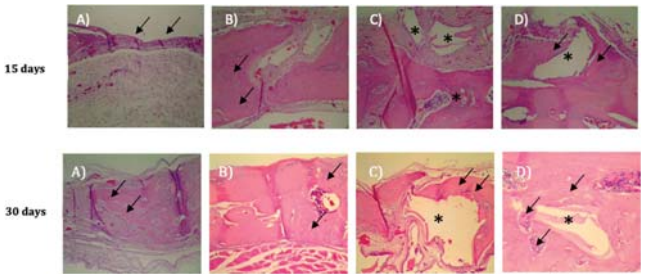
Results: In the results of the VMT analyses after 15 days, it can be observed significant differences in all groups, when compared to G2. Regarding the presence of NVMT, there were no statistical differences in the comparison between the G3 when compared with G4 after 15 days and the variability was absent in groups G1 and G2. Regarding NMT after 15 days, it was observed significant differences in the group G1 when compared to G2 ($p = 0.0062$) and G4 ($p = 0.0090$). Concerning the presence of VMT in the analysis after 30 days, the samples of the group G2 when compared with G4 showed no differences ($p = 0.5970$), while the analysis of the group G2 compared to G3, statistically significant differences were found (0.0445). The amount of VMT in the group G4 after 30 days when compared to G3 showed a significant difference ($p = 0.0090$). Regarding the presence of NVMT, the analyzes showed no statistical differences in the comparison between the groups G4 and G3. Variability was absent in groups G1 and G2

Conclusion and Clinical Implications: These results provided for the first time on an animal model are in line with previous studies, where different authors reported a reduction in bone resorption and an increase in bone tissue deposition when the Rigenera® autologous micrografts concept was used.



Group	15 DAYS			30 DAYS		
	NVMT	VMT	NMT	NVMT	VMT	NMT
G1	0.00±0.00 ^{a}	26.80±07.66 ^{a}	73.20±07.66 ^{a}	0.00±0.00 ^{a}	33.20±16.19 ^{a}	66.80±16.19 ^{a}
G2	0.00±0.00 ^{a}	54.50±14.32 ^{b}	45.50±14.32 ^{bd}	0.00±0.00 ^{a}	49.60±14.86 ^{b}	50.40±14.86 ^{be}
G3	20.40±4.72 ^{bd}	25.60±19.96 ^{a}	53.80±21.91 ^{ad}	24.80±05.07 ^{bd}	27.20±12.05 ^{ac}	48.20±11.10 ^{ce}
G4	21.60±2.70 ^{cd}	25.20±07.33 ^{a}	53.80±09.04 ^{cd}	26.20±08.20 ^{cd}	49.60±05.18 ^{abd}	24.20±06.72 ^{d}

Disclosure of Interest: None Declared.

Keywords: Bone regeneration

EAODGI2023-537/PO-BR-040 | Antibacterial and osteogenic Cu-doped sol-gel coatings for Ti implant functionalization

Francisco Romero-Gavilán[1]; Carlos Arias-Mainer[1]; Andreia Cerqueira[1]; Iñaki García-Arnáez[2]; Loredana Scalschi[3]; Begonya Vicedo[3]; Mikel Azkargorta[4]; Félix Elortza[4]; Mariló Gurruchaga[2]; Isabel Goñi[2]; Julio Suay[1,*]

[1]*Department of Industrial Systems and Design Engineering, Universitat Jaume I, Castelló de la Plana;* [2]*Department of Polymers and Advanced Materials: Physics, Chemistry and Technology, Universidad del País Vasco, San Sebastián;* [3]*Department of Biology, Biochemistry and Natural Sciences, Universitat Jaume I, Castelló de la Plana;* [4]*Proteomics Platform, CIC Biogune, Derio, Spain*

Background: Cu is a micronutrient with positive effects on bone tissue healing. This element was proved to promote osteogenesis and blood vessels growth, as well as display antimicrobial effects in biomaterials. During implantology surgeries, blood come into contact with dental implants and proteins become adsorbed onto their surface. The composition of the formed protein layer can condition how tissue regeneration occurs, so its study can help to understand the biological-implant interactions.

