



健康科學院 105 學年度畢業生研究成果發表會 議程

日 期：105 年 6 月 2 日（星期五）

地 點：勤學樓 (B1) 國際會議廳

時 間	議 程	主持人	活動內容
08:00-08:20	報 到		畢業生至壁報前就定位
08:20-09:30			參加人員簽到、領取資料
	壁報評選	評審委員	畢業生於壁報旁備詢
09:30-09:40	開 幕	潘銘正院長	院長暨貴賓致詞
第 1 場 論文口頭發表			
09:40-09:55	醫技系	醫學影像暨 放射科學系 潘榕光 教授	CHRNA3 以及 CHRNA3 基因多型性與臺灣年輕族群 吸煙行為之相關性 周志傑/歐威志、陳碧蓮
09:55-10:10	醫放系		利用等效衰減及空間結構指標之皮質骨及骨小樑結 構分析 林冠妤/陳佳惠、謝玲鈴
10:10-10:25	牙技系		靜電紡絲法製作氫氧基磷灰石/明膠/聚乙烯醇作為 骨再生奈米纖維支架之評估 張亦如/姚俊旭、吳世經
10:25-10:40	中場休息/茶敘時間		
第 2 場 論文口頭發表			
10:40-10:55	食科系	牙體技術暨 材料系 許世光 主任	比較不同加工方式與糯米粉製作之傳統印尼糯米糕 之感官特性和物理分析 鄧金蓮/郭炯村、劉伯康
10:55-11:10	環安系		噴漆作業場所勞工重金屬與六價鉻暴露之健康風險 評估 吳珮甄/賴嘉祥
11:10-11:25	生醫所		胍鹽類高分子應用於聚丙烯抗菌複合材料及其特性 評估 林建宏/呂兆倉、李孟娟
11:25-11:40	休息時間		
11:40-12:00	頒 獎	論文壁報暨口頭發表得獎	
12:00-12:30	閉 幕	潘銘正院長	



目 錄

105CHS-MMT-001	<i>CHRNA3</i> 以及 <i>CHRNA3</i> 基因多型性與台灣年輕族群吸菸行為之 相關性	1
	周志傑、歐威志*、陳碧蓮*	
105CHS-MMT-002	<i>SLC6A4</i> 及 <i>BDNF</i> 基因與年輕成人吸菸行為之研究	3
	賴彥蓉, 陳碧蓮, 歐威志*	
105CHS-MMT-003	淡水螺螄之尾動幼蟲盛行率研究	5
	許勤郁、李明憲*	
105CHS-MMT-004	健康人與患者睡眠及生活品質的探討 The evaluation of sleep quality and quality of life in healthy people and patients	7
	Gerlee Chuluun , Yu Hsuan Chen*	
105CHS-MR-001	動物放射治療市場評估	9
	張皓甯、謝栢滄、張振榮*	
105CHS-MR-002	使用腹部透視攝影評估照野外劑量分佈之初步研究	11
	吳銘哲、史天宇、鄭凱元*	
105CHS-MR-003	利用逆運算疊代法從冠狀動脈疾病患者之臨床數據預測其血管狹窄 程度	13
	蕭閔峯、潘龍發、潘榕光*	
105CHS-MR-004	利用等效衰減及空間結構指標之皮質骨及骨小樑結構分析	15
	林冠妤、陳佳惠、謝玲鈴*	
105CHS-MR-005	台灣 IGRT 系統影像品質與導引位置準確性調查研究	17
	楊程鈞、蕭安成、黃佩筠、顏妙蓉、陳信雄*	
105CHS-MR-006	以空間矩陣 TLD 佈點模式劑量 X 光是經胸部攝影之空間劑量研究..	21
	黃德發、林政勳*	
105CHS-MR-007	以壓克力假體及半導體計量器量測 64 切電腦斷層儀器之散射輻射 Measurement of scatter radiation in 64-slice ct scan room using acrylic phantom and semiconductor dosimeter	23
	Le Hai Hanh Tien, Cheng-Hsun Lin*, Lung-Kwang Pan	
105CHS-MD-001	牙科植體用 Ti-Nb-Mo 合金表面之顏色及耐蝕性研究	24
	李佩錡、許學全*	
105CHS-MD-002	牙科氧化鋯植體表面以多巴交聯接枝胍之抗菌評估	26
	葉怡辰、許世光、吳世經*	
105CHS-MD-003	牙科植體用多孔 Ti-Nb-Sn 合金特性之研究	28
	劉子瑄、許學全*	
105CHS-MD-004	靜電紡絲法製作氫氧基磷灰石/明膠/聚乙烯醇作為骨再生奈米纖維 支架之評估	30
	張亦如、姚俊旭、吳世經*	



105CHS-MD-005	利用電化學沉積法於鎂表面披覆二水磷酸鈣塗層之體外研究 32 黃曉玫、許世光*
105CHS-MF-001	矽藻培養及抗氧化活性分析 34 田怡茜、賴素媛*
105CHS-MF-002	製備分子印模聚合物應用於食品中苯甲酸之測定 36 陳俞雯、魏銘琪*
105CHS-MF-003	紅蘿蔔渣豆腐乳之製備與其呈味特性 38 詹詠竣、李煜玲*
105CHS-MF-004	不同加工方法與配方對傳統印尼糯米糕感官與物理特性之影響及 印尼與台灣消費者對其感覺之差異 40 鄧金蓮、郭炯村、劉伯康*
105CHS-MS-001	液氮儲槽洩漏引發多重風險堆疊衝擊分析-以台灣某液氮儲存區為例 44 鄭芳宜*、謝明宏
105CHS-MS-002	水力漩流分離器降低水中濁度技術開發與研究 47 張又仁*、徐一量
105CHS-MS-003	利用脫水污泥-飛灰複合陶瓷顆粒為生物膜附著介質分解二氯酚之 動力研究 49 吳佳鴻、林燕輝*
105CHS-MS-004	酚在固定生物膜反應槽中吸附、脫附與生物降解之動力模式 51 蔡怡婷、林燕輝*
105CHS-MS-005	噴漆作業場所勞工重金屬與六價鉻暴露之健康風險評估 53 吳珮甄、賴嘉祥*
105CHS-MBE-001	牙科用 CAD/CAM 氧化鋯切削參數之研究 55 羅安介、吳世經*
105CHS-MBE-002	牙科用多孔 Ti-Nb-Mo 合金表面氫氧基磷灰石鍍層之研究 57 施旻宏、許學全*
105CHS-MBE-003	胍鹽類高分子應用於聚丙烯抗菌複合材料及其特性評估 59 林建宏*、呂兆倉、李孟娟
105CHS-MBE-004	天然精油針對台灣缺蟻之趨避效果及微膠囊製備特性評估 61 許博揚、呂兆倉*、樓靜文
105CHS-MBE-005	中草藥美白奈米纖維面膜製程設計及其特性評估 63 羅立達、樓靜文*、呂兆倉
105CHS-MBE-006	醫用三維凝膠劑量計應用於具壓克力套管之近接治療劑量驗證 65 魏崇軒，陳錦杏，張淵仁*
105CHS-MBE-007	分離自土壤的鏈黴菌之抗菌與抗藻特性分析 68 林紋晏、李孟娟*
105CHS-MBE-008	癌症病童口腔念珠菌感染之分析研究 71 盧建佑*、黃芳亮、李憲明



105CHS-MBE-009	偏鄉地區學童視力不良與視力調節能力之研究	73
	李榮祐、林榮芳 [*] 、葉上民	
105CHS-DMT-001	普惠德生技運動系列保健品對於小鼠模式抗疲勞效用試驗	75
	楊昆翰、陳韋陸 [*]	
105CHS-DMT-002	硫辛酸透過調控 HIF-1 α 來抑制人類膠細胞瘤的生長和轉移	77
	吳哲凱、陳韋陸 [*]	
105CHS-DMT-003	地瓜葉萃取物透過 AMPK 蛋白對脂質代謝的作用	79
	柯宜蓁、陳韋陸 [*]	
105CHS-FF-001	低膽固醇豬油之開發與應用	81
	張仲奇、陳建亘、黃英凱、賴少庸、張永吉 [*] 、劉伯康、郭炯村	
105CHS-FF-002	薏仁甜酒釀的製作與發酵變化之測定	82
	陳祗合、洪菀露、吳育菁、劉雅涵、蕭珮綺、滕芳君、張尹溶 羅培仁 [*]	
105CHS-FF-003	銀耳活菌保健霜淇淋之製作	83
	陳姵如、林可娟、顏敬庭、戴邑芳、林一郎 [*]	
105CHS-FS-001	飲料廢棄品連續發酵產氫之可行性研究	84
	賴均綸、江欣樺、林屏杰、李國興 [*]	
105CHS-FS-002	以厭氧顆粒污泥床搭配減壓操作來提升發酵產氫效能	85
	李淑君、林勁甫、林屏杰、李國興 [*]	
索 引		86



CHRNA3 以及 CHRN3 基因多型性與台灣年輕族群 吸菸行為之相關性

周志傑¹、歐威志^{2,*}、陳碧蓮^{3,*}

¹中臺科技大學醫學檢驗生物技術系 碩士生

²中臺科技大學醫學檢驗生物技術系 助理副教授

³中臺科技大學醫學檢驗生物技術系 副教授

*通訊作者：wcou@ctust.edu.tw plchen@ctust.edu.tw

摘要

吸菸是全球性的健康問題，香菸中最主要成分為尼古丁。尼古丁膽鹼受體 (nicotinic acetylcholine receptors, nAChRs) 是一個配體相關性離子通道，會與尼古丁相互結合。在吸菸的幾秒鐘後，尼古丁會立即與大腦中的尼古丁膽鹼受體結合並釋放多巴胺，使吸菸者感到愉快與產生強烈的獎賞效應。文獻指出尼古丁膽鹼接受器 (cholinergic nicotine receptor, CHRN) 中的單一核苷酸多型性 (single nucleotide polymorphisms, SNPs) 與吸菸息息相關。本研究主要探討CHRNA3及CHRN3基因多型性與台灣年輕族群吸菸行為之關聯性。我們招募了408位吸菸以及未吸菸之男性受試者，並填寫自我評估問卷，包括人口統計數據、吸菸背景和狀況、尼古丁依賴性評估量表 (Fagerstrom Test for Nicotine Dependence, FTND)、生理性菸草依賴量表 (Physiological Cigarette Dependence Scale, PCDS) 以及尼古丁毒性與戒斷症狀量表 (Nicotine Toxicity and Withdrawal Symptoms, CWS-21)。利用PCR-RFLP分析CHRNA3 rs6495309以及CHRN3 rs6474412之基因多型性，再以ANOVA Kruska-Wallis test進行統計分析。比較189位吸菸者與219位未吸菸者之勝算比 (Odd ratios, ORs)，結果在吸菸者與非吸菸者之間無顯著差異性。另外CHRN3 rs6474412基因與尼古丁依賴性 (Nicotine dependence, ND) 和戒斷症狀有顯著關聯性 ($p=0.010$ versus $p=0.010$)。分析2個SNP基因交互作用影響，結果帶有CHRNA3 rs6495309/ CHRN3 rs6474412基因型之吸菸者與尼古丁依賴性 (ND) 有顯著之差異性 ($p=0.044$)。本研究發現，CHRNA3 rs6495309與CHRN3 rs6474412基因型和台灣年輕男性吸菸族群之吸菸行為有關聯性。

關鍵字：吸菸、菸鹼型膽鹼受體 $\alpha 3$ 、 $\beta 3$ (CHRN $\alpha 3$, $\beta 3$)



The correlation between *CHRNA3* and *CHRNA3* gene polymorphism with smoking behavior of young Taiwanese

Chih-Chieh Chou, Wei-Chih Ou *,Pei-Lain Chen *

Department of Medical Laboratory Science and Biotechnology

Central Taiwan University of Science and Technology

*Corresponding author : wcou@ctust.edu.tw plchen@ctust.edu.tw

Abstract

Tobacco smoking is a global health problem. Nicotine is the major psychoactive ingredient in tobacco. Nicotinic acetylcholine receptors (nAChRs) are ligand-gated ion channels that exogenously bind nicotine. Within seconds of inhalation, nicotine interacts with nAChRs on brain cells that release dopamine, causing feelings of pleasure and reward. In previous studies have showed that single nucleotide polymorphisms (SNPs) of cholinergic nicotine receptor (*CHRN*) gene had a relationship on smoking status. The aim of this study was to investigate the correlation of *CHRNA3* and *CHRNA3* polymorphisms on the smoking behavior in young Taiwanese men. In this study, 408 young Taiwanese men completed a self-report questionnaire of smoking status, including demographic data, smoking background and status, Fagerstorm Test for Nicotine Dependence (FTND), Physiological Cigarette Dependence Scale (PCDS) and Nicotine Toxicity and Withdrawal Symptoms (CWS-21). Polymorphisms of the *CHRNA3* rs6495309 and *CHRNA3* rs6474412 were determined by PCR-RFLP. The statistical analysis was performed by ANOVA Kruskal-Wallis test. In a comparison of 189 current smokers and 219 never smokers, the odds ratios (ORs) for smoking were not significantly different. The comparisons for FTND and CWS-21 among the smokers different *CHRNA3* rs6474412 polymorphisms were significantly different ($p=0.010$ versus $p=0.010$). The comparison for the score on FTND among the smokers different (*CHRNA3* rs6495309/ *CHRNA3* rs6474412) was significant ($p=0.044$). These findings suggest that *CHRNA3* rs6495309 and *CHRNA3* rs6474412 affected smoking status in young Taiwanese men.

Keywords : smoking, cholinergic receptor, nicotine, $\alpha 3$, $\beta 3$ (*CHRNA3*, $\beta 3$)



SLC6A4 及 BDNF 基因與年輕成人吸菸行為之研究

賴彥蓉¹，陳碧蓮²，歐威志^{3,*}

¹中臺科技大學醫學檢驗生物技術系 碩士生

²中臺科技大學醫學檢驗生物技術系 副教授

³中臺科技大學醫學檢驗生物技術系 助理教授

*通訊作者：wcou@ctust.edu.tw

摘要

台灣衛生福利部國民健康署菸害防制中指出，國人十大死因大都和吸菸有關，包含癌症、心臟病、中風及慢性肺部疾病等。尼古丁是菸草當中最主要的物質，其有助於吸菸成癮的發展。我們的研究主要針對台灣年輕男性中SLC6A4及BDNF基因對吸菸行為的相關探討。我們的研究通過人體試驗委員會的核准，招募了436位男性(年齡20~25歲)，並且給予填寫同意書及吸菸問卷量表。我們利用聚合酶鏈反應及限制性片段長度多態性分析SLC6A4及BDNF基因多態性。利用邏輯式回歸分析來計算OR(勝算比)95% CI (信賴區間)來評估基因變異對吸菸行為及吸菸強度的機率風險，比較201位吸菸者及235非吸菸者，所有基因型經統計分析後均無顯著差異。另外重度吸菸者中的BDNF基因攜帶AA allele比攜帶GA allele的OR值，顯著降低0.4倍(95%置信區間[CI]: 0.18-0.88, P = 0.023)。在FTND、PCDS及CWS-21問卷當中與SLC6A4及BDNF基因多態性經統計分析也並無顯著差異。這些結果顯示了BDNF基因攜帶AA allele的受測者，影響台灣年輕男性族群中的吸菸強度。

關鍵字：吸菸、基因多型性、SLC6A4及BDNF



Study of the relationship between *SLC6A4* and *BDNF* gene with smoking behavior of young adults

Yen-Jung Lai, Pei-Lain Chen, Wei-Chih Ou*

Department of Medical Laboratory Science and Biotechnology

Central Taiwan University of Science and Technology

*Corresponding author : wcou@ctust.edu.tw

Abstract

Tobacco smoking is a risk factor for diseases, including cancer and lung diseases. Nicotine is the major psychoactive ingredient in tobacco, and it contributes to the development of smoking addiction. Our objectives were to investigate the effects of the interaction between *SLC6A4* and *BDNF* genes and their association with smoking risk in young Taiwanese men. In this study, 436 young men completed a self-report questionnaire on smoking status. Polymorphisms of *SLC6A4* and *BDNF* were determined by using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP). In a comparison of 201 current smokers and 235 never smokers, odds ratios (ORs) for the development of smoking in all genotypes were not statistically significant. Among smokers with *BDNF* AA alleles, the OR of heavier smoking was 0.4 times significantly lower than in those possessing GA alleles (95% confidence interval [CI]: 0.18-0.88, P=0.023). The comparisons for the questionnaires among the smokers with different *SLC6A4/BDNF* genotypes were not significant differences. These findings suggest that the subjects carrying AA allele of *BDNF* affects smoking intensity in young Taiwanese men.

