貼示報告

P01

樹突 - 噬骨前驅細胞 (DDOCp) 在骨質再塑過程的分子信號傳導 (致病) 機轉

Molecular signaling mechanisms of myeloid precursor CD11c+dendritic cell-derived osteoclasts (DDOCp) in bone remodeling

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Objective: Osteoporotic disorders (i.e., periodontitis & arthritis, etc.) are associated with human skeletal illnesses, often lead to physical comorbidities when crippled, by which the RANKL-RANK/OPG triads and non-RANKL-RANK signals mediate critical transducing pathways via TRAF6 or type-II trans-membrane molecules to regulating osteoclastogenesis in osteoclast (OC) & precursors (OCp). ***Methods:*** Via our established protocols, mDCp subsets were co-cultured with murine CD4+T-cells and the microbiomes of interest (i.e., Aggregatibactor actinomycetemcomitans, P. giongivalis, E.coli, or others) in-vitro and in the experimental mice were employed, through which TRAF6-knockout (KO), TGF-βRII-KO and the Cre-lox p-sclerostin conditional knock-in (KI) cassette for various phenotypes were constructed and tested by comparing the subsequent TRAP+-OCp/OC readouts for osteoclastogenesis in-vitro vs. bone loss associated with inflammatory responses or erosion in-vivo (i.e., student t-test & ANOVA analyses). ***Results:*** Our data showed: i) knocking out TGF-βRII signals reduced mDCp development totally abolished its osteoclastogenic functions in-vitro ($p<0.024$); ii) as TRAF6 or/and DC-STAMP was both essential for RANKL-mediated mDCp for osteoclastogensis, additional TGF-β stimulation rescued the signaling defects in mDCp transduced by TRAF6-KO vectors ($p=0.037$; or effector TNF-) vs. Cre-lox conditional KI phenotypes ($p=0.05$); iii) these defective phenotypes were more robustly rescued in the present IL-17- & IL-22-treated co-cultures, as compared to those of TGF-β treatment alone ($p<0.05$); iv) adoptive-transfer of transduced CD11c+-mDDOCp cells resulted in significant effects on arthritic joint swelling and bone erosion upon imaging the recipient mice in-vivo ($p<0.01$), whereas purified Treg cells were equivalently involved in driving osteoclastogenesis for bone remodeling in-vitro. ***Conclusion:*** These novel results are in accordance with central paradigm (Cur. Mol. Med. & Blood, 2009; Periodontology 2000, 2010), suggesting that TGF-β, IL-17/IL-22 vs. effectors (e.g., Treg) together modulate critical transducers onto TRAF6 or non-RANKLRANK pathways in mDCp (OCp) associated with osteoclastogenic phenotypes, depending upon available environmental inter-player(s) at hand.

P02

牙科合金在不同酸度下之電化學特徵

Electrochemical characteristics of dental alloys under different acid solutions

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牙科合金在口腔環境中需要承受複雜的環境變化，如酸鹼度、溫度等，因此，其抗腐蝕性是值得探討的議題。本研究目的為分析臨床上常用的牙科合金在不同酸度下的電化學結果，進而探討其腐蝕特徵。研究材料為貴金屬（高金、低金、鈀銀合金）與基底金屬（鎳鉻合金）共四種，分別在 pH 值 3 到 7 的溶液中，溫度 37℃下進行電化學測試。結果顯示，高金、低金、鈀銀合金與鎳鉻合金在 pH 值 3 到 7 環境下的腐蝕電位，分別 為 -0.106~ -0.048V、 -0.177~-0.029V、 -0.046~ 0.112V 及 -0.378~ -0.15V。貴金屬的腐蝕電位相較於基底金屬的變化小，顯示貴金屬在不同酸度環境下抗腐蝕的特性較好。此外，貴金屬中鈀元素的含量越高，在酸性環境下的抗腐蝕性越好。因此，在複雜的口腔環境下，臨床上可選用貴金屬中的鈀銀合金來製作補綴物。

P03

牙關緊鎖之影像學表現 - 進行性全身性硬化症與鼻咽癌之病例報告

Radiographic manifestations of trismus in nasopharyngeal cancer and progressive sclerosis- 2 cases reports

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曾智皇 [1](Tsen C H)　陳靜怡 [1](Chen J Y)　陳玉昆 [1,2](Chen Y K)
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牙關緊鎖的原因很多，包括口腔內外的發炎、感染、腫瘤、外傷、黏膜下纖維化、神經功能障礙、失智、……等等，所涉及的組織構造以咀嚼功能為主，但有時並不易探查，造成治療不易，甚至預後不佳。本報告回溯分析 2 個牙關緊鎖個案之臨床病史及影像學表徵。第一例為 53 歲女性主訴為假牙評估。她因自幼罹患進行性系統性硬化症，以致黏膜緊繃、口乾與張口受限故而假牙製作困難。影像學檢查發現其下顎骨包含 condyle head, coronoid process 與下顎骨角均嚴重變形。第二例為 41 歲鼻咽癌男性，於放射線治療半年後張口嚴重受限。其電腦斷層與核磁造影之影像檢查發其髁關節頭及關節盤構造正常，但咀嚼肌群間之間隙均已消失。此二例不可逆之張口受限呈現不同的影像學變化，基於治療效果有限，本研究建議應早期以預防性措施介入，或可減輕或減緩其緊鎖程度。

P04

右上後牙區牙齦與硬腭潰瘍性腫塊

Ulcerative mass over right posterior gingiva and hard palate

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上顎牙齦與硬腭的腫瘤由於其解剖位置，因此有許多可能的診斷。其細胞來源可能是鱗狀上皮、唾液腺、齒源性上皮、軟組織、骨頭、血液細胞、遠端轉移等。此病例為一位五十九歲的女性，其有類風濕性關節炎的病史，沒有抽菸、喝酒、吃檳榔的不良習癖。她因為右上後牙區疼痛而前來本院口腔外科求診。臨床檢查發現其右上後牙區無牙崤與硬腭處有一表面潰瘍之腫塊，大小約 3.0 x 2.5 公分，呈現部分紅色潰瘍與一般黏膜的顏色，觸診時可發現有硬節感並有觸痛的情形。頭頸部電腦斷層的檢查可見一軟組織腫瘤侵犯右上牙齦、硬腭與其上方之上顎骨。在病理微觀下，其腫瘤細胞主要由透明性細胞所組成，並侵潤於結締組織中，而覆蓋上方的鱗狀上皮細胞分化程度正常。在口腔內出現由透明性細胞所構成的腫瘤，包括了許多鑑別診斷。例如，唾液腺透明性細胞分化之黏液類上皮癌、透明性上皮細胞癌、齒源透明性上皮細胞癌、鈣化上皮齒源性瘤、遠端轉移的透明性細胞分化之腎細胞癌、肝細胞癌、肺腺癌…等。在免疫組織化學染色中，這些腫瘤細胞對 CK、CK7、CK19、p63 呈現陽性；對 S100、CK20、RCC、PAX8、CD10、TTF-1 呈現陰性。組織染色中也沒有黏液胭脂紅陽性細胞的出現。螢光原位雜交可見腫瘤細胞表現出 EWR1 的基因轉位，因此最終診斷為一罕見唾液腺透明性上皮細胞癌。

P05

口腔 Burkitt 氏淋巴瘤－病例報告
Oral Burkitt's lymphoma: A case report

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淋巴瘤 (lymphoma) 是起源於淋巴組織的惡性腫瘤，分為何杰金氏及非何杰金氏淋巴瘤 (Hodgkin's and Non-Hodgkin's lymphoma)， 其中 Burkitt 氏淋巴瘤 (Burkitt's lymphoma, BL) 為一種高度惡性 (High grade) 的非何杰金氏淋巴瘤，具有生長快速且好發於兒童期等特性。依據臨床表徵及疾病流行學，BL 可區分為三類：地區型 (endemic/African BL)、散發型 (sporadic/non-African BL) 以及免疫缺乏相關 (immunodeficiency associated BL)，除了特定發生於非洲及幾內亞區的 African type 外，另二類在頭頸部並不常見。在組織病理學上以特有的星空型態 (starry sky appearance) 為主要診斷特徵，在治療上則因 BL 對化學療法反應極佳，目前以 intensive, multiagent chemotherapy 為主要治療方法。本案例為一 73 歲女性，因其左側上顎後牙區牙齦腫大至診所求診，經牙周病以及拔牙處置後仍持續腫脹，進而轉診至本院。經臨床診斷並安排病理切片檢查，診斷為 Burkitt 氏淋巴瘤 (Burkitt's lymphoma)，後續會診血液腫瘤內科進行化學治療，迄今預後良好。今提出此一罕見的顎骨 Burkitt's lymphoma 病例，提醒臨床醫師對於口內病灶應提高警覺，以期藉由口內表徵，早期發現內在惡性的可能，及時治療以提升疾病預後。

P06

下顎骨垂直支的矢狀面劈開術的下齒槽神經受損之風險評估：下顎神經管與下顎支外側皮質骨之神經感覺鄰近程度
Evaluation of risk of injury to the inferior alveolar nerve with sagittal split ramus osteotomy: the neurosensory proximity of mandibular canal to cortical bone of ramus

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下顎骨垂直支的矢狀面劈開術 (sagittal split ramus osteotomy) 常被使用於治療顏面發育異常之病患，此術式常見之一術後併發症為神經感覺異常，本研究之目的為利用錐狀射束電腦斷層掃描 (cone-beam computed tomography, CBCT)，來評估本術式對下齒槽神經造成損傷之風險。蒐集十位病患錐狀射束電腦斷層掃描之資料，並評估下顎神經管與下顎支皮質骨之距離。切面起始於下顎神經管孔 (mandibular foramen)，沿著牙弓方向前每 4mm 取一切面，總共取 11 個切面，並標示下顎神經管，測量下顎神經管外側皮質骨至下顎支內側皮質骨之距離，即為骨髓寬度，如果頰側或舌側骨髓寬度測量值為小於 1mm，即被認為是神經感覺高度接近。頰側骨髓寬度最窄處之平均值為 2.4 ± 1.58 mm，其位置落在距離下顎神經管孔 8mm 之內切面，十位病患中有三位 (30%) 顯示出下顎神經管於頰側與下顎支皮質骨有高度接近，所有病患 (100%) 都顯示下顎神經管於舌側與下顎支皮質骨有高度相近。本實驗所得結論為下顎神經管與下顎皮質骨，於頰側皮質骨在下顎支神經感覺高度相近的比例為 30%，於舌側皮質骨則為 100%。因此，施行下顎骨垂直支的矢狀面劈開術前，需要利用術前電腦斷層影像來評估定並降低術後神經感覺異常的發生。

P07

牙周再生手術治療下顎第二大臼齒遠心側牙周骨內缺損之病例報告

Periodontal regeneration surgery in the distal intrabony defect of mandibular second molar - case report

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牙周基本治療後若仍有較深的探測深度與骨內缺損，臨床上常利用牙周再生手術治療。本報告提出一位下顎第二大臼齒遠心側嚴重牙周骨內缺損之病例，經牙周基本治療後，仍有 7 毫米以上的牙周探測深度合併探測出血，故安排牙周再生手術。手術中經翻瓣清創及徹底牙根整平後，發現缺損型態為一個窄而深的三骨壁（3 -wall）骨內缺損，選擇植入牙釉基質衍生物（Enamel matrix derivative, EMD）合併冷凍乾燥骨粉（FDBA）。術後六個月追蹤放射線影像顯示骨密度增加，同時牙周囊袋探測深度降低為 4 毫米，並且無牙周探測出血的情形，治療效果穩定。本報告顯示使用牙釉基質衍生物合併冷凍乾燥骨粉治療牙周骨內缺損，臨床上能得到良好之治療效果。冀望藉由本病例報告，以提升牙周再生手術的可預測性。

P08

慢性牙周炎合併藥物引起牙齦腫大：病例報告

Chronic periodontitis combined with drug induced gingival overgrowth: a case report

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58 歲男性患者，過去病史為心絞痛並接受過心導管治療，自 2017 年 11 月 29 日起開始服用降血壓藥 ADALAT OROS 30mg（學名：Nifedipine) 及兩種抗凝血劑 Plavix 75mg (學名：Clopidogrel) 和 Bokey100mg (學名：aspirin) 每日一劑。2018 年 3 月 29 日到本院牙周病科就診，主訴為全口牙齦腫大持續約兩個月。臨床理學檢查發現患者口內有明顯牙結石堆積，牙齦多處嚴重紅腫發炎及自發性出血，特別是在牙乳頭處有嚴重的腫大現象，整體口腔衛生狀況不佳。初步懷疑病人主訴牙齦腫大與其不良口腔衛生及服用降血壓藥有高度相關，遂即安排全口 X 光片及牙周檢查，口腔衛教並會診其心臟外科醫師關於降血壓藥物的使用，在不影響病人身體狀況的前提下將降血壓藥物改為 DILATREND 6.25mg（學名：Carvedilol）。本病例經由全口非手術性牙周病治療， 藥物的調整及口腔衛生習慣的改善，有效解決患者牙齦腫脹問題。

