal 2017; 11(1):91–98.
23. Inchingolo F, Santacroce L, Ballini A, et al. Oral Cancer: A Historical Review. Int J Environ Res Public Health. 2020; 17(9):3168.
24. Di Venere D, Pettini F, Nardi GM, et al. Correlation between parodontal indexes and orthodontic retainers: prospective study in a group of 16 patients. Oral Implantology 2017; 10:78-86.

25. Inchingolo F, Ballini A, Cagiano R, et al. Immediately loaded dental implants bioactivated with platelet-rich plasma (PRP) placed in maxillary and mandibular region. Clin Ter. 2015; 166 (3):e146-52.
26. Di Venere D, Corsalini M, Nardi GM, Laforgia A, Grassi FR, Rapone B, Pettini F. Obstructive site localization in patients with Obstructive Sleep Apnea Syndrome: a comparison between otolaryngologic data and cephalometric values. Oral Implantology 2017; 10:295–310.
27. Scarano A, Inchingolo F, Murmura G, Traini T, Piattelli A, Lorusso F. Three-Dimensional Architecture and Mechanical Properties of Bovine Bone Mixed with Autologous Platelet Liquid, Blood, or Physiological Water: An In Vitro Study. Int J Mol Sci. 2018; 19 (4):1230.
28. Inchingolo AD, Inchingolo AM, Bordea IR, et al. SARS-CoV-2 Disease Adjuvant Therapies and Supplements Breakthrough for the Infection Prevention. Microorganisms. 202; 9 (3):525.
29. Scarano, A.; Inchingolo, F.; Rapone, B.; Festa, F.; Tari, S.R.; Lorusso, F. Protective Face Masks: Effect on the Oxygenation and Heart Rate Status of Oral Surgeons during Surgery. Int. J. Environ. Res. Public Health 2021, 18, 2363.
30. Rapone B, Ferrara E, Santacroce L, et al. Periodontal Microbiological Status Influences the Occurrence of Cyclosporine-A and Tacrolimus- Induced Gingival Overgrowth. Antibiotics 2019; 8:124.
31. Rapone B, Ferrara E, Montemurro N, et al. Oral Microbiome and Preterm Birth: Correlation or Coincidence? A Narrative Review. Open Access Maced. J. Med. Sci. 2020; 8:123–132.
32. Inchingolo F, Tatullo M, Abenavoli FM, Marrelli M, Inchingolo AD, Inchingolo AM, Dipalma G. Comparison between traditional surgery, CO2 and Nd:Yag laser treatment for generalized gingival hyperplasia in Sturge-Weber syndrome: a retrospective study. J Investig Clin Dent. 2010; 1 (2):85-89.
33. Dang QT, Huynh TD, Inchingolo F, Dipalma G, Inchingolo AD, et al. Human Chondrocytes from Human Adipose Tissue-Derived Mesenchymal Stem Cells Seeded on a Dermal-Derived Collagen Matrix Sheet: Our Preliminary Results for a Ready to Go Biotechnological Cartilage Graft in Clinical Practice. Stem Cells Int. 2021; 2021:6664697.
34. Ballini A, Cantore S, Signorini L, Saini R, Scacco S, Gnoni A, Inchingolo AD, et al. Efficacy of Sea Salt-Based Mouthwash and Xylitol in Improving Oral Hygiene among Adolescent Population: A Pilot Study. Int J Environ Res Public Health. 2020; 18 (1):44.
35. Adina S, Dipalma G, Bordea IR, Lucaciu O, Feurdean C, Inchingolo AD, et al. Orthopedic joint stability influences growth and maxillary development: clinical aspects. J Biol Regul Homeost Agents. 2020; 34 (3):747-756.
36. Lorusso F, Noumbissi S, Inchingolo F, Rapone B, Khater AGA, Scarano A. Scientific Trends in Clinical Research on Zirconia Dental Implants: A Bibliometric Review. Materials 2020, 13:5534.
37. Rapone B, Nardi GM, Di Venere D, Pettini F, Grassi FR, Corsalini M. Oral hygiene in patients with oral cancer undergoing chemotherapy and/or radiotherapy after prosthesis rehabilitation: protocol proposal. Oral Implantology 2016; 9 (01 suppl): 90-97.
38. Di Comite M, Crincoli V, Fatone L, Ballini A, et al. Quantitative analysis of defects at the dentin-post space in endodontically treated teeth. Materials 2015; 8,3268-3283.
39. Rapone B, Palmisano C, Ferrara E, Di Venere D, Albanese G, Corsalini M. The Accuracy of Three Intraoral Scanners in the Oral Environment with and without Saliva: A Comparative Study. Appl. Sci. 2020; 10, 7762.