Keywords : Tobacco smoking, Smoking behavior, *SLC6A4* and *BDNF*



淡水螺螄之尾動幼蟲盛行率研究

許勤郁¹、李明憲^{2,*}

¹中臺科技大學醫學檢驗生物技術系 碩士生

²中臺科技大學醫學檢驗生物技術系 副教授

*通訊作者：mhli@ctust.edu.tw

摘要

吸蟲（學名：Trematoda）屬於扁形蠕蟲門吸蟲綱之寄生蟲。吸蟲之生命週期通常會有一個至兩個的中間宿主；包括軟體動物之淡水螺螄、脊髓動物之魚類、甲殼動物或水生植物等。而大多數的淡水螺螄可能成為寄生蟲感染人類及脊髓動物的中間宿主，然後進一步發育。本研究目的主要是想探討淡水螺螄體內尾動幼蟲之感染率，進行尾動幼蟲之型態觀察及分子生物學上的鑑定。

從 2015 年 4 月至 2017 年 4 月期間，分別在大里溪、大坑溪、頭汴坑溪三條河流收集不同種類之淡水螺螄。藉由光照法使尾動幼蟲自然釋出及人工壓碎法在光學顯微鏡觀察螺螄中是否有尾動幼蟲感染。並將收集到的尾動幼蟲進行 DNA 萃取及以非特異性引子進行聚合酶連鎖反應，DNA 定序後進行 NCBI blast 之物種鑑定。

總共採集1363隻淡水螺螄，其中台灣椎實螺389隻、瘤蜷815隻、圓田螺95隻、石田螺51隻、川蜷13隻。尾動幼蟲總感染率為4.18%，其中台灣椎實螺尾動幼蟲感染率為4.63%、瘤蜷4.79%，而圓田螺、石田螺以及川蜷為0%。經統計結果分析後，螺螄之長度及感染率並沒有顯著差異。然而頭汴坑溪與大坑溪螺螄兩條溪流之間螺螄尾動幼蟲感染率有顯著性差異($p < 0.005$)；頭汴坑溪與大里溪螺螄兩條溪流之螺螄尾動幼蟲感染率有顯著性差異($p < 0.001$)。頭汴坑溪是三條溪流中尾動幼蟲盛行率最高的。而瘤蜷是所有收集之淡水螺螄尾動幼蟲感染率最高的。三條溪流的淡水螺螄分離出三種劍尾類及一種叉尾類尾動幼蟲。經分子技術鑑定出三種吸蟲尾動幼蟲，包括台中異形吸蟲（*Haplorchis taichui*）、扁彎口吸蟲（*Clinostomum complanatum*），和枝腺屬吸蟲（*Paralecithodendrium* sp.）。

關鍵字：吸蟲、尾動幼蟲、淡水螺螄



Prevalence study of the cercariae of the freshwater snail

Chin-Yu Hsu, Ming-Hsien Li *

Department of Medical Laboratory Science and Biotechnology

Central Taiwan University of Science and Technology

*Corresponding author : mhli@ctust.edu.tw

Abstract

Trematodes are an important pathogen of medicine and veterinary. Their life cycle usually has one or two intermediate host; include freshwater snail, fish or crab and others. Most freshwater snails can become intermediate hosts that may infect to humans and animals, and then further development. Freshwater snails were collected from different species during April, 2015 to April, 2017. The cercariae were obtained by lighting or/and crushing methods under optical microscope from snails. Cercariae were used to DNA extraction and sequencing for species identification. A total of 1,363 freshwater snails, representing five species, were examined for shedding cercariae. 389 *Radix swinhoi*, 815 *Tarebia granifera*, 95 *Cipangopaludina chinensis*, 51 *Cipangopaludina miyagii*, and 13 *Semisulcospira libertina* were collected and examined. The average prevalence rate of cercariae infection was 4.18%, including *R. swinhoi* 4.63%, *T. granifera* 4.79%, *C. chinensis* 0%, *C. miyagii* 0% and *S. libertina* 0%, respectively. The statistics results showed that there was no significant difference between infection rate and length in all snails. However, Prevalence was a significant difference between Toubiankeng river and Dakeng river ($p < 0.005$), between Toubiankeng river and Dali river ($p < 0.001$). Three different xiphidiocercaria cercariae were found from *T. granifera*. One furcocercaria cercariae was found from *R. swinhoi*. Highest prevalence of cercariae infection of freshwater snails in the Toubiankeng river among the three streams, while *Tarebia granifera* is the highest prevalence of infection in all freshwater snail. In addition, we isolated three types of cercariae, including *H. taichui*, *C. complanatum*, and *Paralecithodendrium* sp from freshwater snails in Taichung area.

Keywords : trematode, cercariae, freshwater snail



健康人與患者睡眠及生活品質的探討

The evaluation of sleep quality and quality of life in healthy people and patients

Gerlee Chuluun^{1,2}, Yu Hsuan Chen^{2*}

¹ Dornod Medical Center, Dornod province, Mongolia

² Department of Medical Laboratory Science and Biotechnology

Central Taiwan University of Science and Technology

*Corresponding author : yhchen2@ctust.edu.tw

Abstract

The sleep and quality of life are important in both patients and healthy people. Poor sleep and worse quality of life are associated with working errors, occupational injuries and leads to many negative effects of life. Sleep problems and poor quality of life may affect to severity of disease, and may reduce effects of treatment. The aim of thesis part one is to evaluate sleep quality and quality of life among hospital staff of Dornod Medical Center to know their physical and mental health. The aim of second part is to review the publications of PubMed and Google scholar database that investigate sleep quality and quality of life among healthy people and patients. We aimed to focus on what kind of disease was most studied in sleep quality and life quality, and try to know detail information about specific disease. In first Part, evaluation of sleep quality and quality of life sample of 200 staff including doctors, nurses, administrators, pharmacists and assistant workers in Dornod Medical Center. Data were collected on sleep quality and quality of life using the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS) and SF-36 Mongolian version questionnaires, respectively. In the second part is a systematic review study of sleep quality and quality of life. The database of PubMed and Google scholar were used. The following search keywords were used “sleep quality” and “quality of life” combined with “disease”. All references were exported and managed using EndNoteX7. Data were analyzed using PolyAnalyst system and SPSS statistics analysis. The results of part one show most respondents were females (96.5%). Females had poor sleep quality (PSQI=6.2 ± 3.48) than males (PSQI=4.14 ± 2.67). Score of sleepiness is normal (ESS=6.94±3.94) in all participants. Mean score of MCS (47.4±10.08) and PCS (46.0±8.45) of SF-36 were lower than norm in all participants. The both PCS (45.3 ± 8.4) and MCS (46.9 ± 10.0) were lower in the shift workers. Good sleep quality group has higher PCS and MCS, especially MCS is significant (p=0.004) and PSQI is negative correlation to PCS and MCS (p=0.01).



In part 2, a total of 3831 articles were found using keywords from PubMed database. Published year of those articles were between 1978 and 2017. The criteria for excluding 3815 articles were the following: no abstract, animal study, only disease doesn't include sleep quality and quality of life, different languages, articles without epilepsy and no full text. A total of 16 articles are analyzed after screen. A total of 64200 articles were searched using keywords from Google scholar databases between 2000 and 2016, and 200 articles were selected to analyze including author, year, impact factor, country, study design, questionnaires and so on. We found that the research articles that include sleep quality and quality of life were increase more in 2016, and different version of questionnaires were used. We conclude that both physical health and mental health measures demonstrated that poor quality of life is a common health problem among healthy people and patients. The articles related quality of life are more than the articles related sleep quality and combined both. The studies of sleep quality and quality of life were increased for last years in patients with epilepsy.

Keywords : sleep quality, quality of life, epilepsy, PSQI, SF-36, PolyAnalyst..



動物放射治療市場評估

張皓甯¹、謝栢滄²、張振榮^{2,*}

¹中臺科技大學醫學影像暨放射科學系 碩士生

²中臺科技大學醫學影像暨放射科學系 教授

*通訊作者：jrchang@ctust.edu.tw

摘要

本研究針對動物放射治療在台灣在接受度與未來發展做一個市場問卷，而對象是與動物放療中心有簽約的獸醫師以及一般大眾對放射治療的接受度，用統計分析方式來呈現。動物放射治療雖然在國內是新的技術，但根據問卷的數據顯示，未來國內動物放射治療的成長率會約有70%，但需要多的宣傳與介紹。動物放射治療已經日本以及歐美等國家證實，確實有效治療動物腫瘤的方式之一，但是遇到的問題卻很廣泛，例如：飼主的意願、費用等，如果能克服這些問題，相信動物放射治療的發展會越來越好，期許將來能帶起動物放射治療這塊醫療，帶給毛小孩更多的服務，本研究目的即為放射治療於台灣市場的發展，給毛小孩最好的醫療照顧。

關鍵字：放射治療、統計分析、市場評估



Market Assessment of Animal Radiation Therapy

Hao-Ning Chang, Bor-Tsung Hsieh, Cheng-Jung Chang*

Department of Medical Imaging and Radiological Sciences

Central Taiwan University of Science and Technology

***Corresponding author : jrchang@ctust.edu.tw**

Abstract

In this study, the market questionnaires of customer's acceptance in animal radiation therapy in Taiwan were evaluated. Questionnaires were submitted to veterinary in animal hospitals. The results were present by statistical analysis.

Although the animal radiation therapy is a new technique in Taiwan, the market of animal radiation therapy will grow up 70%, according to the result of the questionnaires.

In Japan, Europe and the United State, the radiation therapy has been proved that can treat cancer efficiently by and the other countries. But there are many problems encountered, such as: owners' aspiration, fee of treatment, etc. If these problems can be conquered, the development of animal radiation therapy market will be better and better. Excepting that the animal radiation therapy market could grow up, and then could serve more and more pet. The purpose of this study is exploring the development of animal radiation therapy market in Taiwan. Wish that could provide the best medical caring to pet.

Keywords : Radiation Therapy, Statistical Analysis, Market assessment



使用腹部透視攝影評估照野外劑量分佈之初步研究

吳銘哲¹、史天宇^{1,2}、鄭凱元^{3,*}

¹中臺科技大學醫學影像暨放射科學系 碩士生

²澄清醫院中港分院 放射線科 醫事放射師

³中臺科技大學醫學影像暨放射科學系 教授

*通訊作者：kycheng@ctust.edu.tw

摘要

本研究主要利用 TLD-100H 放置於 ATOM Adult Male Phantom 胸腔範圍內，獲得進行上腹部透視攝影時胸部所接受劑量之大小，藉以評估透視輻射照野外散射劑量分佈狀況。

本實驗將 TLD 放置於胸部之危急器官，並使用透視攝影機照射，照野大小為 $15 \times 15 \text{ cm}^2$ ，分別將 X 光管球放置於檢查床上進行照射 1、2、3 及 4 分鐘和 X 光管球放置於檢查床下進行 1 分鐘透視攝影照射進行比較。

在 X 光管放置於檢查床上透視時間為 1-4 分鐘，胸部各器官輻射劑量隨時間增長而增加。而在一分鐘透視攝影時間下，X 光管球在檢查床上與床下之劑量分別為肺尖： 48.09 ± 19.41 、 $44.43 \pm 13.74 \text{ uGy}$ ；肺門： 366.12 ± 114.61 、 $681.32 \pm 65.44 \text{ uGy}$ ；肺底： 825.93 ± 195.01 、 $2433.48 \pm 1010.90 \text{ uGy}$ ；心臟： 965.60 ± 45.49 、 $375.17 \pm 86.17 \text{ uGy}$ ；左乳腺： 89.05 ± 38.23 、 0 uGy 與右乳腺： 119.93 ± 63.07 、 0 uGy 。

隨時間增長給予胸腔各器官散射劑量也隨之增加，X 光管球放置於檢查床上與床下所給予的散射劑量也有所不同。

關鍵字：TLD、透視攝影、劑量分佈



A preliminary study on the dose evaluation outside the field of view by using the abdominal fluoroscopy

Ming-Jhe Wu¹, Tian-Yu Shih^{1,2}, Kai-Yuan Cheng^{1,*}

¹Department of Medical Imaging and Radiological Sciences

Central Taiwan University of Science and Technology

² Department of Radiology, Cheng Ching Hospital at Chung Kang

***Corresponding author : kycheng@ctust.edu.tw**

Abstract

In this study, TLDs (TLD-100H) were placed in the chest area of ATOM Adult Male Phantom, the doses received by critical organs within the chest area during abdominal fluoroscopy were evaluated to assess the distribution of the radiation dose during fluoroscopy.

TLDs were placed in the critical organs of the chest and irradiated with a fluoroscopy unit with 15 x 15 cm² field size. X-ray tube was placed above the table for 1, 2, 3 and 4 minutes exposure time and X-ray tube under table for 1 minute exposure time.

The X-ray tube placed above the table and irradiated for 1-4 min, radiation doses of the critical organs within the chest area were increased by exposure time. The doses of the chest critical organs with the X-ray tube above and under table for 1 minute exposure time were calculated as follows respectively, Apex (48.09±19.41 vs. 44.43±13.74 uGy), Hilus (366.12±114.61 vs. 681.32±65.44 uGy), Lung base (825.93±195.01 vs. 2433.48±1010.90 uGy), Heart (965.60±45.49 vs. 258.73±86.17 uGy), Left breast (89.05±38.23 vs. 0 uGy) and Right breast (119.93±63.07 vs. 0 uGy).

Scatter dose will increase by exposure time. X-ray tube placed above and under the table, the radiation dose to the critical organs will also be different.

Keywords : TLD, Fluoroscopy, Dose distribution



利用逆運算疊代法從冠狀動脈疾病患者之臨床數據預測其血管狹窄程度

蕭閔峯¹、潘龍發²、潘榕光^{1,*}

¹中臺科技大學醫學影像暨放射科學系 碩士生

²國軍台中總醫院 心導管室技術長

³中臺科技大學醫學影像暨放射科學系 教授

*通訊作者：lkpan@ctust.edu.tw

摘要

本研究是針對冠心病患者接受冠狀動脈血管造影前，利用逆運算分析評估冠心病危險因子與血管實際狹窄程度之關聯性，決定患者是否需進一步接受血管內超音波以確定該血管之功能是否足夠。我們收集93例接受心導管檢查的病患資料，並包括5種相關冠心病危險因子(年齡、體表面積、平均血壓、血糖、低密度膽固醇)及血管狹窄程度，用16個相關數據制定一個一次式非線性方程式，來預測血管實際狹窄程度數值。將所有數據利用正規化方式將把所有數值歸納於 -1 ~ +1之間，再把所有的數據套入逆運算分析中，即求得危險因子與狹窄程度的關係。而實驗的結果求得關聯度之常數 $R^2=0.89$ ，各危險因子參數分別為0.33、0.67、0.84、-0.08、1.17，而低密度膽固醇的影響較大，所以在未來能運用此模型預測出病人的血管狹窄程度，進而判斷是否需要進一步檢查，以降低醫療浪費或誤診的狀況產生。

關鍵字：冠狀動脈血管造影、冠心病、逆運算



Revised inverse problem algorithm-based prediction of coronary artery stenosis readings from the clinical data of patients with coronary heart diseases

Min-Feng Xiao¹, Lung-Fa Pan², Lung-Kwang Pan^{1,*}

**¹Department of Medical Imaging and Radiological Sciences
Central Taiwan University of Science and Technology**

² Department of Cardiology, Taichung Armed Forces General Hospital

***Corresponding author : lkpan@ctust.edu.tw**

Abstract

This study assessed the risk factors for coronary heart disease patients undergone coronary angiography using the inverse problem algorithm-based technique. In the study, Data collected from 93 patients who underwent cardiac catheterization and included five associated risk factors for coronary heart disease (age, body surface area, mean blood pressure, blood glucose, low density cholesterol) and vascular stenosis, with 16 terms of Non-linear equation to predict the actual degree of vascular stenosis. All data were first to be normalized between -1~+1, and then all the data were taken into the inverse analysis, that is, to obtain the relationship between the risk factor and the degree of stenosis. The results were obtained $R^2 = 0.89$, and the risk factor parameters were 0.33、0.67、0.84、-0.08、1.17 for single factor contribution, and low-density lipoprotein cholesterol was shown as dominant impact. The revised technique could be used either to predict the patient's degree of vascular stenosis, or to determine whether needing for further inspection to reduce the medical waste or misdiagnosis of the situation as well.

Keywords : Coronary angiography 、 Coronary Heart Disease 、 Inverse problem



利用等效衰減及空間結構指標之皮質骨及骨小樑結構分析

林冠妤¹、陳佳惠²、謝玲鈴^{3,*}

¹中臺科技大學醫學影像暨放射科學系 碩士生

²中臺科技大學醫學影像暨放射科學系 助理教授

³中臺科技大學生物科技暨醫學工程研究所 教授

*通訊作者：llhsieh@ctust.edu.tw

摘要

現今骨質密度主要以雙能X光吸收術 (dual-energy x-ray absorptiometry, DEXA) 掃描後計算獲得，然而，DEXA受到病人體厚、腹部脂肪含量與骨骼結構的影響使結果高估或低估的誤差存在，為了計算並找出各種骨骼生理參數間的關係，以提升骨質密度評估的準確性，本研究利用電腦斷層影像分析骨頭內結構，並計算平面骨質密度 (areal bone mineral density, aBMD)、體積骨質密度 (volume bone mineral density, vBMD) 及骨小樑分數 (trabecular bone score, TBS)，找出參數間之關聯性。本研究採用了20例腹部電腦斷層影像，於影像中定出腰椎有興趣區域後，接著以灰階平方差計算TBS，並分析與平面及立體骨質密度間的關聯性。根據實驗後的結果顯示，年齡與TBS間相關性是0.65；而TBS與vBMD的的相關性是0.65。從研究結果中發現到，藉由TBS分析可準確的評估病人骨量及強度，並可應用於臨床上評估病人骨骼品質及進一步推算vBMD。

關鍵字：平面骨密度、體積骨質密度、骨小樑分數



Cortical and trabecular bone structure analysis using equivalent attenuation coefficients and spatial-structural indices

Guan-Yu Lin¹, Chia-Hui Chen¹, Ling-Ling Hsieh^{1,2,*}

¹ **Department of Medical Imaging and Radiological Sciences**

Central Taiwan University of Science and Technology

² **Graduate Institute of Biotechnology and Biomedical Engineering**

Central Taiwan University of Science and Technology

***Corresponding author : llhsieh@ctust.edu.tw**

Abstract

Bone mineral density is critical to patient's bone strength. Dual-energy x-ray absorptiometry (DEXA) is a common method to measure bone mineral density (BMD) of patient in clinical. However, the BMD values measured using DEXA are strongly influenced by body thickness, abdominal fat content and bone structure. In this study, the relationships between areal bone mineral density (aBMD) , volume bone mineral density (vBMD) and trabecular bone score (TBS) were evaluated using computed tomography (CT) images. The abdominal CT images were collected from 20 patients who have been confirmed to be free from bone diseases. The aBMD, vBMD and TBS from variogram were calculated from each lumbar spines. According to results, the TBS was inversely proportioned with age with correlation coefficient (r^2) of 0.65 and was proportioned with vBMD with r^2 of 0.65. In conclusion, TBS is a useful index for evaluating the quality of bone and can be used for further estimating vBMD of patients in clinical.