Aim/Hypothesis: The aim of this study is to develop a Cu doped sol-gel coating to modify Ti dental implants, and characterize its immune, osteogenic, and antibacterial properties. Additionally, the effects of Cu on protein adsorption are evaluated using proteomics.

Material and Methods: The synthesis of the coatings were made using methyltrimethoxysilane (M) and tetraethyl orthosilicate (T) as precursors through the sol-gel route. Increasing amounts of CuCl2 (0.1, 0.5, 1 and 3 %wt) were added to the mixtures to obtain the Cu-doped compositions. The coatings were morphologically and chemically studied by SEM, EDX, FT-IR, NMR and XRD. The coating degradation and the release of Cu2+ were also characterized. The osteogenic potential of these materials was evaluated in vitro with HOb through cytotoxicity, proliferation, mineralization and gene expression measurements. Their inflammatory potential was studied by the measurement of cytokine secretion and gene expression in THP-1. In vitro tests with *E. coli* and *S. aureus* were carried out to evaluate their antibacterial behaviour. For protein adsorption, the coatings were incubated with human serum and the analysis was made using nLC-MS/MS.

Results: Well-adhered and homogeneous coatings were successfully obtained. The chemical characterization demonstrated the presence of Cu in the materials and a controlled release of this ion. The coatings were not cytotoxic. A higher expression of BMP-2, ALP and OCN was measured in HOb for Cu-doped materials. Regarding THP-1 cultures, the expression of INF-δ, TNF-α and IL-1β and the secretion of TNF-α were increased for coatings with higher amount of Cu. A reduction in the viability of *E. coli* and *S. aureus* was found for coatings with 1 and 3%wt $CuCl_2$. Proteomic analysis showed a higher adsorption of proteins associated with the immune system activation, coagulation, angiogenesis and fibrinolysis functions due to Cu.

Conclusion and Clinical Implications: The Cu-doped sol-gel coatings exhibited osteogenic potential, and compositions containing 1% and 3%wt Cu demonstrated antibacterial properties. In addition, coatings with 1 and 3%wt CuCl2 provoked an increase in pro-inflammatory markers related to M1 macrophage polarization. This result was consistent with the detection of a higher adsorption of complement system proteins onto these compositions; pathway that leads to the formation of membrane attack complexes with pathogen clearance functions.

Disclosure of Interest: None Declared.

Keywords: Biomaterial, Dental implants, Peri-implantitis

EAODGI2023-640/PO-BR-041 | SIRT3 mediated osteoporosis by regulating mitochondrial function in temporomandibular joint osteoarthritis

Aomeng Mao; Mengjie Wu*

Stomatology Hospital, School of Stomatology, Zhejiang University, Hangzhou, China

Background: Temporomandibular joint (TMJ) osteoarthritis is a degenerative joint disease that affects the TMJ, causing pain, stiffness, and limited jaw movement. Although the exact mechanisms of TMJ osteoarthritis are not fully understood, it is known that the disease is associated with abnormal bone remodeling and degradation of the extracellular matrix. Sirtuins are a family of histone deacetylases that play an important role in regulating cellular stress response, metabolism, and aging. Sirt3, a member of the sirtuin family, has been shown to regulate bone metabolism and protect against bone loss in several studies. However, the role of Sirt3 in TMJ osteoarthritis has not been investigated.

Aim/Hypothesis: The aim of this study was to investigate the role of SIRT3 in temporomandibular joint osteoarthritis (TMJOA) and evaluate the impact of SIRT3 knockdown in mitochondrial function as well as the micro-structure of sub-chondral bone.

