口頭論文報告

R01

以電腦動態導航系統輔助手術切除右側下顎直枝之角質化囊腫
Navigation-assisted surgical excision of the keratocyst over right side mandible

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The mobile nature of the lower jaw complicates its synchronization during surgery with the preacquired imaging data. The accuracy of navigation based on tracking of the patient's head is compromised by asynchronous movements of the mandible during surgery. Direct tracking of the lower jaw, via a teeth-mounted sensor frame, is superior to its indirect tracking. The teeth also provide a more secure basis for the markers than soft tissue attachment. We report a case of recurrent kerato-cyst over right mandible. The lesion is in the medial side of ramus close to mandibular foremen and inferior alveolar nerve. It was hard to approach the tumor without extraoral flap or intraoral approach with sagittal split osteotomy to excision the tumor traditionally. We used the computerized navigation system with a teeth-mounted sensor frame enables more accurate navigation for excision the lesion of the lower jaw and lower the nerve damage risk.

R02

三氧礦化物對於活髓牙與失活牙之再生效果
Regeneration effect of mineral trioxide aggregate for vital or nonvital tooth

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三氧礦化物（mineral trioxide aggregate，MTA）在 1993 年首度被用作根管封填材料爾後又作修復恆牙根分叉穿孔（furcation perforation），又由靈長類動物牙發現優異的生物相容性（biocompability）又有密封性（sealability），還有抗菌功能，又可誘導 osteogenesis 及 cementogenesis 故受到廣大的運用。而且在國外實驗發現具牙根側穿孔之修復（Repair of root lateral perforation）。本院收集 9 個永久牙病例包括兩例

覆髓（direct pulp capping），四例為根尖成形術（apexification），兩例為根尖生成術（apexogenesis），一例為牙根垂直斷裂（root vertical fracture），病因均為外傷或蛀牙。覆髓者 8、13 歲，根尖生成 11 至 13 歲，根尖成形 10 至 44 歲，牙根斷裂為 38 歲。覆髓予牙挖及慢速機頭 0.8-mm round bur（No. 1, 008; Kerr Co, Orange, CA）去除蛀牙，如流血用 10% 次氯酸鈉（sodium hypochlorite）棉丸輕輕壓牙髓曝露處三十秒到五分鐘置入 1.5-mm 厚 MTA（ProRoot MTA; Dentsply Tulsa Dental Specialties，MTA 以 3 比 1 粉水調和再 IRM（intermediate restorative material）封填窩洞口。根尖生成術為去除約 2 mm 壞死牙髓組織，沖洗次氯酸鈉溶液再置入 1.5 mm-2mm 厚 MTA，再放 IRM 封填窩洞口。根尖成形術則置入 4 mm 厚 MTA 於已超音波清創術後之根管。牙根斷裂為清創根管後近遠心斷裂，予環套 banding 後置入 MTA。8 歲患者覆髓於 6 星期後 dentin bridge 形成，根尖生成術於 6 星期後根尖形成 barrier，7 星期後根尖形成，10 歲根尖成形術於 8 星期後根尖形成，44 歲患者於術後兩星期根尖完成並增長三毫米，牙根垂直斷裂還在癒合中，本研究九例均癒後良好。

R03

由醫倫、法論牙醫師在咀嚼吞嚥障礙治療照護之角色～凡塵的掙扎
Treating,Caring,and Rehabilitating Dysphagia: Examining the Dentist's Role From an Ethical and Legal Perspective

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我雙手穩住，是要盡力治療口腔疾病我全神貫注只怕再錯失”嗆咳”的變化在面對倫理與法律的糾結，我更盼望醫病關係的和諧～因此讓我們共同了解整個過程中之角色

目的：由於醫療行為涉及病人生命或身體健康法益，其本身極具侵襲性且醫療過程及醫病互動充滿複雜性及可變性，在咀嚼吞嚥障礙病人更不容輕忽，在臨床實務又常遇到能不能做？該不該做！等問題，故提出探討。

病歷資料內容：（一）以司法實務判決，台灣雲林地方分院 98 年度重訴字第 62 號民事判決～台大雲林分院案及台灣桃園地方法院 101 年度訴字第 119 號刑事判決 - 居善案，就嗆咳致死分述民、刑事過失之內涵。（二）就醫療法、醫師法及緊急醫療救護法，等之規定論醫師對危急病人之救助義務，予以闡明。

討論：（一）醫師可否因病人為身心障礙者，而拒絕對其醫療之倫理、法律觀（二）新修正之醫療法第 82 條對醫界之衝擊（三）手術同意書之變革～如何落實特殊需求者知情同意

結論：綜上內容，期盼經由倫理認知與法律了解，促進醫病關係和諧，達到減少醫療糾紛，建構安全的醫療文化，以營造尊重多元價值的社會。

口頭論文報告

R04

製備三維孔洞結構於牙科鈦金屬表面以促進骨細胞反應
Creation of three-dimensional porous structure on titan

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鈦（titanium, Ti）具有良好機械性質和生物相容性，因此廣泛被使用於牙科植體。然而未經表面處理之 Ti 表面其生物活性並不佳，使其在牙科植體臨床應用上受到一些限制，進而可能影響長期的骨整合。現在臨牙科植體最常使用的表面處理方式之一為噴砂／酸蝕（sand-blasting with large grit and acid-etching, SLA）處理。先前研究也顯示，具有多孔形貌的生物活性 Ti 表面植體可改善其長期的穩定性。本研究目的是在 SLA Ti 表面建構三維多孔結構，進一步提升人類骨髓間葉幹細胞於 Ti 表面之細胞反應。利用簡易物理及化學的表面改質方式，於 Ti 表面製備複合氧化層，包含非晶相之緻密 TiO2 內層（厚度約 900nm）和多孔 TiO2 外層（孔徑 50-500nm；厚度約 80nm）且具有互相連通之三維纖維狀結構（具有仿 ECM 及結構之特性）。此結構不僅具有良好誘導鈣磷化合物（calcium-phosphates, Ca-Ps）沉積能力且 Ca-Ps 也被鑲嵌在仿 ECM 結構內部，此結構可增加 SLA Ti 表面之親水性和生物活性，同時有利於生長因子吸附以促進骨整合。本研究所提出的表面改質方式可提升 SLA Ti 表面之人類骨髓間葉幹細胞反應，具有應用於牙科 Ti 植體表面處理之發展性。

R05

末期癌症患者口腔乾燥程度、口腔症狀及臨床存活狀況之相關性
Association between oral dryness severity oral symptoms and survival of advanced cancer patients in Taiwan