40. Pham VH, Gargiulo Isacco C, Nguyen KCD, et al. Rapid and sensitive diagnostic procedure for multiple detection of pandemic Coronaviridae family members SARS-CoV-2, SARS-CoV, MERS-CoV and HCoV: a translational research and cooperation between the Phan Chau Trinh University in Vietnam and University of Bari "Aldo Moro" in Italy. Eur Rev Med Pharmacol Sci. 2020; 24 (12):7173-7191.
41. Bordea IR, Xhajanka E, Candrea S, Bran S, Onişor F, Inchingolo AD, et al. Coronavirus (SARS-CoV-2) Pandemic: Future Challenges for Dental Practitioners. Microorganisms. 2020; 8 (11):1704.
42. Scarola R, Montemurro N, Ferrara E, Corsalini M, Converti I, Rapone B. Temporomandibular Disorders and Fibromyalgia: A Narrative Review. Open Access

Maced J Med Sci [Internet]. 2021; 9 (F):106-12.
43. Montemurro N., Perrini P., Rapone B. Clinical Risk and Overall Survival in Patients with Diabetes Mellitus, Hyperglycemia and Glioblastoma Multiforme. A Review of the Current Literature. Int. J. Environ. Res. Public Health 2020, 17, 8501. doi: 10.3390/ijerph17228501.
44. Rapone B, Pedone S, Carnevale A, Plantamura P, Scarano A, Demelio A, Demelio GP, Corsalini M. Profilometer Comparison of the Surface Roughness of Four Denture Base Resins: An In Vitro Study. Applied Sciences. 2022; 12(4):1837. https://doi.org/10.3390/app12041837.
45. Malcangi G, Inchingolo AD, Inchingolo AM, Piras F, Settanni V, Garofoli G, Palmieri G, Ceci S, Patano A, Mancini A, Vimercati L, Nemore D, Scardapane A, Rapone B, Semjonova A, D'Oria MT, Macchia L, Bordea IR, Migliore G, Scarano A, Lorusso F, Tartaglia GM, Giovanniello D, Nucci L, Maggialetti N, Parisi A, Domenico MD, Brienza N, Tafuri S, Stefanizzi P, Curatoli L, Corriero A, Contaldo M, Inchingolo F, Dipalma G. COVID-19 Infection in Children and Infants: Current Status on Therapies and Vaccines. Children. 2022; 9(2):249. https://doi.org/10.3390/children9020249.
46. Malcangi G, Inchingolo AD, Patano A, Coloccia G, Ceci S, Garibaldi M, Inchingolo AM, Piras F, Cardarelli F, Settanni V, Rapone B, Corriero A, Mancini A, Corsalini M, Nucci L, Bordea IR, Lorusso F, Scarano A, Giovanniello D, Dipalma G, Posa VM, Di Venere D, Inchingolo F. Impacted Central Incisors in the Upper Jaw in an Adolescent Patient: Orthodontic-Surgical Treatment-A Case Report. Applied Sciences. 2022; 12(5):2657. https://doi.org/10.3390/app12052657.
47. Montemurro N., Perrini P., Marani W., Chaurasia B., Corsalini M., Scarano A., Rapone B. Multiple Brain Abscesses of Odontogenic Origin. May Oral Microbiota Affect Their Development? A Review of the Current Literature. Appl. Sci. 2021, 11, 3316. doi: 10.3390/app11083316.
48. Di Venere D, Rapone B, Corsalini M. Dental trauma in the anterior sector: an analysis of the predisposing factors in a group of orthodontic patients. Clinica Terapeutica 2020, 171 (6):e481-485. doi: 10.7417/CT.2020.2261.
49. Nardi G.M., Ferrara E., Converti I., Cesarano F., Scacco S., Grassi R., Gnoni A., Grassi F.R., Rapone B. Does Diabetes Induce the Vascular Endothelial Growth Factor (VEGF) Expression in Periodontal Tissues? A Systematic. Int. J. Environ. Res. Public Health 2020, 17(8), 2765. doi: 10.3390/ijerph17082765.
50. Di Venere D, Nardi GM, Lacarbonara V, Laforgia A, Stefanachi G, Corsalini M, Grassi FR, Rapone B, Pettini F. Early mandibular canine-lateral incisor transposition: Case Report. Oral Implantology 2017 April; 10(2):181-189. doi: 10.11138/orl/2017.10.2.181.