Material and Methods: We established UAC-induced temporomandibular joint osteoarthritis in wild type and $Sirt3^{-/-}$ mice. The mouse genotypes were confirmed by PCR analysis of tail snip DNA. Microstructure of the condyles in $Sirt3^{-/-}$, $Sirt3^{+/-}$ and wild-type (WT) mice was evaluated at the age of 3 months using a high-resolution microCT system. The condylar morphology and bone microstructure were analyzed using ImageJ software.

Results: MicroCT scanning of the condyles revealed that Sirt3 depletion caused changes in condylar morphology. Compared to WT mice, $Sirt3^{-/-}$ and $Sirt3^{+/-}$ mice had significantly lower sagittal diameters ($p < 0.05$) and $Sirt3^{+/-}$ mice had significantly lower coronal diameters ($p < 0.05$). Additionally, bone mineral density, bone volume fraction, and trabecular thickness were significantly higher in $Sirt3^{-/-}$ and $Sirt3^{+/-}$ mice compared to WT mice ($p < 0.05$), while bone surface area and porosity were significantly lower in $Sirt3^{-/-}$ and $Sirt3^{+/-}$ mice compared to WT mice ($p < 0.05$).

We also evaluated downstream regulation of Sirt3 on Sod2, FoxO1 and mitochondrial-related genes. This further confirms that Sirt3 plays a crucial role in regulating synovial mitochondrial function under inflammatory conditions, and identifies the main pathways involved in this process. These findings highlight the significance of Sirt3 in regulating mitochondrial function and inflammation in the synovial tissue.

Conclusion and Clinical Implications: Our study provides evidence that Sirt3 plays an important role in the pathogenesis of TMJ osteoarthritis. Sirt3 depletion leads to changes in condylar morphology and abnormal bone mass and structure. The increased bone mineral density and bone volume fraction observed in $Sirt3^{-/-}$ and $Sirt3^{+/-}$ mice may be caused by increased osteoblast activity or decreased osteoporosis through mitochondrial dysfunction.

I confirm that ethical permits and approvals are in place in accordance with regulations: Yes, I confirm that ethical permits and approvals are in place.

Disclosure of Interest: None Declared.

Keywords: Bone remodeling, Micro-CT

EAODGI2023-677/PO-BR-042 | Experimental peri-implantitis induces neuroinflammation and neurodegeneration: An exploratory study in rats

Emilio Alfredo Cafferata[1,*]; Ausra Ramanauskaite[1]; Astrid Cuypers[1]; Karina Obreja[1]; Eva Dohle[2]; Shahram Ghanaati[2]; Frank Schwarz[1]

[1]Oral Surgery and Implantology; [2]Frankfurt Oral Regenerative Medicine (FORM-Lab), Clinic for Maxillofacial and Plastic Surgery, Goethe University, Frankfurt, Germany

Background: Cumulating results from different clinical studies demonstrate that chronic periodontal tissue inflammation is closely associated with neuroinflammation and neurodegeneration, which lead to cognitive/motor impairment and the onset of neuropathologies. Recently, the use of periodontitis rodent models inducing oral/gut dysbiosis and/or bacteremia, showed neuroinflammatory and neurodegeneratory histopathologic signs, such as the formation of intra- and extracellular Aβ plaques, and α-synuclein misfolding, compatible with the most prevalent neurodegenerative diseases, Alzheimer's and Parkinson's disease. However, there is no evidence yet that associates peri-implantitis (PI) to neuroinflammation and neurodegeneration that could lead to the onset of neurodegenerative pathologies.

Aim/Hypothesis: This study aimed to investigate the possible association between ligature-induced PI and neuropathological changes in the brain in a novel rat model.

Material and Methods: Chronic-type peri-implant lesions were induced at titanium implants placed in the upper jaws of six Wistar rats, after bilateral first molars extraction, by means of repeated lipopolysaccharide injections and ligature placement. Following 12-weeks of disease progression, brain tissue biopsies were retrieved