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末期癌症患者由於整體虛弱及藥物副作用等多重因素影響，口腔症狀為常見主訴。本研究探討末期癌患者口乾、口腔症狀及存活時間相關性。研究於高醫安寧病房進行，納入 54 位患者，入院日由牙醫師進行口腔檢查，同時記錄患者其餘狀況，如：肢端水腫及意識。口腔症狀頻率中，口腔乾燥比率為 98.1%，其中有 46.3% 患者其臨床口腔乾燥分級為重度，吞嚥障礙比率為 38.8%，黏膜炎比率為 38.9%。本研究探討口腔乾燥程度與其他症狀和因素之相關性，依臨床口乾診斷分級，分為輕中度口乾組（grade1, 2; N=28）與重度口乾組（grade3; N=25），以無母數分析法 Mann-Whitney U 分析，重度口乾組肢端水腫程度、用氧濃度、OHAT 量表中舌頭、牙齦、唾液檢查分數、WHO 黏膜炎分級、口腔髒污沉積之數值均顯著性高於輕中度口乾組（$p < 0.05$）。OHAT 量表唾液檢查分數越高者（即唾液越少），有存活時間較短傾向，呈邊緣性統計顯著性差異（$p=0.056$）。雖然患者口腔狀況與臨床存活狀況受到許多因素影響，本研究建議口乾程度可供評估末期癌症會者口腔症狀與臨床存活狀況的指標，並可經由口腔照護來改善口腔清潔狀態與黏膜炎，以增進患者臨終前的舒適度。

R06

二苯乙烯苷（THSG）誘導人類牙髓幹細胞分化加速大鼠牙周組織再生
2,3,5,4'-tetrahydroxystilbene-2-O-β-D-glucoside(THSG)-induced tissue differentiation of human dental pulp stem cell accelerates periodontal regeneration in rats

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本研究在評估 2,3,5,4'- 四烴基二苯乙烯 -2-O-β-D-葡萄糖苷（THSG）對人類牙隨幹細胞（hDPSC）組織分化再生影響，藉由 THSG 增強 hDPSC 的組織分化潛能來探討對大鼠牙周組織缺損的治療效果。培養 hDPSC 並利用 THSG 誘導 hDPSC 細胞增生，以細胞染色及免疫組織化學分析評估組織分化作用；在大鼠牙周組織缺損模型中，以 micro-CT 影像分析、組織學量測分析評估 THSG 輔助 hDPSC 治療牙周組織缺損之成效。免疫組織化學分析顯示 PCNA、OPN、VEGF 等牙周再生標記之表現，DPSC（D）組和 DPSC-THSG（D-T）組都顯著大於對照組（$p<0.05$; $p < 0.01$），而 D-T 組又大於 D 組（$p < 0.05$）；與手術後兩週的對照組比較，micro-CT 的定量測量顯示，（D）組和（D-T）組都有骨缺損顯著減少及骨支持比率顯著增加（$p < 0.05$; $p<0.01$），而 D-T 組又多於 D 組（$p < 0.05$）；組織學 H&E 染色顯示，D 組及 D-T 組的附連結締組織高度有顯著減少（$p < 0.05$; $p < 0.01$），齒槽骨脊高度也有顯著增加，且 D-T 組也大於 D 組（$p < 0.05$）。本研究顯示 THSG 能有效增強 hDPSC 的組織分化並促進牙周再生，兩者合併使用或可為牙周組織缺損之治療帶來新的展望。

R07

子宮內膜異位症增加薛格連氏症候群風險之世代追蹤研究
Endometriosis Increases The Risk For Sjögren's Syndrome: A Cohort Study

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Objectives:

Sjögren's syndrome (SS) is an autoimmune disease with oral manifestations. SS may result in hormonal imbalance and immune dysfunction, and its occurrence could relate to comorbidities including endometriosis. The prevalence of endometriosis in women with chronic pelvic pain is higher than 33%, and in SS patients the prevalence is 6.3%. Given the limited existing studies, we sought to determine whether endometriosis patients have higher risk of SS.

Kethods:

We performed a cohort study of females with newly diagnosed endometriosis from 1999 to 2013 from the Longitudinal Health Insurance Database (LHID). Data on age, history of underlying comorbidities were retrieved from LHID. Data on the use of corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs) were also compared. A total of 16,214 patients were identified to have endometriosis. Among them, 15,949 patients received a diagnosis of SS after the index date, and were included for analysis. 31,880 (7.10%) of 448,953 eligible patients without a history of endometriosis were recruited as age-matched controls. A Cox proportional hazard model was developed with a priori dichotomous variable of endometriosis, aiming to estimate the risk of SS in patients with endometriosis. A cumulative probability model was adopted to assess the time-dependent effect of endometriosis on the development of SS, implying the casual link of the association. Sensitivity analysis was conducted to further confirm the risk of SS in endometriosis patients.

Results:

The mean±SD age (38.8±8.8 y/o) was the same for patients with or without endometriosis (p=0.406). The Cox proportional hazard model analysis showed that patients with endometriosis were more likely to have SS than patients that didn't develop endometriosis (adjusted hazard ratio=1.5, 95% CI=1.27–1.77, P<0.05), which persisted in a sensitivity analysis (adjusted HR=1.34, 95% CI=1.04–1.74, P<0.05).

Conclusions:

Our findings suggest an association between endometriosis and a higher risk of developing SS. Endometriosis may be a risk factor for, or share a common cause, with SS. This is the first study with extended follow-up that address both the timing and development of SS in patients with endometriosis. Steroids and NSAIDs might reduce such association.

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貼示報告

P01

3D 列印方式製作生物活性玻璃支架之研究
Study of bioceramic scaffold produced by 3D printing method

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近年世界人口平均年齡老化現象逐漸提升，因此，為了維持口腔功能如咀嚼、人際溝通以及美觀等，牙科植牙手術需求也隨之提高。目前進行植牙手術時，常透過骨移植物與再生膜之搭配達到最好的骨組織重建效果。然而，目前骨移植物有來源不穩定及感染風險等疑慮，因此開發一具有良好治療效果之合成骨仍為目前臨床上重要研究方向之一。本研究設計一新型生物活性玻璃，並透過 3D 列印成型方法製作生物活性玻璃支架。透過 TGA/DSC 熱學分析，XRD 結構分析、機械性質測試、MTT 及 LDH 細胞毒性分析等進行效果驗證。初步結果顯示 3D 列印製作精準支架為可行之技術，且生醫玻璃支架具有無毒、良好強度等特性，推斷其具有發展潛能，未來將繼續完成其他待測之試驗，並穩定其製程參數。預期研究結果將能為牙科臨床以及其他部位之硬組織重建領域帶來重要發展。