Keywords : areal bone mineral density, volume bone mineral density, trabecular bone score



台灣 IGRT 系統影像品質與導引位置準確性調查研究

楊程鈞^{1,2}、蕭安成^{3,4}、黃佩筠^{1,2}、顏妙蓉²、陳信雄^{5,*}

¹中臺科技大學醫學影像暨放射科學系 碩士生

²中華民國醫學物理學會 研究助理

³中華民國醫學物理學會 理事長

⁴中國醫藥大學附設醫院腫瘤治療科 物理師

⁵中臺科技大學醫學影像暨放射科學系 副教授

*通訊作者：hhchen@ctust.edu.tw

摘要

影像導引放射治療（IGRT）技術的應用在於使用治療設備所附帶的成像系統，於病患治療擺位完成後擷取治療前的解剖影像資料，同時與電腦治療計畫的影像資料作比對。依據比對差異修正病患的位置後才給予照射治療，本研究目的為建立IGRT品保計畫，並於國內各醫院進行基礎資料蒐集、實測與結果分析。

參考AAPM TG-142和TG-58及TG-104號報告的做法，同時徵詢國內臨床單位的意見與參與，針對國內不同機型的影像導引系統，共同制訂IGRT品保計畫；包括作業項目、作業程序書及建議容許誤差值。本研究共執行79台醫用直線加速器及19台電腦斷層治療機IGRT系統的品保作業訪查，主要項目包括成像系統的機械運動位置準確性，影像品質及影像導引治療床位移準確性，並統整分析訪查結果。

本研究完成資料蒐集、人員訓練及制訂適用於國內醫療院所使用之影像導引系統品保作業導則與作業程序書，同時依據訪查資料建立了各項目的建議誤差容許值。在影像與治療座標中心一致性校驗的部分，依據訪查結果分析，所有系統的差異皆在2mm內，而2D MV、2D kV系統有超過85%；CBCT系統約有73%的量測資料其各軸的差異在1.0mm內。在影像導引治療床位移準確性的部分，訪查結果顯示CBCT系統在兩種臨床常用的影像掃描模式有高於85%的量測數據其位移準確性在1.0mm內。

本研究率先完成國內放射治療影像導引系統品保作業的建立與實測分析。依據統計分析資料，對於各作業項目的建議容許誤差值做出適當的調整，以達到提升影像導引系統作業品質與實際應用可行的目的。該研究資料將提供原子能委員會(AEC)作為研議提升醫療品質的參考。



關鍵字：放射治療、影像導引放射治療品保、CBCT



A Recent Survey on the Image Quality and Position Accuracy of Image-Guided Radiation Therapy Systems in Taiwan

**Cheng-Jyun Yang^{1,2}, An-Cheng Shiau^{2,3}, Pei-Yun Huang^{1,2}, Miao-Jung Yen²,
Hsin-Hsiung Chen^{1,*}**

¹ **Department of Medical Imaging and Radiological Sciences
Central Taiwan University of Science and Technology**

² **Chinese society of medical physics**

³ **Department of Radiation Therapy and Oncology China Medical University
Hospital**

***Corresponding author : hhchen@ctust.edu.tw**

Abstract

Image-guided radiation therapy (IGRT) use imaging technology to acquire anatomical images of patients after the completion of patient set-up, and adjust patient position by comparing these images with those in the treatment planning before the treatment. This study aimed to establish the IGRT quality assurance program and to survey on the image quality and position accuracy of the IGRT systems in Taiwan accordingly.

Referring to reports of the AAPM TG-142, TG-58, and TG-104, and consulting to the clinical department, the initial version of IGRT QA program was established. The QA program included check items, operating procedures, and recommended tolerance value. A total of 79 linear accelerators and 19 Tomotherapy IGRT systems were surveyed in this study. Major items of the QA program included mechanical position accuracy of the imaging device, image quality, and accuracy of the image-guided positioning. The survey data were analyzed and the QA procedure, especially for the recommended tolerance values were adjusted accordingly.

The data collection of IGRT equipments in Taiwan, personnel training, the IGRT QA program, and the recommended tolerance values were accomplished in this study. According to the results of item of imaging and treatment coordinate coincidence, the differences were less than 2 mm for the all survey data, and the 2D MV or kV imaging systems had more than 85% and the cone-beam computed tomography (CBCT) system had approximately 73% of the surveys with the differences within 1.0 mm. Regarding the accuracy of image-guided positioning, the CBCT systems in two major imaging mode showed more than 85% of the surveys were within 1.0 mm.

This study is the first to develop the IGRT QA program in Taiwan. Based on the statistical analysis of the survey data, appropriate adjustments for the recommended



tolerance values were applied. The present study will be provided to the AEC as a reference for the improvement of radiation safety and dosimetry quality.

Keywords : Radiotherapy, IGRT QA, CBCT



以空間矩陣 TLD 佈點模式劑量 X 光是經胸部攝影之空間劑量研究

黃德發¹、林政勳^{2,*}

¹中臺科技大學醫學影像暨放射科學系 碩士生

²中臺科技大學醫學影像暨放射科學系 副教授

*通訊作者：jslin@ctust.edu.tw

摘要

主輻射之外的病人周遭的空間劑量為何?病人家屬協助攙扶病人受到多少散射輻射?本研究以熱發光劑量計(TLD-100H)探討空間輻射劑量分佈。以80顆TLD-100H (Harshaw,美國),在X光室的等中心點(isocenter)四周的140 180cm²空間中,以每20公分間距進行空間佈點。使用日本Shimadzu X光機,以110kVp、3.2mAs、FOV:40×40 cm²、SID: 100 cm 的條件對Chest Phantom N1 “Lungman”(Kyoto Kagaku,日本)假體進行20次攝影,以描述性分析統計之。研究結果得知在主射束下100公分的劑量平均為116.2μGy,散射平均劑量為4.1μGy,而背景值的平均劑量為0.145μGy。X光機的主要劑量分佈在主射束範圍內,雖然主射束外的散射劑量明顯的低,但在X光機的扇形射束下,發現周圍的空間劑量有明顯的方向性,陰極方向劑量高於陽極。

關鍵字：熱發光劑量計、矩陣、輻射劑量分布



Radiation dosimetry for diagnostic medical exposures with TLD array arrangement

Te-Fa Huang, Cheng-Hsun Lin*

Department of Medical Imaging and Radiological Sciences

Central Taiwan University of Science and Technology

***Corresponding author : jslin@ctust.edu.tw**

Abstract

What is the spatial dose around the patient under main radiation? How much dose received by the patient's family when the X-ray exposed? In the Study, The authors aimed to estimate scatter dose distribution by thermometer dosimeter (TLD) from chest examinations on patients. Applied 80 chips TLD-100H (Harshaw, USA) and arranged in a 140x180 cm² space around the X-ray machine 20 cm separated to each other. The Chest Phantom N1 "Lungman" (Kyoto Kagaku, Japan) was exposed 20 times with the parameters of 110 kVp, 3.2 mAs, FOV: 40 40 cm², SID: 100 cm. The results showed that the average dose of 100 cm in the primary beam was 116.2μGy, the average scattering dose was 4.1μGy, and the average value of background value was 0.145μGy. The radiation dose is found majorly in the pathway of primary beam in contrast that the scatter radiation is counted lower aside. The X-ray dose distribution in a phan shape and found the cathode side dose higher than that at anode one.

Keywords : Thermal dosimeter, matrix, radiation dose distribution



以壓克力假體及半導體計量器量測 64 切電腦斷層儀器之散射輻射
Measurement of scatter radiation in 64-slice ct scan room using
acrylic phantom and semiconductor dosimeter

Le Hai Hanh Tien^{1,2}, Cheng-Hsun Lin^{1,*}, Lung-Kwang Pan¹

**¹ Department of Medical Imaging and Radiological Sciences
Central Taiwan University of Science and Technology**

² Pham Ngoc Thach University of Medicine, Vietnam

***Corresponding author : jslin@ctust.edu.tw**

Abstract

The purpose of this study was to evaluate scatter radiation dose of family member of patient during routine chest CT at different positions around the gantry and to investigate the degree of dose reduction for them when using lead apron. Acrylic phantom that simulated family member was put at 4 positions around the gantry: in front of gantry and 300 from isocenter, in front of gantry and 450 from isocenter, in the back of gantry and 300 from isocenter, in the back of gantry and 450 from isocenter. All 4 measurement points were in the left side of the CT couch and 80cm away from patient isocenter. Semiconductor was attached to the phantom at the height equal to CT table to evaluate entrance skin dose (ESD). There were 2 scenarios were implied: with and without wearing lead apron. Routine chest CT protocol was applied at a teaching hospital with constant kVp (120) and scan length (320mm) but changing dose length product (DLP) from 378mGy*cm to 629.9mGy*cm in 2 increments. The results shown that scatter doses in front of gantry were higher than in the back of gantry (32.44%) in both scenarios. Doses at 450 from isocenter were higher than at 300 (12.13%) for both in the back and front of gantry, with and without lead apron. However, the differences between doses among measurement points were not consistent with different DLPs. Using protective apron can reduce original dose to 6.8%. Hence, standing at 300 or at 450 from patient isocenter at the same distance were acceptable due to insignificant different doses between them. Wearing lead apron can reduce secondary radiation significantly, therefore it is strongly recommended in clinical application.

Keywords : Computed tomography, acrylic phantom, semiconductor dosimeter, scatter radiation



牙科植體用 Ti-Nb-Mo 合金表面之顏色及耐蝕性研究

李佩錡¹、許學全^{2,*}

¹中臺科技大學牙體技術暨材料系 碩士生

²中臺科技大學牙體技術暨材料系 教授

*通訊作者：hchs@ctust.edu.tw

摘要

Ti-Nb-Mo合金具有較高的強度/彈性模數比，可應用於牙科植體。本研究探討著色後Ti-Nb-Mo合金的顏色和耐蝕性。在 NH_4BF_4 溶液中，以不同電壓下陽極氧化時，Ti-Nb-Mo合金表面可產生黃色、黃棕色、深藍色、藍綠色和桃紫色。使用XPS測量陽極氧化層的厚度範圍為2.68至293.97 nm，可以觀察到，通過增加陽極氧化電壓會增加氧化膜的厚度。試片在Hank's溶液中OCP曲線顯示，Ti-Nb-Mo合金可以快速形成穩定的鈍化層。從動態極化曲線獲得腐蝕電位在-0.52~-0.40 V。腐蝕速率範圍為 $0.01\sim 0.21 \mu\text{A cm}^{-2}$ 。總而言之，Ti-Nb-Mo合金的陽極氧化層的顏色和厚度可以由陽極氧化電壓改變。電壓陽極氧化後Ti-Nb-Mo合金的腐蝕速率降低。其中在30 V下陽極氧化的試片有最低的腐蝕速率。

關鍵詞：鈦合金、陽極氧化、顏色、耐蝕性



Color and Corrosion Resistance of Anodized Ti-Nb-Mo Alloy for Dental Implant Application

Pei-Chi Li, Hsueh-Chuan Hsu *

Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology

*Corresponding author: hchsu@ctust.edu.tw

Abstract

Ti-Nb-Mo alloy was developed with a higher strength/modulus ratio for biomedical application. In this study, the surface color and corrosion properties of Ti-Nb-Mo alloy were investigated. We have successfully produced different colored surfaces of Ti-Nb-Mo alloy during anodizing at different voltages in NH_4BF_4 solution. Ti-Nb-Mo alloy could exhibit light-yellow, yellow-brown, dark-blue, blue-green and peach-purple at different voltage. The thickness of anodizing layer was measured by XPS. It could be seen that by increasing the anodizing voltage and consequently increasing the anodic film thickness. The open circuit potential (OCP) of samples in Hank's solution were in the range of -0.20 V to -0.37 V. The OCP curves show that Ti-Nb-Mo alloy could quickly form a stable passivation layer. The corrosion rate of the anodized samples (10 V~50 V) and the non-anodized sample (0 V) were tested by potentiodynamic polarization in Hank's solution. The results show that corrosion potentials were in the range of -0.52~-0.40 V. The corrosion rate of the non-anodized sample was $0.21 \mu\text{A cm}^{-2}$, while after applying the anodizing layer, the corrosion rates were in the range of $0.01\sim 0.12 \mu\text{A cm}^{-2}$. In summary, the color and thickness of the anodizing layer of Ti-Nb-Mo alloy were changed by the anodizing voltage. The corrosion rate of Ti-Nb-Mo alloy has decreased after applying the anodizing layer. Among the anodized samples, the lowest corrosion rate was for the sample anodized at 30 V.

Keywords : Titanium alloy, Anodize, Color, Corrosion resistance



牙科氧化鋯植體表面以多巴交聯接枝胜肽之抗菌評估

葉怡辰¹、許世光²、吳世經^{3,*}

¹ 中臺科技大學牙體技術暨材料系 碩士生

² 中臺科技大學牙體技術暨材料系 副教授

³ 中臺科技大學牙體技術暨材料系 教授

*通訊作者: scwu@ctust.edu.tw

摘要

氧化鋯顏色與天然齒相似，其具有良好的生物相容性和優異的機械性能，使其廣泛應用於牙科領域。除了作為牙科贗復物外，在植牙領域的應用也蓬勃發展。然而，感染是臨床應用中最嚴重的問題之一。作為植入材料，抗菌能力是減少感染的重要因素。本研究利用在氧化鋯表面塗覆抗菌胜肽，作為預防感染的策略。

本研究使用L-多巴作為交聯劑，將兩種抗菌胜肽（ABP I和ABP II）固定在氧化鋯（3Y-TZP）的表面上。然後，通過與細菌共培養來評估其抗菌能力。本研究中選擇變形鏈球菌和伴放線桿菌分析抗菌活性並觀察生物膜型態。

結果顯示，利用L-多巴作為交聯劑，可以成功地將抗菌胜肽接枝在3Y-TZP試片表面。體外試驗顯示這兩種抗菌肽均具有抑制伴放線桿菌和變形鏈球菌生長的能力，ABP II對*A. actinomycetemcomitans*的抗菌效果比對*S. mutans*效果好。此外，由WST-1活性觀察，MG-63成骨細胞的增殖顯著增加，這意味著在抗菌肽接枝後，並沒有抑制骨細胞生長。

關鍵字：氧化鋯、多巴、抗菌胜肽、變形鏈球菌、伴放線桿菌



Evaluation of Antibacterial Ability of Peptide Immobilized Dental Zirconia Implant Using L-Dopa as Cross-linker.

Yi-Chen Ye, Shih-Kuang Hsu, Shih-Ching Wu*

**Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology**

*** Corresponding author: scwu@ctust.edu.tw**

Abstract

Zirconia is similar in color to human teeth. The good biological compatibility and excellent mechanical properties have made them widely used in dentistry. In addition to the using in dental prosthesis, the application in dental implant field is vigorous expansion now. However, infection is one of the most serious problems in clinical applications. As an implant material, the antibacterial ability is a very important factor to reduce the infection. This study proposes coating antibacterial peptides on the surface of zirconia as an ideal strategy of preventing infection.

Two kinds of antibacterial peptides (coded by ABP I and ABP II) were immobilized on the surface of yttria-tetragonal zirconia polycrystal (3Y-TZP) using L-dopa as cross-linker. Then, the antibacterial activities were evaluated by co-culture with bacterium. In this study, *Streptococcus mutans* and *Actinobacillus actinomycetemcomitans* were chosen for analyzing of antibacterial activity and observing of biofilm morphology.

The results revealed that the antibacterial peptides can be successfully grafted on the surface of 3Y-TZP in this study. In vitro assay revealed that both of these two antibacterial peptides showed good antibacterial abilities. From the antibacterial point of view, ABP II is more effective for *A. actinomycetemcomitans* than for *S. mutans*. In addition, a significant increase in MG-63 osteoblast cell proliferation was observed from WST-1 activity. It meant that there is no inhibition of osteoblast cell activity after grafting the antibacterial peptides.

Keywords : Zirconia, L-dopa, antibacterial peptides, *Streptococcus mutans*, *Actinobacillus actinomycetemcomitans*.



牙科植體用多孔 Ti-Nb-Sn 合金特性之研究

劉子瑄¹、許學全^{2,*}

¹ 中臺科技大學牙體技術暨材料系 碩士生

² 中臺科技大學牙體技術暨材料系 教授

*通訊作者：hchs@ctust.edu.tw

摘要

Ti-Nb-Sn 新型鈦合金含有具有良好生物相容性，耐腐蝕性和低彈性模數，本研究期望製作成多孔合金以適合用於牙科植入物。以 Ti、Nb 和 Sn 的金屬粉末配製成 Ti-25Nb-8Sn (Ti-25wt.%Nb-8wt.%Sn)。將 Ti-25Nb-8Sn 粉末與聚乙醇醇(PVA)混合，然後添加三種不同比例 50%，60% 和 70% 的碳酸氫銨(NH₄HCO₃)。SEM 觀察顯示，多孔 Ti-25Nb-8Sn 合金的孔徑在 0.5~750μm 的範圍內。多孔 Ti-25Nb-8Sn 合金的孔隙率為 50.69~67.00%，抗壓強度為 110.03~27.01MPa，彈性模數為 6.37~0.52GPa。在 SBF 溶液中浸泡 4 天後，在鹼熱處理的多孔 Ti-25Nb-8Sn 合金表面上覆蓋一層緻密的磷灰石層。在這項研究中，製造的多孔 Ti-25Nb-8Sn 合金顯示與天然骨相似的抗壓強度和彈性模數，並且將來可能是一種很好的骨替代材料。

關鍵字：多孔鈦合金、粉末冶金、鹼熱處理、生物活性



Characteristics of the porous Ti-Nb-Sn alloy for dental implant applications

Tzu-Hsuan Liu, Hsueh-Chuan Hsu *

Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology

*Corresponding author : hchsuh@ctust.edu.tw

Abstract

The new titanium alloy contains Nb and Sn elements which has good biocompatibility, corrosion resistance and low modulus of elasticity. However, the mismatch of Young's modulus between Ti alloys and bones would cause bone resorption and implant loosening. Thus, the porous alloy is expected to be suitable for bone implants. Commercial elemental metal powders of Ti, Nb and Sn were weighed to form a nominal composition of Ti-25Nb-8Sn (Ti-25wt.%Nb-8wt.%Sn). The Ti-25Nb-8Sn powders were mixed with a polyvinyl alcohol (PVA) binder, and then with 50 vol.%, 60 vol.%, and 70 vol.% of ammonium hydrogen carbonate (NH_4HCO_3). SEM observations showed that the porous Ti-25Nb-8Sn alloys had pore sizes in the range of 0.5 ~ 750 μm . The porous Ti-25Nb-8Sn alloys were revealed to have a porosity of 50.69 ~ 67.00 %, a compressive strength of 110.03 ~ 27.01 MPa, and an elastic modulus of 6.37 ~ 0.52 GPa. After immersed in an SBF solution for 4 days, a dense apatite layer covered on the surfaces of the alkali-heat treated porous Ti-25Nb-8Sn alloys. In this study, the fabricated porous Ti-25Nb-8Sn alloy shows the similar compressive strength and elastic modulus with the natural bone, and has the potential to be a good bone substitute material in the future.

Keywords : Porous titanium alloy, powder metallurgy, alkali-heat treatment, bioactivity



105CHS-MD-004

靜電紡絲法製作氫氧基磷灰石/明膠/聚乙烯醇作為骨再生奈米纖維支架之評估

張亦如¹、姚俊旭²、吳世經^{3,*}

¹ 中臺科技大學牙體技術暨材料系 碩士生

² 中國醫藥大學生物醫學影像暨放射科學學系 教授

³ 中臺科技大學牙體技術暨材料系 教授

*通訊作者：scwu@ctust.edu.tw

摘要

靜電紡絲是一種可以得到高的比表面積及孔隙率的新穎材料製造技術，許多植入物和人工組織結構均可用此方法製作，特別是生物降解聚合物，更適合這種方法。本研究擬結合無機和有機成分的生醫材料，利用靜電紡絲技術製作奈米纖維支架，評估其應用於骨再生的適切性。

本研究將明膠與聚乙稀醇配製成溶液後，摻入不同比例之氫氧基磷灰石奈米粒子，利用靜電紡絲技術製作奈米纖維支架，而後以戊二醛進行交聯。製作完成之奈米纖維支架以傅立葉轉換紅外線光譜儀鑑定化學結構；以掃描式電子顯微鏡進行表面形態觀察；並以細胞存活率、鹼性磷酸酶活性、細胞貼附及增殖等方法進行生物活性評估。

本研究成功以靜電紡絲方法，製作出含氫氧基磷灰石顆粒之奈米纖維支架，其優異的生物活性，具有運用在骨再生的潛力。

關鍵字：靜電紡絲、氫氧基磷灰石、骨再生



Evaluation of Electrospun Hydroxyapatite/Gelatin/Poly(vinyl)alcohol Nanofibrous Scaffold for Bone Regeneration

Yi-Ru Zhang¹, Chun-Hsu Yao², Shih-Ching Wu^{1,*}

**¹Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology**

**²Department of Biomedical Imaging and Radiological Science
China Medical University**

***Corresponding author : scwu@ctust.edu.tw**

Abstract

Electrospinning is a good manufacturing technique that can achieve products with high specific surface area and porosity. This producing method is suitable for many implants and artificial tissue substances, especially suitable for biodegradable polymer materials. In this study, the preparation of nanofibrous scaffold by electrospinning technique in combination of inorganic and organic components was proposed for the application in bone tissue engineering.