51. Inchingolo, A.D.; Ceci, S.; Patano, A.; Inchingolo, A.M.; Montenegro, V.; Di Pede, C.; Malcangi, G.; Marinelli, G.; Coloccia, G.; Garibaldi, M.; Kruti, Z.; Palmieri, G.; De Leonardis, N.; Rapone, B.; Mancini, A.; Semjonova, A.; Nucci, L.; Bordea, I.R.; Scarano, A.; Lorusso, F.; Ferrara, E.; Farronato, M.; Tartaglia, G.M.; Di Venere, D.; Cardarelli, F.; Inchingolo, F.; Dipalma, G. Elastodontic Therapy of Hyperdivergent Class II Patients Using AMCOP® Devices: A Retrospective Study. Appl. Sci.2022, 12, 3259. doi: 10.3390/app12073259
52. Bellocchio, L., Bordea, I.R., Ballini, A., ...Logroscino, G., Miani, A. Environmental issues and neurological manifestations associated with covid-19 pandemic: New aspects of the disease? International Journal of Environmental Research and Public Health, 2020, 17(21), pp. 1–11, 8049
53. Dohan Ehrenfest, D.M., Del Corso, M., Inchingolo, F., Charrier, J.-B. Selecting a relevant in vitro cell model for testing and comparing the effects of a Choukroun's platelet-rich fibrin (PRF) membrane and a platelet-rich plasma (PRP) gel: Tricks and traps. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology, 2010, 110(4), pp. 409–411.
54. Farronato, M.; Farronato, D.; Inchingolo, F.; Grassi, L.; Lanteri, V.; Maspero, C. Evaluation of Dental Surface after De-Bonding Orthodontic Bracket Bonded with a Novel Fluorescent Composite: In Vitro Comparative Study. Appl. Sci. 2021, 11, 6354, doi:10.3390/app11146354.
55. Cardarelli, F.; Patano, A.; Montenegro, V.; Malcangi, G.; Coloccia, G.; Inchingolo, A.D.; Marinelli, G.;

Laudadio, C.; Dipalma, G.; Di Venere, D.; Inchingolo, F. Elastodontic therapy un nuovo approccio alla terapia ortodontica funzionale. Il Dentista Moderno 2021, 48-63ùInchingolo, F.; Tatullo, M.; Marrelli,

56. M.; Inchingolo, A.M.; Tarullo, A.; Inchingolo, A.D.; Dipalma, G.; Brunetti, S.P.; Tarullo, A.; Cagiano, R. Combined Occlusal and Pharmacological Therapy in the Treatment of Temporo-Mandibular Disorders. Eur. Rev. Med. Pharmacol. Sci. 2011, 15, 1296–1300.
57. Delvecchio M, Pastore C, Giordano P. Treatment Options for MODY Patients: A Systematic Review of Literature. Diabetes Ther. 2020 Aug;11(8):1667-1685. doi: 10.1007/s13300-020-00864-4.
58. Scaramuzza A, Cherubini V, Tumini S, Bonfanti R, Buono P, Cardella F, d'Annunzio G, Frongia AP, Lombardo F, Monciotti AC, Rabbone I, Schiaffini R, Toni S, Zucchini S, Frontino G, Iafusco D; Diabetes Study Group of the Italian Society for Pediatric Endocrinology and Diabetology. Recommendations for self-monitoring in pediatric diabetes: a consensus statement by the ISPED. Acta Diabetol. 2014 Apr;51(2):173-84. doi: 10.1007/s00592-013-0521-7.
59. Faienza MF, Brunetti G, Delvecchio M, Zito A, De Palma F, Cortese F, Nitti A, Massari E, Gesualdo M, Ricci G, Carbonara S, Giordano P, Cavallo L, Scicchitano P, Ciccone MM. Vascular Function and Myocardial Performance Indices in Children Born Small for Gestational Age. Circ J. 2016;80(4):958-63. doi: 10.1253/circj.CJ-15-1038.
60. Delvecchio M, Ludovico O, Menzaghi C, Di Paola R, Zelante L, Marucci A, Grasso V, Trischitta V, Carella M, Barbetti F, Gallo F, Coccioli MS, Zecchino C, Faienza MF, Cardinale G, Franzese A, Mozzillo E, Iafusco D, Zanfardino A. Low prevalence of HNF1A mutations after molecular screening of multiple MODY genes in 58 Italian families recruited in the pediatric or adult diabetes clinic from a single Italian hospital. Diabetes Care. 2014 Dec;37(12):e258-60. doi: 10.2337/dc14-1788.
61. Delvecchio M, Pastore C, Giordano P. Treatment Options for MODY Patients: A Systematic Review of Literature. Diabetes Ther. 2020 Aug;11(8):1667-1685. doi: 10.1007/s13300-020-00864-4.
62. Palumbo O, Palumbo P, Delvecchio M, Palladino T, Stallone R, Crisetti M, Zelante L, Carella M. Microdeletion of 12q24.31: report of a girl with intellectual disability, stereotypies, seizures and facial dysmorphisms. Am J Med Genet A. 2015 Feb;167A(2):438-44. doi: 10.1002/ajmg.a.36872.
63. Pinelli M, Acquaviva F, Barbetti F, Caredda E, Cocozza S, Delvecchio M, Mozzillo E, Pirozzi D, Prisco F, Rabbone I, Sacchetti L, Tinto N, Toni S, Zucchini S, Iafusco D; Italian Study Group on Diabetes of the Italian Society of Pediatric Endocrinology and Diabetology. Identification of candidate children for maturity-onset diabetes of the young type 2 (MODY2) gene testing: a seven-item clinical flowchart (7-iF). PLoS One. 2013 Nov 11;8(11):e79933. doi: 10.1371/journal.pone.0079933.