P09

上顎第一大臼齒牙根切除術 - 病例報告

Root Resection of Maxillary First Molar - A Case Report

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近年來患者對自然牙列保存的欲望提升，使牙科醫師偏向採取更能保留牙齒的治療方式。本病例報告目的是為了保留牙齒與控制牙周發炎所施行的牙根切除術，患者為 50 歲女性，無重大系統性疾病，主訴為右上後牙區牙齦腫痛已有一段時間。右上顎第一大臼齒診斷為重度牙周病，近心頰側牙根處骨缺損尤為嚴重。經過牙周病基本治療後觀察一年，該牙齒回診時仍有大於 5 毫米的囊袋，且牙周囊袋探測會有出血與化膿情形，因此建議將近心頰側的牙根切除。在根管治療完成後安排牙周翻瓣手術並切除近心頰側牙根，術後半年牙周囊袋探測深度與牙齒動搖度已恢復正常，無牙周探測後出血，且觀察到近心頰側區的齒槽骨有增高，此時牙周狀況已呈穩定，轉診至贋復牙科製作牙冠。患者在牙根切除術後每三個月定期回診，經過兩年的追蹤，牙周狀況穩定且擁有正常咬合功能。文獻指出牙根切除術長期的成功率為 62%-100%，對於因牙周病造成大臼齒牙根分叉侵犯與單一牙根牙周嚴重破壞，只要剩餘牙根的牙周支持骨高度仍有五成，搭配良好的根管治療品質與正確設計的牙冠贋復物，並維持高水準的口腔清潔與定期回診，牙根切除術仍然是一種有效保留牙齒的治療方式。

P10

使用全冠髓切除術合併牙根切除術治療左下第一大臼齒二級根叉侵犯：病例報告

Treatment of Grade II furcation Involvement over Left Lower First Molar with Full Pulpotomy and Root Amputation: A Case Report

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牙根切除術是牙周病在治療二級以上根叉侵犯常使用的術式之一。若是在活髓牙上進行此類術式，由於切除牙根後會有牙髓的暴露，早期都是在切除前或是切除後立即進行根管治療。但由於切除牙根的牙齒結構較脆弱，且加上根管治療對於齒質的削減，難免增加此類牙齒的斷裂風險。後續為了降低根管治療對於此類牙齒的影響，開始使用切除牙根後進行逆向冠髓切除術，並配合氫氧化鈣、氧化鋅丁香油酚黏合劑及汞齊填補的活牙根截除術 (vital root amputation)。但這種術式的難度較高，所使用的材料生物相容性亦較差。本案例為一位 54 歲女性，其左下第一大臼齒的舌側及遠心側的牙根分叉皆有二級的根叉侵犯、遠心舌側牙根嚴重垂直骨喪失。該牙齒的牙髓診斷為正常牙髓組織、根尖診斷為正常根尖組織。治療計畫為遠心舌側牙根切除術、並在切除牙根前進行全冠髓切除術並配合三氧礦化物進行覆髓，以減少術式的難度以及術中可能造成的牙髓感染。本病例術後一年半的追蹤未出現任何症狀且未有根尖病灶的產生，僅提出本病例以討論將活髓治療應用在需要牙根切除的活髓牙上的可能性。

P11

齒源性皮膚竇管 : 病例報告

Odontogenic cutaneous sinus tract : a case report

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齒源性皮膚竇管 (odontogenic cutaneous sinus tract) 常由牙髓的感染所引起，初期正確診斷有其難度。本報告將討論齒源性皮膚竇管之成因、臨床表徵、好發部位及診斷與治療方式，並探討各專科間轉診及合作的重要性。本病例為 31 歲男性病患因左下臉頰區域之皮膚出現竇管，經皮膚科藥物塗抹治療，服用系統性抗生素，和手術治療後仍無法痊癒。至牙科求診，診斷為左下第一大臼齒慢性根尖膿瘍，經非手術性根管治療後，皮膚竇管消失，10 個月追蹤顯示根尖病灶接近完全癒合。齒源性皮膚竇管多源自下顎牙齒，但因為缺乏牙齒疼痛與口腔內的症狀，患者起初多前往皮膚科或整形外科就診，延誤牙科治療時間。臨床檢查時，建議以淚管通條 (lacrimal probe) 或牙膠針探測 (gutta-percha point tracing) 溯源，再拍攝 X 光片協助診斷確認。大多數齒源性皮膚竇管在經過非手術性根管治療後，臨床症狀就會消失，在皮膚表面留下粉紅色的疤痕。總結來說，齒源性皮膚竇管若能經各專科合作及時做出正確診斷，可減少病人承受非必要的外科手術或抗生素治療，大部分病例經非手術根管治療後都有良好的預後。

P12

奈米矽片銀聚氨酯複合材料作為牙齒窩隙封劑之研究

Polyurethane composites with silver nanoparticles immobilized on nanoscale silicate platelets as pit and fissure sealants

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本研究製備奈米矽片銀聚氨酯複合材料作為牙科窩隙封劑，以了解此複合材料對致齲菌種轉糖鏈球菌（Streptococcus mutans）的抗菌性。實驗分成三個部分：一、首先針對聚氨酯丙烯酸酯（Urethane acrylate），添加適當比例的稀釋單體（TPGDA）與光起始劑（CQ 和 EDMAB），製備出具有良好流動性與聚合程度的聚氨酯樹脂基質；二、測試冷凍乾燥後的奈米矽片銀，對轉糖鏈球菌的抗菌效果；三、以聚氨酯樹脂基質、矽烷化二氧化矽及奈米矽片銀製備奈米矽片銀聚氨酯複合材料，測試其機械物理性質、生物相容性和抗菌活性。結果顯示 50:50UA/TPGDA 能夠得到臨床上可接受的流動性，而光起始劑 CQ/EDMAB 分別以 1/2 phr 的比例添加至 50:50UA/TPGDA 中，可得到適當的轉化率、聚合深度和交聯程度；而冷凍乾燥後的奈米矽片銀乃具有極佳之抗菌活性，僅需 10ppm 即可對轉糖鏈球菌達完全的抗菌效果；奈米矽片銀聚氨酯複合材料在銀濃度為 300ppm 時，具有臨床上可接受的機械物理性質和良好的生物相容性，且相對於未添加奈米矽片銀的對照組，其菌量減少為 55.82%，達統計上顯著差異。本實驗的數據皆以單因子變異數分析進行檢定，而組間的差異則使用費雪最小顯著差異法進行分析。本實驗製備之奈米矽片銀聚氨酯複合材料具有臨床上可接受的機械物理性質、良好的生物相容性，且對於轉糖鏈球菌具備抗菌性。

P13

東引島社區口腔健康營造 – 口腔健康調查

Oral community health building in Dongyin Island – Oral health survey

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研究目的：台灣之全民健保雖已實施多年，但仍存在著城鄉差異的問題。東引偏處馬祖列島的東北端，也是中華民國最北端的領土，軍人人數約為1600 人，而實際居住民眾約有 800 人。島上沒有牙醫診所，僅有衛生所之設置。健康促進是社區衛生或公共衛生三段五級預防模式中的第一級預防，其目標是為了提升個體與社區的健康狀態，我們認為若能在東引建構一社區口腔健康促進模式，以預防為導向，以社區為目標，以健康促進為核心價值之人力資源網，將能有效消弭偏鄉地區所造成的健康不平等。本計畫為社區營造第一步驟之「社區分析及診斷」。目的是了解東引島民眾之口腔健康狀況、口腔健康知識及態度、及相關口腔健康行為。研究方法：本研究採橫斷式研究設計，針對東引島 20 歲以上民眾進行口腔檢查以得知其口腔健康狀況，並請民眾填寫問卷以得知其口腔衛生習慣、及飲食狀況等，以得知當地之口腔健康情形。預計收案 250~300 人。結果：本計畫已進行完口檢，共計 295 人，串連口檢表及問卷之後，發現受檢者女性佔 46.8%（101 人）、男性佔 53.2%（115 人）；40 歲以下佔 17.1%（36 人）、40 至 60 歲佔 66.2%（139 人）、60 歲以上佔 16.7%（35 人）。此族群之齲齒經驗平均值為 13.51（標準差 7.68），有 39.3%（116 人）口內有未治療齲齒，有 14.6%（43 人）口內有未治療之牙根齲齒。影響居民受檢者口內之 DMFT 值之最重要因素有 (1) 牙齒健康狀態（3.31 顆）；(2) 年齡（2.90~6.84 顆）；(3) 早上起床後是否有刷牙習慣（2.88 顆）；(4) 是否因牙齒問題而限制吃東西的種類（1.13~5.16 顆）；(5) 自覺罹患牙周病的可能性（-1.64 顆）。結論：本族群之齲齒經驗平均值仍偏高，但因為島上只有衛生所能提供牙科醫療服務，普遍性勢必不足，由本研究我們建議可教導民眾如何使用牙線或牙線棒、提升島民的口腔健康意識，以增進自我照護能力。

P14

早期齲齒可能是兒童精神行為缺陷的風險：一個新挑戰

Early childhood caries may be a risk for psychomotor deficit: a new challenge

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Objectives: The impact of early childhood caries (ECC) on psychomotor development remains unclear, from which two cohorts of pre-school children aged 4-to-6-yr via dmft and (co)-variables on growth/development were analyzed to address our hypothesis. ***Methods:*** To reveal any risks of ECC on child's psychomotor development, serial crosssectional analyses were employed by assessing pre-schoolers from urban cities vs. rural townships (lower vs. higher dmft) in Taiwan. The subjects' demographic & dietary records, hygiene charts, summed dmft caries scores and amended comprehensive scales (CCDI/MCDI) of psychomotor development were collected to compute their relationships, where >320 children with guardian's consents and post-power-analyses were involved for the justified recruits. The One-way ANOVA vs. multiple linear-regression analyses, and a Chi-square analysis were individually set off to compare the differences of variables between gender, age & dmft vs. the relationship among all co-variables and CCDI measures to address associated risk(s), respectively. ***Results:*** The results showed that there was clearly a positive relationship among 4-to-6-yr pre-schoolers with higher ECC levels (i.e., dmft $\geq$ 4, 5 etc.), but not with lower (<3) or extremely high (>8) scores, and the subsequent psychomotor development (i.e., language expression, verbal skills & communications), with which oral hygiene alone appeared not any independent risk(s) involved over time. A similar trend for dmft (6.88$\pm$5.17) and CCDI on the psychomotor deficits was comparatively identified in the rural townships with higher caries activities. ***Conclusions:*** Our present findings, when substantiated, will be important to dental and medical professionals, as ECC may give rise onto child's psychomotor development, where we have proposed a new challenging theme on ECC in the growing children, since it not only causes physical loses in the dentitions, but results in the sequelae accompanied by the psychomotor deficits (i.e., personal language- communication to psycho-social interactions, etc).

P15

臺灣地區牙科專科醫師人力之城鄉區域分布調查 - 初步成果

The regional distribution of dental specialist in Taiwan – Preliminary result

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台灣牙醫專科醫師制度行之有年，除了醫療市場導向的需求外，對於口腔醫療品質的提升，該專科之教育訓練等都有其正面的影響。而目前實施中的二年期牙醫師畢業後一般醫學訓練計畫 (牙醫 PGY) 也要求牙醫畢業生在接受兩年的一般牙科以及選修課程的基礎後取得 PGY 資格，再進階接受牙醫專科醫師訓練，為目前較為理想的牙醫專科醫師訓練規劃。根據先前的統計資料指出，牙科各專科醫師人力之分佈以大都會區：台北、台中、台南與高雄等縣市為主，再往其他地區擴展。通常各專科醫師的執業都有自費的醫療項目，因此傾向在都會區經濟狀況較佳人口數較多的地方執業。有部份專科醫師不看健保，僅從事自費的專科項目；有些專科醫師則從事跨科的口腔醫療服務，這些都是會影響專科醫師執業地點的考量。本研究希望可以藉由分析台灣地區牙醫專科醫師之執業區域分布情形，來得出專科醫師執業區域現況，對專科醫師制度提出改善建議。本研究以 2017 年衛生福利部醫事司所登錄之醫事人員資料，串連各專科醫學會之專科醫師資料，得到專科醫師牌照登記地點以及報備支援之地點，以此得出台灣地區專科醫師之所有執業地點。再進行服務地點、服務方式以及服務區域分析。本研究初步成果預計可以得到台灣地區全體牙醫師執業區域分佈情形，以及單一牙醫專科醫師之執業區域分布情形。並以初步成果進行研究方法之修正，進而推測台灣未來專科醫師制度之結構與分佈的調整。

P16

兩階段拔除下顎第三大臼齒以避免下齒槽神經損傷 : 病例報告

Two-staged extraction method for mandibular third molar to avoid neurosensory impairment: a case report

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為了避免拔除下顎第三大臼齒而導致下齒槽神經損傷，透過兩階段拔除下顎第三大臼齒算是一個相當創新的術式。本次病例報告透過臨床實際的操作來驗證透過這種術式是否能避免下齒槽神經損傷。一名 28 歲男性想拔除右側下顎第三大臼齒，經檢查後發現其右側下顎第三大臼齒為水平阻生齒且牙根靠近下齒槽神經，經與病人討論後決定以兩階段方式拔除右側下顎第三大臼齒，於第一次先將牙冠切除後縫合。術後以 X 光片追蹤發現牙根向前萌發遠離下齒槽神經，術後 7 個月將剩餘牙根部分拔除，經追蹤術後預後良好。本次結果顯示透過兩階段拔除下顎第三大臼齒能使牙根遠離下齒槽神經，進而避免因拔除第三大臼齒所導致之下齒槽神經損傷。

P17

深咬病人的義齒重建：病例報告

Rehabilitation of a patient with deep bite：A Case Report

顧長順▲ [1](Ku CS)
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Objective：Anterior palatal pain is often caused by deep bite especially in the case of posterior teeth missing. The aim of this study was to relieve the pain through the design of RPD. ***Methods***：A patient with deep bite was diagnosed. The oral photographic and radiographic manifestations were assessed. ***Results***：Deep bite induced biting pain often dominated the clinical features. The pain was relieved by the placement of an upper RPD with an anterior palatal plate covering both teeth and mucosa. ***Conclusion***：The results suggest that the design of an upper RPD with a palatal plate can protect anterior palate from biting pain.