Various proportions of hydroxyapatite nanoparticles were added into the gelatin and poly(vinyl)alcohol solution. Then, nanofibrous scaffolds were obtained by the electrospun process. Finally, cross-linking was performed by using glutaraldehyde to obtain stable nanofibrous scaffolds. Chemical structure and morphology were characterized by fourier transform infrared spectroscopy (FTIR) and scan electron microscopy (SEM), respectively. In addition, the biocompatibility was evaluated by in vitro studies, including MTT and alkaline phosphatase activity assays (ALP) tests.

Using electrospinning technique, hydroxyapatite nanoparticles were successfully added into the nanofibrous scaffolds in this study. The excellent biocompatibility of these nanofibrous scaffolds indicated the potentiality for tissue engineering applications.

Keywords : Electrospinning, Hydroxyapatite, Bone Regeneration



利用電化學沉積法於鎂表面披覆二水磷酸鈣塗層之體外研究

黃曉玫¹、許世光^{2,*}

¹ 中臺科技大學牙體技術暨材料系 碩士生

² 中臺科技大學牙體技術暨材料系 副教授

*通訊作者：sksheu@ctust.edu.tw

摘要

鎂是屬於可生物降解的金屬植入生醫材料，常應用於骨科醫療手術中。為了改善鎂金屬在生理環境下降解速度過快之缺陷，並提升其生物活性，本研究利用電化學沉積方法，於鈣磷溶液中將dicalcium phosphate dehydrate（二水磷酸鈣，DCPD）披覆於鎂金屬表面。披覆DCPD之鎂試片，再分別以掃描電子顯微鏡（SEM）觀察其表面形貌、以X光繞射分析儀（XRD）分析其結晶相的變化，以及利用電化學方法評估其耐腐蝕行為。依據XRD分析結果顯示，此沉積之披覆層主要成分由具良好結晶相的DCPD所組成；由SEM觀察中發現此披覆層沉積緻密且均勻，呈現片狀結構；電位極化曲線分析顯示，披覆DCPD之鎂試片，在PBS溶液中顯現出較高的極化曲線，亦即是耐腐蝕性明顯提升。在生物相容性測定中，與MG63骨母細胞共培養1天後，發現生長於披覆DCPD之鎂試片表面的細胞貼附較為平坦且偽足呈現伸展的型態。由上述初步研究結果顯示，DCPD披覆層能有效提升鎂金屬的耐腐蝕性並增進其生物活性。

關鍵字：生物降解材料、鎂、電化學沉積、耐腐蝕性



In vitro study of magnesium coated with dicalcium phosphate dehydrate using electrodeposition method.

Hsiao-Mei Huang, Shih-Kuang Hsu*

**Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology**

***Corresponding author : sksheu@ctust.edu.tw**

Abstract

Magnesium (Mg) is potential biodegradable implant material for orthopedics application. In order to improve its bioactivity and corrosion resistance in physiological environment, in this study, Mg coated with dicalcium phosphate dehydrate (DCPD) was performed in calcium phosphate solution by electrodeposition methods. The surface morphology, phase structure and corrosion behavior were evaluated by scanning electron microscopy (SEM), X-ray diffractometry (XRD), and electrochemical method. According to the XRD analysis, the as-deposited coating mainly consisted of well-crystallized DCPD, the morphology of deposited Ca-P coatings were observed by SEM, the crystallization appeared to be dense and homogeneous. From the potentiodynamic polarization curve analysis, the potential curve of Ca-P coated magnesium was significantly higher than that of uncoated Mg in PBS solution. In biocompatibility assay, the MG63 osteoblast cells significant extended the pseudopodia and flat onto Ca-P coated Mg compared to uncoated after culturing for 1 day. Preliminary results revealed that the DCPD coated Mg could enhance the corrosion resistance and bioactivity.

Keywords : Biodegradable materials, Magnesium, Electrodeposition, Corrosion resistance



矽藻培養及抗氧化活性分析

田怡茜¹、賴素媛^{2,*}

¹ 中臺科技大學食品科技系 碩士生

² 中臺科技大學食品科技系 教授

*通訊作者：sylai@ctust.edu.tw

摘要

矽藻是自然界中種類最多的單細胞藻類，已有研究指出矽藻多醣具有抗氧化、抗癌之活性。本研究使用台中港取得之矽藻TPC14 (*Odontella sinensis*)，首先以f/2培養基在溫度25℃、光照/黑暗週期為14/10小時下培養14天，建立其生長曲線。接著使用不同培養基f、3/2f、2f、5f及L1培養，每天取樣、計數細胞數並繪製生長曲線圖，並在培養第14天萃取總醣，利用酚硫酸法測量醣類含量並以DPPH、ABTS自由基清除能力測定其抗氧化活性。結果顯示f培養基所培養之TPC14其細胞數最高，在培養第14天約達到 82×10^5 個細胞/L。矽藻培養所得到之胞外可溶性聚合物其含量約為0.52 mg/L、胞外附著性聚合物約為0.06 mg/L、胞內碳水化合物之含量約為0.06 mg/L、殘餘碳水化合物則約為2.68 mg/L。我們的實驗證實粗萃之殘餘碳水化合物具有抗氧化活性，當其濃度為500 ppm時，DPPH自由基清除率約可達93.48% ($EC_{50} = 89$ ppm)，當殘餘碳水化合物濃度達400 ppm時，ABTS自由基清除率約為85.74% ($EC_{50} = 140$ ppm)。

關鍵字：矽藻、*Odontella sinensis*、多醣、DPPH自由基清除能力、ABTS自由基清除能力



Diatom Culture and Analysis of Antioxidant Activity

Yi-Cian Tian, Su-Yuan Lai*

Department of Food Science and Technology
Central Taiwan University of Science and Technology

*Corresponding author : sylai@ctust.edu.tw

Abstract

Diatoms are the most abundant species among the unicellular algae. Researches had shown that polysaccharides from diatoms have the effects of anti-oxidation and anti-cancer. TPC14 (*Odontella sinensis*), diatoms collected from port of Taichung, was cultured using f/2 medium in the condition of 25 °C, light/dark cycle 14/10 hours to establish its growth curve. They were also grown at various culture medium f、3/2f、2f、5f and L1 to find out the optimal culture condition and estimate its total carbohydrate contents by phenol-sulfuric acid method. DPPH and ABTS free radical scavenging effect were used to test the antioxidant activity of the carbohydrates. Our results showed that the highest cell number reached 82×10^5 cells/L at day 14 in medium f. The amount of extracellular soluble polysaccharides and extracellular adhesive polysaccharides obtained from diatom TPC14 were about 0.52 mg/L and 0.06 mg/L respectively. The amount of intracellular carbohydrates and the residual carbohydrates were 0.06 mg/L and 2.68 mg/L, respectively. Our results further demonstrated that the residual carbohydrates of diatom TPC14 had strong scavenging activities *in vitro* on DPPH radical ($EC_{50} = 89$ ppm) and on ABTS radical ($EC_{50} = 140$ ppm).

Keywords : diatom, *Odontella sinensis*, polysaccharides, DPPH scavenging activity, ABTS scavenging activity



製備分子印模聚合物應用於食品中苯甲酸之測定

陳俞雯¹、魏銘琪^{2,*}

¹ 中臺科技大學食品科技系 碩士生

² 中臺科技大學食品科技系 副教授

*通訊作者：mcwei@ctust.edu.tw

摘要

防腐劑為食品添加物的一種，目的是延緩食品的變質及腐敗，其方法是抑制或減緩微生物在食物中的生長。而苯甲酸為食品中常使用防腐劑之一，但在食品添加的過程中，可能會產生添加過量而影響消費者的健康。衛福部食品藥物管理署公告的「食品添加物使用範圍及限量暨規格標準」中苯甲酸及其鈉鹽限制使用量為0.6 g/kg(600ppm)及1.0 g/kg (1000ppm)以下。

分子印模聚合物分別由模板分子、功能性單體、交聯劑、起始劑以及製孔劑五種成分聚合而成，具有專一性及高選擇性、降低樣品基質干擾，可作為快速之樣品前處理方法。本研究開發分子印模聚合物作為固相萃取之吸附劑，使用分光光度計當分析儀器達到簡便及快速檢測苯甲酸之含量。本實驗最佳參數如下：合成分子印模聚合物時間以24小時最佳，固相萃取樣品進樣以pH 2.2、沖洗溶液為pH 10 H₂O，沖提溶液為甲醇，有最好的萃取效果。

比較衛福部公告方法和本研究方法，雖然本研究方法萃取率比公告方法低，但本研究方法可以去除干擾物質，提高專一性，操作簡單、儀器及耗材成本較低，也符合現在所提倡的綠色分析。

關鍵字：防腐劑、苯甲酸、分子印模聚合物、固相萃取



Preparation of Molecular imprinted Polymers for the determination of Benzoic acid in food

Yu-Wen Chen 、Ming-Chi Wei*

**Department of Food Science and Technology
Central Taiwan University of Science and Technology**

***Corresponding author : mcwei@ctust.edu.tw**

Abstract

Preservatives are a kind of food additive. The Purpose is delaying the food spoilage and corruption, its method is used to restrain or delay the microorganism growth of in food. Benzoic acid is one of the most commonly used preservatives in food. Additives are added during the process and may result in excessive additions that affect the health of the consumer. Taiwan Food and Drug Administration (TFDA) have regulated requirement standard for use of food additives, Benzoic acid and its sodium salt are limited to 0.6g/kg (600 ppm) and 1.0g/kg (1000 ppm).

The molecular imprinted polymers(MIP) are composed of template molecular, functional monomers, cross-linker, initiators and porogenic solvents and it can provide high specificity and selectivity, decrease the sample matrix interference, speed up analytic procedure. In this study, molecular imprinted polymers were developed as adsorbents of solid phase extraction to process analysis.

The optimum parameters as follow : Synthetic polymer molecules print template takes 24 hours best, the pH of samples solution as 2.2, wash solution as pH 10 H₂O, elute solution is use Methanol,those could get best extraction.

Comparing declaration methods and MIP method, although this MIP extraction rate lower than the declaration methods, but MIP method could remove interference material, reduce operating time,it is a friendly green analysis.

Keywords : Preservatives 、Benzoic acid 、molecularly imprinted polymers 、solid phase extraction(SPE)



紅蘿蔔渣豆腐乳之製備與其呈味特性

詹詠竣¹、李煜玲^{2,*}

¹ 中臺科技大學食品科技系 碩士生

² 中臺科技大學食品科技系 助理教授

*通訊作者：106412@ctust.edu.tw

摘要

中式豆腐乳已是歷史悠久的發酵食品，具高營養價值及特殊風味，且受大眾喜愛。有別於中式豆腐乳之製程，台式豆腐乳之釀造是先進行鹽漬豆腐，再將鹽滷豆干與米豆麩醪混合進行發酵。近年來，智慧型手機的盛行，在長時間的使用上，會導致眼睛視力的受損，而民眾藉由飲用紅蘿蔔汁來補充維生素A，維持正常的視覺，因此，紅蘿蔔汁的產量增加，而產生大量的紅蘿蔔渣，這些紅蘿蔔渣被視為廢棄物。本研究利用紅蘿蔔渣增加產品的新口味及附加營養價值，以台式豆腐乳的製程製做紅蘿蔔渣豆腐乳，豆腐中添加不同比例之紅蘿蔔渣(0%、10%及20%)與豆米麩醪混合裝罐，進而探討在不同溫度(25、30及35℃)及時間(0、7、14及21天)發酵下之酵素活性及 β -carotene含量變化。

結果顯示，在酵素活性測定上有無添加紅蘿蔔渣之豆腐乳的protease及 α -amylase活性從發酵第0天至第14天有顯著性的增加，於發酵第21天時呈現趨緩，而最佳酵素活性在protease中以無添加紅蘿蔔渣之豆腐乳於35℃與發酵第21天的含量最高(110.4 U/g)，而 α -amylase則是以添加10%及20%紅蘿蔔渣之豆腐乳於35℃與發酵第14天的含量最高(分別為437.6及443.3 S/g)。然而有無添加紅蘿蔔渣之豆腐乳的 β -amylase及 β -glucosidase活性從發酵第0天至第7天中有顯著性的增加，而發酵第7天至第14天呈現趨緩，發酵第14天至第21天中又顯著的增加，而最酵素活性在 β -amylase中以添加20%紅蘿蔔渣之豆腐乳於30℃與發酵第21天中含量最高(1820 U/g)，而 β -glucosidase則是以無添加紅蘿蔔渣之豆腐乳於35℃與第21天中含量最高(108.6 U/g)。最佳的 β -carotene含量在發酵第0天20%含量最高(0.33 mg/g)，添加紅蘿蔔渣之豆腐乳在發酵第0天至第7天有顯著的降低約50%，於發酵第7天至第21天呈現趨緩，0%豆腐乳皆未檢出 β -carotene。綜合以上結果顯示酵素在35℃之活性最佳，而 β -carotene在添加20%紅蘿蔔渣之豆腐乳最佳。

關鍵字：豆腐乳、紅蘿蔔渣、酵素活性



Preparation of sufu with carrot waste and their taste quality

Yong-Jun Zhan, Yu-Ling Lee*

Department of Food Science and Technology
Central Taiwan University of Science and Technology

*Corresponding author : 106412@ctust.edu.tw

Abstract

Chinese sufu was a fermented food and developed for a long time by their high nutritional value and special flavor. Taiwanese sufu was different from Chinese sufu, its fermentation was used salted tofu and rice-soybean koji. In recent years, people use smartphones for a long time will be impaired vision, so they drink carrot juice with vitamin A to maintain normal vision. Therefore, making more carrot juice will produce more carrot waste. In this study, the utilization of carrot waste to increase the product's new taste and additional nutritional value, by manufacturing process of Taiwan sufu the production of sufu with carrot waste, added different proportions of carrot waste (0, 10 and 20%) in tofu with rice-soybean koji combined to ferment, and to evaluate the changes of enzyme activity and β -carotene content of fresh sufu at different temperature (25, 30 and 35°C) and time (0, 7, 14 and 21 days) fermentation.

The results showed, the protease and α -amylase activity from Day 0 to Day 14 was significantly increased of sufu of enzyme activity determination with or without different proportions of carrot waste, and the best enzyme activity of protease of sufu (0%) at 35°C and the fermentation Day 21 was highest content (110.4 U/g), while α -amylase was added with 10% and 20% of sufu with carotene waste at 35°C and the fermentation Day 14 were the highest content (Respectively 437.6 and 443.3 S/g). However, the β -amylase and β -glucosidase activity from Day 0 to Day 7 was significantly increased of sufu of enzyme activity determination with or without different proportions of carrot waste, while the best enzyme activity of β -amylase was 20% of sufu with carotene waste at 30°C and the highest content (1820 U/g) at Day 21, β -glucosidase was the highest content (108.6 U/g) at 35°C and Day 21 of sufu (0%). The β -carotene content of optimum at fermentation Day 0 of sufu (20%) content was the highest, fermentation Day 0 to Day 7 a significant reduction of about 50% in sufu of different proportions of carotene waste, showed a slowdown from Day 7 to Day 21 of fermentation, 0% sufu not detected β -carotene. Conclusion, enzyme activity at 35°C of activity optimal, while the β -carotene at 20% sufu with carotene waste optimal.

Keywords : sufu, carrot waste, enzyme activity



不同加工方法與配方對傳統印尼糯米糕感官與物理特性之影響 及印尼與台灣消費者對其感覺之差異

鄧金蓮¹、郭炯村²、劉伯康^{3,*}

¹ 中臺科技大學食品科技系 碩士生

² 中臺科技大學食品科技系 講師

³ 中臺科技大學食品科技系 助理教授

*通訊作者：106755@ctust.edu.tw

摘要

印尼傳統的糯米糕(Klepon)在印尼是一個最有名的傳統點心，來自於爪哇，是一個內餡包黑糖而外面用椰絲包覆，通常是烹煮過後食用的甜點。他是印尼的一種美食遺產，推展到其他國家將是一項重要的工作。在全球市場擴張的時代，跨文化研究與科學及快速的感官品評評估技術得到了更多的注意，因為研究發現文化因素對食品的接受性和喜好性有顯著性的影響。有別於傳統的描述分析技術，選擇適合項目法（CATA）是一種以消費者品評員進行食品描述分析的快速方法，已被大量使用在評估產品開發和配方的確定及為行銷目的定義消費者有感的關鍵感官特性。本研究的目的是利用9分法和選擇適合分析法評估3個因子所製備的12種糯米糕，包含不同種類的糯米粉（印尼糯米粉，台灣長糯米粉和台灣圓糯米粉），糯米粉百分比（100%和90%）及不同的烹飪方法（煮和蒸）對產品的感官接受性和物理特性的影響，同時了解印尼和台灣消費者對於感官特性感覺上的差異。

本研究招募了120位印尼當地消費者（60位評估煮及60位評估蒸的樣品）使用傳統品評單，和136位台灣消費者（71位評估煮及65位評估蒸的樣品）於品評小室使用電腦化的品評單，評估消費者的喜歡程度、24種感官屬性、5種感官感覺與購買意圖。樣品提供順序使用拉丁威廉方塊設計。質地分析和顏色範圍使用質地分析儀和色差儀進行分析。

研究結果顯示糯米粉的種類和烹飪方法與糯米粉百分比的交互作用影響了印尼消費者對產品的消費者接受性；台灣消費者對產品的消費者接受性則受到糯米粉的種類、糯米粉百分比與烹飪方法與糯米粉百分比交互作用的影響。印尼和台灣消費者都不太喜歡用台灣糯米粉所製作出的糯米糕；印尼消費者最喜歡的產



品，除了傳統配方和烹煮方法的糯米糕外，也喜歡含有10%老麵團且用印尼糯米粉製作且蒸的產品。台灣消費者最喜歡的產品，包含了傳統配方用蒸和煮的糯米糕及10%老麵團且用印尼糯米粉製作產品。選擇適合項目法的結果顯示印尼消費者能夠顯著的區分出樣品的感官特性包含甜味、香蘭味、粘稠性、咀嚼性和硬度而台灣消費者可區分出甜味、黑糖風味、椰子風味和硬度。此外，研究也發現消費者的購買意圖和喜歡程度並沒有相關性。儀器分析的結果也發現糯米粉的種類對彈性，內聚性，回復性有影響；烹飪方式改變了樣品的內聚性，回復性。L和b值；三個因素間的相互作用也影響了內聚性和a值。總而言之，非常有價值的利用科學操作去了解印尼和台灣消費者的消費行為和感官感覺而且本研究對食品開發和跨文化評估也建立了一個邏輯及科學的模式。

關鍵字：感官品評、消費者測試、跨文化研究、糯米糕、選擇適合項目法



Influence on sensory and physical characteristics for traditional Indonesian glutinous rice cakes with different processing methods and ingredients and their differences in the sensory perception between Indonesian and Taiwanese consumers

Nathalia Marshellina Subagyo, Chun-Tsun Kuo, Bo-Kang Liou*

**Department of Food Science and Technology
Central Taiwan University of Science and Technology**

***Corresponding author : 106755@ctust.edu.tw**

Abstract

Klepon, one of popular Indonesian traditional glutinous rice cake from Java, Indonesia, which is a boiled green-colored product filled with brown sugar and coated the grated coconuts in the skin. It is the gastronomic heritage so it need to preserve and introduce other countries. In the age of the global market expansion, a cross-cultural study and the scientific and fast sensory evaluation have gained more attentions because cultural factors will affect the acceptance and preference liking for a food product. Check-all-that-apply (CATA), a consumer-based driven descriptive test, has been widely used to evaluate the product characterizations for development and reformulation of products as well as the identification of the key sensory drivers for marketing in the food industry. The present study was to investigate the sensory and physical characteristics for 6 products, composed of the type of flours (Indonesian glutinous rice flour, Taiwan long glutinous rice flour, and Taiwan round glutinous rice flour), the percentage of flours (100% and 90%) and the cooking method (boiling and steaming), and to understand the differences of the sensory perception between Indonesian and Taiwanese consumers using 9-point hedonic test and CATA questions.

