MSP RESEARCH DAY 2021

REFINING THE REVOLUTION OF PERIODONTAL RESEARCH

25th September 2021
via Microsoft Teams
9 am - 1 pm

MALAYSIAN SOCIETY OF PERIODONTOLOGY

Persatuan Periodontologi Malaysia
Malaysian Society of Periodontology
PPMSP

CONTENTS

MESSAGE FROM THE PRESIDENT

Assalamualaikum / Salam Sejahtera.

Thank you very much to all presenters and participants, and congratulation to the Organising Committee of this MSP Research Day 2021 seminar, headed by Dr Nor Haliza Mat Baharin, for this inaugural event.

MSP is indeed indebted to its members and in return, the society will try to put in place programmes which will benefit the members, for their progress through their professional careers and lives in general. Evidence-based dentistry and medicine is the word of the day, so let us not just be the user of scientific evidences, but getting involved in producing evidences to our ever evolving dental and periodontal practice and procedures.

As a first project in this aspect of dentistry, research, I am sure there will be more improvement in the organisation and contents of the seminar. From this seminar, we hope to produce a publication (Special Issue of Archives of Orofacial Sciences) the proceedings of this seminar and will be part of our history in this current world of evidence-based practice. With all your supports, I am very confident, we will be soaring new heights in our scientific research and practice.

So, do enjoy the seminar and make sure it is a fruitful as well as a memorable one. I hope you will be looking forward to next one.

Regards

Datuk Dr Ahmad Sharifuddin Mohd Asari
President
Malaysian Society of Periodontology

PROGRAMME

Time	Activities	
8.30 – 9.00 am	Registration	
9.00 – 9.15 am	Opening Remarks by MSP President	
9.15 – 10.15 am	Plenary Talk by Assoc. Prof. Dr. Syarida Hasnur Safii **'Translational Research in Periodontology'**	
10.15 – 10.30 am	Break	
10.30 am - 12.30 pm	**Main channel**	**Room 1**
	Oral Presentations for Original Research	Oral Presentations for Case Report and Review
12.30 pm - 12.45 pm	Lucky draw	Judges Discussion
12.45 pm - 1.00 pm	Closing Remarks and Announcement of Winners	
1.00 pm	End of Programme	

PLENARY SPEAKER

Associate Professor Dr. Syarida Hasnur Safii received her degree in Dentistry from Universiti Kebangsaan Malaysia in 2002, following which she served as a dental officer with Ministry of Health in Kuantan, Pahang for 4 years. She joined University of Malaya as a tutor in 2006 and gained her Master of Clinical Dentistry in Periodontology from King's College London in 2009. She was also awarded the Membership of Restorative Dentistry from the Royal College of Surgeons of Edinburgh in the same year. She completed her PhD at University of Otago, New Zealand in 2018.

Currently, Associate Professor Dr. Syarida is a senior lecturer in the Faculty of Dentistry, University of Malaya. She teaches undergraduate dental students and supervising postgraduate students enrolled in Master of Clinical Dentistry, Master of Dental Science and PhD programmes. She is the coordinator for Periodontology course, Bachelor of Dental Surgery programme and General Dentistry course, Master of Clinical Dentistry programme.

Her main research areas include periodontal disease and systemic disease/ conditions, locally-delivered antimicrobial as an adjunct to scaling and root surface debridement in the treatment of periodontitis, systematic reviews and dental education. She has published her work in various journals such Journal of Periodontal Research, Archives of Oral Biology, European Journal of Dental Education, Journal of Oral Science and a few other ISI/ Scopus journals. She has also reviewed manuscripts for publication in ISI journals, Archives of Oral Biology and Sains Malaysiana.

SYNOPSIS OF PLENARY TALK

TRANSLATIONAL RESEARCH IN PERIODONTOLOGY

Translational research has gained momentum thanks to the advancements in the basic science research which has led to a better understanding of the cellular and molecular aspects of oral diseases. However, translation or conversion of the laboratory findings to the clinical practice is slow, expensive and subjected to many failures.

In the plenary talk, translational research in Periodontology and the challenges will be explained. Some examples of translational research that have been conducted in Malaysia will also be shared.