P18

阻生上顎正中門齒的矯正治療：病例報告

Orthodontic treatment of impacted maxillary central incisor: a case report

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上顎正中門齒阻生的機率雖然僅有0.06%~0.2%，但阻生的上顎門齒會造成很顯著的美觀問題，進而影響一個人的自尊及人際互動，也可能會影響發音和功能咬合。此一病例報告為一個上顎正中門齒阻生的 12 歲男孩，其診斷為骨性一級關係，雙側第一大臼齒安格氏一級咬合，左上正中門牙阻生，及雙側側門牙為釘狀齒。上下顎牙弓狹窄及牙齒輕度擁擠，治療計劃為不拔牙的治療方式，預計使用固定矯正裝置，將阻生齒萌發空間重新創造出來，使用根向後位翻瓣術(Apically positioned flap) 暴露阻生齒，並利用臨近牙齒為錨定將阻生齒牽引出來。經過 39 個月的矯正治療後，我們完成左上上顎正中門齒強制萌出(forced eruption)，緩解牙齒擁擠，並達到可接受的水平覆蓋及垂直覆咬，雙側臼齒關係維持安格氏一級咬合。阻生齒通常可以藉由手術暴露及矯正牽引治療，本病例報告一個常見的上顎阻生門齒處理方式，用這樣的方式治療，我們能達到臨床可以接受的美觀及功能咬合。

P19

富鈣磷表處植牙運用於嚴重骨質疏鬆患者之臨床探討

Calcium-rich phosphate implant treatment in patient with severe osteoporosis

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骨質疏鬆症是否適合植牙手術始終困擾著牙醫師。本篇報告之目的是探討嚴重骨質疏鬆患者植牙治療之可能性，本研究是執行科技部南科臨床試驗計畫 (DX-03-20-35-106) 所收案的一位患者，計畫採用 Anker SB II 富鈣磷植體系統為主之手術。患者於術前評估時，基本資料並無顯示有骨鬆病史，且詢問患者過去病史否認有骨質疏鬆問題，CBCT 檢查發現骨質密度較疏鬆。上顎大臼齒植牙術後立即量測植體穩定度 (Implant Stability Quotients, ISQ) 達 67，但術後一個月軟組織狀況不佳，而術後第二個月回診，要檢測 ISQ 時發現時發現整支植體仍會轉動，故懷疑患者是否有糖尿病或骨質疏鬆症，讓骨整合變差。經臨床檢查後排除糖尿病，然而病人在做完骨質疏鬆檢測後不論脊髓還是左右兩側髖骨 T 值及 Z 值皆小於 -2.5，確診為嚴重骨質疏鬆症。世界衛生組織根據骨質密度水平對於骨質疏鬆症的分級方式 T 值小於 -2.5 判定為嚴重骨質疏鬆症。確認為骨質疏鬆症後，請患者退出 IRB 計畫，但持續替患者治療，並追蹤患者植牙狀況。於術後六個月回診，發現植牙骨整合成功且 ISQ 值也提升到 76，就進行牙冠補綴物製作，後續追蹤 3 個月均未發生問題。本臨床案例顯示以富鈣磷特殊表面處理植體，或許能提供更多的鈣磷媒介增加骨整合之進行使骨質疏鬆患者增加植牙成功率。但本症例也顯示患者對身體狀況有時會提供不正確之資料，導致醫師之誤判。故牙醫師於植牙手術前最好要作完整的檢測報告。將來會以富鈣磷植體運用於骨質疏鬆患者的試驗，以更多的樣本數來確認是否富鈣磷植體能有效的提高骨整合。

P20

以人造骨模擬齒槽骨之 3D 骨質密度與結構之評估

Evaluation of 3D bone density and structure of artificial alveolar bone

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本研究以四種具擬真多孔性質的人造骨，分別為發泡密度 0.12 g/cm3 (Model 1522–09, Pacific Research Laboratories, WA, USA)、 0.16g/cm3 (Model 1522–10, Pacific Research Laboratories)、0.20 g/cm3 (Model 1522–11, Pacific Research Laboratories) 與 0.32 g/cm3 (Model 1522–12, Pacific Research Laboratories) 以牙科用斷層電腦掃瞄儀器與醫學影像分析軟體工具探討其 3D 骨質密度與結構。本研究取得牙科用斷層電腦掃瞄影像 DICOM 檔案，再將其影像帶入醫學影像分析軟體 CtAn (SkyScan, Belgium)，輸入一連串影像之後，篩除沒有掃到人造骨的 DICOM 檔案，並以其中一片 DICOM 影像選定 AOI (Area of Interest)，設定 CT 亮度值之閥值上限與下限之後，進一步輸出其 AOI 區域之鬆質骨 3D 結果一體積密度 (BV/TV) 與骨小樑型態參數，包含：？骨小樑厚度 (Tb.Th)、骨小樑數目 (Tb.N)、骨小樑間隔空間 (Tb.Sp)。研究成果符合趨勢，發泡密度越高的人造骨，其骨體積密度越高，骨小樑厚度降低，骨小樑數目增加，骨小樑間隔空間降低 (發泡密度越高的人造骨，雖然骨小樑厚度降低、但是骨小樑數目增加，使得壓縮了骨小樑與骨小樑之間的空隙，導致骨小樑間隔空間降低)。本次報告的成果顯示，依此實驗的流程所做之對照組數據，其結果的趨勢合理，可以放心與日後實驗組 (口腔內電腦層析掃描原型機之影像分析) 之數據進行比較，且後續實驗組的實驗步驟將再加上與微米級電腦斷層掃描儀器 (Micro-CT) 之影像進行兩兩之比較。本研究的實驗仍在進行中。

P21

思覺失調患者之咀嚼功能與牙科恐懼及口乾症之相關性研究

The association of chewing function with dental fear, and xerostomia in schizophrenia

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Aim: The aim of this study was to compare the dental fear, chewing difficulties, food preferences, swallowing difficulties, xerostomia, and TMD between having chewing function and poor chewing function among the schizophrenia. ***Materials & Methods:*** There were 109 schizophrenia patients in this study. They were divided into two groups, having chewing function (CF) and poor chewing function (PCF) according to the premolars of both sides by two dentists. There were questionnaire about the dental fear, chewing difficulties, food preferences, swallowing difficulties, xerostomia, and TMD. ***Results:*** There were 62 patients (56.88%) in PCF, and 47 patients (43.12%) in CF. There were 22 patients (35.48%) had dental fear in PCF and 10 patients (21.28%) in CF. There were 32 patients (51.61%) had chewing difficulties in PCF and 5 patients (10.64%) in CF. There were 46 patients (74.19%) had food preferences in PCF and 22 patients (46.81%) in CF. There were 17 patients (27.42%) had swallowing difficulties in PCF and 5 patients (10.64%) in CF. There were 25 patients (40.32%) had xerostomia in PCF and 10 patients (21.28%) in CF. There were 5 patients (8.06%) had TMD in PCF and 1 patients (2.13%) in CF. Conclusions: Poor chewing function group had more dental fear. They also preferred soft foods, and had more swallowing difficulties, xerostomia, and TMD. Improving the oral health and maintaining chewing function are very significant for schizophrenia.

P22

乳糖對變形鏈球菌 - 血統鏈球菌形成雙菌生物膜之影響

The effect of lactose on dual-species biofilms formed by Streptococcus mutans and S. sanguinis

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乳品中的乳糖被認為與齲齒形成有關，但對生物膜影響未完全釐清。本研究目的為觀察乳糖對齲齒菌 Streptococcus mutans、其拮抗菌 Streptococcus sanguinis 或兩菌共同形成之生物膜的影響。在大氣條件下培養鏈球菌單菌或雙菌生物膜時，於培養基中添加不同濃度的乳糖或蔗糖。生物膜質量以結晶紫染色測量生物膜的 biomass。統計數據以 ANOVA 比較各組別間差異，顯著水準為 0.05。結果顯示當蔗糖濃度達 1000 μg/ml 時，S. sanguinis 單菌生物膜質量較無糖組增加 10 倍 ($p < 0.05$)；但有乳糖存在時，生物膜質量隨著濃度增加的趨勢較不明顯，且較蔗糖組低。當蔗糖濃度達 125 μg/ml，S. mutan 單菌生物膜質量增加 5 倍 ($p < 0.05$)；但乳糖達 1000 μg/ml 時才讓生物膜質量明顯增加 6 倍 ($p < 0.05$)，且為 1000 μg/ml 蔗糖組的 1/2。雙菌生物膜形成時存在乳糖，生物膜質量亦較蔗糖組低，但乳糖組的雙菌生物膜質量較 S. mutans 單菌低，蔗糖組差異較不顯著。本研究的結果顯示，雖然乳糖或蔗糖皆會幫助兩種鏈球菌單菌或雙菌生物膜形成，但乳糖造成的影響比蔗糖低。

P23

人類牙髓幹細胞在多胜肽薄膜上的成骨分化

Osteogenic differentiation of human dental pulp stem cells on polypeptide multilayer films

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幹細胞的生長和分化會強烈受到環境中基質軟硬程度和材料生物活性的影響。本研究利用聚 -L- 離胺酸 (PLL)/ 聚 -L- 麩胺酸 (PLGA) 層疊交聯的奈米薄膜來培養並觀察牙髓幹細胞的生長和成骨分化。CyQUANT Cell Proliferation Assay 用來量測細胞生長，樣本數為 5，RTqPCR 用來觀察成骨分化的基因表現，如 ALP、OCN 和 OPN，樣本數為 3。比較人類間葉幹細胞在一般市售的培養皿中及在有多胜肽薄膜覆蓋的培養皿中的差異，藉由調整薄膜交聯濃度 (EDC/NHS: 20 mM, 40 mM, 80 mM, 100 mM/ 50mM)，結果顯示當薄膜交聯溶液濃度較高時 (EDC/NHS: 100 mM/50 mM)，能提升多胜肽薄膜的硬度，所以在有多胜肽交聯薄膜的培養皿中，其生長及成骨分化能力均有顯著提升。在生長能力的量測中，比較種植在不同層數 (1- 6 層) 的交聯薄膜上的細胞生長能力，生長在偶數層 (2、4、6 層) 薄膜的牙髓幹細胞生長速率分別為 1.06±0.10, 1.15±0.11, 1.29±0.14 比奇數層 (1、3、5 層) 薄膜的牙髓幹細胞生長速率分別為 1.00±0.10, 0.93±0.10, 0.95±0.07 或培養皿的牙髓幹細胞生長速率 1.00±0.09 佳 ($p < 0.01$, ttest)，其中又以生長在 6 層交聯薄膜上的細胞生長能力 (1.29±0.14) 最為理想，所以後續分化實驗皆以 6 層交聯薄膜為基準。在成骨分化能力測試中，在前期時 (分化 7 天)，骨鈣蛋白 (OCN) 與骨橋蛋白 (OPN) 的表現量達到最大值，其數值分別為 27.89±0.10 及 97.15±1.10，與培養皿之表現量（數值分別為 3.39±0.26 及 0.96±0.03）相比表現分別提升約 10 與 100 倍 ($p < 0.001$, ttest)。而在骨分化後期 (分化約 21 天)，鹼性磷酸酶 (ALP) 的表現量達到最大值，其數值為 2.24×109±270.26，與培養皿之表現量（數值為 1.32×106±330.26）相比表現提升約 1700 倍 ($p < 0.001$, ttest)。多胜肽交聯薄膜容易製備、無毒、具有生物相容性與生物可降解性，是很有潛力的生醫材料，對未來治療或修復骨組織將產生益處。

P24

具獨特分層多孔表面之鈦牙科植體特徵

Characterizations of the titanium dental implant with a unique hierarchical porous surface

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The aim of the study was to elucidate the properties of a unique hierarchical micro/nano porous (HMNP) surface on the titanium (Ti) dental implant fabricated through an optimal micro-arc oxidation (OMAO) process. In this study, the topography, wettability, stress transfer and bone healing properties of the Ti dental implant with the HMNP surface were characterized using scanning electron microscopy, dripping and immersion method, finite element analysis (FEA) and in vivo animal test, respectively. Analytical results indicated that a hierarchical micro (Φ 1.4 ± 0.6 μm) and nano (Φ 93.3 ± 5.8 nm) porous texture was formed on the surface of the Ti dental implant after an OMAO process. The HMNP surface also exhibited an excellent wettability and compatibility on blood interaction. Moreover, a smooth stress transfer feature can be found at the interface between the HMNP surface and cortical bone tissue according to the FEA results. After 12 weeks of healing periods, the Ti dental implant with the HMNP surface group (88.1 ± 3.5%,*$P < 0.05$) presented significantly higher bone to implant contact ratio than the of untreated Ti dental implant group (71.8 ± 4.8%). The HMNP surface played a vital role in the early stages of bone healing. Thus, these findings demonstrate that the Ti dental implant with the HMNP surface is a potential implant material for dental and biomedical applications.