64. Pocsfalvi G, Cuccurullo M, Schlosser G, Cacace G, Siciliano RA, Mazzeo MF, Scacco S, Cocco T, Gnoni A, Malorni A, Papa S. Shotgun proteomics for the characterization of subunit composition of mitochondrial complex I. Biochim Biophys Acta. 2006 Sep-Oct;1757(9-10):1438-50. doi: 10.1016/j.bbabio.2006.05.037.
65. Cai F, Manton DJ, Shen P, Walker GD, Cross KJ, Yuan Y, et al. Effect of addition of citric acid and casein phosphopeptide-amorphous calcium phosphate to a sugar-free chewing gum on enamel remineralization in situ. Caries Res 2007; 41:377–383
66. Gnoni A, Giudetti AM. Dietary long-chain unsaturated fatty acids acutely and differently reduce the activities of lipogenic enzymes and of citrate carrier in rat liver. J Physiol Biochem. 2016 Sep;72(3):485-94. doi: 10.1007/s13105-016-0495-3.
67. Taurino F, Gnoni A. Systematic review of plasma-membrane ecto-ATP synthase: A new player in health and disease. Exp Mol Pathol. 2018 Feb;104(1):59-70. doi: 10.1016/j.yexmp.2017.12.006.
68. Lippolis R, Siciliano RA, Mazzeo MF, Abbrescia A, Gnoni A, Sardanelli AM, Papa S. Comparative secretome analysis of four isogenic Bacillus clausii probiotic strains. Proteome Sci. 2013 Jul 1;11(1):28. doi: 10.1186/1477-5956-11-28.
69. Priore P, Gnoni A, Natali F, Testini M, Gnoni GV, Siculella L, Damiano F. Oleic Acid and Hydroxytyrosol Inhibit Cholesterol and Fatty Acid Synthesis in C6 Glioma Cells. Oxid Med Cell Longev. 2017;2017:9076052. doi: 10.1155/2017/9076052.

70. Taurino F, Stanca E, Siculella L, Trentadue R, Papa S, Zanotti F, Gnoni A. Mitochondrial proteome analysis reveals depression of the Ndufs3 subunit and activity of complex I in diabetic rat brain. J Proteomics. 2012 Apr 18;75(8):2331-41. doi: 10.1016/j.jprot.2012.02.002.
71. Gnoni A, Longo S, Gnoni GV, Giudetti AM. Carnitine in Human Muscle Bioenergetics: Can Carnitine Supplementation Improve Physical Exercise? Molecules. 2020 Jan 1;25(1):182. doi: 10.3390/molecules25010182.
72. Cavallo A, Gnoni A, Conte E, Siculella L, Zanotti F, Papa S, Gnoni GV. 3,5-diiodo-L-thyronine increases FoF1-ATP synthase activity and cardiolipin level in liver mitochondria of hypothyroid rats. J Bioenerg Biomembr. 2011 Aug;43(4):349-57. doi: 10.1007/s10863-011-9366-3.
73. Zanotti F, Gnoni A, Mangiullo R, Papa S. Effect of the ATPase inhibitor protein IF1 on H+ translocation in the mitochondrial ATP synthase complex. Biochem Biophys Res Commun. 2009 Jun 19;384(1):43-8. doi: 10.1016/j.bbrc.2009.04.046.
74. Cross KJ, Huq NL, Palamara JE, Perich JW, Reynolds EC. Physicochemical characterization of casein phosphopeptideamorphous calcium phosphate nanocomplexes. J Biol Chem 2005; 280:15362-1536
75. MacKie IC, Hobson P. Dental erosion associated with unusual drinking habits in childhood. J Paediatr Dent 1986; 2: 89–94
76. Lussi A, Jaeggi T, Jaeggi-Schärer S: Prediction of the erosive potential of some beverages. Caries Res 1995;29:349–354
77. Cavallo A, Priore P, Gnoni GV, Papa S, Zanotti F, Gnoni A. 3,5-Diiodo-L-thyronine administration to hypothyroid rats rapidly enhances fatty acid oxidation rate and bioenergetic parameters in liver cells. PLoS One. 2013;8(1):e52328. doi: 10.1371/journal.pone.0052328.
78. Caputi Jambrenghi A, Paglialonga G, Gnoni A, Zanotti F, Giannico F, Vonghia G, Gnoni GV. Changes in lipid composition and lipogenic enzyme activities in liver of lambs fed omega-6 polyunsaturated fatty acids. Comp Biochem Physiol B Biochem Mol Biol. 2007 Jul;147(3):498-503. doi: 10.1016/j.cbpb.2007.03.003.