LIST OF JUDGES

PROF. DR. RATHNA DEVI VAITHILINGAM

Professor of Periodontology
Department of Restorative Dentistry
Faculty of Dentistry
University of Malaya
Kuala Lumpur

DR. ZURAIRAH BERAHIM

Lecturer in Periodontology
Periodontics Unit,
School of Dental Sciences,
Universiti Sains Malaysia
Kubang Kerian, Kelantan

DR. WAN NUR ALWANI WAN ABDUL AZIZ

Senior Lecturer
Department of Periodontology & Community Dentistry,
Faculty of Dentistry,
Universiti Sains Islam Malaysia
Kuala Lumpur

DR. BENNETE FERNANDES

Lecturer in Periodontology
Department of Periodontics,
SEGI University,
Kota Damansara

LIST OF ORAL PRESENTATIONS

ORIGINAL RESEARCH

No	Time	Presentation ID	Presenter	Title
1.	10.30-10.45am	A1	Dr. Wahidatunur Musa	Antibacterial Activity of Olive Oil Extracts on Periodontopathogenic Oral Bacteria
2.	10.45-11.00am	A2	Dr. Nur Zety Mohd Noh	The Evaluation of Bone Regeneration Following Socket Preservation with Concentrated Growth Factor (CGF) and Poly Lactic-Co-Glycolic Acid (PLGA) Scaffold in Rabbits
3.	11.00-11.15am	A3	Dr. Hirzi Bin Kamaludin	Prevalence of Chronic Periodontitis in Erectile Dysfunction patients
4.	11.15-11.30am	A4	Dr. Siti Nurqissa Mustafa	Comparison between periodontal self-examination and self-reported periodontal disease
5.	11.30-11.45am	A5	Dr. Aisah Ahmad	Periodontal Disease during pregnancy

CASE REPORT & REVIEW

No	Time	Presentation ID	Presenter	Title
1.	10.30-10.45am	B1	Dr. Nik Fatin Sarah Nik Mhd Abdul Nasser	Early Dental Implant Failure in Patient with Active Implant Periapical Lesions: Lesson Learnt from Two Case Reports
2.	10.45-11.00am	B2	Dr. Cheng Zi Hui	Alveolar ridge preservation after tooth extraction and replacement with fibre-reinforced composite bridge in young patient: a case report.
3.	11.00-11.15am	B3	Dr. Jane Evelyne Chong	Desquamative Gingivitis As The First Clinical Sign of Pemphigus Vulgaris - A Case Report
4.	11.15-11.30am	B4	Dr. Nurul Wahida Mohd Hasan	Electronic Cigarette Vapour and the Impacts on Oral Health

ORIGINAL RESEARCH

ABSTRACTS

A1 ANTIBACTERIAL ACTIVITY OF OLIVE OIL EXTRACTS ON PERIODONTOPATHOGENIC ORAL BACTERIA

Wahidatunur Musa[1], Nurulhuda Mohd[2], Zamirah Zainal-Abidin[3], Mazlina Mohd Said[4], Badiah Baharin[2]

[1] Periodontic Unit, Baling Dental Clinic, Ministry of Health, Kedah
[2] Unit of Periodontology, Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia
[3] Department of Craniofacial Diagnostics and Biosciences, Faculty of Dentistry, Universiti Kebangsaan Malaysia
[4] Faculty of Pharmacy, Universiti Kebangsaan Malaysia

Abstract: Phenolic compounds are secondary metabolites of plants metabolism. They can be found in various parts of olive including its oil. They exhibit antimicrobial activity towards both gram-positive and gram-negative bacteria. However, little is known about the antibacterial activity of the compounds towards periodontopathogens. Objective: To investigate the potential of these compounds as an antibacterial agent towards pathogens, specifically Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis and Fusobacterium nucleatum. Methods: Phenolic compounds were extracted from extra virgin olive oil (EVOO) through liquid-liquid separation using methanol:water (70:30) and hexane. It was then prepared in various concentrations to determine its minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against the periodontopathogens. The antiadhesion activity was quantified using crystal violet staining while the effects on the morphology were examined through scanning electron microscopy (SEM). Result: The MICs of the phenolic compounds on A. actinomycetemcomitans, P. gingivalis and F. nucleatum were 31.25 mg/mL, 62.5 mg/mL and 125 mg/mL respectively. The MBCs of the phenolic compounds on A. actinomycetemcomitans and F. nucleatum were 62.5 mg/mL and 125 mg/mL respectively, suggesting this compound can eradicate these bacteria. There was no bactericidal effect on P. gingivalis. The adhesion of all the bacteria was interrupted by the compounds at the lowest concentration (1.95 mg/mL). SEM findings showed disruption of bacterial cell surfaces such as blebs and disintegration of cells after exposure to this extract. Conclusion: Phenolic compounds of olive oil exhibited antibacterial activity against the tested pathogens, with bactericidal effects on A. actinomycetemcomitans and F. nucleatum and bacteriostatic effects on P.gingivalis.