P25

牙種植體骨水平評估，隨訪 3 年

Marginal bone level evaluation using platform switching or platform matching in sandblasted, large grit and acid etched dental implants: 3-year follow up study.

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Platform-switching technique has proven successfully to maintain bone level stable in several studies, but its effect needs to be interpreted carefully. The aim of the present clinical study was to observe mesial and distal marginal bone level remodeling around sandblasted with large grit and acid etched (S.L.A.) platform-switched (PS) vs platformmatched (PM) dental implants up to 36 months after restoration. Forty-seven patients received 60 implants. Digital periapical radiographs were recorded before loading (baseline), immediately after loading, 1, 3, 6, 12 and 36 months after loading. The implant/abutment interface to crestal bone and first bone to implant contact, were considered as the reference point for measuring horizontal and vertical marginal bone level. At the end of the evaluation, all 60 implants were successfully osseointegrated, with mean vertical marginal bone loss reduction (VMBL) in PS and PM groups of 0.96 ± 1.28mm and 0.30 ± 1.15mm respectively ($P < 0.05$). The mean horizontal marginal bone loss (HMBL) from the baseline to 36 months in PS and PM groups were 0.48 ± 1.01mm. and 0.37 ±0.77mm respectively, with no statistically significant difference. With the limitations of the present study, PS in this S.L.A dental implants, seemed to be more effective for better mesial and distal implant VMBL and HMBL reduction than PM after 3 years. Further studies with longer periods of time and measurements of other parameters are needed.

P26

探討 RUNX3 對於口腔鱗狀上皮細胞癌之影響

To investigate the role of RUNX3 in oral squamous cell carcinoma

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世界常見癌症中，口腔癌排名第十五位，在台灣口腔癌則在國人癌症死因排名第五，由此可見，口腔癌在台灣是一個相當重要的研究議題。口腔癌雖淺顯易見，病人的存活率並沒有因此提升。在此想要找到一個能夠早期偵測到口腔癌的分子標記物。TGF-β 訊號傳遞途徑會影響口腔癌的生成與轉移，而 RUNX3 在其中扮演著重要的角色，然而 RUNX3 於口腔癌中所扮演角色尚未明確，本篇研究想探討 RUNX3 在口腔癌中所扮演的角色。首先利用 siRNA 降低 SCC25 細胞株中 RUNX3 表現量，觀察 SCC25 細胞株的增生、遷移、侵襲及細胞凋亡能力。接著透過免疫組織染色及網路上的數據分析進一步了解 RUNX3 於口腔癌中的臨床意義。結果顯示，當降低 RUNX3 表現量後，會促進細胞增生、遷移及侵襲能力，同時也會抑制細胞凋亡。透過免疫組織染色實驗發現 RUNX3 大多都表現於正常細胞及血管細胞當中，從 The Human Protein Atlas 的數據也發現，在頭頸癌中 RUNX3 表現量越高則病人存活率也越好，綜合以上結果得知 RUNX3 在口腔癌中可能是扮演抑癌基因 (Tumor suppressor gene) 的角色。先前研究發現，在許多癌症中的 RUNX3 基因常不表現，其原因大多都是受到 DNA 甲基化的調控。透過 MSP 分析發現，在七株口腔癌細胞當中，YD38、SAS 這兩株細胞確實是有高甲基化現象的發生，添加 5-aza-dC 將 DNA 去甲基化之後確實也回復 RUNX3 表現量。本篇研究結果推測抑制 RUNX3 表現可能會促進口腔癌細胞的生長，具有抑癌基因的發展潛能，當中也發現 DNA 甲基化也可能調控 RUNX3 表現量，未來會進一步朝這個方向更深入去探討其中的機制。

P27

β-TCP 骨骼表徵後 Glow Discharge Plasma Surface sputtering. 體外研究

β-Tricalcium Phosphate Bone Substitute characterization after Glow Discharge Plasma Surface sputtering. In vitro study

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β-tricalcium phosphate (β-TCP) have proven in vitro, in vivo and in clinical studies its biocompatibility, bioactivity and osteoconductivity as a scaffold for new bone regeneration. Argon plasma sputtering is a widely used procedure and could be used for β-TCP surface impurities removal. The present work deals with β-TCP surface sputtering by Argon plasma, while enhancing its biocompatibility, physical, chemical properties, and without surface modification, by removing surface impurities. β-TCP particles were treated for 15 min with Argon Glow Discharge Plasma with power: 80 W; frequency: 13.56 MHz; and pressure: 100 mTorr. The treated β-TCP characterization was done by doing scanning electron microscopy (SEM), Energy Dispersive Spectrometry (EDS), X-ray Photoelectron Spectroscopy (XPS), X-ray Diffraction Analyses (XRD), Cell Viability Assay (MTT), Cell Morphology Analyses, and Alkaline Phosphatase Assay (ALP). Results indicated a slight enhancement in β-TCP by Argon GDP sputtering, with a higher Ca/P 2.05 ratio than control, MTT improved at all days ($P < 0.05$), ALP was better in all days (only day 3, $P < 0.05$). XPS and SEM indicated no modification in the surface of the treated β-TCP while impurities were removed. As conclusions Argon GDP sputtering can be considered for removing impurities from β-TCP surfaces, and at the same time improve its biocompatibility by increasing the Ca/P ratio, cells proliferation and differentiation, without altering its surface roughness.

P28

人工牙根植體以不同角度鎖入人造假骨之初期穩定度比較

Angulation and measurement direction of dental implant affect primary stability

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本研究探討不鎖入角度對人工牙根植體初期穩定度影響。選用 Nobel Biocare 公司所製造的牙科植體，根據臨床研究回顧以及廠商之指導原則，以垂直、17 度以及 30 度鎖入 Sawbone 公司所生產的人造假骨，並以四個方向 (近心側、遠心側、頰側、舌側) 測量其 Periotest value (PTV)。統計分析不同量測方向 (近心側、遠心側、頰側、舌側) 與不同鎖入角度 (0, 17, 30 degrees) 是否會對植體的 PTV 造成影響，以及不同鎖入角度 (0, 17, 30 度) 是否會對植體的 PTV 造成影響。研究結果顯示，垂直植體在所有方向間都不具有統計差異 ($P>0.05$)，17 度鎖入植體則是近心側、遠心側和頰舌側平均值兩兩比較都具有顯著差異 ($P<0.05$)，而 30 度鎖入植體則是近心側和遠心側比較具有統計差異 ($P<0.05$)，頰舌側平均值與近遠心側之間都不具有統計差異 ($P>0.05$)。至於不同角度間的比較，在 distal 方向顯示傾斜 17 度 (-4.06±0.55) 比垂直 (-5.84±0.358) 和傾斜 30 度 (5.18±0.239) 來得大 ($P<0.05$)，傾斜 30 度 (-5.18±0.239) 則與垂直鎖入 (-5.84±0.358) 沒有統計差異 ($P>0.05$)。研究結論為在鎖入傾斜植體時，人工牙根植體的 PTV 會受到不同方向量測所影響，且 17 度鎖入牙科植體可能較不穩定。

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緻密骨與人工牙根之三維接觸面積對人工牙根周邊骨質流失之影響——牙科電腦斷層影像分析與骨高度量測

Effects of cortical bone to implant 3D contact area in peri-implant bone loss analysis of dental computed tomography and measurement of bone height

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研究人工牙根與緻密骨的三維接觸面積對於人工牙根周邊骨質流失的關聯，探究此一結果與人工牙根的穩定度和存活率之相關性。透過患者的牙科用電腦斷層 (Dental CT) 影像，利用醫療影像軟體，計算緻密骨與人工牙根之間的 3D 接觸面積，並透過同一個患者的根尖 X 光片，去計算 (一) 剛植入人工牙根、(二) 骨整合後裝上贋復物、(三) 咬合受力一年內，這三個階段，人工牙根周邊骨質的流失量，並對 3D BICA (3D bone to implant contact area) 與骨質流失量進行分析，去探究兩者之關聯。此研究目前的資料量尚不足夠，只有四位病患的資料可用，造成 BICA 對於骨質流失的影響之趨勢，十分不明顯，現階段只能針對此研究所分組之因素，例如年齡、性別、植體尺寸、植牙牙位等等進行個案與個案之間的比較，本研究初步可看出此些因素皆會影響 BICA 或骨質流失率量測之結果。本研究最大之貢獻為已證明本研究之材料與方法是可行的。BIC (bone to implant contact) 一直都是影響人工牙根之穩定度的因素。本研究利用非壞性的量測方式，並期望 BIC 進化至三維的程度，使得 3D BIC 可成為術前評估的指標。期望未來累積更多資料後能夠更為確信的證明出 BICA 與骨質流失狀況有強烈的關聯性，並期望達成最終目標，給予牙醫師在未來評估病患植牙狀況時的標準。

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以結締組織及牙釉質蛋白衍生物進行大臼齒二級頰側根間分叉侵犯之牙周再生手術：病例系列報告

CTG and EMD for periodontal regeneration in molar with furcation involvement

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傳統使用導引組織再生術 (guided tissue regeneration) 合併再生膜來治療二級根間分叉侵犯，其臨床效果可預測性較低。研究指出牙釉質蛋白衍生物 (enamel matrix derivative) 能達到更高根間分岔侵犯閉合的比例，並有較少的術後牙齦萎縮量。另外，結締組織移植 (connective tissue graft) 應用在牙周翻瓣手術能增加牙齦厚度並降低皮瓣裂開的機會。本篇為合併使用結締組織及牙釉質蛋白衍生物於治療臼齒區頰側根尖分岔侵犯的病例報告。案例裡包含兩位病人 (52 歲女性、31 歲女性)，案例一因右上顎第一大臼齒牙齦腫痛、化膿就診，經過非手術性牙周治療後症狀獲得改善，但仍有頰側第二級根間分岔侵犯及七毫米深的牙周囊袋。安排在局部麻醉下進行牙周翻瓣手術，清除牙結石及肉芽組織後，於根間分岔處置入牙釉質蛋白衍生物並覆蓋自右上顎側取得的結締組織，初級縫合傷口。術後癒合良好，十一個月後患部牙周探測深度降至四毫米，牙齦萎縮量不變且角化牙齦寬度從 3 毫米增加為 4 毫米。案例二因右下顎第一大臼齒在接受非手術性牙周治療後仍有頰側第二級根間分岔侵犯及五毫米深的牙周囊袋。經由上述的手術步驟並在頰側骨內缺損區域放置自體移植骨。術後九個月患部牙周探測深度降至四毫米，牙齦萎縮量從 2 毫米降至 1 毫米且角化牙齦寬度從 3 毫米增加為 4 毫米。本案例顯示於頰側二級根間分岔的牙周再生手術中，使用牙釉質蛋白衍生物合併結締組織移植，追蹤九至十一個月後，可得到牙周附連組織增加及降低根尖分岔侵犯的程度。未來值得進行病歷系列或隨機分派研究。