P02

利用鈦網做引導骨再生手術的案例報告
Guided bone regeneration with the use of titanium mesh : Case series

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1- 牙科

現今有許多做引導骨再生手術的方式被提出來應用在牙脊萎縮的病人身上，術後可以獲得足夠的骨量來達到後續良好的植牙　復物重建。這二則案例報告的目的是評估利用鈦鋼及骨粉做引導骨再生手術的可靠性及其獲得的骨再生結果。

其中一個案例是一位 81 歲女性，其上顎右側後牙區有嚴重的牙脊萎縮，另一個案例是一位 50 歲女性，其下顎左側後牙區有嚴重的牙脊萎縮，兩個案例皆使用 0.06mm 厚度，孔洞大小 0.25mm 的鈦鋼來覆蓋骨缺損的位置提供骨粉所需要的空間。前者二次手術移除鈦鋼，後者植牙時移除鈦鋼，發現牙脊達到足夠的高度和寬度，減少後續植牙的複雜度。此報告會討論利用鈦鋼做骨引導手術的效果。這些案例結果顯示利用鈦鋼做骨引導再生手術是一個可預期的方式來達到複雜牙脊萎縮區域後續的植牙重建。

P03

減壓術合併根管治療應用於根尖囊腫樣病灶－病例報告
Management of a cyst-like periapical lesion by decompression combined with root canal treatment: A case report

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大部分的發炎性根尖病灶（inflammatory periapical lesion）在初步臨床診斷時可依據侵犯牙齒顆數、病灶大小甚至透過抽吸（aspiration）來辨別是否為根尖囊腫樣病灶（cyst-like periapical lesion），唯最終診斷仍需透過組織切片確認。治療上建議先從非手術性治療（如：傳統根管治療、減壓術、根管內藥物置放等）開始進行，若失敗則考慮手術性根管治療介入，但 large periapical lesion 治療中根管內可能不斷地出現滲出液而影響預後，另外當病灶大小侵犯到活髓牙齒的根尖以及相鄰解剖構造（如：下頜神經管、上顎鼻竇、鼻腔底部以及腭穹窿）時，若直接進行手術移除病灶可能會影響牙齒活性、造成骨支持不足或神經傷害，因此除了傳統根管治療外尚須搭配其他輔助性治療，先減小病灶範圍再追蹤觀察根尖手術的必要性。本案例為一 25 歲女性，因其左側下顎後牙區牙齦腫脹約一年而至本院就診。經臨床診斷後可見病灶範圍涉及頦孔（mental foramen）而且根管內不斷有液體引流出，因此建議患者先採取根管治療合併減壓術（decompression technique）縮小病灶範圍，降低日後手術風險。今提出此一根尖囊腫樣病灶的病例，提供臨床醫師利用非手術性治療大範圍根尖病變的可能性。

P04

小範圍錐狀射束電腦斷層影像品質與照射參數關係之研究
Evaluating Image Quality of Small FOV CBCT with Different Exposure Parameters

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平面的根尖 X 光片因為影像重疊的關係，呈現出來的結果有所限制。美國牙隨病學會建議對於特殊根管解剖型態可使用小範圍錐狀射束電腦斷層（small FOV CBCT）輔助診斷。然而目前對於根管治療所使用的小範圍 CBCT 照射參數沒有一定的標準，本研究希望提供針對牙科根管解剖型態的小範圍 CBCT 拍攝參數參考，達到盡可能降低輻射劑量，同時能夠提供臨床醫師足夠的訊息。

本研究選用乾燥人頭骨之右上第一大臼齒，以 3D Accuitomo 170（J. Morita MFG. Corp., Kyoto,Japan）、電壓 90kVp、照射範圍 4cm x 4cm、體積像素 0.08mm 搭配不同的管電流（5.0mA、2.5mA）、掃瞄時間（高解析度模式、標準模式、高速模式）進行拍攝，請兩位牙醫師評分觀察近心頰側第二根管之清晰度，並與目前廠商建議之拍攝參數 5.0mA、高解析度模式比較。結果顯示以 2.5mA、高解析度模式拍攝之影像 5.0mA、高解析度模式有相似之辨別度。由於電流、掃描時間皆與輻射劑量呈正相關，因此本研究建議對於特殊根管解剖型態判讀所需要的小範圍 CBCT 拍攝參數可減低至 2.5mA 之高解析度模式拍攝。

P05

右下臼齒區牙冠斷裂之處理
Treatment For The Crown Fractured Tooth In Mandibular Molars – A Case Report

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病人是 61 歲身體健康之男性榮民，主訴右下第一大臼齒有斷裂感，咬東西會疼痛。臨床檢查：右下第一大臼齒舌側軟組織有 5mm X 5mm 之發炎腫脹，但牙套完整。

拆除牙套後發現遠心舌側牙冠斷裂，曾做過根管治療，經取出斷裂，清創乾淨。檢視根管發現剩餘之馬來膠填充物完整，不需要根管治療。於一星期後初次回診，腫脹明顯消退。二星期後與三星期後回診腫脹幾乎完全消失。

接者沿遠心與近心舌側根鑽孔，將螺紋針旋轉插入，牙冠腔內欠損空間用冠心樹脂充填。牙冠復形後，置入陶瓷熔合金屬牙冠，牙冠邊並未深入牙根分叉處，並導致病患使用牙間刷清潔分叉。

初視本報告病患之舌側軟組織發炎腫脹會誤以為牙根斷裂，需要拔除。但拆除牙套後，X 光顯示牙根完整，根尖附近並無透射線，主要是遠心舌側牙冠斷裂破損，並不需要拔除。探測顯示有較深的根叉侵犯，經過拆除牙套、牙周治療、置入陶瓷熔合金屬牙冠與口腔衛教後，留住剩餘齒，數月後回診牙周無發炎現象，探測深度改善，根叉附近的骨有長回現象，堪稱成功的保存案例。

P06

自體移植存活率與根管治療時機之關聯性－健保資料庫分析
Timing of endodontic treatment and survival rate for autotransplanted third molars : A nationwide population-based study