Keywords: *natural antimicrobial compound, antimicrobial effect, phenolic compounds, periodontal bacteria*

A2 THE EVALUATION OF BONE REGENERATION FOLLOWING SOCKET PRESERVATION WITH CONCENTRATED GROWTH FACTOR (CGF) AND POLY LACTIC-CO-GLYCOLIC ACID (PLGA) SCAFFOLD IN RABBITS

Nur Zety Mohd Noh [1,2], Nur Aliana Hidayah Mohamed [3,4], Erni Noor [1]

[1] Centre of Periodontology Studies, Faculty of Dentistry, Universiti Teknologi MARA
[2] Department of Restorative Dentistry, Kulliyyah of Dentistry, International Islamic University Malaysia
[3] Centre of Postgraduate Studies, Faculty of Dentistry, Universiti Teknologi MARA
[4] Centre of Preclinical Studies, Faculty of Dentistry, Universiti Teknologi MARA

Various grafting materials are utilised to facilitate regeneration. There is currently a paradigm shift towards applying poly lactic-co-glycolic acid (PLGA), which is regarded as an excellent scaffold for tissue engineering. Concentrated growth factor (CGF) has also been reported to promote wound healing. Nevertheless, the role of PLGA microspheres as a substitute for bone graft material with CGF in bone regeneration remains unclear. This study aims to evaluate the effect of CGF with PLGA on bone formation and the expression of alkaline phosphatase (ALP) following socket preservation. PLGA microspheres were prepared using double solvent evaporation method and observed under scanning electron microscopy (SEM). A 6 ml of rabbit's blood was collected from the marginal ear vein and centrifuged to obtain CGF. Blood was also collected for ALP assessment from 24 New Zealand White (NZW) male rabbits subjected to the first upper left premolar extraction. Sockets were filled with CGF, PLGA, CGF+PLGA or left empty and observed with microscopic computed tomography (micro-CT) at four and eight weeks. The SEM image revealed a spherical shape with interconnected pores on the surface of the PLGA particles. Repeated measures ANOVA were used to evaluate the effect of time and treatment ($p < 0.05$) with significant differences in bone width, height, volume, volume fraction and expression of ALP was observed with CGF+PLGA. Both CGF and PLGA have the potential as alternative grafting materials and this study serves as an ideal benchmark for future investigations on the role of CGF+PLGA in bone regeneration enhancement.

Keywords: *Concentrated growth factor; poly lactic-co-glycolic acid; regeneration; socket preservation*

A3

PREVALENCE OF CHRONIC PERIODONTITIS IN ERECTILE DYSFUNCTION PATIENTS

Hirzi Kamaludin[1], Jamie Chin Kok Kwong[2], Lili Zuryani Marmuji[3], Khamiza Zainol Abidin[1]

[1] Periodontic Specialty Clinic, Gunung Rapat Dental Clinic, Perak State Oral Health Division, Ministry of Health Malaysia

[2] Urology Clinic, Department of Surgery, Raja Permaisuri Bainun Hospital, Ministry of Health Malaysia

[3] Family Medicine Specialty Clinic, Gunung Rapat Health Clinic, Perak State Health Department, Ministry of Health Malaysia