120 Indonesian consumers (60 Indonesian evaluated Indonesian glutinous rice cakes using boiling cooking method and 60 Indonesian evaluated Indonesian glutinous rice cakes using steaming cooking method) in Indonesia and 136 Taiwanese consumers (71 Taiwanese evaluated Indonesian glutinous rice cakes using boiling cooking method and 65 Indonesian evaluated Indonesian glutinous rice cakes using steaming cooking method) in Taiwan voluntarily participated this study and both evaluated the liking degrees, 24 sensory attributes, 5 sensory feelings and the willingness to buy using either paper ballot or computerized ballot. The order of sampling was conducted by the Latin Williams squares design. The texture profile analyzer and chromameter were used to detect texture profile and the CIE Lab range.

The result demonstrated that the flour type and the interaction of cooking method



and the percentage of flour significantly affect the consumer acceptance for Indonesian consumers but the overall likings of Taiwanese consumers were meaningfully influenced on the flour type, the percentage of flour and the interaction of cooking method and the percentage of flour. The both consumers disliked the rice cake made by Taiwan glutinous rice flours. The preferred sample in Indonesian consumers contain a traditional formula and it's with 10% dough cooked by steaming method and the most choices by Taiwanese consumers are traditional formula cooked by the both methods and the product with 10% dough. CATA showed Indonesian consumers could distinguish the sensory attributes such as sweetness, pandan flavor, stickiness, chewiness, and hardness as well as Taiwanese could determinate sweetness, brown sugar flavor, coconut flavor, and hardness. In addition, the result also found the purchase intent could not positively agree with the liking degree. The instrumental analysis indicated that flour type affected the springiness, cohesiveness, and resilience, the cooking method altered the cohesiveness, resilience, L and b value, and the interaction of three factors related the cohesiveness and a value.

In summary, it is very valuable to scientifically understand the consumer behaviors and sensory perceptions for Indonesian and Taiwanese consumers and also to establish a logical and scientific model for the food product development and cross-cultural evaluation.

Keywords : sensory evaluation, consumer test, cross-cultural study, glutinous rice cake, check-all-that-apply method



105CHS-MS-001

液氮儲槽洩漏引發多重風險堆疊衝擊分析-以台灣某液氮儲存區為例

鄭芳宜^{1,*}、謝明宏²

¹中臺科技大學環境與安全衛生工程系 碩士生

²中臺科技大學環境與安全衛生工程系 副教授

*通訊作者：t0988252081@gmail.com

摘要

本文是以國內液氮儲存區液態氮洩漏可能引發之危害為研究主題，探討單一儲槽因外力衝擊造成管線斷裂而導致液態氮外洩事件，其可能引發之連鎖反應與其可能衍生之多重風險堆疊衝擊，並分析與探討可能產生之爆炸危害。經由初步危害分析發現，液態氮洩漏可能造成儲槽破真空而引發沸騰液體膨脹蒸氣爆炸(BLEVE)。但礙於國內最常使用之洩漏模擬軟體ALOHA，其內建之化學物質並不包含液態氮及氮氣，因此本研究利用Bernoulli's principle、Adiabatic Expansion theory及Hopkinson-scaled distance等理論進行爆炸推估與演算，有效的將BLEVE之爆炸危害範圍與其可能衍生之危害衝擊模擬與分析出，並配合製程條件進行後續危害風險分析及探討。

由液氮洩漏所引發儲槽之BLEVE，其爆壓在0.68 barg、0.35 barg及0.21 barg時，其相對危害半徑分別為33 m、24.7 m及15.7 m，不僅會造成廠房、周圍儲槽及公共道路遭受嚴重破壞，更導致嚴重人員傷亡、財產損失、製程中斷等嚴重後果，而其爆炸波會導致周圍之液氮儲槽破裂，產生大量液氮外洩，經半球型洩放擴散模式模擬，結果發現在大氣條件採F等級，且無風狀態下，其引發缺氧(氧氣濃度18%以下)，危害半徑可達77.92 m。從模擬結果得知，只要修正儲槽間高低差之設計及進出料管線之材質與設置方位，便能有效避免前述重大危害之發生。因此若能於設廠前先進行模擬分析，並能據此設置適當之預防及防護措施，可有效預防與降低危害發生之風險。

關鍵字：液氮、沸騰液體膨脹蒸氣爆炸、擴散模擬、多重風險堆疊分析



The Impact Analysis of Overlaped Multi-risks Induced by Liquid Nitrogen Leakage- A Case Study from a Storage site in Taiwan

Fang-Yi Cheng^{*}, Ming-Hong Hsieh

Department of Safety Health & Environmental Engineering

Central Taiwan University of Science and Technology

***Corresponding author : t0988252081@gmail.com**

Abstract

This research focuses on the potential hazards resulted from the leakage of liquid nitrogen from a liquid nitrogen tank in Taiwan, investigating the leaking events of a single tank caused by the rupture of pipeline due to external forces. Possible chain reactions and the multi-risk overlaped impact derived from the leakage were examined, as well as the analysis and exploration of the potential explosion hazards.

By conducting preliminary hazard analysis, it was discovered that the leakage of liquid nitrogen may cause the vacuum loss of the tank, which could possibly lead to boiling liquid expanding vapor explosion (BLEVE). Nevertheless, liquid nitrogen and nitrogen are not available in the chemical database of ALOHA, the most widely utilized leakage simulation software in Taiwan. Therefore, Bernoulli's Principle, Adiabatic Expansion Theory, and Hopkinson-Scaled Distance were applied in the estimation and calculation of explosion in this study.

With the application of these theories, we can effectively simulate and analyze the hazard range of explosion, and the possible hazard impact brought by BLEVE, facilitating the analysis and exploration of hazard risks with the reference of process conditions. The overpressures of BLEVE caused by the leakage of liquid nitrogen were 0.68 barg, 0.35 barg, and 0.21 barg; and the relative hazard distances were 33 m, 24.7 m, and 15.7 m. BLEVE would not only damage manufacturing facilities, near-by tanks, and public roads severely; but also give rise to casualties, property damage, and process interruption. The explosion wave could lead to the rupture of near-by liquid nitrogen tanks, causing a greater amount of leakage. With the simulation of hemispherical diffusion mode, it was observed that by taking F grade under a calm atmospheric condition, the hazard distance of oxygen deficiency (the concentration of oxygen lower than 18%) can reach up to 77.92 m. From the simulation, we can effectively avoid the hazards mentioned above by adjusting the height differences of the tanks and the materials, as well as the positions of the pipelines. Consequently, conducting simulation analysis and taking proper protection measures accordingly prior to the establishment of factories can significantly reduce potential risk, and, furthermore, to prevent the risk from happening.



Keywords : Liquid nitrogen, BLEVE, Multi-risk Overlaps Impact



水力漩流分離器降低水中濁度技術開發與研究

張又仁^{1,*}、徐一量²

¹中臺科技大學環境與安全衛生工程系 碩士生

²中臺科技大學環境與安全衛生工程系 副教授

*通訊作者：lock8232000@gmail.com

摘要

每年颱風季節，大雨侵蝕造成水中夾帶大量砂土，造成水中濁度過高，超過淨水廠可承受，只能直接將水排放，導致停水或限水的情形發生。本研究欲利用水力漩流分離器來分離水中砂粒，降低水中濁度，以符合淨水場處理要求，解決大雨造成水中濁度過高的問題。

本研究以Ansys Fluent進行水力漩流分離器之設計，透過模擬軟體進行水力漩流分離器效能模擬，本研究使用k-epsilon RNG數值模型作為模擬方法，水力漩流分離器基本型直徑120 mm錐長338 mm溢流口直徑55 mm底流口直徑20 mm，先以入口流速2 m/s，分別針對粒徑75 μm 、150 μm 、250 μm 、500 μm 進行模擬測試，探討不同粒徑在水力漩流分離器之分離效率。

模擬結果顯示，當入口流速、溢流口、底流口都不變的情況下，粒徑75 μm ，86%的顆粒從溢流口流出，而14%的顆粒從底流口流出，表示大部分細顆粒從溢流口流出，對細顆粒可達到明顯分離效果。粒徑150 μm 、250 μm 、500 μm ，從底流口流出之比例為100%，表示粗顆粒皆從底流口流出，透過水力漩流分離器可將粗顆粒分離，降低粗顆粒對水中濁度的影響。此水力漩流分離器達到本研究目標，利用離心力將粗細顆粒做分離，粗顆粒經由碰撞後從底流口流出，而細顆粒大部分從溢流口流出，達到粗細顆粒分離效果，當水中砂粒大量減少，就可以快速降低水中濁度，將溢流口之水源進行淨水廠後續流程，減輕淨水場負擔，不會因為濁度過高問題而無法處理，影響民生用水。

關鍵字：水力漩流、顆粒分離、濁度



The Study on Using Hydrocyclone Technology to Decrease Turbidity of the Water

Yu-Jen Chang^{*}, Yi-Liang Shu

Department of Safety Health & Environmental Engineering

Central Taiwan University of Science and Technology

***Corresponding author : lock8232000@gmail.com**

Abstract

Each year the typhoon season, heavy rain erosion caused by a large number of sand in water, resulting in turbidity in water is too high, which over the water plant can withstand. The high turbidity water can only be directly discharged, resulting in water shortage situation. In this study, we use hydrocyclone to separate the sand in the water and reduce the turbidity in the water to meet the requirements of the water treatment field to solve the problem that the turbidity of the water is too high to be treated.

In this study, the design of the hydrocyclone was carried out with Ansys Fluent. The simulation results were carried out by this simulation software. The k-epsilon RNG numerical model was used as the simulation method. The basic hydrocyclone with diameter of 120 mm, Length of 338 mm, overflow hole diameter of 55 mm, bottom flow mouth diameter of 20 mm. The inlet flow velocity is set as 2 m/s. Particle size 75 μm , 150 μm , 250 μm and 500 μm were simulated separated to explore the separation efficiency of hydrocyclone for different sand droplet size .

The simulation results show that when the inlet flow rate, the overflow port and the bottom flow port are set, while the particle size 75 μm , and 86% of the particles flow out of the overflow port, and 14% of the particles flow out of the bottom port, indicating that most of the fine particles escaped from the overflow port, achieved significant separation efficiency. The ratio of the coarse particles to the turbidity of the water is reduced by separating the coarse particles from the bottom flow port through the hydrocyclone. The coarse particles 150 μm , 250 μm and 500 μm are separated from the bottom flow port. The hydrocyclone separates the target, and the coarse particles are separated by centrifugal force. The coarse particles flow out from the bottom flow after the collision, and the fine particles flow out from the overflow port to reach the coarse and fine particle separation effect. The hydrocycle can quickly reduce the turbidity of water, reduced the burden of water purification, high turbidity problems can be handled and solved the problem of water supply.

Keywords : Hydrocyclone, Particle Separation, Turbidity



利用脫水污泥-飛灰複合陶瓷顆粒為生物膜附著介質分解二氯酚之動力研究

吳佳鴻¹、林燕輝^{2,*}

¹中臺科技大學環境與安全衛生工程系 碩士生

²中臺科技大學環境與安全衛生工程系 教授

*通訊作者：yhlin1@ctust.edu.tw

摘要

此研究開發一種數學動力模式系統，描述使用脫水污泥-飛灰複合陶瓷顆粒作為載體介質的固定生物膜反應槽中二氯酚的生物降解動力學。動力模式系統包含基質在生物膜中質量通量的擴散和生物膜中生物降解。此動力模式系統亦包括生物膜的生長、基質在液相中被懸浮微生物分解和懸浮微生物在液相中生長。生物降解以Haldane動力學的機制描述。使用正交搭配法和吉爾積分法解答生物膜動力模式系統。進行批次實驗推求微生物動力參數作為動力模式系統的輸入參數。建立實驗室級的固定生物膜反應槽填充脫水污泥-飛灰複合陶瓷顆粒作為附著介質處理二氯酚污染物以驗證數學模式動力模式系統。數學動力模式系統預測結果二氯酚約93%。

關鍵字：動力模式、脫水污泥-飛灰、複合陶瓷顆粒、生物膜、二氯酚



Kinetics of the biodegradation of 2-chlorophenol in a fixed biofilm reactor using dewatered sludge-fly ash composite ceramic particle as a supporting medium

Chia-Hung Wu, Yen-Hui Lin*

**Department of Safety Health & Environmental Engineering
Central Taiwan University of Science and Technology**

***Corresponding author : yhlin1@ctust.edu.tw**

Abstract

A mathematical model was developed to describe the kinetics of biodegradation of 2-chlorophenol in the fixed-biofilm reactor using dewater sludge-fly ash composite ceramic particle as a supporting medium . The model system incorporates the mechanisms of diffusive mass transport and Haldane kinetics. The kinetic model includes the substrate utilization by biofilm, biofilm growth, substrate utilization by suspended biomass in bulk liquid and the growth of suspended biomass in the bulk liquid. The model was solved using a combination of orthogonal collocation method and Gear's method. Batch kinetic tests were conducted independently to determine the biokinetic parameters used in the model system. A laboratory-scale column reactor was conducted to verify the model system. The model-predicted result shows that the removal efficiency of 2-chlorophenol was approximately 93%.

Keywords : Kinetic model, Dewatered sludge-fly ash, Composite ceramic particle, Biofilm, 2-chlorophenol



酚在固定生物膜反應槽中吸附、脫附與生物降解之動力模式

蔡怡婷¹、林燕輝^{2,*}

¹中臺科技大學環境與安全衛生工程系 碩士生

²中臺科技大學環境與安全衛生工程系 教授

*通訊作者：yhlin1@ctust.edu.tw

摘要

數學動力模式系統用於描述使用活性碳作為支撐介質的好氧固定生物膜反應槽程序中苯酚的吸附和生物降解。模式系統結合活性碳顆粒內表面擴散模式、生物膜生物分解基質模式、生物膜生長模式、液相微生物分解基質模式和液相微生物生長模式。基質生物降解模式主要是用Haldane抑制動力學的機制來描述。使用正交分配法和吉爾積分法的組合來解答該模式系統。利用批次試驗求取吸附參數與微生物動力參數作為活性碳動力模式系統輸入參數。並進行實驗室規模的生物活性碳管柱反應槽以驗證模式系統。生物活性碳動力模式系統預測結果顯示在一個穩定生物活性碳反應槽操作條件下，苯酚的去除效率約為95%。

關鍵字：動力模式、吸附、生物降解、苯酚、固定生物膜反應槽、活性碳



Kinetic model of adsorption, desorption and biodegradation of phenol in a fixed-biofilm reactor

Yi-Ting Cai, Yen-Hui Lin*

Department of Safety Health & Environmental Engineering

Central Taiwan University of Science and Technology

***Corresponding author : yhlin1@ctust.edu.tw**

Abstract

A mathematical kinetic model system was developed to describe adsorption and biodegradation of phenol in an aerobic fixed-biofilm reactor using activated carbon as a supporting medium. The model system incorporates the mechanisms of intraparticle diffusion and Haldane inhibition kinetics. The kinetic model system includes surface diffusion model, substrate utilization by biofilm model, the biofilm growth model, substrate utilization in bulk liquid by suspended biomass and the growth of suspended biomass in the bulk liquid. The model was solved using a combination of orthogonal collocation method and Gear's method. A laboratory-scale column reactor was conducted to verify the model system. Batch kinetic tests were conducted independently to determine the adsorption and biokinetic parameters used in the model system. The model-predicted results showed that the removal efficiency for phenol was approximately 95% at a steady-state condition.