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研究目的：牙體自體移植（tooth autotransplantation）是將同一病患口腔內包埋、阻生或是已萌發的牙齒移植到口內另外剛拔完牙或是利用手術預先準備好的齒槽內。目的是利用可供使用的牙齒來解決缺牙問題。當供給齒（donor tooth）被拔出時，會造成根尖周圍的血管組織傷害，通過根尖的血管叢會因此斷裂導致循環的中斷，使得牙髓腔內部血管的管壁缺氧而造成壞死的現象，但根管治療的時機卻尚無定論。研究方法：本研究為回溯形世代研究，收集 2000-2013 年有申報自體移植的第三大臼齒進行分析。排除條件為：患者基本資料不明、及牙齒未進行完整根管治療。治療時機分為手術前、手術當日（口外施行）、及手術後。最後以牙齒拔除與否進行存活分析。結果：14 年間共有 1811 顆牙齒納入分析，總存活率為 74.49%（平均追蹤 8.33 年）。調整了病患年齡、性別、牙位、根管數量等因子，存活分析發現手術前根管治療的牙齒，拔除機率為手術後根管治療牙齒的 2.00 倍（95% 信賴區間 =1.11-3.60、P=0.020）；手術當天口外施行根管治療的牙齒，拔除機率為手術後根管治療牙齒的 1.33 倍（95% 信賴區間 =1.05-1.68、P=0.020）。若針對手術後根管治療的牙齒進行分析，則發現有使用橡皮障可減少 46% 的拔牙機率（HR=0.54、95% 信賴區間 =0.43–0.69、P<0.0001）。結論：自體移植之第三大臼齒，手術後再進行根管治療，相較於手術前或手術當日（口外施行），有較高的存活率。

P07

咬合成對數對可撤式局部活動義齒重建預後的影響－病例報告
The influence of occlusal pairs for prognosis of removable partial denture rehabilitation - a case report

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牙周病患者常因嚴重骨缺損導致牙齒被拔除，影響咀嚼功能及生活品質。本病例為七十四歲男性病患，有慢性牙周病，在牙周病治療後全口餘十八顆健康沒動搖的牙齒、咬合成對數五對，根據宮地建夫咬合三角理論及 Eichner's 咬合成對數分類，診斷可以設計傳統可撤式活動義齒來重建患者缺牙區域，使其恢復基本外觀功能。此協同診斷可使治療結果符合病人期待且有好的長期預後，咬合成對數理論用於協助臨床醫師於治療計畫的決定與判斷，而可撤式局部活動義齒之臨床治療適應症包含長距離缺牙區、缺牙區的後方無支台齒支撐、剩餘牙齒的牙周支持差、需要橫跨牙弓重建、殘餘齒槽嵴；過度吸收、美觀需求等。

本報告顯示在有足夠咬合成對數的病例中，使用傳統可撤式局部活動義齒重建牙周病患者缺牙區，臨床上較能得到良好之治療效果。病患經治療後，追蹤半年所有支台齒狀況穩定，病患滿意治療效果，藉此本病例報告以說明於現代牙科中，遵從咬合支持指數之原則，傳統可撤式局部活動義齒依舊是良好的治療選項。

P08

診斷挑戰：似根尖囊腫之單側性鼻腭管囊腫 -6 個病例回顧
A Diagnostic Challenge: Unilateral Nasopalatine Duct Cyst : A Review of 6 Cases

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典型鼻腭管囊腫之影像學特徵為一好發於上顎跨中線，正中門齒根尖附近之一界線清楚，具硬化骨邊緣之圓形、卵圓形、心形或倒梨形的放射線透射性病灶。臨床多發生於 30 至 50 歲間，男性居多，無症狀而意外發現或有時伴隨前腭部腫痛感染。當病灶僅出現於單側時，無論有無症狀，都將使診斷變得具挑戰性。本報告回溯分析 2002 至 2018 年本科病理資料庫中的 6 個單側性的鼻腭管囊腫確診病例。6 例中，4 例位於左側，男女比 4：2，年齡分布為 17 至 53 歲。其中兩例先經根管治療併根尖手術治療後無效，再經牙科椎狀束電腦斷層攝影（CBCT）及切片檢查，最終證實為鼻腭管囊腫。本研究建議上顎門牙區之根尖放射線透射性病灶，如為活性齒且病灶具硬化之骨邊緣，無論單側或跨中線，都應將鼻腭管囊腫優先列入鑑別診斷之列，牙科錐狀束電腦斷層攝影（CBCT）對此單側之鼻腭管囊腫具極高之診斷價值。

P09

早期齲齒和幼兒精神行為發育的潛在相關性作用：前瞻性隊列研究（先期計劃：第一次報告）

Potential interactions between early caries and children' psychomotor development : A prospective follow-up study (a preliminary report of the part-1 project)

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Objectives :

The impact of early childhood caries (ECC) on developing psychomotor deficiency remains elusive to date, with which two distinct cohorts of aged-4-to-6 kindergarteners via dmft and (co)-variables of psychomotor development were cemployed to address our new hypothesis.

Methods :

To explore the risks of ECC on psychomotor development over time, a 2- yr follow-up study was designed to assess the kindergarteners from urban cities vs. rural townships in southern and central Taiwan (lower vs. higher dmft). The demographic, dietary & hygiene records, summed dmft scores and amended comprehensive scales (CCDI/MCDIA) for psychomotor development were collected to compute their co-relationship, where 104 children collected from each distict region with parents' consents and pre-test power-analyses were applied for the justified recruits. One-way ANOVA vs. multiple linear-regression and Chi- square analyses were set off to compare the differences of variables between age, gender & dmft vs. the relationship among co-variables and CCDI measures to address the potential risk(s), respectively.

Results :

The preliminary data yielded that there was a positive relationship amonA 4-to-6-yr kindergarteners with high ECC scores (i.e., dmft=3.33+/-3.25 in central vs. 2.69+/-2.75 in south Taiwan), which was clearly associated with lesser psychomotor developments (i.e., expressive language, comprehension-concept, personal-social; $p<0.01$-0.05), suggesting a tendency for dmft measured and CCDI on the psychomotor deficits was comparatively identified in rural townships with higher caries activities; yet, oral hygiene itself was independently involved.

Conclusion :

The preliminary results, when fully analysed, suggest that severe ECC may have impact on the pre-schoolers' psychomotor deficiency, which could manifest via personal interactions with the family or peers in communities, resulting in specific engagements to their language learning and delays on the psycho-social developmental as well.