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利用引導組織再生術治療骨內缺損－病例報告

Treatment of Intrabony Defect with Guided Tissue Regeneration – A Case Report

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嚴重的齒槽骨缺損對臨床牙周病醫師而言是一項挑戰，臨床上常使用的牙周再生手術來治療骨缺損。此病例報告目的為利用引導組織再生術來恢復因牙周病所喪失的牙周組織。患者為一名 50 歲的女性患者，無任何系統性疾病，主訴為牙齦時常腫痛已有一段時間，牙周檢查後診斷為廣泛性慢性中度牙周炎，經過牙周基本治療後，下顎右側第一小臼齒遠心端仍有 6 至 8 毫米的殘存牙周囊袋，X 光片顯示遠心處有一角化骨缺損 (angular defect) 建議接受牙周翻瓣手術治療合併引導組織再生術來治療角化骨缺損，手術中完成清創與牙根整平後，發現遠心處的骨缺損為 1~2-wall 的骨缺損 (上半部為 1-wall 的缺損，下半部為 2-wall 的缺損)，骨缺損深度約為 5 毫米，在骨缺損處放入冷凍乾燥異體移植骨 (FDBA –Freeze Dried Bone Allograft) 及膠原蛋白可吸收再生膜 (Bio-Gide®)，患者經過兩年半的追蹤，牙周再生情形良好。系統性文獻回顧結果顯示引導組織再生術比牙周翻瓣手術 (open flap debridement) 可以降低較多牙周囊袋、獲得較多的牙周附連及較少的牙齦萎縮。因此，引導組織再生術有助於恢復被破壞的牙周支持組織，解決嚴重的骨內缺損，且經過長時間追蹤是穩定的。

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窩洞設計對於陶瓷嵌體及複合樹脂填補之生物力學分析

Biomechanical analysis of cavity design on ceramic inlay and composite resin restored class II cavity: 3D finite element analysis

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由於臨床對美觀之需求，陶瓷嵌體與複合樹脂被廣泛使用，然而常見失敗原因為補綴物脫落或牙齒的斷裂。目的 : 本研究之目的是探討窩洞設計對於陶瓷嵌體及複合樹脂填補之生物力學分析，以 3D 有限元素分析二級窩洞之牙齦壁底部有無固持設計之應力分析。材料與方法 : 本研究以 3D 有限元素分析二級窩洞之牙齦壁底部有無固持設計之應力分析。我們使用微米級電腦斷層掃描人類上顎小臼齒，再重建其 3D 模型。窩洞設計為兩組近心咬合面第二級窩洞，其中一組之窩洞設計為在牙齦壁底部具有兩個固持設計，另一組則無。我們分析 3D 有限元素之牙齒模型模擬受力 (400N) 時之應力分佈。固持設計與否將影響應力分佈情形與陶瓷材料或複合樹脂在齒內產生的壓力與口內的持久性。結果 : 陶瓷嵌體組別之應力分析結果顯示，有固持設計，其牙齦壁底部之中央應力約為 15.6±1.3MPa，低於無固持設計組的 17.2±1.9MPa，具統計學上顯著差異 ($p<0.05$)，而固持之設計與否對於頰側與顎側之應力皆無統計學上之差異 ($p>0.05$)。在複合樹脂組別，窩洞底部中央、頰側、顎側分析結果表示，有固持設計可降低應力集中，但並無顯著差異，而顎側應力高於中央應力達 25%，較可能引發顎側斷裂。結論 : 本研究結果顯示具固持設計有降低牙齦壁底部應力集中現象，臨床應用上具有降低牙齒斷裂的潛在功能，在陶瓷嵌體上表現更為顯著。

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以複合樹脂重建全口嚴重磨耗齒列之病例報告

Full mouth rehabilitation of worn dentition by composite resin - A case report

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牙齒嚴重磨耗不僅會影響病人的美觀，甚至有可能造成牙齒敏感、牙髓病變、咀嚼效率下降等功能問題。而隨著當代材料之進步，牙科黏著劑及複合樹脂於謹慎操作下已有良好的長期表現。本病例為一 33 歲女性，主訴這幾年來牙齒變短，希望能回復牙齒美觀。由於牙釉質發育不全且長期胃食道逆流和夜間磨牙造成全口嚴重磨耗，並造成多顆上顎前牙之牙髓壞死已接受根管治療。經診斷蠟模型評估並與患者充分溝通，控制造成磨耗之病因後，印模於口外製作出上下顎後牙複合樹脂修復體，於橡皮帳隔濕下口內進行黏著；接著進行上顎前牙玻璃纖維根柱放置，及上下顎前牙直接複合樹脂填補，並持續追蹤 6 個月。本篇病例以複合樹脂重建咬合高度，保守性治療全口嚴重磨耗之齒列，以恢復患者之美觀及功能，目前仍須更多長期追蹤案例，且樹脂材料之選擇、操作過程及咬合型態亦會影響其成功率及使用壽命。

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安格式第二級第二分類矯正治療：病例報告

Orthodontic treatment of Class II Division 2 malocclusion: a case report

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安格式第二級第二分類咬合異常常見的特徵為往內傾倒的上顎門齒，較深的垂直覆蓋，明顯的下巴以及相對後縮的嘴唇，在台灣的發生率約為 1%。此一病例報告為 13 歲女性患者，其診斷為骨性二級關係，安格式第二級第二分類異常咬合，合併有右上釘狀側門齒，左側側門齒缺失，左上側乳齒滯留，左下第二小臼齒部分萌發以及下顎右側門齒缺失，上下牙齒擁擠，前牙深咬及有較大的水平覆蓋。治療計畫為拔除右上釘狀側門齒，左上滯留乳齒，使用固定式矯正器治療，用上顎雙顎犬齒取代側門齒， 下顎創造空間使左下第二小臼齒強迫萌出。經過 33 個月的矯正治療後，我們將上顎中門齒原本後傾角度調整正常，緩解牙齒擁擠，上顎雙側犬齒取代側門齒並關閉拔牙空間， 達到可接受的水平覆蓋及垂直覆咬，雙側臼齒關係維持安格式第二級咬合。本病例報告為上顎拔牙治療，對於改正前牙後傾的難度會提高，我們利用矯正線前牙區三級彎曲，及輕拉力的彈力鍊來關閉拔牙空間。此外，因為犬齒取代側門齒以及下顎只有三顆中門齒，我們利用 Bolton ratio 的計算來修磨上顎牙齒，使最後治療完時前牙區能達到臨床可以接受的水平及垂直覆蓋，並改善咬合功能與美觀。

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使用早期輕量顎間橡皮筋以及咬合墊開快速改善前牙錯咬：病例報告

Early Light Short Elastic and Cement Bite Block for Anterior Cross Bite Correction: A Case Report

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前牙錯咬的患者通常是安格氏第三類異常咬合，常會合併骨性三級異常、下顎前凸以及凹型側面輪廓。如果三級異常咬合且有功能性偏移的患者，通常會傾向選擇較保守的掩飾型矯正治療而非正顎手術。本病例報告是個 15 歲的男孩，骨性三級異常、正常臉型開展度、安格氏第三類異常咬合合併前牙錯咬及深咬，除此之外還有功能性偏移。在使用早期輕量顎間橡皮筋合併咬合墊開，在開始治療兩個月即把錯咬改正，臉部外觀也得到改善，之後繼續打平史畢氏曲線，目前治療 12 個月已進入最後精細調整階段。大臼齒挺出會造成下顎骨順時針旋轉，同時也能讓凹型側面輪廓改善，但是也會使得下臉部變長。所以若要對三級異常咬合的患者進行掩飾型矯正治療，治療前宜審慎診斷及評估。

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利用自然牙齒和塑膠牙齒評估牙科用電腦斷層尺寸準確度

Evaluation of Dimensional Accuracy of Dental Computed Tomography for Natural and Plastic Teeth

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牙科醫師都期望能夠透過立體和準確性高的電腦斷層影像清楚瞭解患者口內狀況，因此目前臨床上牙科用電腦斷層設備可以用來當作植牙治療前診斷、牙齒斷裂與否、牙齒周圍齒槽骨狀況和填補材料與牙髓神經距離的輔助利器，藉以降低醫療風險和提高醫療品質。然而電腦斷層影像會因為機型、電流、電壓、拍攝物體位置和牙科用填補材料因素使得影像上量測的距離有不同程度的影響。本研究利用在 10 顆自然牙齒 (上顎大臼齒) 和 10 顆塑膠牙齒 (上顎第一大臼齒) 上的 A 處 (牙齒的近心) 和 B 處 (牙齒的遠心) 製造 3*3*3mm 窩洞的樣本，各分成 2 組，分別以樹脂 (Prodigy^{TM} Kerr) 或銀粉填補窩洞。5 顆牙齒排列於影像不互相干擾的位置 (光源至樣本中心距離 487.48- 516.24mm)，以牙科用電腦斷層設備 (Alioth 系列 , 型號 AZ 3000 CT, I Mode) 拍攝樣本。使用專門讀取 Dicom 檔案的 Horos 軟體對影像檔進行數值的量測。調整影像的亮度 (WL) 與對比度 (WW) 可以減少散射影響成像邊緣的判斷，經測試後設定可以有清楚的邊緣用以當作尺規起點與終點 (膠牙的亮度 -151；對比度 140、真牙的亮度 2598；對比度 809、樹脂的亮度 2799；對比度 998、銀粉的亮度 2400；對比度 900)。研究結果為 (1) 自然牙齒 - 填補樹脂前的影像值和牙齒上實際值的差異：A 處 - 0.58-2.92 %，B 處 -1.44-4.41%；填補樹脂前後影像值的差異：A 處 - 12.05-18.06 %，B 處 - 7.94-15.71 %。 (2) 自然牙齒 - 填補銀粉的影像值和牙齒上實際值的差異：A 處 - 0.41-2.41 %，B 處 - 0.26-1.75 %；填補銀粉前後影像值的差異 A 處 - 6.64-17.08 %，B 處 -10.33-19.28 %。(3) 塑膠牙齒 - 填補樹脂前的影像值和牙齒上實際值的差異：A 處 - 0.54-2.88 %，B 處 - 0.20-0.91%；填補樹脂前後影像值的差異 A 處 - 5.18-14.58 %，B 處 - 6.66-17.54 %。(4) 塑膠牙齒 - 填補銀粉前的影像值和牙齒上實際值的差異：A 處 -0.23-1.57 %，B 處 - 0.13-1.05 %；填補銀粉前後影像值的差異 A 處 - 6.49-24.11 %，B 處 - 6.94-17.90%。填補材料前的影像值和牙齒上實際值的差異結果發現無論是自然牙齒或是塑膠牙齒都是在 B 處的樣本有較高比例出現最大差異值；填補材料前後影像分析值的誤差是自然牙齒 - 樹脂填補 B 處的樣本有較高比例出現最大差異值，塑膠牙齒 - 樹脂填補 A 處的樣本有較高比例出現最小差異值。電腦斷層影像中，牙齒和填補材料的邊緣會因為拍攝物體位置、物體材質和填補材料的差異有不同程度不是很銳利的分界，造成邊界判斷的差異。由本研究的結果顯示樹脂填補材料可能會對電腦斷層影像產生較大的影響，使影像中的填補物較實際大。因此研發新創醫材藉由類似拍攝牙科根尖片 (periapicalfilm) 的拍攝方式，並以物體為旋轉中心的概念進行拍攝數張影像後進行 3D 重建，應能使患者接受更低的輻射劑量和牙齒及其周圍組織更高的精準度，對於提升臨床醫師診斷的精確性助益極大。

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口內 2.5D 根尖機系統研發

Development of a 2.5D Periapical Radiography System

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數位根尖片廣泛用於臨床牙科，因為數位根尖片影像能提供很多資訊，技術與設備簡單且便宜，所以被廣泛用於臨床牙科中。 然而根尖片的主要缺點是，由於其拍攝方式的關係，以至於將三維影像的資訊壓縮成一張二維影像，造成許多牙齒或骨頭影像資訊流失，而降低了其應用性。本研究目前開發一口內 2.5D 數位根尖機系統的原型機，此一原型機可提供了準三維影像 (2.5D)，也就是可以得到數個不同深度切面的二維影像。原型機主要架構為電動旋轉盤 (DG130R-AZAAD-3, ORIENTAL MOTOR, , Taipei, TAIWAN)、X 光　管 (PDM90P, Spellman, Hauppauge, NY, USA) 與口內數位感測片 (RVG6200-SIZE1, Carestream Dental, Stuttgart, Germany)，並配合結構硬體支架，組成了一台 2.5D 數位根尖拍攝系統的原型機，利用人類上顎右側第三大臼齒做為拍攝樣本，將此樣本架設於原型機上進行拍攝，拍攝角度範圍為正負 60 度，光管旋轉間格一度拍攝一張 2 維影像，共有 121 張影像，接著利用電腦層析 (computed tomosynthesis) 法進行三維影像重建，以得到數個不同深度的二維切面影像，重建後影像的解析度為 36um。此外，同一樣本也利用市售高階微米級電腦斷層掃描機 (mirco-computed tomography) (SKYSCAN2211) 拍攝，並以電腦斷層掃描背投影法進行影像重建，重建後影像解析度同樣是 36 um。最後再比對相同的樣本情況下，本原型機與市售微米級電腦斷層掃描機所重建的影像其差異性。本原型機在初步體外測試已指出有其應用性，未來將此系統進行更完整臨床考量與系統操控，期望能實際應用於臨床牙科診療中。

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應用跨理論行為改變模式探討牙周病患者牙齒鄰接面清潔行為及其相關因素

Interproximal Cleaning Behaviors and Related Factors in Patients with Periodontal Disease: Apply for Transtheoretical Model

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Background: Periodontal disease is considered one of the most common diseases in the population and, if left untreated, can lead to tooth loss. Regular interdental cleaning is associated with lower levels of bacterial plaque, dental calculus, and gingivitis. ***Objective:*** This study examined the applicability of the Transtheoretical Model (TTM) to understanding interproximal cleaning behavior in patients with periodontal disease. ***Method:*** A cross-sectional study was conducted. Overall, 206 patients with periodontal disease in the Dental Department of Kaohsiung Medical University in Taiwan were recruited. Patients with disability and routine use of bisphosphonates were excluded. The independent variable was stage of interproximal cleaning behavior change. The dependent variables analyzed were cleaning efficacy expectations, decisional balance (i.e., pros and cons), and the processes of change. We used a face-to-face interview to collect the information by a structured questionnaire. Fifty-two percent of patients were interproximal cleaning irregularly (precontemplation, contemplation, or preparation stages), whereas 23% were in the action stage (regularly active <6 months) and 25% were in the maintenances stage (regularly active <6 months). The multivariate regression model analyzed the stage of interproximal cleaning behavior change associated with dependent variables. ***Result:*** Compared to irregularly stage, patients in action stage and maintenances stage were significantly associated with cons (β =-4.09 and -5.45) of decisional balance, self-efficacy (β =6.48 and 7.15), experiential processes (β =3.50 and 5.42) and behavioral processes (β =3.00 and 3.43). ***Conclusion:*** Regularly active interproximal cleaning behavior was associated with efficacy expectations, decisional balance, and the processes of change. Results support the use of the entire TTM in examining interproximal cleaning behavior in patients with periodontal disease.