Keywords : Kinetic model, adsorption , biodegradation, phenol, fixed-biofilm, activated carbon



噴漆作業場所勞工重金屬與六價鉻暴露之健康風險評估

吳珮甄¹、賴嘉祥^{2,*}

¹中臺科技大學環境與安全衛生工程系 碩士生

²中臺科技大學環境與安全衛生工程系 副教授

*通訊作者：chlai2@ctust.edu.tw

摘要

工業通風設備製造廠在噴漆過程中，含有金屬的油漆顆粒會依不同粒徑大小分佈在作業場所中，對勞工造成健康上的影響。2017年採集30個工作天之空氣樣本，氣膠樣本是利用Sioutas五階個人式高流量空氣採樣器採集8小時，金屬元素則是利用感應耦合電漿源子發射光譜儀(ICP/OES)進行分析。

在噴漆過程中，最高的質量濃度為粒徑 $>2.5\mu\text{m}$ 之 $15.24\pm 8.53\text{ mg/m}^3$ ，而粒徑 $\text{PM}_{1-2.5}$ 對於總懸浮粒徑質量比值為0.04-0.17， $\text{PM}_{0.25-1}$ 和 $\text{PM}_{<0.25}$ 分別占總懸浮粒徑質量之10.15%和4.34%。在金屬元素濃度方面，濃度最高為鉛($663.70\mu\text{g/m}^3$)和鐵($285.88\mu\text{g/m}^3$)。利用國際放射防護委員會(ICRP)的模式預估重金屬在噴漆勞工呼吸系統之總沉積量約為1.23-29.42 mg/day，其中沉積濃度最高的呼吸系統區域為頭部區域之 $83.57\%\pm 1.82\%$ ，依序為肺泡區域($10.80\%\pm 0.70\%$)及支氣管區域($5.63\%\pm 1.24\%$)。最重要的是，六價鉻於勞工呼吸系統之總沉積量約為28.21-394.04 ng/m³，且六價鉻為噴漆顆粒之重金屬中致癌斜率因子(Slope factor)最高的。

在健康暴露風險評估方面，鎘、鎳、鉻與六價鉻之致癌金屬在總懸浮微粒中的致癌風險值分別為 1.3×10^{-6} ， 7.9×10^{-6} ， 2.01×10^{-3} and 2.2 ± 10^{-5} 。特別的是，勞工的健康風險評估值顯示均超過致癌風險值(10^{-6})，表示噴漆作業場所中是有潛在的致癌風險存在。

關鍵字：粒徑分佈、重金屬、六價鉻、噴漆、健康風險評估



Health Risk Assessment of Workers Exposed to heavy metals and hexavalent chromium in a spray-painting workplace

Pei-Chen Wu, Chia-Hsiang Lai*

Department of Safety Health & Environmental Engineering

Central Taiwan University of Science and Technology

*Corresponding author : chlai2@ctust.edu.tw

Abstract

The health effects of metal-containing paint-particles at various particle-size distributions on workers in a spray painting process at an industrial ventilation equipment manufacturing plant. Samples were collected over 30 working days in 2017. Aerosol samples were collected for 8 h using the 5 impaction stages of Sioutas Cascade Impactor. Metal-containing particles were analyzed using an inductively coupled plasma with optical emission spectroscopy (ICP-OES).

Measurement results show that the particles with the highest mass concentrations were $PM_{>2.5}$ ($15.24 \pm 8.53 \text{ mg/m}^3$). The mass ratios of $PM_{1-2.5}$ to total PM ranged from 0.04 to 0.17. The $PM_{0.25-1}$ and $PM_{<0.25}$ constituted 10.15% and 4.34% of the total PM mass, respectively. The most abundant metal elements in all particle sizes on all sampling days were Pb ($663.70 \text{ } \mu\text{g/m}^3$) and Fe ($285.88 \text{ } \mu\text{g/m}^3$). The total deposition fluxes of heavy metals were estimated at 1.23–29.42 mg/day by the ICRP model, and the region with the highest contribution was the head region ($83.57\% \pm 1.82\%$), followed by the alveolar region ($10.80\% \pm 0.70\%$) and tracheobronchial region ($5.63\% \pm 1.24\%$). Significantly, Cr (VI) of the total deposition fluxes were in the range 28.21–394.04 ng/m³. The inhalation slope factor of Cr (VI) is the highest than that in all carcinogenic metals.

Cancer risks of carcinogenic metals (Cd, Ni, Co and Cr⁺⁶) in total particles were 1.3×10^{-6} , 7.9×10^{-6} , 2.01×10^{-3} and 2.2×10^{-5} for paint spraying process workers. In particular, health risk assessment revealed that the risk values for workers were all above the guidelines of cancer risk (10^{-6}), indicating that there are potential cancer risk in the spray-painting workplace.

Keywords : Size distributions; Heavy metals; Hexavalent chromium; Spray-painting; Health-risk assessment



牙科用 CAD/CAM 氧化鋁切削參數之研究

羅安介¹、吳世經^{2,*}

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學牙體技術暨材料系 教授

*通訊作者：scwu@ctust.edu.tw

摘要

電腦輔助設計/電腦輔助製造 (CAD/CAM) 已經廣泛應用於牙科修復體的設計和製造中，氧化鋁陶瓷也因為這些CAD/CAM的加工製作，在牙科領域中越來越重要。

市面上有許多不同品牌的氧化鋁瓷塊。本研究比較四種臺灣市售的氧化鋁瓷塊，以各種切削參數，包括進給速度和切削深度，切削氧化鋁瓷塊，進行切削性評估。

實驗結果顯示，進給速度越高，表面粗糙度越大，增加切割深度會導致較高的粗糙度值。在切削精度方面，AR廠牌的破損距離最少，屬於四者中最精細，而AD廠牌只有在高進給速度、低切削深度的情況下擁有最佳的細部完整度。在切削性評估，Z品牌表現出比其他三個品牌更少的切削時間，具最佳的機械加工性質。

關鍵字：氧化鋁、電腦輔助設計/電腦輔助製造、加工參數



A Study of Cutting Parameter on Dental Zirconia for CAD/CAM Application

An-Jie Lo¹, Shih-Ching Wu^{2,*}

**¹Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology**

**²Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology**

***Corresponding author : scwu@ctust.edu.tw**

Abstract

The computer-aided design / computer-aided manufacturing (CAD/CAM) have been widely applied in designing and manufacturing of dental restorations. Zirconia ceramics are also becoming more and more important in dentistry due to the use of CAD/CAM processes.

There are many different brands of zirconia blocks on the market. In this study, four kinds of commercially available zirconia blocks were compared with each other. The cutting parameters, including feed rate and cutting depth, were evaluated.

The experimental results showed that the higher feed speed, the greater the surface roughness value. Increasing the cutting depth induced the higher roughness value. In terms of cutting accuracy, Brand AR has the least damage, and Brand AD can get the best accuracy only at high feed rate and low cutting depth. Using the weight-load-cutting testing machine to evaluate the machinability, Brand Z showed the less cutting time, indicating the best machinability.

Keywords : Zirconia, CAD/CAM, Cutting parameter



牙科用多孔 Ti-Nb-Mo 合金表面氫氧基磷灰石鍍層之研究

施旻宏¹、許學全^{2,*}

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學牙體技術暨材料系 教授

*通訊作者：hchs@ctust.edu.tw

摘要

製備多孔 Ti-Nb-Mo 合金後電解沉積方法表面製作氫氧基磷灰石 ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$; HA) 鍍層。製作的多孔 Ti-Nb-Mo 合金的孔徑在 101-250 μm 範圍內，符合骨生長的最佳孔徑範圍 100-500 μm 。多孔 Ti-Nb-Mo 合金的孔隙率為 50%，抗壓強度為 153MPa，彈性模量為 3.13GPa。而 HA 塗覆的多孔 Ti-Nb-Mo 合金的孔隙率為 50%，抗壓強度為 155MPa，彈性模量為 2.13GPa。電解沉積層的 EDS 光譜顯示得到約 1.67 的 Ca/P 比。XRD 顯示相組成為 HA。多孔 Ti-Nb-Mo 表面上的沉積層的形態是針狀。以上結果顯示，HA 塗層多孔 Ti-Nb-Mo 合金接近於天然骨骼，並適合用作生物醫學植入材料。

關鍵字：多孔鈦、電解沉積、氫氧基磷灰石



Electrodeposited Hydroxyapatite Coating on Porous Ti-Nb-Mo Alloy for Dental Applications

Min-Hung Shih¹, Hsueh-Chuan Hsu^{2,*}

¹Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology

²Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology

*Corresponding author : hchsu@ctust.edu.tw

Abstract

A porous Ti-Nb-Mo alloy was fabricated using a space-holder sintering method, and then hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$; HA) coatings on porous Ti-Nb-Mo alloy was prepared by a electrolytic deposition process. The pore sizes of the porous Ti-Nb-Mo alloys were in the range of 101–250 μm which confirmed an optimal pore size for bone ingrowth in the range of 100–500 μm . In addition, the porous Ti-Nb-Mo alloys had a porosity of 50%, a compressive strength of 153 MPa, and an elastic modulus of 3.13 GPa. Moreover, the HA coated porous Ti-Nb-Mo alloys still had a porosity of 50%, a compressive strength of 155 MPa, and an elastic modulus of 2.13 GPa.

Then chemical composition, phase composition and morphology of electrolytic deposited layers were investigated. EDS spectra of the deposited layers show that a Ca/P ratio of around 1.67 is obtained. XRD shows that the phase composition of deposited layers consists of HA only, without any other calcium phosphate phases. The morphology of the deposited layer on a porous Ti-Nb-Mo surface is needle-like. It is assumed that the pores act as preferred nucleation sites for HA crystals. The results show that the HA coated specimens are close to that of natural bone and would allow bone ingrowth if used as a biomedical implant material.

Keywords : Porous titanium, Electrolytic Deposition, Hydroxyapatite



胍鹽類高分子應用於聚丙烯抗菌複合材料及其特性評估

林建宏^{1,*}、呂兆倉²、李孟娟³

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學牙體技術暨材料系 副教授

³中臺科技大學生物科技暨醫學工程研究所 助理教授

*通訊作者：lovebeige91@gmail.com

摘要

目前合成高分子材料應用在許多領域與產業發展，建立抗菌防禦系統是目前特別重視的議題之一。本研究將聚丙烯(PP)與聚六亞甲基鹽酸胍(PHGH)以熔融混合法製備，之後利用熱壓成型機製成PP/PHGH抗菌複合材料。利用傅里葉變換紅外光譜(FT-IR)和熱重分析(TGA)測量材料之物理性能。並測試PP/PHGH複合材料對金黃色葡萄球菌和大腸桿菌之抗菌影響。FT-IR證實PP和PHGH為物理混合。抗菌試驗結果表明，PP/PHGH複合材料具有良好的抗菌效果。

關鍵字：聚丙烯(PP)、聚六亞甲基鹽酸胍(PHGH)、抗菌劑



Property Evaluations of Antibacterial Polypropylene Composites Made of Guanidine Polymers

Jian-Hong Lin^{1,*}, Chao-Tsang Lu², Mong-Chuan Lee¹

**¹Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology**

**²Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology**

***Corresponding author : lovebeige91@gmail.com**

Abstract

Currently synthetic polymeric materials have been used in many fields with the development of industries. Their antimicrobial defense system has become an important concern. In this study, polypropylene (PP) and Polyhexamethylene guanidine hydrochloride (PHGH) are processed with melt compounding, and then hot pressed into PP/PHGH antimicrobial composites using a thermoforming machine. Fourier transform infrared spectroscopy (FT-IR), and Thermogravimetric analysis (TGA), are used to measure physical properties of the composites. Moreover, the antibacterial effects of the PP/PHGH composites against *S. aureus* and *E. coli* are evaluated. FT-IR result confirms that PP and PHGH are physically blended. Antimicrobial test results show that PP/PHGH composites has excellent antibacterial activities.

Keywords : polypropylene (PP), polyhexamethylene guanidine hydrochloride (PHGH), antibacterial agent



天然精油針對台灣缺蠓之趨避效果及微膠囊製備特性評估

許博揚¹、呂兆倉^{2,*}、樓靜文³

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學牙體技術暨材料系 副教授

³中臺科技大學生物科技暨醫學工程研究所 教授

*通訊作者：ctlu@ctust.edu.tw

摘要

本實驗使用3種天然植物精油百里香、廣霍香及大茴香以200 μ L進行台灣缺蠓趨避測試取得最佳趨避精油，再進行微膠囊包覆並針對其型態及化學結構進行測試。結果表明百里香(60.33%)趨避效果高於前兩者(廣霍香55%、大茴香38%)。將百里香與0.5wt%、1.0wt%及1.5wt%比例的幾丁聚醣進行微膠囊化測試。OM表明微膠囊化是成功的，能夠形成完整的微粒形態，並由FTIR顯示在幾丁聚醣微膠囊中含有百里香精油此一成分。由以上測試結果可得知百里香精油是可以應用在台灣缺蠓的趨避上，並可正確的進行微膠囊化的作業。

關鍵字：台灣缺蠓、天然植物精油、百里香、趨避、微膠囊



Repellent Effects of Natural Vegetal Essential Oils against *Forcipomyia taiwana*

Po-Yang Hsu¹, Chao-Tsang Lu^{2,*}, Ching-Wen Lou¹

¹Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology

²Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology

*Corresponding author : ctlou@ctust.edu.tw

Abstract

In this study, three natural vegetal essential oils of *Thymus*, *Pogostemon* and *Illicium* at 200 μ L are used for the repellent test against *Forcipomyia taiwana* (*F. taiwana*), examining the optimal essential oil. The optimal essential oil is then encapsulated in order to obtain a slow release. The formation and chemical structure of microcapsules are observed and measured. Moreover, the repellent efficacy is 60.33 % for *Thymus*, 55 % for *Pogostemon*, and 38 % for *Illicium*, indicating that *Thymus* outperforms the latter two in repelling *F. taiwana*. *Thymus* is then encapsulated in 0.5 wt%, 1.0 wt% and 1.5 wt% chitosan. The optical microscopy (OM) results confirm the successful microencapsulation, which causes a complete particulate pattern. In addition, Fourier transform infrared spectroscopy (FTIR) results also confirm the presence of *Thymus* essential oil inside the chitosan microcapsules. It is proven that using *Thymus* essential oil against *F. taiwana* is effective and the microencapsulation of the essential oil is feasible.

Keywords: *Forcipomyia taiwana*, Natural Vegetal Essential Oils, *Thymus*, repellent, microcapsules



中草藥美白奈米纖維面膜製程設計及其特性評估

羅立達¹、樓靜文^{2,*}、呂兆倉³

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學生物科技暨醫學工程研究所 教授

³中臺科技大學牙體技術暨材料系 副教授

*通訊作者：cwlou@ctust.edu.tw

摘要

由於人們愛美所屬天性化妝品對於現代人已成為人手必備的商品，以往傳統化妝品、保養品都會添加化學混合物，長久下來會致使皮膚產生過敏、發炎反應，因此由天然植物萃取的化妝品逐漸受到矚目，本研究選取天然中草藥進行萃取經由靜電紡絲技術將萃取出的中草藥與高分子材料聚乙烯吡咯烷酮與明膠做結合製備成奈米纖維薄膜達到高體表面積與多孔隙率，並附合於水針布織布上成為多功能性面膜，且利用細胞貼附與生長來表明對人體不具有排斥反應。

關鍵字：中草藥、靜電紡絲、水針不織布、面膜



Whitening Nano-Fiber Masks Composed of Traditional Chinese Medicine: Manufacturing Design and Characteristic Evaluations

Li-Ta Lo¹, Ching-Wen Lou^{1,*}, Chao-Tsang Lu²

**¹Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology**

**²Department of Dental Technology and Materials Science
Central Taiwan University of Science and Technology**

***Corresponding author : cwlou@ctust.edu.tw**

Abstract

People crave for beauty by nature because cosmetics has become necessary commodity for modern people. Conventional cosmetics or skincare products are composed of chemical compounds, the long-term use of which leads to allergy and inflammation on the skin. Therefore cosmetics that are made of plants extracts gradually attract the attention. In this research, we choose to use natural Chinese herbal medicine to make the extracts. Then, via electrospinning technology, we combine the extracts Chinese herbal medicine, polymeric material- polyvinyl pyrrolidone and gelatin to make nano fiber membrane, achieving high specific surface and high porosity, then attached above the Spunlace Nonwoven to become the multi-functional mask. Also, we use cell attachment and growth to show that there is no adverse skin reaction on human's body.

Keywords : Chinese herbal medicine, Electrospinning, Spunlace Nonwoven, Mask



醫用三維凝膠劑量計應用於具壓克力套管之近接治療劑量驗證

魏崇軒¹，陳錦杏²，張淵仁^{2,*}

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學資訊管理系 教授

*通訊作者：ronchang@gmail.com

摘要

近接治療(brachytherapy)是一種將射源放置於靠近腫瘤旁的治療方式，然而其高劑量梯度與大劑量變化的特性，使得近接治療在臨床上劑量分佈測量是一個挑戰。本研究以 NIPAM 凝膠劑量計，並且使用直徑 10cm、高度 10cm 之圓柱型壓克力容器，容器中插入不鏽鋼與周圍直徑 2cm 的壓克力作為近接治療的裝療器，並使用高劑量率近接治療，其射源為銨-192(¹⁹²Ir)，以輻射照射結果進行劑量驗證分析。

本次實驗使用之 NIPAM 凝膠劑量計成分為 5% Gelatin、5% NIPAM、3% BIS、5mM THPC，等待凝固後經由 Micro Selectron 照射，射源為 Ir-192。本研究使用自主研發的平行光光學電腦斷層掃描儀進行掃描，使用 MATLAB 軟體進行數據分析。分析方法是 Gamma 評估法逐點比較 Optical CT 重組之測量值與 TPS，使用的條件為 3%的 Dose-difference(DD)、3mm 的 Distance-to-agreement (DTA)。

許多前人研究指出，臨床近接治療的治療計畫並未將裝療器或導管納入治療計畫(TPS)計算，因此，在本研究將壓克力裝療器與金屬導管置入NIPAM假體中以評估其影響。本研究結果顯示，於照射24小時後，其Gamma通過率皆大於94%以上，代表TPS與凝膠劑量計量測的結果有很高的一致性。結果也發現於裝療器附近區域產生不通過之現象，其原因可能是因為裝療器影響凝膠之聚合、裝療器與凝膠間雷射光之折散射。而由此實驗結果可以得知，在TPS計算中應將裝療器本體與金屬套管列入考慮，以免造成劑量的高估。未來，仍需更進一步詳細的實驗探明此現象。

關鍵字：聚合物凝膠劑量計、光學電腦斷層掃描儀、近接治療、伽瑪評估法、裝療器



Dose verification of brachytherapy with acrylic applicator by using three-dimensional gel dosimeter

Tsung-Hsuan Wel¹, Chin-Hsing Chen², Yuan-Jen Chang^{1,2,*}

¹Graduate Institute of Biotechnology and Biomedical Engineering, Master

Central Taiwan University of Science and Technology

² Management Information Systems

Central Taiwan University of Science and Technology

***Corresponding author : ronchang@gmail.com**

Abstract

Brachytherapy is a treatment technique that the radioactive source is placed close to the tumor target. However, it is difficult to measure the dose distribution of radiation because of its characteristic of high dose gradient and large dose variation in clinical setting. Different from traditional dosimeters, TLD and radiochromic film, which are tools for one or two-dimensional dose verification, polymer gel dosimeter is able to measure the dose distribution in three dimensions. It is a potential tool for dose verification. In this study, metal tube with cylindrical PMMA which is 2 cm diameter is placed within NIPAM polymer gel to simulate brachytherapy with the former deemed as the applicator and the latter as the tissue. The treatment technique adopted in this study is high dose rate (HDR) brachytherapy with Ir-192 used as the radioactive source. The reconstruction image is obtained by scanning NIPAM polymer gel for dose verification.