Note :

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P10

模擬刷牙後不同義齒基底的耐磨性與表面粗糙度
The wear resistance and surface roughness of different denture base materials after simulating toothbrushing

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前言：為探討電腦輔助設計製造之義齒基底樹脂與傳統製程之義齒基底樹脂在抗磨耗與表面粗糙度表現上的差異。材料與方法：選用兩種實驗材料 Triplex Cold Polymer（TCP, PMMA）、ThermoSens（TS, Polyamide）製作成 25×25×2mm^3 試片，每組共 5 片試片，以 0.3μm 氧化鋁粉末拋光後進行重量與表面粗糙度的前測。並以線性磨耗試驗機荷重 200g 模擬刷牙共 100,000 次後並進行後測。統計分析使用 SPSS20.0 進行重複測量二因子變異數分析，並進行事後比較。結果：兩種材料的重量損失與材料和刷牙次數無顯著性差異，但它們的交互作用存在顯著差異（P < 0.01），在表面粗糙方面，與材料（P < 0.05）和刷牙（P < 0.05）以及它們的交互作用（P < 0.05）有顯著差異。結論：義齒基底的刷耗會根據材料而有所不同。因此，應根據患者的平常清潔方法來考慮義齒基底材料的選擇。

P11

嚴肅遊戲於口腔醫學教育應用的前驅研究
The application of serious game in dental education-pilot study

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Serious games are widely used for learning and education and these can increase the effectiveness of learning and help in maintaining results. However, the benefits of serious games have rarely been studied in the field of dentistry. In this study, the subjects were students from the faculty of dentistry. The aim of the study is to examine the applicability of a serious game, "simulation of dental clinic," and evaluate the effectiveness of using it to aid education. This is convenience sampling. For the study,93 students who were about to start their clinical clerkship were recruited,of which 34 signed the informed consent form. Out of them,13 students did not indulge in self-learning, while 21 students played games for self-learning. During the clerkship from September 2018 to April 2019, 84 visits where conducted. After the clerkship, the relevant clinical departments awarded clerkship scores. In addition, before starting the clinical internship, students took a written test conducted by the Association for Dental Sciences of the Republic of China. One-way analysis of variance (ANOVA) was used for statistical testing of the number of self-learning sessions, clerkship scores from various departments,and written test scores. The differences were statistically significant (p < 0.05), indicating that students who engaged in self-learning tend to have higher scores in written tests, clerkship scores from periodontics and conservative dentistry department than those who did not. Among students who completed the questionnaire, 81% agreed that the game software had education results, and it can help in gaining medical knowledge and clinical skills. From this, we can see that the game, "simulation of dental clinic," can provide another method of learning for students and it exhibits the effectiveness of these games in teaching.

P12

磁吸式義齒於單側殘存齒列覆蓋式義齒重建之病例報告
Complete denture rehabilitation assisted with magnet attachment on unilateral residual root : A Case Report

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口內大量缺牙的情況會對很多人的生活品質與咀嚼功效造成影響。根據內政部的統計在 2021 年老年人口數也將來到 14.6%。若從缺牙數的觀點來看，統計結果顯示在年紀大於 65 歲且口內殘存的牙齒數大於 20 顆牙約占 59.3%。此兩項數據意味著台灣正邁入高齡化社會而且有近一半以上的老年人口是有缺牙且需要接受補綴重建的。以局部活動假牙及全口假牙的觀點來看，剩餘的牙齒不但能支撐補綴物，有效地減緩骨頭的吸收且能增加咀嚼的力量。本病歷報告為 63 歲男性病患於上顎使用了磁吸式裝置來做為輔助覆蓋式義齒，在此病例中殘存齒的分布是單側且排列為線性，此類覆蓋式義齒在支台齒分布不佳時容易造成義齒的翻轉，因此在設計時加入了較長的覆蓋體設計與全平衡咬合設計，同時注意著組織沉降情形才給予磁鐵的吸附功能，在追蹤期間更要時時注意是否有骨吸收造成義齒的貼附度降低而影響磁鐵的磁力。病患追蹤至今相當滿意治療的結果，大量缺牙區的病患於設計義齒時若能有效的應用殘存的齒質搭配磁鐵副聯物將能使治療的預後及使用上的滿意度受到大幅增加。

P13

牙科作業環境 PM2.5 金屬粉塵暴露暨其清淨效能之研究
Exposure of PM2.5 metal aerosol and cleaning control on dental workplace

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牙科金屬暴露危害受到國際廣泛的重視，過去著重於汞（齊）危害，對無嗅無味可深入胸腔區（PM10）或肺泡區（PM2.5）金屬微粒人體暴露危害討論甚少。本研究探討牙科作業 PM2.5 金屬粉塵暴露及其清淨效能；實驗包含三項：牙冠研磨 近距離 PM2.5 微粒暴露（距離 0.2m）使用三種常見牙冠合金材質（Ni-Cr、Co-Cr、Pd-Ag）瞭解材質對金屬粉與微粒徑影響；並討論不同診間（距離 1.5m）金屬粉塵濃度（假牙區／一般診療區／背景區），及解析兩種清淨設備（上吸式或全罩式）PM2.5 金屬粉塵之淨化效能。研究結果顯示，三種牙冠合金近距離 PM2.5 粉塵濃度依序 Ni-Cr > Co-Cr > Pd-Ag。細／粗粒子分布比值（PM2.5 ／ PM10），Co-Cr 比值最高（87%），Ni-Cr 次之，Pd-Ag 最低（35%），其中 Co-Cr 材質較硬，研磨以細微粒為主可深入肺泡區，顯示合金材質將會影響粒徑分布與其危害區域。診間內 PM2.5 金屬粉塵以假牙區最高（180±137μg／m3），一般診療區次之，背景區 PM2.5 最低（～6μg／m3）。清淨設備 PM2.5 淨化效能，全罩式明顯優於上吸式（90% vs. 23%）。故建議近距離研磨牙冠作業應配戴口罩或採用相關清境等防護措施，降低 PM2.5 金屬粉塵之長期暴露危險。

補助參加
各類國際會議貼示
報告

P14

Bony Effects of Laser Melting Biomimetic Ti6Al4V Scaffold Implant Material

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Objectives : How to repair or replacement of bone defects is an attention problem. 3D scaffolds have emerged as a potential candidate for bone substitutes, of which Ti alloys are one of the most promising choices among the metal alloys due to their low cytotoxicity and mechanical properties. The aim of this study, in vitro and in vivo, was to evaluate the biologic effects of the mix chitosan (CH) and calcium silicate (CS) composites onto Ti6Al4V 3d-printed scaffolds.
Methods : The biomimetic Ti6Al4V scaffold material fabricated by the selective laser melting process. The CH/CS composite solution was dropped onto Ti6Al4V scaffold and then transferred into a freezer at 80 ° C. The characterization of scaffolds surface contained an assessment of physicochemical properties as well as mechanical testing. In vitro study, the proliferation and differentiation of human Wharton's Jelly mesenchymal stem cells were assessed. In vivo study, the effect of bone regeneration were done by creating a critical size defects in the femur (6.5 mm in diameter and 10 mm in depth) of adult New Zealand rabbits with implanted the scaffold.
Results : The CH/CS-coated Ti6Al4V scaffolds were able to show and retain their original morphologies and architectures, which significantly influenced following bone regeneration. The CH/CS-coated Ti6Al4V scaffolds surface showed hydrophilic and the compressive strength was comparable to natural bone. In vitro cell culture, the modifications affected the cellular behavior such as adhesion, proliferation, and differentiation that led to promote osteogenesis and mineralization downstream. In vivo implanted data showed that CH/CS-coated Ti6Al4V scaffold promoted the bone regeneration and ingrowth at the critical size bone defects of rabbits.
Conclusions : The present study demonstrated that the proposed CH/CS-coated Ti6Al4V scaffold was a favorable and inductive micro-environment that could be served as a promising modification for future bone substitutes in tissue regeneration.