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社區高齡者之口腔健康狀況、身體功能與生活品質之關聯性

Variables associated with oral health status, physical function and quality of life in community-dwelling older adults

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Physical function and oral health status influence quality of life in older individuals. A lack of occlusal support result in impaired masticatory function and increased duration of swallowing are recognized as physiological changes due to aging. The purpose of this study is to investigate whether oral health, oral hygiene and oral function are associated with frailty, sarcopenia and cognition status in community-dwelling older Taiwanese adults. Furthermore, find out which oral factors as predictors of physical changes. This cross-sectional survey recruited 151 adults aged ≥ 65 years old. Dental examination (i.e. charting, plaque index and tongue coating) was implemented by a dentist. Information concerning oral and denture care behaviors, body function, xerostomia index, swallowing function, mastication function, and Geriatric Oral Health Assessment Index (GOHAI) were collected via a face-to-face interview questionnaire. Moreover, 30 seconds the repetitive saliva swallowing test (RSST), 10 seconds oral diadochokinesis, chewing performance using color-changeable chewing gum and five consecutive times rising from a chair were recorded by the interviewer. The prevalence of pre-frailty was 17.2%. About 17.2% participants had fewer than 20 teeth and 15.2% had swallowing problem. The mean GOHAI scores was 50.97±5.48. The worse the oral health status are, the more dissatisfaction of life the elderly are. Therefore, we suggest that prevent the oral health problems at young age and increase the health function in later life.

P40

In vitro evaluation of the calcium phosphate precipitation method for the treatment of dentin hypersensitivity

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Objective: Dentin hypersensitivity is common symptom in periodontal patients after periodontal treatment. In this study, calcium phosphate precipitation

(CPP) method combined with polypeptide was employed to induce antibacterial effects and dentin tubule occlusion. ***Methods:*** CPP solution from dicalcium phosphate dehydrate (DCPD) and four concentrations of polypeptide solutions (0.125%, 0.25%, 0.5%, 1%) were prepared. Dentin discs were prepared from recently extracted human third molars. Dentin discs were incubated with Porphyromonas gingivalis (ATCC 33277) bacterial suspension (ca. 105 bacteria) containing Brain Heart Infusion media supplemented with 0.1g/ml Vitamin K, 0.5mg/ml hemin, 0.4g/ml L-cysteine in anaerobic jars (37 ℃) for 7 days to allow for biofilm formation. Biofilm-infected and not-infected dentin specimens were randomly divided into five groups: DCPD+0.125%PP, DCPD+0.25%PP, DCPD+0.5%PP, DCPD+1%PP, negative control (untreated). On each dentin specimen, DCPD solution was applied for followed by polypeptide solution with microbrush. Then, the dentin specimens were immersed in artificial saliva for 72 before proceeding to SEM analysis. The mixture of DCPD and polypeptide solutions were analyzed by X-ray diffractometer (XRD). ***Results:*** DCPD+0.25% and DCPD+0.5%PP showed complete bacterial inhibition and dentin tubule occlusion. The longitudinal analysis in dentin discs reveal deep occlusion of tubules with hydroxyapatite-like crystal growth after 72 hours. ***Conclusion:*** The findings demonstrate that CPP and polypeptide combined method have good potential for serving as both antibacterial and carrier in the repair of dental hard tissue.

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Knockdown of MTA2 Suppresses Metastasis of Human Oral Cancer Cells

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Objectives: Metastasis tumor-associated protein-2 (MTA2), a central element in Mi-2/NuRD complex localized in the nucleus, which function is both nucleosome remodelling and histone deacetylase activities. In recent years, another function was explored that MTA2 regulate the ability of cell proliferation and metastasis in several kinds of cancer. However, the function of MTA2 in oral squamous cell carcinoma(OSCC) is unclear. This study aims to explore the role of MTA2 in oral cancer. ***Methods:*** Cell viability of HSC-3 and OECM-1 silenced with MTA2 shRNA system was measured by MTT assay in 24 and 48 hrs. The ability of invasion and migration was investigated by use of Boyden chamber. The expression of mRNA and protein after silenced by MTA2 shRNA system was investigated by real-time PCR and western blot. ***Results:*** First, clinical results showed that the expression of MTA2 progressively increased in different grade of oral cancer. Similarly, the expression of MTA2 in OSCC cell lines HSC-3 and OECM-1 was further enhanced compared with the normal oral cell line HOK in western blot. The results suggested that MTA2 might be an oncogene in OSCC. Therefore, we used the system of shRNA-Induced silence to explore the role of MTA2 in OSCC. MTT assay results showed that knockdown of MTA2 didn't affect cell viability. Invasion and migration ability were strongly suppressed by silence of MTA2 in Boyden chamber assay, suggested that MTA2 might be an important role in OSCC cell line. ***Conclusions:*** These results demonstrate that shRNA-Induced silencing of MTA2 effectively suppressed the migratory/ invasive abilities in oral squamous cell carcinoma.

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3D-printed Ti6Al4V scaffold with chitosan/magnesium-calcium silicate for hard tissue regeneration

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Objectives: Additive manufacturing techniques are getting more established as reliable methods for fabricating 3d porous metal scaffold. The porous Ti6Al4V scaffolds fabricated by means of selective laser melting (SLM) that controllable geometrical features and preferable mechanical properties. In this study, we fabricated the chitosan/magnesium-calcium silicate (Chi/Mg-CS) coated porous Ti scaffold to promote the osseointegration capacity that compared with pure Ti scaffold. ***Methods:*** The pre-alloyed Ti-6Al-4V powders (Ti64ELI) were purchased from Renishaw, England. The composition of the Ti-6Al-4V powder is specified by ASTM F136 to make sure the end product exhibits good corrosion resistance, good biocompatibility, low density, and excellent ductility if the process environment is under well controlled. In addition, the chitosan was dissolved chitosan in acetic acid and stirring at room temperature overnight. The acidulated magnesium-calcium silicate powder was dissolved in chitosan solution for 1 day. Then the composite scaffolds were transferred into a freezer at -80 ℃ for 12 h. First, we have used the compressive strength measurement to obtain the mechanical strength and stability of scaffolds. In addition, we also examined the behavior of human mesenchymal stem cells (hMSCs) cultured with Chi/Mg-CS coated Ti scaffold. ***Results:*** Our data indicated the mechanical properties and structure interconnectivity of the Ti6Al4V scaffolds were not affected with the Chi/Mg-CS coating. Moreover, the cell culture experiments proved that the adhesion, proliferation, and differentiation of on the Chi/Mg-CS-coated Ti6Al4V scaffolds were promoted as compared with those on the Chi-coated Ti6Al4V and pure Ti6Al4V scaffolds. In addition, the Si ion release from Chi/Mg-CS-coated Ti6Al4V scaffolds could stimulate the osteogenic-related protein (alkaline phosphatase, osteocalcin, bone morphogenetic protein-2) expression. ***Conclusions:*** Our results demonstrated that the Chi/Mg-CS coating could be an effective approach to achieving promoted surface bio-functionalization for 3d-printed Ti6Al4V scaffolds. These findings were considered to be developed for future metal biomaterials of the use of Ti6Al4V for additively manufactured porous implants.

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Physicochemical and biological expressions of biodegradable 3D-printed apatite/calcium sulfate scaffolds

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Objectives: Tissue engineering strategies have been tackled in leveraging 3D printing technology for engineered bone over past few years. There were several studies indicated that bioscaffolds composed of polymers and inorganic materials through 3D printing process provided substantially osteogenic activity and cellular benefits. Among the variety of biocompatible polymers, polycaprolactone (PCL) have been approved for clinical use without toxicity when fed to metabolic pathways and the low melting point makes it a high performance printable biomaterial in a lab environment. However, the flaws of PCL still lack in its suitable biodegradability and hydrophilicity behavior. Bioceramics based on apatite and calcium sulfate materials were drawn much attention owing to their high biological activity, which has excellent osteogenic differentiation both in vitro and in vivo. To check its effectiveness, a series of calcium sulfate/apatite with different ratios were prepared to make new bioactive and biodegradable bioscaffold for bone repair. ***Methods:*** This study proposed a facile route for fabricating the ideal porous 3D scaffolds with tailored degradability and osteogenic activity by introducing apatite-calcium sulfate into PCL. The diametral tensile strength and weight loss of composites were considered before and after immersion in simulated body fluid. We also considered the behavior of human mesenchymal stem cells (hMSCs) cultured on apatite-calcium sulfate/PCL bioscaffolds. ***Results:*** As the results, the in vitro degradation experiments shown that the weight of apatitecalcium sulfate/PCL scaffolds lost 52% after three months. In addition, the data indicated that the addition of apatite-calcium sulfate significantly improved the wettability on the surface of PCL. This also directly further promotes cell behaviors. Moreover, the apatite-calcium sulfate/PCL scaffolds offered higher levels of osteogenic-related gene expression of Wharton's Jelly mesenchymal stem cells. ***Conclusions:*** These results suggest that the apatite-calcium sulfate/PCL composites may have a potential application for bone regeneration.

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Risk of pneumonia in patients with burn injury: a population-based cohort study

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Background: Burns are the main cause of accidental injury, and pneumonia is a common respiratory disease in humans. ***Aim:*** The purpose of this study was to investigate the relationship between burn injury and pneumonia. ***Patients and methods:*** A nationwide population-based cohort study was conducted using data from the National Health Insurance Research Database in Taiwan. We identified and enrolled 2,893 subjects with burn injury, who were individually matched to 2,893 subjects in the comparison group by using the propensity score. Furthermore, we used a self-controlled case-series design to estimate the temporal association between burn injury and pneumonia. ***Results:*** Exposure to burn injury revealed a higher risk of pneumonia than that to non-burn injury within 1 year. The Cox proportional hazards model revealed that, compared with the non-burn injury, burn injury yielded a 2.39-fold (95% CI=1.44–3.96) increase in risk of pneumonia. The exposure period of burn injury within 30 days showed 2.76-fold increase in risk of pneumonia (95% CI=1.44–3.96) compared with that in the baseline period. ***Conclusion:*** Burn injury was associated with a significant increased risk of pneumonia, especially occurring within 30 days..

P45

Tension Stimulation Drives Periodontal Ligament Tissue Formation in Bio-printed Scaffold

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Objectives: Tension force is known to stimulate periodontal ligament tissue differentiation. However, the mechanism has not been clearly investigated. In this study, with 3D bioprinted scaffolds and multi-cell culture, we can better mimic the in-vivo microenvironments than previous studies. ***Methods:*** First, we synthesize GelMA and determine the best cultural parameter of PDL cells. Then we exert tension stimulation of strain from 5%~20% and frequency from 0.5~2 Hz to PDL cells to investigate the influence of different tension forces on the differentiation of periodontal tissue. ***Results:*** Our data proved that tension force can translate PDL cells to generate Mesenchymal cells. The tension stimulation that results in nearly seven-fold enhanced in tensile properties over unstimulated hydrogel, may allow the engineering of mechanically robust biological replacements of nature tissue. ***Conclusions:*** With multi-culture of PDL cells and HUVECs, and 3D bio-printed scaffold, our study can better mimic the in-vivo microenvironments of periodontal tissue than previous studies, and thus have a better look on the mechanism of the differentiation of PDL cells into bone cell.