79. Barbour ME, Parker DM, Allen GC, Jandt KD. Human enamel dissolution in citric acid as a function of pH in the range 2.30 £ pH £ 6.30 – a nanoindentation study. Eur J Oral Sci 2003; 111: 258– 262
80. Lussi A, Schaffner M: Progression of and risk factors for dental erosion and wedge-shaped defects over a 6-year period. Caries Res 2000;34:182–187.
81. Martino NA, Marzano G, Mangiacotti M, Miedico O, Sardanelli AM, Gnoni A, Lacalandra GM, Chiaravalle AE, Ciani E, Bogliolo L, Minervini F, Pizzi F, Dell'Aquila ME. Exposure to cadmium during in vitro maturation at environmental nanomolar levels impairs oocyte fertilization through oxidative damage: A large animal model study. Reprod Toxicol. 2017 Apr;69:132-145. doi: 10.1016/j.reprotox.2017.02.005.
82. Cavallo A, Taurino F, Damiano F, Siculella L, Sardanelli AM, Gnoni A. Acute administration of 3,5-diiodo-L-thyronine to hypothyroid rats stimulates bioenergetic parameters in liver mitochondria. J Bioenerg Biomembr. 2016 Oct;48(5):521-529. doi: 10.1007/s10863-016-9686-4.
83. Taurino F, Stanca E, Vonghia L, Siculella L, Sardanelli AM, Papa S, Zanotti F, Gnoni A. Short-term type-1 diabetes differentially modulates 14-3-3 proteins in rat brain and liver. Eur J Clin Invest. 2014 Apr;44(4):350-8. doi: 10.1111/eci.12241.
84. Damiano F, Giannotti L, Gnoni GV, Siculella L, Gnoni A. Quercetin inhibition of SREBPs and ChREBP expression results in reduced cholesterol and fatty acid synthesis in C6 glioma cells. Int J Biochem Cell Biol. 2019 Dec;117:105618. doi: 10.1016/j.biocel.2019.105618.
85. Gnoni A, Siculella L, Paglialonga G, Damiano F, Giudetti AM. 3,5-diiodo-L-thyronine increases de novo lipogenesis in liver from hypothyroid rats by SREBP-1 and ChREBP-mediated transcriptional mechanisms. IUBMB Life. 2019 Jul;71(7):863-872. doi: 10.1002/iub.2014.
86. Taurino F, Giannoccaro C, Sardanelli AM, Cavallo A, De Luca E, Santacroce S, Papa S, Zanotti F, Gnoni A. Function and expression study uncovered hepatocyte plasma membrane ecto-ATP synthase as a novel player in liver regeneration. Biochem J. 2016 Aug 15;473(16):2519-30. doi: 10.1042/BCJ20160065.

87. Dugmore CR, Rock WP. The prevalence of tooth erosion in 12- year-old children. Br Dent J 2004; 196: 279–282.
88. Maupome G, Diez-de-Bonilla J, Torres-Villasenor G, Andrade-Delgado LC, Castano VM: In vitro quantitative assessment of enamel microhardness after exposure to eroding immersion in a cola drink. Caries Res 1998;32:148–153.
89. Dowker SEP, Anderson P, Elliot JC, Gao XJ. Crystal chemistry and dissolution of calcium phosphate in dental enamel. Mineral Mag 1999; 63: 791–801
90. Bartlett DW. The role of erosion in tooth wear: aetiology, prevention and management. Int Dent J 2005; 55: 277–284
91. Larsen MJ: Chemical events during tooth dissolution. J Dent Res 1990;69(spec No):575–580.
92. Maspero C, Abate A, Inchingolo F, Dolci C, Cagetti MG, Tartaglia GM. Incidental Finding in Pre-Orthodontic Treatment Radiographs of an Aural Foreign Body: A Case Report. Children (Basel). 2022 Mar 15;9(3):421. doi: 10.3390/children9030421.
93. Delvecchio M, Rapone B, Simonetti S, Fecarotta S, De Carlo G, Favoino E, Loverro MT, Romano AMI, Taurino F, Di Naro E, Gnoni A. Dietary cholesterol supplementation and inhibitory factor 1 serum levels in two dizygotic Smith-Lemli-Opitz syndrome twins: a case report. Ital J Pediatr. 2020 Oct 28;46(1):161. doi: 10.1186/s13052-020-00924-2.
94. Maspero C, Cappella A, Dolci C, Cagetti MG, Inchingolo F, Sforza C. Is Orthodontic Treatment with Microperforations Worth It? A Scoping Review. Children (Basel). 2022 Feb 6;9(2):208. doi: 10.3390/children9020208.
95. Ceratti C, Maspero C, Consonni D, Caprioglio A, Connelly ST, Inchingolo F, Tartaglia GM. Cone-Beam Computed Tomographic Assessment of the Mandibular Condylar Volume in Different Skeletal Patterns: A Retrospective Study in Adult Patients. Bioengineering (Basel). 2022 Mar 2;9(3):102. doi: 10.3390/bioengineering9030102.