The applicator is place in a cylindrical PMMA phantom with 10 cm in diameter and 10 cm in height, filled with NIPAM polymer gel comprising 5% gelatin, 5% NIPAM, 3% N,N'-methylene bisacrylamide (Bis), and 5mM Tetrakis (hydroxymethyl) phosphonium chloride (THPC). After gel solidification, the phantom is irradiated with Microtron and the source is Ir-192. Finally, The CCD-based parallel-beam optical-CT scanner (CT-s2) developed in our lab is used to perform dose measurement. All of the data collected are analyzed by using a program designed with MATLAB. The measured doses and TPS doses are compared point by point using gamma evaluation technique under the criteria of 3% dose-difference (DD) and 3 mm dose-to-agreement (DTA).

Many previous studies indicated that clinical brachytherapy treatment planning system (TPS) don't take applicator and transfer tube into consideration. In this study, we put applicator and metal transfer tube in NIPAM polymer gel phantom and intend to evaluate the effect. The results showed that the gamma pass rate is higher than 94%



and the measurement result is consistent with the TPS. But some rejected regions were found around the applicator. It may be caused by the reflection and refraction effect near the applicator and metal transfer tube. The result also showed that the consideration of applicator and metal transfer tube in TPS calculation cannot be neglected. The more detailed experiments are needed to confirm our findings.

Keywords : polymer gel dosimeter, optical-CT scanner, brachytherapy, gamma evaluation, applicator



分離自土壤的鏈黴菌之抗菌與抗藻特性分析

林玟晏¹、李孟娟^{2,*}

¹中臺科技大學生物科技暨醫學工程研究所 碩士生

²中臺科技大學生物科技暨醫學工程研究所 助理教授

*通訊作者：mclee@ctust.edu.tw

摘要

鏈黴菌 (*Streptomyces*) 為革蘭氏陽性絲狀的放線菌，鏈黴菌所產生的新抗生素大於放線菌其他菌屬，在製藥工業應用及人類健康照護非常重要。台灣缺蠓 (*Forcipomyia taiwana*) 於台中市大坑地區肆虐，本校的師生與當地居民也不堪其擾，特別是部分的遊客初次被叮咬會造成嚴重過敏反應。過去研究，發現台灣缺蠓的密度與環境有很大的關係，例如：台灣缺蠓幼蟲的食物-藻類的孳生。所以，本實驗室研究聚焦於台灣缺蠓的生物防治的發展與應用。先前本實驗室自大坑地區分離三株 *Streptomyces* 分離株，經測試具有抑制綠藻、藍綠藻及細菌生長之能力。本研究進行此三株 *Streptomyces* 之特性分析，並評估是否具有抗菌與抗藻之實際應用之潛力。本研究進行以下實驗：(1) 以 *Streptomyces* 上清液進行抑菌試驗，測試是否有抑菌效果；(2) 以 *Streptomyces* 上清液進行藻類抑制試驗，測試是否會抑制藻類生長；(3) 分析 *Streptomyces* 培養液抗菌效果最佳的培養天數；(4) 測試 *Streptomyces* 上清液是否會影響台灣缺蠓幼蟲生長；(5) 使用 proteinase K 及加熱處理 *Streptomyces* 上清液後進行抑菌試驗，確認抑菌物質是否會受蛋白酶及加熱處理所影響；(6) *Streptomyces* 上清液以不同濃度有機溶劑與 SPE column 進行初步純化萃取並進行抑菌測試。實驗結果顯示：(1) *Streptomyces* 培養上清液可抑制 *Escherichia coli* ATCC 25922、*Staphylococcus aureus* ATCC 25923 生長；(2) *Streptomyces* 培養上清液可抑制綠藻及藍綠藻生長；(3) *Streptomyces* 培養至第四天的上清液抑菌效果最顯著；(4) *Streptomyces* 的上清液對台灣缺蠓幼蟲的生長無明顯影響；(5) *Streptomyces* 上清液的抗菌能力不受蛋白酶及加熱處理所影響；(6) *Streptomyces* 上清液以 30%、40% 甲醇及 SPE column 沖提後所收集的萃取液抗菌效果最顯著。綜合以上結果，顯示此三株 *Streptomyces* 皆具有抗菌及抗藻之能力，並應進一步評估實際應用或發展為生物防治之可行性。

關鍵字： *Streptomyces*、抗菌、抗藻、生物防治



Characterization of antimicrobial and anti-algae of *Streptomyces* was isolated from soil

Wen-Yan Lin, Mong-Chuan Lee*

Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology

*Corresponding author : mclee@ctust.edu.tw

Abstract

Streptomyces is a Gram-positive filamentous actinomycete that produced by new antibiotics than other actinomycetes, so the application of the pharmaceutical industry and human health care is very important. *Forcipomyia taiwana* was rage in the Da-Kan area of Taichung City, also caused on teachers and students of the school and the local residents it's unbearable, particularly some of the tourists due to first bites and cause serious allergic reactions. Previous reports showed that the density of *F. taiwana* has a great relationship with the environment, such as the breeding of algae that food of *F. taiwana* larvae. Therefore, this laboratory is committed to the development and application of *F. taiwana* biocontrol. Previously, three *Streptomyces* isolates were isolated from the pit area and tested to have the ability to inhibit green algae, blue-green algae and bacterial growth. In this study, the characteristics of the three *Streptomyces* were analyzed and the potential for antimicrobial and anti-algae was evaluated. The following experiments were conducted in this study: (1) Evaluation the antibacterial effect of extracellular substances by *Streptomyces* culture supernatant. (2) Evaluation the anti-algae effect of extracellular substances by *Streptomyces* culture supernatant. (3) The best days of incubation for *Streptomyces* antibacterial effect were tested. (4) To test the effect of *Streptomyces* supernatant on the growth of *F. taiwana* larvae. (5) To confirm the effect of protease and heat on the antibacterial ability of *Streptomyces* supernatant. (6) The *Streptomyces* supernatant was purified by different concentration of organic solvent and SPE column for antibacterial assay. The results of this study were (1) The growth of *Escherichia coli* ATCC 25922, and *Staphylococcus aureus* ATCC 25923 were inhibited by *Streptomyces* culture supernatant. (2) The growth of green algae, and blue green algae were inhibited by *Streptomyces* culture supernatant. (3) The antibacterial effect of *Streptomyces* supernatant on the fourth day was the most significant. (4) The supernatant of *Streptomyces* culture had no significant effect on the growth of *F. taiwana* larvae. (5) The antibacterial activity of the *Streptomyces* supernatant was not affected by protease and heat treatment. (6) The antibacterial effect of *Streptomyces* supernatant extracted with 30%, 40% methanol and SPE column was most significant. Based on the above results, it is shown that three *Streptomyces* isolates have the



ability of antibacterial and anti-algae, and should further evaluate the feasibility of practical application or development for biocontrol.

Keywords : *Streptomyces* 、 antibacterial 、 anti-algae 、 biocontrol



癌症病童口腔念珠菌感染之分析研究

盧建佑^{1,*}、黃芳亮²、李憲明³

¹ 中臺科技大學生物科技暨醫學工程研究所 碩士生

² 臺中榮民總醫院兒童醫學部 主治醫師

³ 中臺科技大學護理系 助理教授

*通訊作者：stonecold@vghtc.gov.tw

摘要

兒童癌症病患常因化學治療，引發白血球低下、口腔黏膜受損，而導致口腔念珠菌感染。以傳統培養方法檢測其感染曠日廢時，若利用分子檢測分析黴菌 rRNA 的內轉錄間隔區 (internal transcribed spacer, ITS)，則可簡便、快速篩檢大量樣品。為了探討癌症病童之口腔念珠菌感染情形，本研究收集 55 位癌症病童及 25 位正常族群之 oral rinse solution。首先使用 Real-time PCR 針對 ITS 篩選念珠菌陽性之樣品，再挑選陽性之病童與對照組樣品各 8 個，利用 Length heterogeneity-polymerization chain reaction (LH-PCR) 進行菌種的鑑定。此外，另行挑選陽性之病童與對照組樣品各 5 個進行次世代定序 (Next Generation Sequencing, NGS)，分析病患與正常族群口腔真菌菌叢的多樣性以及數量的差異。在 LH-PCR 之分析中，出現 *C. albicans*、*C. dubliniensis* 與 *C. parapsirosis* 之病患檢體數高於對照組，其比值分別為 5/2, 3/1 與 3/1。在 NGS 的結果中，5 個病患檢體的 *C. albicans*、*C. glabrata*、*C. parapsirosis* 與 *C. tropicalis* 數目，其中至少一種明顯高於對照組。上述結果顯示：一、LH-PCR 和 NGS 可有效評估於兒童癌症病患口腔念珠菌感染；二、在本研究所收集的檢體中，癌症病童之口腔念珠菌檢出率高於正常族群。

關鍵字：兒童癌症病人、口腔念珠菌感染、內轉錄間隔區、LH-PCR、NGS



Isolation and identification of oral *Candida* species in Childhood Cancers

Chien-Yu Lu¹, Fang-Liang Huang², Hsien-Ming Lee³

¹ Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology

² Department of Pediatrics, Taichung Veterans General Hospital

³ Department of Nursing, Central Taiwan University of Science and Technology

*Corresponding author : stonecold@vghtc.gov.tw

Abstract

Side effects of chemotherapy, leukopenia and oral mucosa injury, often caused oral candidal infection in child cancer patients. The traditional culturing methods for the diagnosis of *Candida* infection are time consuming and laborious. Instead, molecular genetic analysis of internal transcribed spacer (ITS) regions of fungal rRNA provided a simple and rapid way to screen a large amount of samples. To investigate the prevalence of oral candidiasis in child cancer patients, the oral rinse solution from 55 child cancer patients and the same amount of healthy controls were collected in this study, and screened for *Candida* specific ITS signal by real-time PCR. Then, 8 child cancer patient and 8 control samples showing *Candida* specific ITS signal were chosen for fungal species identification by length heterogeneity-polymerization chain reaction (LH-PCR). Furthermore, additional 5 child cancer patients and 5 control samples were analyzed by next generation sequencing (NGS) to find out the diversity and abundance of *Candida* species in these samples. In the analysis of LH-PCR, *C. albicans*, *C. dubliniensis* and *C. parapsirosis* were detected in patients more often than controls with a patient-control ratio of 5/2, 3/1 and 3/1, respectively. The NGS results demonstrated that the abundance of *Candida* species in patients is significantly higher than controls, at least one species among *C. albicans*, *C. glabrata*、*C. parapsirosis* and *C. tropicalis*. These results suggest that LH-PCR and NGC are useful techniques for assessing the severity of oral candidal infection in child cancer patient, and the detection rate of *Candida* species in oral cavity is significantly higher in child cancer patients than controls.

Keywords : child cancer patients, oral candidal infection , ITS, LH-PCR, NGS



偏鄉地區學童視力不良與視力調節能力之研究

李榮祐¹、林榮芳^{2,*}、葉上民²

¹ 中臺科技大學生物科技暨醫學工程研究所 碩士生

² 中臺科技大學視光系 助理教授

*通訊作者：rlfin@ctust.edu.tw

摘要

本研究針對偏鄉地區學童在視力不良與眼睛視力調節能力之關聯。

研究設計分為兩部分，問卷及視覺相關檢查，參與的學童共96位，問卷回答未點用藥水治療近視者佔多數，有10%學童點藥水治療。研究學童的最佳矯正視力與近距離慣用視力，近距離視力調節、近點調節、調節靈巧度等項目。

使用的統計方法分析視力、雙眼視覺機能二者的相關。

需要注意的問題是，參與視力檢查的學童中仍然有30%的學童未接受屈光矯正。由學童在室內看遠、室內看近反應結果來看，眼睛視力調節的功能討論兩者的相關。

關鍵字：調節、屈光矯正、視力



Study for the children of poor eyesights and the ability of vision adjustment on the remote district

Rong-Yu Lee¹, Rong-Fong Lin², Shang-Min Yeh²

**¹ Graduate Institute of Biotechnology and Biomedical Engineering, Master
Central Taiwan University of Science and Technology**

**² Department of Optometry, Central Taiwan University of Science and
Technology**

***Corresponding author : rflin@ctust.edu.tw**

Abstract

This study is aimed at the association of poor school children with visual acuity in the rural areas.

The study design is divided into two parts, questionnaires and visual related examination, a total of 96 students participated in the questionnaire, the answer to the point of treatment of myopia with no treatment of myopia, about one percent of school children point of medicine treatment. Study the best corrected visual acuity of schoolchildren and close-up vision, close vision adjustment, near point adjustment, adjust the smart degree and other items.

Using statistical methods to analyze visual acuity, binocular vision function is related to both.

It is important to note that there are still about 30% of schoolchildren who are enrolled in visual examinations who have not received refractive correction. By the children in the indoors, indoor look at the reaction results, eye vision adjustment function to discuss the relationship between the two.

Keywords : accommodation, correction, visual acuity



普惠德生技運動系列保健品對於小鼠模式抗疲勞效用試驗

楊昆翰¹、陳韋陸^{2,*}

¹中臺科技大學醫學檢驗生物技術系 大學生

²中臺科技大學護理系 助理教授

*通訊作者：107761@ctust.edu.tw

摘要

疲勞是指身體無法維持在一定水平上運作，各器官也不能保持固定的工作能力，也就是身體因過度活動而造成肌肉無法維持力量，而導致活動能力下降，進而造成提早老化；現階段健康食品的抗疲勞功能，乃針對經過運動測試後，延緩運動期間疲勞的發生或促進運動後疲勞消除之評估；亦即對受測對象給予運動測試，觀察運動期間或運動後的休息期間一些與疲勞相關數值變化的情形。

在上一個委託案中，我們已經證實AGA01小鼠抗疲勞的作用，不論劑量高低都可以延長小鼠的游泳時間，表示小鼠的運動耐力增強了；在小鼠的血清生化值當中，乳酸及尿素氮都有顯著的下降，表示小鼠的疲勞程度有減輕。

根據以上的實驗結果，普惠德生技股份有限公司對此產品深具信心，希望開發為商品投入市場中，因此本委託案將更進一步比較三種即將商品化的配方，找出效果最佳的組合。檢測目標如下：

我們用80隻ICR mice為研究的實驗工具，比較三種配方的抗疲勞作用。分析餵食二週、四周及六周後小鼠游泳的能力，以及分析血清中各項生化值，來了解其抗疲勞的作用。

關鍵字：抗疲勞、耐力、游泳試驗



Effect of Profeat Biotech dietary supplement on anti-fatigued in mice

Kun-Han Yang¹, Wei-Lu Chen^{2,*}

¹Department of Medical Laboratory Science and Biotechnology
Central Taiwan University of Science and Technology

² Department of Nursing, Central Taiwan University of Science and Technology

*Corresponding author : 107761@ctust.edu.tw

Abstract

Fatigue means the body can not maintain at a certain level of function and the organ can not remain working capacity. Excessive activity caused muscle strength failure leading to decreased activity and premature aging. We had demonstrated that AGA01 was provided with anti-fatigued effect in past project. AGA01 could promote exercise endurance at high or low concentration. At the same time, AGA01 could reduce lactate and BUN in mice serum leading to decrease fatigue.

Based on these data, we further compare three commercialization formulas and find out the best construction input market.

We compare three formulas by using 80 ICR mice in anti-fatigued effect. After 2, 4, and 6 weeks treatment, we observe that the mice presented the ability of swimming length and the kinds of biochemical variables.

Keywords : anti-fatigued, endurance, swimming test



硫辛酸透過調控 HIF-1 α 來抑制人類膠細胞瘤的生長和轉移

吳哲凱¹、陳韋陸^{2,*}

¹中臺科技大學醫學檢驗生物技術系 大學生

²中臺科技大學護理系 助理教授

*通訊作者：107761@ctust.edu.tw

摘要

缺氧誘導因子-1 α (HIF-1 α) 是一種轉錄因子，有助於癌細胞適應缺氧環境並刺激腫瘤生長，U87MG人類神經膠質瘤細胞屬於第四級星形細胞瘤是最常見和最惡性的原發性腦癌，往往造成手術切除不完全目前容易再復發，病人治療後五年存活率低，因現行臨床的治療方多數效果不佳極需開發新的輔助療法。組織缺氧的狀態下HIF-1 α 有助癌細胞快速生長，在本研究中，我們加入CoCl₂模擬細胞的缺氧環境，使HIF-1 α 穩定增加後，再處理硫辛酸(ALA)發現到HIF-1 α 的表現被抑制了，同時調解醣類利用路徑的下游蛋白如hexokinase II (HK-II)、lactate dehydrogenase A (LDHA)和glucose transporter 1 (Glut-1)也受到抑制，所以可以有效抑制癌細胞的增生；更進一步，我們發現到TWIST、Vimentin及Nestin也會被ALA抑制，這些蛋白質都是受到HIF-1 α 所調節，與癌細胞的轉移功能相關，而且ALA也能增加作為星形細胞的GFAP（膠質纖維酸性蛋白）表現量，促進星形膠質細胞分化，因此，我們也證實了ALA可以抑癌細胞的爬行能力(migration)，來降低癌細胞的惡性度。假如癌細胞分化良好可以使病患預後較佳使癌症治療效果明顯，總結來說，本研究證明了ALA可以透過降低HIF-1 α 蛋白量並降低癌症的惡化程度，將來對於治療人類神經膠質瘤能有所幫助。

關鍵字：人類神經膠質瘤細胞、缺氧誘導因子-1 α 、硫辛酸、氯化亞鉍



Lipoic acid inhibit proliferation and metastasis in human glial cell through the regulation of HIF-1 α

Che-Kai Wu¹, Wei-Lu Chen^{2,*}

¹Department of Medical Laboratory Science and Biotechnology

Central Taiwan University of Science and Technology

² Department of Nursing, Central Taiwan University of Science and Technology

***Corresponding author : 107761@ctust.edu.tw**

Abstract

Hypoxia-inducible factor-1 α (HIF-1 α), a hypoxia-induced transcription factor, helped cancer cells to adapt hypoxia environment and stimulated tumor growth. U87MG glioma cells belong to grade IV astrocytoma, which is the most common and most malignant primary brain cancer. The current clinical treatment is hard to cured completely to urgent develop new adjuvant therapy. In this study, U87MG cells were pretreated with CoCl₂ to adapt hypoxia environment that HIF-1 α increased stably, and treated α -lipoic acid(ALA). We demonstrated that ALA decreased the expression of HIF-1 α under hypoxia condition. Reduction of HIF-1 α also decreased the expression of hexokinase II (HK-II)、lactate dehydrogenase A (LDHA) and glucose transporter 1 (Glut-1) to inhibit cell proliferation. Also, ALA decrease TWIST、Vimentin and Nestin protein expression levels to inhibit cell migration. ALA increase GFAP expression which is a differentiation of astrocyte marker. We demonstrated that ALA suppressed migration ability to degrade U87MG cells malignancy. In conclusion, this data was suggested that ALA may reduced HIF-1 α protein expression and reduced U87MG cell proliferation and malignancy. These findings were suggested that ALA may exert beneficial effects in the treatment of human glioma.