Introduction: Erectile dysfunction and periodontitis have common risk factors, such as diabetes mellitus and tobacco smoking. Multiple reports are available in regards to the association between erectile dysfunction and chronic periodontitis. Aim: To determine the association of erectile dysfunction and chronic periodontitis in selected Malaysian population. Methods: 74 patients (mean age= 52.4 ± 10.9 years) diagnosed with erectile dysfunction, from scores via the International Index of Sexual Function-5 (IIEF-5) questionnaire, were included in the study. Erectile dysfunction severity was classified as mild, mild to moderate, moderate, and severe. Periodontal condition was recorded using basic periodontal examination (BPE) method, of which scores of 0, 1, 2, 3 were associated with having no periodontitis while a score of 4 was considered to have periodontitis. Results: There are 40 (54.1%) subjects found to have periodontitis and the association of erectile dysfunction and periodontitis showed a moderate positive degree of correlation, ρ=0.487 ($p<0.001$). The percentage of subjects having periodontitis indicated an increasing trend with the severity of ED; from 19.0% (mild ED), 54.2% (mild to moderate ED), 75.0% (moderate ED), to 84.6% (severe ED). Greater degree of correlation was noted in between dental scaling experience and erectile dysfunction, ρ=0.635 ($p<0.001$). Binomial logistic regression had shown no other co-morbidities and factors were affecting this relation. Conclusions: There seemed to be an association between erectile dysfunction and periodontitis existing in these selected Malaysian population.

Keywords: *Chronic periodontitis, erectile dysfunction, dental scaling*

A4 COMPARISON BETWEEN PERIODONTAL SELF-EXAMINATION AND SELF-REPORTED PERIODONTAL DISEASE

Siti Nurqissa Mustafa[1], Badiah Baharin[2], Tanti Irawati Rosli [2]

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[2] Faculty of Dentistry, Universiti Kebangsaan Malaysia

Objective: This study was to compare findings and agreement between periodontal self-examination and self-reported assessments in detection of periodontal disease among selected adult patients in Kuala Lumpur. Methods: Subjects were patients attending Periodontic clinics in Faculty of Dentistry, UKM. Periodontal patients who met the inclusion criteria were randomly assigned into two groups, self-examination and self-reported groups. Patients in the self-examination group performed a periodontal self-examination using illustrated written manual with questionnaire, while those in the self-reported group will only answered questionnaire. Both groups were given similar content of questionnaire. A clinical oral examination was carried out on all patients by a single trained calibrated examiner. Results: A total of 172 patients (86 in each group) participated in the study with the mean age of 48 years (SD12.6). Majority of them had severe periodontal disease. Only for item 'total number of teeth' had showed good agreement ($p<0.01$) between groups. Self-reported group showed higher sensitivity for all items (mobility, colour, recession and bleeding). Meanwhile, the self-examination group demonstrated higher specificity for items on mobility, recession and bleeding. Conclusion: Both self-reported and self-examination assessments area reliable in measuring total number of teeth in periodontal patients. Self-reported assessment is more sensitive in detecting periodontal disease in terms of items for mobility, colour, recession and bleeding.

Keywords: *periodontitis, self-examination; self-reported; periodontal disease; adult*

A5 PERIODONTAL DISEASE DURING PREGNANCY

Aisah Ahmad [1], Mohamad Adib Jaafar [2,3]

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[2] Periodontal Specialist Unit of Sibu Jaya, Sibu Jaya Dental Clinic, Ministry of Health Malaysia, Sarawak

[3] Periodontal Specialist Clinic of Mak Mandin, Polyclinic of Mak Mandin, Ministry of Health Malaysia, Penang

Epidemiologic and longitudinal studies have shown that pregnancy is associated with increased gingival inflammation and worsening of periodontal status. It also reported that 30-100% of pregnant women have periodontal disease during pregnancy. Prospective studies suggested that periodontal therapy during pregnancy may reduce the risk of adverse pregnancy outcomes and significant periodontal status improvement. The objectives of this study were to evaluate the prevalence of periodontal disease among pregnant women, to compare periodontal conditions before and after non-surgical periodontal therapy, and to look at pregnancy outcomes after delivery in both test and control groups. This was a cross-sectional and intervention study of pregnant women. Pregnant women attending the MCH Jalan P. Ramlee Clinic, Kuching, for their ante-natal check-up were invited to participate in this study following informed and written consent. All subjects fulfilled a set of inclusion and exclusion criteria before being referred to the Periodontic Unit, Klinik Pergigian Jalan Masjid, Kuching for periodontal examination and treatment. All subjects were examined and diagnosed with healthy periodontium or diseased periodontium. All subjects underwent non-surgical periodontal therapy: Oral hygiene education, scaling, and root debridement according to their diagnosis. Periodontal parameters (Plaque score and Bleeding score: expressed as the percentage of surfaces showing bleeding and plaque) evaluated at baseline and 8 weeks. The data collected were analysed using SPSS (T-test, paired T-test). There were 60 subjects examined. 85% of subjects were diagnosed with diseased periodontium, and 15% of subjects as healthy periodontium. At baseline, all periodontal parameters (mean ± SD) were higher in the diseased periodontium group compared to the healthy group (Bleeding score 39.6±21.5 versus 6.5±3.9; p=0.001, Plaque score 46.4±30.1 versus 33.5±31.1; p=0.243). After 2 months, both groups showed improvement in all periodontal parameters; diseased periodontium (Bleeding score 39.6±21.5 vs 16.6±9.8; p=0.001, Plaque score 46.4±30.1 vs 18.6±11.0; p=0.001) and healthy periodontium group (Bleeding score 6.5±3.9 vs 5.4±3.7; p=0.230, Plaque score 33.5±31.1 vs 24.1±17.7; p=0.218). This study showed that 85% of pregnant women involved in this study were diagnosed with periodontal disease. It also showed that the non-surgical periodontal therapy improved the periodontal status in which that less gingival bleeding and improve the oral hygiene of subjects in both groups, but more pronounce and significant in the diseased periodontium group.