P15

The Study of Bone Regeneration Synergistic Effects of 3D-printed Meso-Bioscaffold

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Objectives : The 3D-printed mesoporous ceramic bioscaffold showed excellent bioactivity and influenced cell or tissue regeneration. The purpose of this study was to evaluate the effects of the different mesoporous ceramic bioscaffold which loaded of bone morphogenetic protein-2 (BMP-2) by employing the 3D-printing technique.
Methods : The BMP-2 was loaded into mesoporous calcium silicate (MesoCS) and mesoporous apatite (MesoHA) by soaking in the BMP-2 solution. The 3D mesoporous calcium silicate (CS) or hydroxyapatite (HA) bioscaffolds were fabricated by fused deposition modeling. The characteristics of Meso-CS or Meso-HA scaffold were observed by transmission electron microscopy, X-ray diffraction and scanning electron microscopy. In vitro study, the Meso-CS or Meso-HA scaffold biocompatibility and osteogenic-related ability of human mesenchymal stem cell were evaluated. In vivo study, the scaffolds were implanted into rabbit femur and estimated the ability of bone regeneration.
Results : The BMP-2 component was found that continued releasing from the Meso-CS and Meso-HA scaffold significantly more than the CS and HA scaffold from 48 hours to 7 days. The degradation experiments showed that the weight of Meso-CS and Meso-HA scaffolds were lost 55% and 38% after immersed for 3 months. Adhesion and proliferation of human mesenchymal stem cell cultured on Meso-CS scaffold were also more significant than Meso-HA scaffolds. The in vivo implanted study demonstrated that the Meso-CS scaffold group achieves the highest percentage of new bone ingrowth than Meso-HA scaffold group.
Conclusions : The present study suggests a promising potential application of 3D-printed Meso-CS and Meso-HA scaffolds in the clinic, especially for repair of critical bone defect. It is hoped the potential clinical applications of BMP-2-loaded bioscaffolds for treatments with substantially increased bone repair and regeneration efficacy in the future.

P16

Demethoxycurcumin induces apoptosis of oral cancer cells via heme oxygenase-1 expression

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Objectives : Demethoxycurcumin (DMC) one of the curcuminoids, has shown potent anticancer activities on various cancer cells. However, there is no available information to address the effects of DMC on human oral cancer cells. Here, we investigated the anti-apoptosis activity of DMC on two human oral cancer cell lines (SCC-9 and HSC-3) in vitro and its underlying mechanisms.
Methods : Cell viability was examined by MTT assay, whereas apoptosis features was measured by flow cytometric assays. Pathways involved in apoptosis were investigated by the human proteinase antibody array and western blotting analysis.
Results: The present study showed that DMC concentration-dependently inhibited cell proliferation in the SCC-9 and HSC-3 cell lines. DMC also induced several features of apoptosis such as sub G1-phase cell increase, phosphatidylserine (PS) externalization, and significantly activated proapoptotic signaling including caspase-8, -9, and -3 activation and poly (ADP-ribose) polymerase (PARP) cleavage in HSC-3 cells. Moreover, the human proteinase antibody array indicated that the DMC treatment induced the expression of heme oxygenase-1 (HO-1) protein in human oral cancer cell. HO-1 inhibitor can reverse the DMC-induced activation of the caspase-3.
Keywords : Demethoxycurcumin; apoptosis; oral cancer

P17

Graphene-modified calcium silicate 3D-printed scaffolds stimulate osteogenic/ angiogenic differentiation

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Objectives : Graphene was attracted much interest for applications in bone tissue regeneration. Owing to the superior mechanical properties and low cytotoxicity, graphene has been widely used in the coating of biocomposites. The aim of this research was to fabricate graphene-modified calcium silicate (GCS) bioscaffold and then examine the material's osteogenic/angiogenic behavior, as well as explain some of the molecular and signal mechanisms behind this.
Methods : In the present study, 1 wt% graphene was reinforced into calcium silicate (CS) powder and manufactured 3D scaffold via bioprinter. The apatite layer precipitated on the scaffold surface after immersion in simulated body fluid was evaluated by scanning electron microscopy and X-ray diffractometer. In vitro, the osteogenic/angiogenic behavior of the GCS was considered using a human marrow stem cells (hMSCs) and analysis by western blot.
Results : Adding 1 wt% graphene into CS scaffold enhanced Young's modulus by 39.5%. Moreover, the apatite layer precipitated on the GCS scaffold was not affected in simulated body fluid. The alkaline phosphatase and osteogenesis-related protein expression of the hMSCs on the GCS indicated better results than on CS scaffold. We also demonstrated the activation of the Wnt/beta-catenin signaling pathway in hMSCs seems to be the mechanism behind this angiogenesis induction by GCS scaffold.
Conclusions : These results support that GCS scaffold caused stem cell response as better than pure CS scaffold. We hope the material can be used to bone graft for tissue engineering applications in the future.

P18

Bonding mechanism of bioactive dentin substitute material to composite resin

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Objective : Bioactive dentin substitute (e.g. Biodentine®) can served as promising pulp capping material. However, its bonding to composite resin remains challenge. We aim to explore the bonding mechanism by analyzing the phase/element changes and microstructures of Biodentine crystallization. We further evaluated the Shear bond strength (SBS) with various surface treatments on Biodentine.

Material and methods : We analyzed phase changes of Biodentine at various time intervals (1d, 2d, 3d, 7d, 14d and 28d) under XRD (2θ : 20°-60)° determinations. One hundred and eight Biodentine specimens were prepared (4-mm diameter/2-mm height) for SBS test. After 7d storage, the specimens were randomly divided into three groups with different surface treatments, three bonding systems with additional primers (RCP, RelyXTM Ceramic Primer/MBP, MonobondTM Plus) or not. Each group was allocated into 3 subgroups (n=12 for each) : Prime & Bond NTTM (PNT), Single Bond Universal (SBU) and Xeno V (Xeno), for bonding to composite resin (SDRTM). SBS was measured using universal testing machine (crosshead speed : 1 mm/min). The data was analyzed with one-way ANOVA and post-hoc Tukey's test (α =0.05). SEM/EDS examinations were used to analyze the bonding interface of Biodentine and adhesives. Fractography was also analyzed under SEM examination.