Keywords : U87MG、HIF-1 α 、 α -lipoic acid、CoCl₂



地瓜葉萃取物透過 AMPK 蛋白對脂質代謝的作用

柯宜蓁¹、陳韋陸^{2,*}

¹中臺科技大學醫學檢驗生物技術系 大學生

²中臺科技大學護理系 助理教授

*通訊作者：107761@ctust.edu.tw

摘要

由於現代人飲食精緻化加上運動量不足，國人肥胖問題越來越嚴重，伴隨著代謝相關疾病更是接踵而來，像是心血管疾病及糖尿病等等，不但患者痛苦，照顧患者的家屬負擔更是沉重，也造成大量社會成本的支出。科學家在西元2000年發現到，AMPK是感應細胞內能量代謝的一個關鍵調控者，可以減少內臟脂肪及膽固醇的合成，並且抑制肝臟糖質新生，同時近年研究發現 AMPK 能增加小鼠三酸甘油酯分解酶(Adipose Triglyceride Lipase, ATGL) 的水解活性，對於三酸甘油酯水解具有專一性，對於肌肉細胞的脂質代謝相當重要。地瓜葉是隨處可見、取得容易且價格低的食物，本研究篩選數種地瓜葉萃取物，包括酒精層、正己烷層、二氯甲烷層及水層，發現酒精層的地瓜萃取物處理老鼠肌小管細胞 (C2C12 myotubes)會增加AMPK的活性，進而促進ATGL的表現，同時抑制脂肪合成酶 (Fatty Acid Synthase, FAS) 的量，更進一步地觀察到，在高糖處理過的肌小管細胞會有大量的脂肪油滴堆積，再處理酒精層萃取物後，油滴的堆積有明顯的減少。本研究發現到地瓜葉酒精層萃取物能有效活化AMPK，促進ATGL的表現，減少脂肪的堆積，希望未來對代謝症候群的治能有所幫助。

關鍵字：AMPK、脂質代謝、三酸甘油酯分解酶、脂肪合成酶



Sweet potato leaf extract regulates lipid metabolism via AMP-activated protein kinase (AMPK)

Yi-Jhen Ke¹, Wei-Lu Chen^{2,*}

**¹Department of Medical Laboratory Science and Biotechnology
Central Taiwan University of Science and Technology**

²Department of Nursing, Central Taiwan University of Science and Technology

***Corresponding author : 107761@ctust.edu.tw**

Abstract

Due to over-nutrition and changes of food style, the occurrence rate of diabetes mellitus has been dramatically increased. Obesity is often associated with a variety of severe chronic complications, including cataract, diabetic nephropathy, and diabetic neuropathy. These chronic complications are mostly irreversible and the burden of medical care has become an important social economic issue. In 2000, scientists found that AMPK is a key regulator of energy metabolism in body, which reduces the synthesis of both visceral fat and cholesterol, also inhibits liver gluconeogenesis. The hydrolytic activity of Adipose Triglyceride Lipase (ATGL) is important for the lipid metabolism of muscle cells. Sweet potato leaves are easy found and low price food. This research screens several kinds of sweet potato leaves extracts. We found that the alcohol layer extract increases the activity of AMPK in C2C12 myotubes. Active AMPK promoted ATGL performance and inhibited fatty acid synthase (FAS). Further, high-glucose treatment induced myotubes lipid droplet accumulation. After treatment with alcohol extract, the accumulation of lipid droplets was significantly reduced. This study was demonstrated that sweet potato leaves extract effectively activates AMPK and promotes ATGL expression, resulting in the accumulation of lipid reduction. On the other hand, it may be helpful with the treatment of metabolic syndrome in the future.

Keywords : AMPK 、Lipid metabolism 、ATGL 、FAS



低膽固醇豬油之開發與應用

張仲奇¹、陳建亘¹、黃英凱¹、賴少庸¹、張永吉^{2,*}、劉伯康³、郭炯村⁴

¹中臺科技大學食品科技系學士生

²中臺科技大學食品科技系 副教授

³中臺科技大學食品科技系 助理教授

⁴中臺科技大學食品科技系 講師

*通訊作者：Email: ycchang766@gmail.com

摘要

本研究利用環糊精攪拌包接方式，進行豬油膽固醇包接移除，探討降低豬油膽固醇並以連續中間工廠三相離心機，分離油、水與糊精之可行性，同時也以實際產品應用，在感官品評試驗中，比較包接處理豬油產品之風味及口感等品質之差異。結果顯示，實驗室包接處理可以將豬油膽固醇降低至殘餘量10%左右，其包接移除率最高可達85-90%之間、且在中間工廠規模三相離心機試驗操作下，順利將60公斤處理量(其中之攪拌包接處理30公斤豬油)，完成三相(油脂與水與包接後環狀糊精)離心分離，所得包接豬油回收率約71.6%、並以包接處理移除膽固醇之豬油樣品，製成菊花酥與油蔥酥豬油兩種產品，分別進行感官品評測試，所得產品風味品質與未包接對照組豬油產品相近。綜合上述顯示，本研究擬開發之低膽固醇豬油，具有市場商品化生產與產品應用開發之潛力。

關鍵字：豬油、膽固醇、環狀糊精、包接移除



薏仁甜酒釀的製作與發酵變化之測定

陳祗合¹、洪菟露¹、吳育菁¹、劉雅涵¹、蕭珮綺¹、滕芳君¹、張尹溶¹
羅培仁^{2,*}

¹中臺科技大學食品科技系 大學生

²中臺科技大學食品科技系 副教授

*通訊作者：pilo@ctust.edu.tw

摘要

甜酒釀簡稱酒釀，是具有特殊甜味、低酒精含量與豐富營養成分的傳統民間發酵食品，具有快速補充能量、健胃和健脾的功效，深受廣大群眾的喜愛。甜酒釀製作是將圓糯米或粳米經過蒸煮糊化，利用市售酒藥(俗稱白麴)中存在的根霉菌(*Rhizopus* spp.)、毛霉(*Mucor* spp.)等麴菌將糊化後的澱粉糖化，然後由酵母菌利用糖化產物進行生長和繁殖，在厭氧條件下經由醱解與酒精發酵途徑將糖類轉化成酒精而製成的產品。薏仁又稱薏米，適量食用具有降低膽固醇與血脂肪，並使皮膚光滑，減少皺紋，有消除色素斑點等功效，還能促進體內血液和水分的代謝效果。本研究目的是嘗試以薏仁為原料製作甜酒釀，相較傳統圓糯米原料釀製出的甜酒釀，在發酵期間之 pH 值、有機酸、酒精濃度及糖度有何差異，並與市售甜酒釀成品進行比較。

關鍵字：薏仁、甜酒釀、發酵



銀耳活菌保健霜淇淋之製作

陳婉如¹、林可娟¹、顏敬庭¹、戴邑芳¹、林一郎^{2,*}

¹ 中臺科技大學食品科技系 大學生

² 中臺科技大學食品科技系 副教授

*通訊作者：yllin@ctust.edu.tw

摘要

國人在外飲食，如西式飲食、高油、高蛋白,都有利於腸道壞菌的繁殖，破壞腸道菌相平衡，使益生菌不易在腸道中維持優勢數量。然而，改善腸道環境，不需要我們犧牲對美食的享受，因此我們改變美食成分，消費者享用霜淇淋美食同時也補充了乳品的營養素、活的益生菌與銀耳的益生源保健成分，是我們此次產品製作的重點。這銀耳活菌霜淇淋的組合，一為提供活的益生菌能達到改善腸道菌相，再者提供銀耳膳食纖維、果寡糖、膠質和其他營養素，銀耳也可提供活益生菌益生物質環境，增加活益生菌代謝所產生有益人體健康的維生素B群。先前我們團隊觀察市售五種品牌優酪乳益生菌活菌數的數量。我們研究團隊特別選擇每毫升達一億個活菌菌數且具健康食品標章的優酪乳和有機栽培的銀耳製成銀耳活菌保健霜淇淋，提供給消費者更健康而多元的美食選擇。

關鍵字：銀耳、益生菌、益生源



飲料廢棄品連續醱酵產氫之可行性研究

賴均綸¹、江欣樺²、林屏杰³、李國興^{4,*}

¹中臺科技大學環境與安全衛生工程系 大學生

²逢甲大學化學工程系 碩士生

³逢甲大學化學工程系 教授

⁴中臺科技大學環境與安全衛生工程系 副教授

*通訊作者：kslee@ctust.edu.tw

摘要

氫氣為乾淨的替代能源，利用微生物進行有機廢棄物醱酵產氫，兼具廢污處理及能源回收之優點。蔗糖、葡萄糖等簡單醣類之產氫效率遠高於澱粉、纖維素等複雜醣類，因此飲料廢棄品應該相當適合作為醱酵產氫之料源。本研究首先以 CSTR (continuous flow stirred tank reactor) 反應器於總糖濃度約 30g/L 及水力滯留時間(hydraulic retention time, HRT) 8 h 的條件下分別進行果菜汁、可口可樂及思樂冰糖漿三種飲料廢棄品之混菌系統連續醱酵產氫試驗。結果顯示，三種飲料廢棄品均適合用來醱酵產氫，其總體產氫效率(overall H₂ production efficiency, HPE) 分別為 39.9%、46.3% 及 47.9%。由於可口可樂廢品產氫表現最佳，因此隨後針對可口可樂廢品於總糖濃度約 20 g/L 之條件下進行 HRT (8、6 及 4 h) 之效應探討，結果顯示 HRT 8 及 6 h 之產氫表現相近，而 HRT 4 h 之產氫表現高於前二者，產氫速率(hydrogen production rate, HPR)、氫氣產率(H₂ yield, HY) 及 HPE 分別可達 1.029 mol/L/d、1.93 mol H₂/mol hexose 及 47.5%，推測低 HRT (高稀釋速率) 之操作有利混菌系統中產氫菌之優勢化而提升產氫表現。另，本研究之三種飲料廢棄品之產氫表現並不亞於本實驗室過去以食品級蔗糖作為基質之產氫表現，顯示飲料廢棄品作為醱酵產氫之料源極具發展前景。

關鍵字：醱酵產氫(fermentative hydrogen production)、飲料廢棄品(waste beverage)、CSTR



以厭氧顆粒污泥床搭配減壓操作來提升發酵產氫效能

李淑君¹、林勁甫²、林屏杰³、李國興^{4,*}

¹中臺科技大學環境與安全衛生工程系 大學生

²逢甲大學化學工程系 碩士生

³逢甲大學化學工程系 教授

⁴中臺科技大學環境與安全衛生工程系 副教授

*通訊作者：kslee@ctust.edu.tw

摘要

本研究首先以CSTR (continuous flow stirred tank reactor)反應器於水力滯留時間(hydraulic retention time, HRT) 4 h的條件下進行蔗糖之三種不同基質濃度(16.8、20、25 g COD/L)之產氫試驗，結果顯示產氫速率(H_2 production rate, HPR)及氫氣產率(H_2 yield, HY)兩者雖然都隨基質濃度的增加而增加，但基質利用率(substrate utilization, x)及總體產氫效率(overall H_2 production efficiency, HPE)二者卻隨基質濃度的增加而降低，於基質濃度25 g COD/L之試程，二者僅分別為69.5%及35.1%，顯示CSTR系統因反應器構形而使其操作於較高的進料量時系統整體之產氫表現降低。本研究繼而以本實驗室所發展之厭氧顆粒污泥床(anaerobic granular sludge bed, AnGSB)於HRT 4 h及基質濃度25 g COD/L之條件下進行產氫試驗，結果顯示HPR、 x 及HPE分別提升達1.27 mol/L/day、86.4%、及40.2%，相對於CSTR系統HPE提升了15%，其乃因AnGSB系統可誘發產氫污泥形成顆粒污泥而提升系統之產氫污泥濃度。最後，本研究再以AnGSB進行各種減壓條件(570、380及190 mmHg)之產氫試驗，結果顯示系統570 mmHg之產氫表現與常壓(760 mmHg)相近，然而當壓力降至380及190 mmHg，雖然 x 隨壓力降低而小幅下降，但系統整體之產氫表現則隨壓力降低而增加，於190 mmHg之試程，HPR、HY、 x 及HPE分別達1.51 mol/L/day、2.35 mol H_2 /mol hexose、86.6%、及49.6%，相對於常壓CSTR系統HPE提升了41%，顯示AnGSB系統搭配減壓操作(降低氫分壓)確實可有效提升發酵產氫效能。

關鍵字：發酵產氫(fermentative hydrogen production)、厭氧顆粒污泥床(anaerobic granular sludge bed)、減壓操作(reduced-pressure operation)



索引

A

An-Cheng Shiau 19

An-Jie Lo 56

B

Bo-Kang Liou 42

Bor-Tsung Hsieh 10

C

Chao-Tsang Lu 60, 62, 64

Che-Kai Wu 78

Cheng-Hsun Lin 22, 23

Cheng-Jung Chan 10

Cheng-Jyun Yang 19

Chia-Hsiang Lai 54

Chia-Hui Chen 16

Chia-Hung Wu 50

Chien-Yu Lu 72

Chih-Chieh Chou 2

Ching-Wen Lou 62, 64

Chin-Hsing Chen 66

Chin-Yu Hsu 6

Chun-Hsu Yao 31

Chun-Tsun Kuo 42

F

Fang-Liang Huang 72

Fang-Yi Cheng 45

G

Gerlee Chuluun 7

Guan-Yu Lin 16

H

Hao-Ning Chang 10

Hsiao-Mei Huang 33

Hsien-Ming Lee 72

Hsin-Hsiung Chen 19

Hsueh-Chuan Hsu 25, 29, 58

J

Jian-Hong Lin 60

K

Kai-Yuan Cheng 12

Kun-Han Yang 76

L

Le Hai Hanh Tien 23

Ling-Ling Hsieh 16

Li-Ta Lo 64

Lung-Fa Pan 14

Lung-Kwang Pan 14, 23

M

Miao-Jung Yen 19

Min-Feng Xiao 14

Ming-Chi Wei 37

Ming-Hong Hsieh 45

Ming-Hsien Li 6

Ming-Jhe Wu 12

Min-Hung Shih 58

Mong-Chuan Lee 60, 69

N

Nathalia Marshellina Subagyo 42

P

Pei-Chen Wu 54

Pei-Chi Li 25

Pei-Lain Chen 2, 4

Pei-Yun Huang 19

Po-Yang Hsu 62

R

Rong-Fong Lin 74



Rong-Yu Lee..... 74

S

Shang-Min Yeh..... 74

Shih-Ching Wu..... 27, 31, 56

Shih-Kuang Hsu 27, 33

T

Te-Fa Huang 22

Tian-Yu Shih..... 12

Tsung-Hsuan Wel..... 66

Tzu-Hsuan Liu..... 29

W

Wei-Chih Ou..... 2, 4

Wei-Lu Chen 76, 78, 80

Wen-Yan Lin..... 69

Y

Yen-Hui Lin..... 50, 52

Yen-Jung Lai..... 4

Yi-Chen Ye 27

Yi-Jhen Ke 80

Yi-Liang Shu 48

Yi-Ru Zhang 31

Yi-Ting Cai..... 52

Yong-Jun Zhan 39

Yu Hsuan Chen..... 7

Yuan-Jen Chang..... 66

Yu-Jen Chang 48

Yu-Ling Lee..... 39

Yu-Wen Chen..... 37

五劃

史天宇11

六劃

江欣樺 84

七劃

吳世經 26, 30, 55

吳育菁 82

吳佳鴻 49

吳哲凱 77

吳珮甄 53

吳銘哲 11

呂兆倉 59, 61, 63

李佩錡 24

李孟娟 59, 68

李明憲 5

李國興 84, 85

李淑君 85

李煜玲 38

李榮祐 73

李憲明 71

八劃

周志傑 1

林一郎 83

林可娟 83

林玟晏 68

林冠妤 15

林勁甫 85

林屏杰 84, 85

林建宏 59

林政勳 21

林榮芳 73

林燕輝 49, 51

九劃

姚俊旭 30

施旻宏 57

柯宜蓁 79

洪苑露 82

十劃

徐一量 47

十一劃

張又仁 47

張尹溶 82



張永吉	81
張亦如	30
張仲奇	81
張振榮	9
張淵仁	65
張皓甯	9
許世光	26, 32
許博揚	61
許勤郁	5
許學全	24, 28, 57
郭炯村	40, 81
陳佳惠	15
陳俞雯	36
陳信雄	17
陳颯如	83
陳建亘	81
陳祗合	82
陳韋陸	75, 77, 79
陳碧蓮	1, 3
陳錦杏	65

十二劃

黃佩筠	17
黃芳亮	71
黃英凱	81
黃德發	21
黃曉玫	32

十三劃

楊昆翰	75
楊程鈞	17
葉上民	73
葉怡辰	26
詹詠竣	38

十五劃

劉子瑄	28
劉伯康	40, 81

劉雅涵	82
樓靜文	61, 63
歐威志	1, 3
滕芳君	82
潘榕光	13
潘龍發	13
蔡怡婷	51
鄧金蓮	40
鄭芳宜	44
鄭凱元	11

十六劃

盧建佑	71
蕭安成	17
蕭珮綺	82
蕭閔峯	13
賴少庸	81
賴均綸	84
賴彥蓉	3
賴嘉祥	53

十七劃

戴邑芳	83
謝明宏	44
謝玲鈴	15
謝栢滄	9

十八劃

顏妙蓉	17
顏敬庭	83
魏崇軒	65
魏銘琪	36

十九劃

羅立達	63
羅安介	55
羅培仁	82

國家圖書館出版品預行編目資料

健康科學院畢業生研究成果發表會會議手冊. 105 學年度/潘銘正、李國興主編；
中臺科技大學健康科學院.-初版-. 台中市：中臺科大健科院.民 106.06

ISBN 978-986-94955-0-9 (平裝) NT\$: 180

105 學年健康科學院畢業生研究成果發表會會議手冊

書 名：105 學年度健康科學院畢業生研究成果發表會會議手冊

出 版 者：中臺科技大學健康科學院

40601 台中市北屯區廬子路 666 號

電話：04-2239-1647 轉 3986、3987

網址：<http://chs.ctust.edu.tw/bin/home.php>

主 編：潘銘正、李國興

編 輯：陳美玲、李霈宸

印 刷：智翔文化有限公司

定 價：180 元

出版日期：中華民國 106 年 6 月初版