96. Goldoni R, Dolci C, Boccalari E, Inchingolo F, Paghi A, Strambini L, Galimberti D, Tartaglia GM. Salivary biomarkers of neurodegenerative and demyelinating diseases and biosensors for their detection. Ageing Res Rev. 2022 Apr;76:101587. doi: 10.1016/j.arr.2022.101587.
97. Cozzani M, Sadri D, Nucci L, Jamilian P, Pirhadirad AP, Jamilian A. The effect of Alexander, Gianelly, Roth, and MBT bracket systems on anterior retraction: a 3-dimensional finite element study. Clin Oral Investig. 2020 Mar;24(3):1351-1357. doi: 10.1007/s00784-019-03016-6.
98. Marra, P.; Nucci, L.; Jamilian, A.; Perillo, L.; Itro, A.; Grassia, V. Odontoma in a Young and Anxious Patient Associated with Unerupted Permanent Mandibular Cuspid: A Case Report. J. Int. Oral Health 2020, 12, 182, doi:10.4103/jioh.jioh_287_19.
99. De Felice ME, Nucci L, Fiori A, Flores-Mir C, Perillo L, Grassia V. Accuracy of interproximal enamel reduction during clear aligner treatment. Prog Orthod. 2020 Jul 28;21(1):28. doi: 10.1186/s40510-020-00329-1.
100. d'Apuzzo, F.; Minervini, G.; Grassia, V.; Rotolo, R.P.; Perillo, L.; Nucci, L. Mandibular Coronoid Process Hypertrophy: Diagnosis and 20-Year Follow-Up with CBCT, MRI and EMG Evaluations. Appl.vSci. 2021, 11, 4504, doi:10.3390/app11104504.
101. Cozzani M, Nucci L, Lupini D, Dolatshahizand H, Fazeli D, Barzkar E, Naeini E, Jamilian A. The ideal insertion angle after immediate loading in Jeil, Storm, and Thunder miniscrews: A 3D-FEM study. Int Orthod. 2020 Sep;18(3):503-508. doi: 10.1016/j.ortho.2020.03.003.
102. Di Naro E, Loverro M, Converti I, Loverro MT, Ferrara E, Rapone B. The Effect of Menopause Hypoestrogenism on Osteogenic Differentiation of Periodontal Ligament Cells (PDLC) and Stem Cells (PDLCs): A Systematic Review. Healthcare (Basel). 2021 May 12;9(5):572. doi: 10.3390/healthcare9050572.
103. Mavriqi L, Lorusso F, Conte R, Rapone B, Scarano A. Zygomatic implant penetration to the central portion of orbit: a case report. BMC Ophthalmol. 2021, 21(1):121. doi: 10.1186/s12886-021-01846-1.
104. Corsalini M, Rapone B, Cagnetta G, Carossa M, Sportelli P, De Giacomo A, Laforgia A, Di Venere D. Orofacial functions and chewing effiency in elderly patients with Parkinsons's disease rehabilitated with removable prostheses. The Open Dentistry 2020, 14:13-18. doi: 10.2174/1874210602014010013.
105. Scarano A, Rapone B, Amuso D, Inchingolo F, Lorusso F. Hyaluronic Acid Fillers Enriched with

Glycine and Proline in Eyebrow Augmentation Procedure. Aesthetic Plast Surg. 2022 Feb;46(1):419-428. doi: 10.1007/s00266-021-02412-2.

106. Cozzani M, Sadri D, Nucci L, Jamilian P, Pirhadirad AP, Jamilian A. The effect of Alexander, Gianelly, Roth, and MBT bracket systems on anterior retraction: a 3-dimensional finite element study. Clin Oral Investig. 2020 Mar;24(3):1351-1357. doi: 10.1007/s00784-019-03016-6.
107. Scarano A., Inchingolo F., Rapone B., Lucchina A.G., Qorri E., Lorusso F. Role of Autologous Platelet Gel (APG) in Bone Healing: A Rabbit Study. Appl. Sci. 2021, 11, 395. doi: 10.3390/app11010395.
108. Dekel E, Nucci L, Weill T, Flores-Mir C, Becker A, Perillo L, Chaushu S. Impaction of maxillary canines and its effect on the position of adjacent teeth and canine development: A cone-beam computed tomography study. Am J Orthod Dentofacial Orthop. 2021 Feb;159(2):e135-e147. doi: 10.1016/j.ajodo.2020.10.015.
109. Calabriso N, Stanca E, Rochira A, Damiano F, Giannotti L, Di Chiara Stanca B, Massaro M, Scoditti E, Demitri C, Nitti P, Palermo A, Siculella L, Carluccio MA. Angiogenic Properties of Concentrated Growth Factors (CGFs): The Role of Soluble Factors and Cellular Components. Pharmaceutics. 2021 Apr 29;13(5):635. doi: 10.3390/pharmaceutics13050635.