Results and Discussion : In this study we simulated oral tooth environment to immerse the Biodentine specimens for determine the crystallization. XRD showed CaCO3 was most presented in all test conditions, while ZrO2 was detected as minor intensity. We found the intensities increased in first 3d and became stable after 7d. Biodentine in SBU with MBP primer subgroup exhibited significant higher SBS ($P < 0.05$) among all groups. (Control : 10.8±2.3; RCP : 12.8±2.9; MBP : 17.5±3.6 MPa). SEM indicated most specimens of failure mode was mixed failure in Biodentine side. No specimen failed cohesively in composite resin. The unfilled porous among CaCO3 and ZrO2 grains might be the risk area of fracture. SEM/EDS analysis showed calcium and silicate were the mainly component in the bonding area.

Conclusion : Generally Biodentine showed low SBS to all tested bonding systems because calcium and zirconia in Biodentine might impair the bonding to resin. However,10-MDP contained Monobond Plus primer enhanced SBS except in etchand- rinse PNT adhesive. The given results would be also of great help to improve such kinds of bioactive dentine substitute materials bonding to resin.

Adhesion Enhancement Of Stainless-Steel And PMMA Using Nitrogen Atmospheric-Pressure-Plasma-Jets

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Objectives : Magnetic attachments have been widely used in implant-retained overdenture rehabilitation. However, detachment of magnetic assemblies from PMMA is a frequent problem. As the magnetic attachments are enveloped by stainless steel, the aim of this study was to evaluate the effects of N2 atmospheric pressure plasma jet (APPJ) on the adhesion of stainless steel and PMMA.

Material and Methods : Stainless steel discs (5.5 mm in diameter and 2.5 mm in thickness, Aichi Steel Corp.) were used. They were divided into 8 groups and no N2 APPJ treatment served as control. The 7 experimental groups received APPJ treatment for 20 s and were designed as follows. Four groups were treated with different sinter temperatures (425, 500, 600, and 700 oC) by adjusting the N2 flow rate and without air quenching. Three groups received air quenching using 3 quartz tubes with different diameters (0.7, 1.2, and 1.7 cm) of side holes. Each group contained 10 discs. After APPJ treatment, alloy primer (Kuraray) was applied on each disc using microbrush. Subsequently, each disc was mounted in a mold and PMMA (Unifast Trad, GC Dental Corp.) was filled to contact disc surfaces. Shear bond strengths (SBS) were measured using Instron at crosshead speed of 1 mm/min. The SBS after thermocycling (5,000 cycles between 5 and 55 °c, with a 30 s water immersion time) were also measured. In addition, the contact angles of stainless steel discs before and after APPJ treatments were measured. Statistical analysis was performed with one-way ANOVA.

Results: Water contact angles : All APPJ treatments reduced contact angles of stainless steel discs (ranged from 42.01 °±8.7 °to 26.63 °±5.4 °), Compared with control group (71.95 °±5.4 °). Moreover, the higer sinter temperatures, the lower contact angles were found (fig. 1). The value of contact angles became even lower when ambient air was involved in the APPJ reaction.

Shear bond strengths: APPJ treated group with small-hole air quenching (19.11±2.2 MPa) display the highest value in the pre-SBS thermocycling test, almost twice that of the control group (9.94±1.3 MPa). After APPJ treatment, the SBS of all groups were significantly increased ($p < 0.01$), although thermocycling decreased SBS. Even so, the post-thermocycling SBSs of all plasma treated groups were comparable and were still significantly higher than control groups ($p < 0.05$)(fig. 2).

Conclusion: N2 APPJ is effective in enhancing initial SBS in a short treatment time (20s). But the enhancing effects were vulnerable through thermal cycling aging process. Because only short treatment time is needed, APPJ surface treatment has the potential of becoming an useful clinical procedure which can make overdenture more durable and reliable.

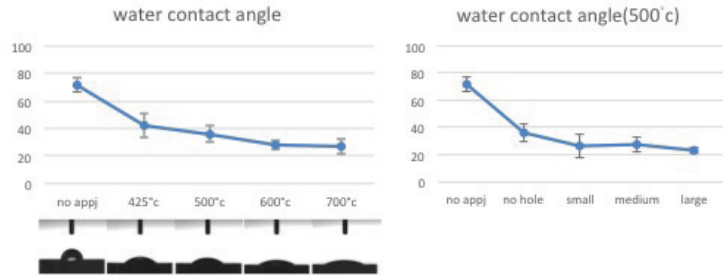

Fig.1 All APPJ treatments reduced water contact angles of stainless steel discs.

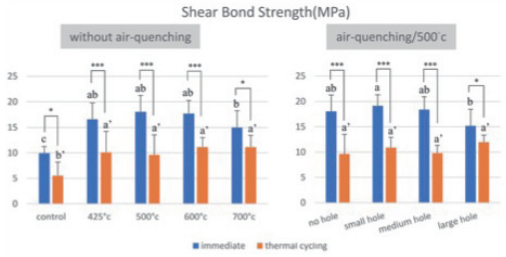

Fig.2 After APPJ treatment, the SBSs of all groups were significantly increased.