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Erupted Vertically-Growth Mesiodens: a Report of Two Cases

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A mesiodens is the most frequent type of supernumerary tooth located in the midline of the maxilla between central incisors and its overall prevalence is between 0.15% and 1.9%. The aim of this paper is to present two cases of young male patients with erupted, vertically-growth mesiodentes and to investigate the treatment schedule.

Category: Oral Medicine and Pathology

P47

Toxic Mechanisms of ZnO Particles and Nanoparticles on MG-63 Osteoblasts

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Objectives: ZnO eugenol-based materials are used for temporary restoration of caries cavity, apical retrofilling and root canal sealer. However their effects on apical bone healing await investigation. The toxic mechanisms of ZnO particles and nanoparticles to MG-63 osteoblastic cells were studied. Methods: Morphology of various ZnO particles was observed by Scanning electron microscope (SEM). MG-63 cells were exposed to ZnO particles (ZnO205532), nanoparticles (ZnO677450) and two commercial ZnO products (Roth, Canals) with/ without pretreatment and co-incubation by inhibitors or antioxidants. Cell viability, cell cycle alteration, reactive oxygen species (ROS) production were measured by MTT assay, and flow cytometry, respectively. Protein expression was analyzed by western blotting or immunofluorescent staining. Results: SEM observation confirmed the different morphology and size of various particles. ZnO particles showed cytotoxicity at concentrations of 25-200 μg/ml. ZnO nanoparticles showed stronger cytotoxicity, followed by ZnO205532. Roth and Canals are less toxic. Exposure to ZnO particles induced ROS production and cellular apoptosis. ZnO activated the γ-H2FAX, ATM, ATR, Chk1, Chk2, Akt, ERK and p38 phosphorylation. The protein expression of cdc2, cyclin B1 and cdc25C were decreased, whereas Hemeoxygenase-1 (HO-1) and GADD45 were stimulated. ZnO further stimulated endoplasmic reticulum (ER) stress, by increasing of Grp78, p-IRE1α and XBP1 expression. ZnO particles cytotoxicity to MG-63 cells was prevented by EDTA (a chelator of Zn ion), N-acetylcysteine, LY294002 (PI3K/Akt inhibitor). U0126 (MEK/ERK inhibitor), SB203580 (p38 inhibitor), Zn-protoporphyrin (HO-1 inhibitor) and STF083010 (IRE1 inhibitor) showed little prevention. Conclusions: These results indicate that ZnO nanoparticles are more toxic to osteoblasts. ZnO particles'toxicity is related to Zn entry into cells, oxidative stress, DNA damage, checkpoint kinases, and ER stress responses as well as PI3K/Akt, ERK and p38 signaling, relating to cell cycle arrest and apoptosis. These results are useful for future materials' development and promote apical healing.

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Effects of erbium-doped yttrium aluminium garnet laser on lipopolysaccharides of Porphyromonas gingivalis over titanium discs : an in vitro study

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Backgrounds: Studies have reported a high prevalence of peri-implantitis with radiographic marginal bone loss. Evidence to date indicates that no available treatments result in total resolution of established peri-implantitis. The aim of this study was to mimic the biofilm contamination on titanium discs, and evaluate the anti-microbial effect of erbium-doped yttrium aluminium garnet (Er:YAG) laser irradiation on *Porphyromonas gingivalis* (*P. gingivalis*) and lipopolysaccharides (LPS). ***Materials and Methods:*** Grade IV titanium discs were incubated with a suspension of P. gingivalis (ATCC® 33277™) in brain heart infusion (BHI) broth. Six groups (n=6) with a total of 36 titanium discs were prepared. Group 1 was the negative control. Group 2 to 6, titanium discs were incubated with P. gingivalis biofilm. Group 3, curette was used to debride the biofilm. Group 4, 0.12 % Chlorhexidine was used for irrigation. Group 5, Er:YAG laser irradiation was performed at pulse energy 60 mJ and frequency 20 pulse per second to debride the biofilm. Group 6, Er:YAG laser irradiation was followed by curette debridement. After various treatments, the topography of the titanium discs was observed by scanning electron microscope, and the quantitation of LPS was performed by lymulus amoebocyte lysate (LAL) test. ***Results:*** Laser treatment of the titanium discs did not result in visible microscope alterations. Chlorhexidine irrigation couldn't remove bacteria or LPS efficiently. The residual bacteria and LPS was significantly lowest in the group with Er:YAG laser irradiation and curette debridement. ***Conclusion:*** Mechanical debridement is crucial to remove the biofilm. Er:YAG laser would be a promising adjuvant therapy to treat peri-implantitis by removal of LPS without altering titanium surface. Further studies are required to evaluate the potential of osteoblast or fibroblast adhesion after Er:YAG laser treatment.

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Network meta-analysis for antimicrobials treatment comparison on residual periodontal pockets

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Periodontal research - therapy

Objectives: To assess the effect of adjunctive antimicrobial agents in the treatment of residual pockets in the maintenance phase of chronic periodontitis. ***Methods:*** A network meta-analysis of randomized controlled clinical trials comparing efficacy of adjunctive local antimicrobial agents in adults with residual pockets in periodontal maintenance care was performed. Electronic databases (MEDLINE, EMBASE, and CENTRAL) were searched systematically up to October, 2017. Primary outcomes were changes in probing pocket depth and clinical attachment level from baseline to follow-up visits of different time points. We did random-effects network meta-analysis to obtain estimates for outcomes and presented these estimates as weighted mean differences with 95% confidence intervals. Comparative effects of all antimicrobial agents were ranked and expressed by surface under the cumulative ranking probabilities. ***Results:*** A total of 22 studies were included in the network meta-analysis. In the short-term follow-up, adjunctive use of tetracycline fiber, chlorhexidine chip, and photodynamic therapy showed statistically significant results than scaling and root planing alone. In the medium-term follow-up, significantly better results can be obtained using adjunctive tetracycline fiber and chlorhexidine chip in probing depth reduction. Besides, adjunctive use of doxycycline gel and chlorhexidine chip would achieve significantly better results in clinical attachment level gain. No adjunctive antimicrobial agents showed significant advantage in the long-term follow-up. All the
differences between each adjunctive treatments in all time points we investigated were relatively small with wide confidence intervals. ***Conclusion:*** Adjunctive local antimicrobial agents performed better than scaling and root planing alone, and the additional benefits can be maintained for up to six months. The most consistent advantages were obtained with the use of tetracycline fiber and chlorhexidine chip.

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A study on autotransplantated third molar with complete root formation

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Objectives: The objective of this retrospective study is to investigate the clinical outcomes and possible prognostic factors for autotransplantated third molars with complete root formation. Either impacted or non-impacted third molars were included as donor teeth. ***Methods:*** A total of 94 autotransplanted third molars with at least 6 months follow-up post-operatively were investigated. The clinical examination records and radiographic images were evaluated in detail. Cases radiographically showed complete bone healing and clinically noted without symptom and signs were identified as success. ***Results:*** A total of 39 male (41.5%) and 55 female (58.5%) patients aged 20-62 years were included. Most patients distributed between 20 and 39 years old in age (72.34%). The number of impacted donor third molars (48.9%) was similar to non-impacted ones (51.1%). Most impacted donors were mandibular third molars (82.6%). The overall success rate was 57.5%. Sex, age, root shape of donor tooth, impaction classification of donor tooth, recipient tooth position, and recipient tooth diagnosis were without statistical significant influence on success rate ($P > .05$). It also showed no significant difference between success group (21.13 ± 17.34 days) and non-success group (27.30 ± 28.93days) in the initiation time of their post-operative endodontic approach. ***Conclusions:*** Autotransplantation of impacted donor third molars with complete root formation exhibited similar success rate to that of non-impacted third molar teeth. Endodontic treatments initiated more than 14 days post-operativelly seems not to affect the success rate.

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Epithelial Expression of Claudin-1 and Vimentin by Areca Immunomodulatorty Effects

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Objectives: Areca nut chewing is a major cause of oral squamous cell carcinoma (OSCC) in Taiwan. Epithelialmesenchymal transition (EMT) is achieved by down-regulation of epithelial proteins like E-cadherin and claudin-1 and increased expression of mesenchymal proteins such as vimentin and α-smooth muscle actin (α-SMA). The study aims to investigate the immunomodulatory effects of ANE with/without other oral risk factors like nicotine (NT) and lipopolysaccharides (LPS) on the EMT of epithelial cells. ***Methods:*** The study was approved by the Institutional Review Board of Taipei Veterans General Hospital. The oral tissue samples were retrieved from patients undergoing routine oral surgery with informed consent. The expression of EMT markers in tissues was examined using immunohistochemistry. Purified PBMC obtained from healthy volunteers were treated with 40 μg/ml ANE, 1μg/ml of LPS and/or 100 μg/ml of NT for 20 hours. The supernatants of PBMC were collected as conditioned media (CM). Oral epithelial cells were treated with CM or oral risk factors for 24 hours, the expression of vimentin and claudin-1 was investigated using western blot analysis or immunofluorescence staining. Cytokine production in supernatants of PBMC was detected using enzyme-linked immunosorbent assay. ***Results:*** Histopathologic sections revealed that the expression of claudin-1, vimentin and α-SMA, but not E-cadherin, in oral cancer tissues was higher than in adjacent normal tissues. In epithelial experiments, ANE, LPS and/or NT increased the production of vimentin, but showed no significant effects on claudin-1. However, nearly all CM of risk factors-treated PBMC increased the expression of claudin-1 and vimentin, especially apparent in the ANE-containing groups. Moreover, the secretion of TNF-α and IFN-γ by PBMC was increased by ANE, but not LPS/NT. ***Conclusions:*** Besides the direct effects, the altered immune cell function by risk factors, especially areca nut, might play a role in the EMT and collective invasion during areca-related oral carcinogenesis.

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Role of Link N in modulating arthritis in temporomandibular joints

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Objectives: This study aims to elucidatethe role of Link N in regulating human mesenchymal stem cells (hMSCs) under interleukin (IL)-1 β stimulation in vitro and in modulating inflammation of temporomandibular joint (TMJ) in vivo. ***Methods:*** In vitro analysis for hMSCs treated with Link N, IL-1β and costimulation of Link N and IL-1β for 24/96 hours was performed. The cytokine levels and epithelial mesenchymal transition (EMT) gene expression were quantitatively examined using Luminex multiplex assays and real-time RT-PCR, respectively. To determine the impact of Link N in ameliorating TMJ tissue homeostasis in arthritis condition, histological changes in rat arthritis TMJ induced by complete Freund's adjuvant (CFA) followed by an application of Link N was examined. ***Results:*** Increasing IL-6, IP-10 and RANTES was detected in response to IL-1β treatment as the levels significantly drop in costimulation group. In contrast, the anti-inflammatory cytokines and chondrogenesis regulators increased in the costimulation group compared to IL-1β group. Furthermore, it was also found that ERBB3 and NODAL genes were greatly expressed in the costimulation group compared with IL-1β group. Histological analysis for rat condyles showed significant recovery in the Link N treated group compared with the CFA-induced arthritis group.
Conclusions: Taken together, our findings indicated that Link N treatment could modulate inflammation and EMT related gene expression showing beneficial impact for chondrogenic differentiation in vitro. Link N could also repair arthritis-mediated TMJ disruption in vivo suggesting Link N could be a potential therapeutic agent for patients with TMJ disorder.

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Regulatory Role of Mitochondrial Transcriptional Factor A (TFAM) in Head and Neck Carcinogenesis

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Objective: Metabolic reprogramming is one of the hallmarks of cancers. While it was well accepted that mitochondrial function is defective in cancer, the role of mitochondrial cues in controlling tumuorigenesis remained to be explored. Mitochondrial transcriptional factor A (TFAM) is a key factor to regulate transcription and replication of mitochondrial DNA (mtDNA) that encodes most subunits of electron transportation chain (ETC). The significance of TFAM in modulating carcinogenesis, however, is controversial as previous studies indicated that TFAM could be oncogenic in breast cancer, bladder cancer and colorectal cancer but act as a tumor suppressor in melanoma. Current study therefore aimed to delineate TFAM mediated regulations in head and neck cancers (HNCs). ***Method:*** The TFAM expression and ETC molecules in clinic HNC tissues were initially examined. In vitro analysis for cell growth, cell motility, chemotherapeutic resistance, metabolic and molecular changes in HNC cells as well as *in vivo* xenografic tumour growth in response to TFAM deficiency was analysed. ***Results:*** It was found that TFAM as well as mtDNA copy number are downregulated in human HNC tissues compared with their normal counterparts whereas rare TFAM mutations were detected in HNC patients by using cBioPortal cancer genomic database. Further analysis found that shRNA mediated TFAM knockdown resulted in decreased mtDNA copy number in accompany with an enhanced cell proliferation; an upregulated cell motility as well as a greater resistance to chemotherapeutic agent cisplatin, 5-fluorouracil and paclitaxel. Moreover, TFAM knockdown facilitated glucose uptake probably via an increased glycolytic genes and triggered oncogenic ERK1/2 and Akt-mTORC-S6 signaling axis in HNC cells suggesting an active tumourigenic metabolic and molecular modulations in response to TFAM loss. Interestinly, *in vivo* analysis further showed a greater xenografic tumour growth in TFAM deficient HNC cells. Conclusion: Collectively, our data supported a tumor suppressor role of TFAM in HNCs.