110. Palermo, A.; Ferrante, F.; Stanca, E.; Damiano, F.; Gnoni, A.; Batani, T.; Carluccio, M.A.; Demitri, C.; Siculella, L. Release of VEGF from Dental Implant Surface (IML® Implant) Coated with Concentrated Growth Factors (CGF) and the Liquid Phase of CGF (LPCGF): In Vitro Results and Future Expectations. Appl. Sci. 2019, 9, 2114. https://doi.org/10.3390/app9102114
111. Inchingolo F, Paracchini L, DE Angelis F, Cielo A, Orefici A, Spitaleri D, Santacroce L, Gheno E, Palermo A. Biomechanical behaviour of a jawbone loaded with a prosthetic system supported by monophasic and biphasic implants. Oral Implantol (Rome). 2017 Feb 14;9(Suppl 1/2016 to N 4/2016):65-70. doi: 10.11138/orl/2016.9.1S.065.
112. Stanca E, Calabriso N, Giannotti L, Nitti P, Damiano F, Stanca BDC, Carluccio MA, De Benedetto GE, Demitri C, Palermo A, Ferrante F, Siculella L, Rochira A. Analysis of CGF Biomolecules, Structure and Cell Population: Characterization of the Stemness Features of CGF Cells and Osteogenic Potential. Int J Mol Sci. 2021 Aug 18;22(16):8867. doi: 10.3390/ijms22168867.
113. Cochrane NJ, Saranathan S, Cai F, Cross KJ, Reynolds EC. Enamel subsurface lesion remineralisation with casein phosphopeptide stabilised solutions of calcium, phosphate and fluoride. Caries Res 2008; 42:88–97.
114. Dang QT, Huynh TD, Inchingolo F, Dipalma G, Inchingolo AD, et al. Human Chondrocytes from Human Adipose Tissue-Derived Mesenchymal Stem Cells Seeded on a Dermal-Derived Collagen Matrix Sheet: Our Preliminary Results for a Ready to Go Biotechnological Cartilage Graft in Clinical Practice. Stem Cells Int. 2021; 2021:6664697.
115. Pham VH, Gargiulo Isacco C, Nguyen KCD, et al. Rapid and sensitive diagnostic procedure for multiple detection of pandemic Coronaviridae family members SARS-CoV-2, SARS-CoV, MERS-CoV and HCoV: a translational research and cooperation between the Phan Chau Trinh University in Vietnam and University of Bari "Aldo Moro" in Italy. Eur Rev Med Pharmacol Sci. 2020; 24 (12):7173-7191.
116. Topi S, Santacroce L, Bottalico L, Ballini A, Inchingolo AD, Dipalma G, Charitos IA, Inchingolo F. Gastric Cancer in History: A Perspective Interdisciplinary Study. Cancers (Basel). 2020 Jan 22;12(2):264. doi: 10.3390/cancers12020264.
117. Boccellino M, Di Stasio D, Dipalma G, Cantore S, Ambrosio P, Coppola M, Quagliuolo L, Scarano A, Malcangi G, Borsani E, Rinaldi B, Nuzzolese M, Xhajanka E, Ballini A, Inchingolo F, Di Domenico M. Steroids and growth factors in oral squamous cell carcinoma: useful source of dental-derived stem cells to develop a steroidogenic model in new clinical strategies. Eur Rev Med Pharmacol Sci. 2019 Oct;23(20):8730-8740. doi: 10.26355/eurrev_201910_19267.
118. Vermesan D, Inchingolo F, Patrascu JM, Trocan I, Prejbeanu R, Florescu S, Damian G, Benagiano V, Abbinante A, Caprio M, Cagiano R, Haragus H. Anterior cruciate ligament reconstruction and determination of tunnel size and graft obliquity. Eur Rev Med Pharmacol Sci. 2015;19(3):357-64.
119. Inchingolo F, Tatullo M, Abenavoli FM, Marrelli M,

Inchingolo AD, Corelli R, Inchingolo AM, Dipalma G. Upper eyelid reconstruction: a short report of an eyelid defect following a thermal burn. Head Face Med. 2009 Nov 25;5:26. doi: 10.1186/1746-160X-5-26.

120. Inchingolo F, Pacifici A, Gargari M, Acitores Garcia JI, Amantea M, Marrelli M, Dipalma G, Inchingolo AM, Rinaldi R, Inchingolo AD, Pacifici L, Tatullo M. CHARGE syndrome: an overview on dental and maxillofacial features. Eur Rev Med Pharmacol Sci. 2014;18(15):2089-93.
121. Inchingolo F, Tatullo M, Abenavoli FM, Inchingolo AD, Inchingolo AM, Dipalma G. Fish-hook injuries: a risk for fishermen. Head Face Med. 2010 Dec 14;6:28. doi: 10.1186/1746-160X-6-28.