P20

Toxic Effects of TEGDMA and HEMA on dental pulp cells

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Objectives : TEGDMA (triethylene glycol dimethacrylate) and HEMA (2-hydroxyethyl methacrylate), two common components of dentin bonding agent, may potentially affect the viability and biological activities of the dental pulp. However, the underlying mechanisms remain largely unknown. This study aimed to investigate the influences of TEGDMA and HEMA on the expression of matrix (type I collagen), cell cycle-related molecules (cdc2, p21), Nrf2 and heme oxygenase-1 (HO-1), inflammatory molecules (cyclooxygenase-2 [COX-2] and related drug-metabolizing proteins' expression (NQO-1, superoxide dismutase-1 [SOD-1]).
Materials and Methods : Primary human dental pulp cells were treated with different concentrations of TEGDMA (0-5 mM), and HEMA (0-10 mM) for 24 hours. Cell viability was measured by 3-(4,5-dimethylthiazol-2-yl) -2,5-diphenyltetrazolium bromide (MTT) assay. Changes in cellular mRNA expression were determined by reverse-transcription polymerase chain reaction (RT-PCR). Changes in protein production of pulp cells were evaluated by western blot.
Results : TEGDMA and HEMA may induce cytotoxic effect by impairing cell viability on human dental pulp cells at higher concentrations. The expressions of collagen type I, and cdc2 in dental pulp cells were down-regulated after exposure to TEGDMA and HEMA for 24 hours. The expressions of p21, NQO-1, Nrf2, HO-1, and COX-2 showed up-regulation, whereas SOD-1 showed no marked change by both monomers.
Conclusions : This study provides an insight into the mechanism of TEGDMA- and HEMA-induced toxicity toward human dental pulp cells. Impairment of matrix turnover and cell cycle, as well as induction of Nrf2, HO-1, NQO-1, and COX-2 inflammatory response by TEGDMA and HEMA, may contribute to the response of dental pulp to dentin bonding agents and composite resin materials after clinical operative procedures.
Keywords : TEGDMA, HEMA, Human dental pulp cells, type I collagen, cdc2, p21, Nrf2, HO-1, COX-2, NQO-1, SOD-1

P21

Effects of lactose on biofilms formed by two oral Streptococci

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Objectives : Dental caries is considered to be caused by the infection of Streptococcus mutans (Sm). Metabolism of lactose by Sm is shown to be less cariogenic than sucrose. However, effects of lactose on biofilms formed by Sm with other oral bacteria are unclear. Properties of biofilms formed by Sm and S. sanguinis (Ss), an oral antagonizer of Sm, in the presence of lactose were determined.
Methods : Sm (ATCC25175) and Ss (ATCC10556) were grown in brain heart infusion (BHI) to the statistic phase, and then grown alone or co-cultured (Sm-Ss) in BHI containing lactose or sucrose (2 mg/ml) for 24 hours to form biofilms. Biomass was determined by the crystal violet assay. The growth of Sm or Ss in BHI containing lactose of sucrose was determined by measuring OD 600 or cell counts. pH values of the cultures were also measured.
Results : Biomass of Sm, Ss or Sm-Ss biofilms grown in the lactose medium was less than biofilms grown in the sucrose medium. Biomass of Sm-Ss biofilms grown in the lactose medium was similar to biomass of Ss biofilms, but both were lower than biomass of Sm biofilms. In contrast, biomass of each type of biofilms grown in the sucrose medium were not significantly different. Levels of Ss or Sm grown to the static phase in the lactose medium were similar to those in the sucrose medium. pH values of lactose medium used to grow Ss or Sm was less than the sucrose medium.
Conclusion : The level of Ss, Sm or Sm-Ss biofilms formed in the presence of lactose medium was less than biofilms formed in the presence of sucrose. Acidification of culture medium during the bacterial growth might contribute to this phenomenon. Other mechanisms behind the reduction in biomass of Sm-Ss grown in the lactose medium, as compared to Sm biofilms, requires further investigation.
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P22

The effect of nicotine on HMGB1 in oral epithelium

Objectives: Cigarette smoking alters overreacting inflammation followed by dental plaque infection, aggravating periodontitis. High mobility group box 1 (HMGB1) is a nuclear protein which not only acts as the transcriptional factor but also as an inflammatory mediator once it is released from cells. Although the level of HMGB1 in periodontal tissues is higher than tissues of healthy subjects, whether smoking affects the level of HMGB1 is unknown. In this study, effects of nicotine (NT) on the activation of HMGB1 and the effects of smoking on the expression of HMGB1 in gingival tissues were determined.
Methods: Normal oral keratinocytes (NOKs) were treated with different concentrations of NT for 24 hours and then stimulated with ATP (0.72mM) and lipopolysaccharides of Porphyromonas gingivalis (Pg-LPS, 1 μg/ml) for another 24 hours. The expression and the intracellular localization of HMGB1 in cells were determined by Western blot analyses and immunofluorescence, respectively. The release of HMGB1 into culture medium was determined by ELISA. Gingival tissues were collected from non-smokers without or with periodontitis or smokers with periodontitis for immunohistochemistry of HMGB1.
Results: NT alone barely affected the expression level and the intracellular localization of HMGB1 in NOKs. The expression levels of HMGB1 increased by stimulation of ATP and Pg-LPS was inhibited by pretreatment of NT. Translocation from nuclei to cytoplasm and release of HMGB1 stimulated by ATP and Pg-LPS were also inhibited by nicotine. In gingival tissues obtained from non-smokers with periodontitis, higher expression levels and less nuclear restriction of HMGB1 was noticed, compared to healthy subjects. In contrast, the expression level and the intracellular localization of HMGB1 in gingival tissues obtained from smokers with periodontitis were similar to healthy subjects.
Conclusion: NT was shown to inhibited the expression and release of HMGB1 in oral keratinocytes. This finding reflected changes of HMGB1 in gingival tissues in smokers.

P23

THSG promotes periodontal regeneration effect of dental pulp stem cells

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Objectives: The aim of this study was to evaluate the regenerative effects of 2,3,5,4'-tetrahydroxystilbene-2-O-β-D-glucoside (THSG) on human dental pulp stem cells (hDPSCs) in experimental periodontitis model of rats.
Methods: To evaluate the regenerative capacities of THSG-treated hDPSCs on periodontal tissues, the periodontal defects were created in male Sprague-Dawley rats. Defects were treated with Matrigel (control group), hDPSCs, or hDPSCs+THSG. After 2 weeks, the animals were euthanized, and then defects healing was evaluated by micro-computed tomographic. Hematoxylin and eosin staining were used for histological analysis. The expression of ALP, OPN, and PCNA were evaluated using immunohistochemistry.
Results: In micro-computed tomography analysis, hDPSC attenuated the alveolar bone loss in periodontal defects of rats, compared with control group. Furthermore, the bone loss in hDPSCs+THSG group was significantly less than those in control and hDPSCs groups. Moreover, the most bone supporting ratio was significantly observed in hDPSCs+THSG group. In the results of H&E staining, tissues from the hDPSCs+THSG groups also showed significantly reduced alveolar bone loss and extracellular matrix destruction. The expression of bone markers, ALP and OPN was significantly enhanced by hDPSCs+THSG treatment, compared with control and DPSC groups. In addition, the expression of proliferative marker, PCNA, was also significantly increased in hDPSCs+THSG group.
Conclusions: To achieve the goal of genuine regeneration of periodontal tissues, DPSC-based therapy is thought to be a new choice. In addition, the THSG-promoted regenerative effects of DPSC enhance the reconstruction of soft and hard tissues, which may provide a brand new strategy for clinical treatments.