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Cyclosporin-A Activated Latent TGF-β through Reactive Oxygen Species in Gingival Epithelial Cells

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Objectives: Transforming growth factor β (TGF-β) is a key regulator associated with pathogenesis of gingival overgrowth. Cyclosporin-A (CsA) has been shown to induce gingival overgrowth through TGF-β signaling pathway. However, the mechanisms of CsA-induced latent TGF-β1 activation is still unknown. The aim of this study were to investigate the mechanisms of CsA activates latent TGF-β1 and the role of reactive oxygen species (ROS) in CsA-induced TGF-β1 activation in human gingival epithelium (hGE) cells.***Methods:*** Effects of CsA on epithelial-to mesenchymal transition (EMT), Smad3 phosphorylation and activated-TGF-β1 levels in two hGE cells (OECM-1 and CA9-22) were assessed by Western blot analysis and enzyme-linked immunosorbent assay.***Results:*** The expression of E-cadherin decreased and slug increased after 48 hours treatment with CsA in OECM-1 and CA9-22 cells. CsA induced Smad3 phosphorylation by TGF-β1 activation in OECM-1 and CA9-22 cells. Pretreatment with N-acetyl-cystenine (reactive oxygen species (ROS) inhibitor), Diphenylene iodonium (NOX inhibitor), Plumbagin (NOX4 inhibitor), Apocynine (NOX2 inhibitor), curcumin, EGCG, lovastatin in OECM-1 and CA9-22 cells significantly inhibited CsA-induced TGF-β1 activation. Moreover, curcumin dose-dependently inhibited CsA-induced latent TGF-β1 activation in OECM-1 and CA9-22 cells. ***Conclusions:*** CsA induced latent TGF-β1 activation via NOX2 and NOX4-derived ROS generation in hGE cells. Curcumin significantly inhibited CsA-induced latent TGF-β1 activation in hGE cells and could be a potential therapy of gingival overgrowth.

P55

In vitro Evaluation of the Bactericidal Effect and Fibroblast Attachment on Contaminated Rough Titanium Surfaces Treated with Er: YAG Laser

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Objectives: Studies have reported a high prevalence of peri-implantitis with radiographic marginal bone loss. Evidence to date indicates that no available treatments result in total resolution of established peri-implantitis. The aim of this study was to investigate the bactericidal effect and fibroblast attachment on contaminated titanium surface treated with erbium-doped yttrium aluminium garnet (Er:YAG) laser. ***Methods:*** Grade IV titanium discs were incubated with a suspension of *P. gingivalis* (ATCC® 33277™) in brain heart infusion (BHI) broth. Six groups (n=6) with a total of 36 titanium discs were prepared. Group 1 was the negative control. Group 2 to 6, titanium discs were incubated with *P. gingivalis* biofilm. Group 3, 0.12 % Chlorhexidine was used for irrigation. Group 4, curette was used for debridement. Group 5, Er:YAG laser irradiation was performed at pulse energy 80 mJ and frequency 25 pulse per second for debridement. Group 6, Curette debridement was followed by Er:YAG laser irradiation. After various treatments, surface roughness (Ra) and hydrophilicity were measured. The residual bacterial was examined by biomass quantification, scanning electron microscope and confocal laser scanning microscope. Then, the adhesion of fibroblast cell was quantified by fluorescent microscope. ***Results:*** Chlorhexidine irrigation or curette debridement alone couldn't remove bacteria efficiently. Although Er:YAG Laser combined with curette debridement was the most effective therapy in removing bacterial remnants, the adhesion of fibroblast was not as high with clean titanium discs. ***Conclusions:*** Er:YAG laser would be a promising adjuvant therapy to treat peri-implantitis by removing bacterial remnants without altering titanium surface. Further studies are required to evaluate the potential of osteoblast adhesion after Er:YAG laser treatment.

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Distribution of Tooth Loss in Periodontally Compromised Patients in Taiwanese Population: A Retrospective Cross-sectional Study

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Objectives: To investigate the distribution of tooth loss in periodontally compromised patients in Taiwanese population. ***Methods:*** 119 patients who have been diagnosed with generalized chronic periodontitis were recruited from Dental clinic of National Taiwan University Hospital from 2014-2015. All the patients received full-mouth periodontal examination including the number of residual teeth by a well-trained periodontist. All participants provided written informed consent, and all protocols were approved by the Ethical Committee of National Taiwan University Hospital. The number, frequency and distribution of tooth loss was recorded. Moreover, the factors those might affect tooth loss was also investigated. ***Results:*** The distribution of tooth loss showed no significant difference in gender and different age groups (P = 0.731, P=0.321, respectively). Tooth 36 seemed to be the highest frequent site with tooth loss, followed by tooth 27, tooth 37 and tooth 46. When considered by paired tooth position, lower first molar (tooth 36 and 46) seemed to be the most frequent positions with tooth loss, followed by upper second molar (tooth 17 and 27), lower second molar (tooth 37 and 47), and upper first molar (tooth 16 and 26). ***Conclusions:*** The frequency or distribution of tooth loss may be associated with several factors, including the access to oral hygiene care, crown and root morphology and early erupted teeth.

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Associations of Tooth Sites with Degrees of Periodontal destruction in Taiwanese Population: A Cross-sectional Study

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Objective: To investigate the associations of the periodontally compromised tooth or sites with the severity of periodontal destruction in Taiwanese population. ***Methods:*** 119 patients who have been diagnosed with generalized chronic periodontitis were recruited from Dental Clinic of National Taiwan University Hospital from 2014-2015. All the patients received full-mouth periodontal examination including probing depth, recession, clinical attachment level and residual teeth by one well-trained periodontist. All participants provided written informed consent, and all protocols were approved by the Ethical Committee of National Taiwan University Hospital. The specific tooth position or sites those were associated with more periodontal destruction were investigated. ***Results:*** The results show that upper and lower posterior teeth with significantly more sites with probing depth > 5mm, compared with those in anterior teeth ($P < 0.001$). Moreover, posterior lingual sites showed the significantly higher frequency with probing depth > 5mm than those in posterior buccal side ($P < 0.001$). ***Conclusions:*** Periodontal destruction was more prominent in posterior teeth, especially at posterior lingual sites. This may mainly relate to the difficulty of access for oral hygiene care in those area.

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Adjunctive 660 nm Light-Emitting Diodes Irradiation During the Non-Surgical Periodontal Therapy: A Split-Mouth Cross over Clinical Trail

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Objectives: To confirm the additional clinical outcome of adjunctive 660 nm irradiation during the non-surgical periodontal therapy. ***Methods:*** Patients with at least one periodontitis-involved tooth in either three quadrants were recruited, and three protocols of LED light irradiation, including LED01 sites received LED light irradiation from initial clinical assessment (T0) until the completion of scaling and root planning (T1), LED02 sites received LED light irradiation from T1 until the date of re-evaluation (T2), and control sites received no LED light irradiation, were randomly assigned to each quadrant during the non-surgical periodontal therapy. Clinical parameters were assessed at T0 and T2, and biomarkers, including IL-1b and MMP-8, from gingival crevicular fluid were assessed at T0, T1, and T2. ***Results:*** 19 of 21 participants completed the full treatment course. All examined sites revealed reduced probing pocket depth (PD), clinical attachment level (CAL), gingival index (GI), and plaque index (PI) with increased gingival recession (REC) at T2. LED01 and LED02 sites showed slightly greater PD reduction and CAL gain than the control sites. In LED02 sites, decreasing of MMP-8 was more prominent at T1 and T2, and the decrease of IL-1b was slightly greater in T1 when compared to the control sites. ***Conclusions:*** LED light irradiation assisted the recovery of periodontium and can be used as an adjunctive treatment for non-surgical periodontal therapy.

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The lip bumper application in various patients

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1. Introduction
The lip bumper can correct lip biting habit. This report describes how this appliance can be used on normal or special needs patient.
2. Case Description
The first case is a 9-year old boy with Angle class II malocclusion, anterior teeth crowding, and proclination of upper incisors. He was diagnosed with lower lip biting habit. The treatment plane was to apply 2X4 fixed appliance combined with a lower lip bumper. After four months, the habit was eliminated, lower incisors uprighted and irregularity index decreased.
The second case is an 11-year old with cerebral palsy. He was suffered from bruxism and hypersalivation. He was treated with soft bite plate for years but invalid. Lower lip ulceration was the result of unconscious lip biting. The lower dentition was severe linclined lingually. Under general anesthesia, the patient were treated with lower lip bumper. After three months followed, the lower lip wound was healed.
3. Discussion
Bad oral habits such as lower lip biting can cause malocclusion or trauma. Blocking of such habit can improve occlusion and increase life quality. In normal patient, Lip biting needs to be corrected as early as possible. However, this treatment philosophy should also be thought and applied to special needs patients too. After wearing lip bumper, we found the quality of living of those with special needs improved greatly. Which also ease the burden of their guardian or parents.
4. Conclusion/clinical significance
Lip bumper is suitable to any kind of patients who suffered from bad lip biting habit.

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Cellular effects from metal brackets after immersion in beverages

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Objective: Metal bracket can be release some metal ions in different solutions. The purpose of this study was to investigate the cellular effects of the elutes from conventional and self-ligating (SL) metal brackets after immersion in beverages in vitro. ***Materials and Methods:*** There were conventional metal bracket (CB) and SL metal brackets (SLBs) used in the present experiment. The beverages used were black tea, lemon tea and cola. After the metal brackets were immersed for one day, seven days and sixty days, bracket surface morphology was assessed by scanning electron microscopy and energy-dispersive X ray analysis. The metal ions in the eluate were detected by inductively coupled plasma-mass spectrometry. A bone marrow mesenchymal stem cell (BMSC) line was added to the eluate to detect cell viability and genotoxicity. ***Results:*** The results revealed pit corrosion on the surfaces of the CB and SL brackets. The Damon Q showed higher Ni and Cr ion release than the OPK or T1 brackets in all beverages. The T1 showed higher Fe ion release in black tea and cola. BMSC viability decreased in all groups by the 4th day of culture. The lowest cell viability was the Damon Q in lemon tea group ($p<0.05$). The sub-G1 content of the BMSC culture increased in the black tea and lemon tea conditions ($p<0.05$) indicating genotoxicity. ***Conclusion:*** Apoptosis was the mechanism of BMSC cell death in all experiment groups. The CB and SLBs can corrode and release metal ions, which may cause unwanted side effects to cells.

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Stabilizing Dentin Collagen with Dopamine Treatment

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Objectives: Collagen degradation remains a major challenge to dentin adhesion. Polyphenolic collagen cross-linkers can enhance the biostability and mechanical strength of dentin collagen according to previous studies. The objective of this study was to explore the effects of dopamine, a phenolic compound with catechol functional group, on dentin collagen stabilization. ***Methods:*** Human dentin specimens were treated with dopamine HCl (10-1/-2/-3 M, pH = 8.5) for 24 hours while those treated with Tris buffer or 5% glutaraldehyde for 30 minutes were served as negative or positive controls. All specimens were rinsed for 3 times after treatments then immersed in de-ionized water for 24 hours to remove unbound agents. Afterwards, the specimens were analyzed with ATR-FTIR to confirm the absorption of dopamine onto surface-demineralized dentin. Regarding the effect of dopamine treatment on biostability of dentin collagen matrix, cross-section SEM images of the demineralized dentin surface were captured after challenged by collagenase from Clostridium histolyticum (1 mg/ml in HEPES buffer with 0.36 mM CaCl2). Furthermore, biodegradation of fully-demineralized dentin slabs was measured as the percentage of weight loss after collagenase (100 ug/ml) degradation for 48 hours. ***Results:*** The ATR-FTIR spectra revealed the absorption of dopamine onto dentin matrix as the increase in the absorbance at 1500 & 1600 cm-1 (aromatic C=C stretching) after treatment with 10-1~10-2 M dopamine. SEM images showed that all dopamine treatments could help the demineralized dentin matrix to maintain their integrity upon collagenase challenge. The results of biodegradation assay suggested dopamine treatment could dose-dependently reduce the collagenase-induced degradation of dentin collagen compared with the negative control. ***Conclusions:*** The study discloses the effects of dopamine on dentin collagen stabilization. These findings bring a deeper insight into the mechanism and critical factors affecting collagen stabilization with great potential in the future dentin bonding system development.