122. Borsani E, Bonazza V, Buffoli B, Nocini PF, Albanese M, Zotti F, Inchingolo F, Rezzani R, Rodella LF. Beneficial Effects of Concentrated Growth Factors and Resveratrol on Human Osteoblasts In Vitro Treated with Bisphosphonates. Biomed Res Int. 2018 May 16;2018:4597321. doi: 10.1155/2018/4597321.
123. Fanali S, Tumedei M, Pignatelli P, Inchingolo F, Pennacchietti P, Pace G, Piattelli A. Implant primary stability with an osteocondensation drilling protocol in different density polyurethane blocks. Comput Methods Biomech Biomed Engin. 2021 Jan;24(1):14-20. doi: 10.1080/10255842.2020.1806251.
124. Dohan Ehrenfest, D.M., Del Corso, M., Inchingolo, F., Charrier, J.-B. Selecting a relevant in vitro cell model for testing and comparing the effects of a Choukroun's platelet-rich fibrin (PRF) membrane and a platelet-rich plasma (PRP) gel: Tricks and traps. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology, 2010, 110(4), pp. 409–411.
125. Inchingolo F, Tatullo M, Marrelli M, Inchingolo AD, Corelli R, Inchingolo AM, Dipalma G, Abenavoli FM. Clinical case-study describing the use of skin-perichondrium-cartilage graft from the auricular concha to cover large defects of the nose. Head Face Med. 2012 Mar 19;8:10. doi: 10.1186/1746-160X-8-10.
126. Inchingolo F, Tatullo M, Abenavoli FM, Marrelli M, Inchingolo AD, Servili A, Inchingolo AM, Dipalma G. A hypothetical correlation between hyaluronic acid gel and development of cutaneous metaplastic synovial cyst. Head Face Med. 2010 Jul 15;6:13. doi: 10.1186/1746-160X-6-13.
127. Cantore, S., Ballini, A., De Vito, D., et al. Clinical results of improvement in periodontal condition by administration of oral Probiotics. Journal of Biological Regulators and Homeostatic Agents, 2018, 32(5), pp. 1329–1334.
128. Corsalini M, Rapone B, Grassi FR, Di Venere D. A study on oral rehabilitation in stroke patients: analysis of a group of 33 patients. Gerodontology. 2010 Sep;27(3):178-82. doi: 10.1111/j.1741-2358.2009.00322.x.
129. Kalemaj Z, Scarano A, Valbonetti L, Rapone B, Grassi FR. Bone Response to Four Dental Implants with Different Surface Topographies: A Histologic and Histometric Study in Minipigs. Int J Periodontics Restorative Dent. 2016 Sep-Oct;36(5):745-54. doi: 10.11607/prd.2719.
130. Rapone B, Inchingolo AD, Trasarti S, Ferrara E, Qorri E, Mancini A, Montemurro N, Scarano A, Inchingolo AM, Dipalma G, Inchingolo F. Long-Term Outcomes of Implants Placed in Maxillary Sinus Floor Augmentation with Porous Fluorohydroxyapatite (Algipore® FRIOS®) in Comparison with Anorganic Bovine Bone (Bio-Oss®) and Platelet Rich Plasma (PRP): A Retrospective Study. Journal of Clinical Medicine. 2022; 11(9):2491.
131. Inchingolo AD, Patano A, Coloccia G, Ceci S, Inchingolo AM, Marinelli G, Malcangi G, Di Pede C, Garibaldi M, Ciocia AM, Mancini A, Palmieri G, Rapone B, Piras F, Cardarelli F, Nucci L, Bordea IR, Scarano A, Lorusso F, Giovanniello D, Costa S, Tartaglia GM, Di Venere D, Dipalma G, Inchingolo F. Treatment of Class III Malocclusion and Anterior Crossbite with Aligners: A Case Report. Medicina. 2022; 58(5):603.
132. Inchingolo AD, Malcangi G, Inchingolo AM, Piras F, Settanni V, Garofoli G, Palmieri G, Ceci S, Patano A, De Leonardis N, Di Pede C, Montenegro V, Azzollini D, Garibaldi MG, Kruti Z, Tarullo A, Coloccia G, Mancini A, Rapone B et al. Benefits and Implications of Resveratrol Supplementation on Microbiota Modulations: A Systematic Review of the Literature. International Journal of Molecular Sciences. 2022; 23(7):4027.
133. Kalemaj Z, Scarano A, Valbonetti L, Rapone B,

Grassi FR. Bone response to four dental implants with different surface topography: a histologic and histometric study in minipigs. Int J Periodontics Restorative Dent. 2016; 36(5):745-54.

134. Lorusso, F.; Postiglione, F.; Delvecchio, M.; Rapone, B.; Scarano, A. The impact of diabetes in implant oral rehabilitations: A bibliometric study and literature review. Acta Med. Mediterr. 2020, 36, 3333.