Keywords: *Periodontal diseases, pregnant women*

CASE REPORT & REVIEW

ABSTRACTS

B1 EARLY DENTAL IMPLANT FAILURE IN PATIENT WITH ACTIVE IMPLANT PERIAPICAL LESIONS: LESSON LEARNT FROM TWO CASE REPORTS

Nik Fatin Sarah Nik Mhd Abdul Nasser[1,3], Nurul Qamar Salehuddin[1], Nurul Ain Mohamed Yusof[1], Wan Nurhazirah Wan Ahmad Kamil[2], Erni Noor[1]

[1] Center for Periodontology Studies, Faculty of Dentistry, Universiti Teknologi MARA,
[2] Oral & Maxillofacial Diagnostics & Medicine Studies, Faculty of Dentistry, Universiti Teknologi MARA
[3] Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia

Implant periapical lesion (IPL), also known as retrograde peri-implantitis, was first noted in 1992 by McAllister. As the name suggest, it involves inflammation surrounding the apical part of the dental implants. Previously, many studies have reported the event of IPL that further delays osseointegration, and some reported failure of implant placement due to this disease. In this article, we described two cases of early dental implant failure associated with active IPL and correlate the clinical and radiographical findings with the histopathological findings.

Keywords: *Implant periapical lesion; retrograde peri-implantitis*

B2 ALVEOLAR RIDGE PRESERVATION AFTER TOOTH EXTRACTION AND REPLACEMENT WITH FIBRE-REINFORCED COMPOSITE BRIDGE IN YOUNG PATIENT: A CASE REPORT

Cheng Zi Hui[1], Lim Ei Leen[1]

[1] Unit Pakar Periodontik, Klinik Pergigian Bandar Jerantut, Kementerian Kesihatan Malaysia, Pahang

Alveolar ridge preservation is a surgical procedure aimed to preserve the alveolar bone after tooth extraction to eliminate or reduce the need for bone augmentation during implant placement. It includes the use of membrane that is either being used alone or in combination with a bone replacement graft. This case describes the technique of alveolar ridge preservation after tooth extraction using a xenogenic bone graft combined with a resorbable collagen membrane, and the fabrication of an anterior fibre-reinforced composite (FRC) bridge in an 18-year-old male patient. This treatment allows him to have a good preservation of the volume and architecture of the alveolar ridge as well as soft tissues and temporarily replace a missing anterior tooth until a definitive restoration can be achieved.

Keywords: *case report, alveolar ridge preservation, fibre-reinforced composite bridge*

B3 DESQUAMATIVE GINGIVITIS AS THE FIRST CLINICAL SIGN OF PEMPHIGUS VULGARIS - A CASE REPORT

Jane Evelyne Chong Huey Yuh[1] , Evelyn Able Padtong[1], Fairuz Abdul Rahman[2]

[1] Ministry Of Health, Malaysia, Periodontology Unit, Putatan Government Dental Clinic, Sabah

[2] Ministry Of Health, Malaysia, Department of Oral Pathology & Oral Medicine, Queen Elizabeth Hospital 1, Kota Kinabalu, Sabah

Desquamative gingivitis is characterised by desquamation of the gingiva with painful erosion and ulceration. It is predominantly a manifestation of several vesiculobullous diseases. Delayed diagnosis or misdiagnosis often led to disease progression. Pemphigus vulgaris is a chronic, life-threatening autoimmune disease resulting in blistering of the mucosa and skin. Oral lesions normally preceded skin lesions. Early diagnosis and treatment are important to prevent involvement of the skin, as the treatment and prognosis varies with extraoral involvement. Clinical, histopathological examination and direct immunofluorescent are necessary for the diagnosis of pemphigus vulgaris. Treatment of desquamative gingivitis involves improving oral hygiene, reduce irritation to the lesions and specific therapy to the underlying disease. This paper describes a case of a patient with desquamative gingivitis for one year, whom is ultimately diagnosed as having pemphigus vulgaris.

Keywords: *Desquamative gingivitis, vesiculobullous diseases, pemphigus vulgaris, oral lesions, direct immunofluorescent*

B4 ELECTRONIC CIGARETTE VAPOUR AND THE IMPACTS ON ORAL HEALTH

Nurul Wahida Mohd Hasan[1,2], Badiah Baharin[1], Nurulhuda Mohd[1]

[1] Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia

[2] Unit of Periodontics, School of Dental Sciences, Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan

Electronic cigarettes (e-cigarette) have been in demand among young generations as a modern way of smoking since last decade. E-cigarette devices generated the vapour through the heating process and the inhalation of vapour through the mouth called vaping directly exposed the oral cavity to potentially toxic chemicals in the vapour. The e-cigarette vapour has been reported with potential systemic and oral health impacts though it is to a lesser extent than the conventional cigarette. The toxicity of the chemicals in e-cigarette vapour has been highlighted by various in-vitro studies and currently being explored by many researchers. Nicotine content in e-cigarette vapour not only causes addiction but has deleterious effects on the oral mucosa. E-cigarette vapour is commonly associated with oral health-related problems such as irritation to the oral mucosa, periodontal disease, and possibly the initiation of dental caries. As a marketing strategy, e-cigarette has been promoted as a safer way of smoking habit and use as a smoking cessation tool. Non-scientific assertions regarding e-cigarettes are causing public misunderstanding, leading people to assume that they are safe while the truth is yet unclear. This literature review aims to emphasize the hazard of e-cigarette vapour and the outcome to oral health by summarizing the evidence gathered from previous studies and the potential role of e-cigarette for smoking cessation aids considering the widespread usage of e-cigarettes and public concerns.

Keywords: *e-cigarette, smoking, aerosol, periodontitis, nicotine*

OUR TEAM

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The Evaluation of Bone Regeneration Following Socket Preservation with Concentrated Growth Factor (CGF) and Poly Lactic-Co-Glycolic Acid (PLGA) Scaffold in Rabbits

Student: Nur Zety binti Mohd Noh

Main supervisor: Dr Erni Noor

Co-supervisor: Dr Nur Aliana Hidayah Mohamed

Presentation ID: A2

Outline

1 Introduction

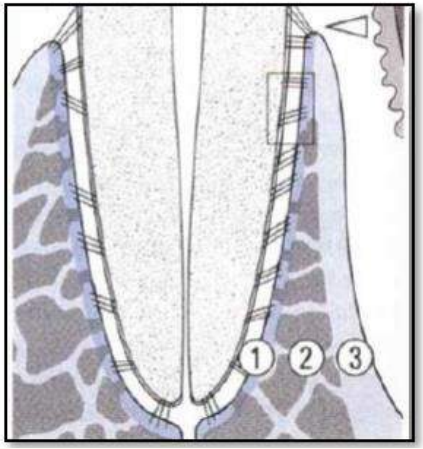
2 Materials and Methods

3 Results and Discussion

4 Conclusions

INTRODUCTION

Research Background



Alveolar bone (Hassell 1993)
1: alveolar bone proper
2: trabecular bone
3: compact bone

Socket preservation
(Ten Heggeler *et al* 2012, Aimetti *et al* 2018)

PLGA
- **Carrier for drug delivery.**
- Scaffold to facilitate cell behaviour and performance.

CGF
- Platelet concentrate.
- **Autologous.**
- Enriched with numerous growth factors.

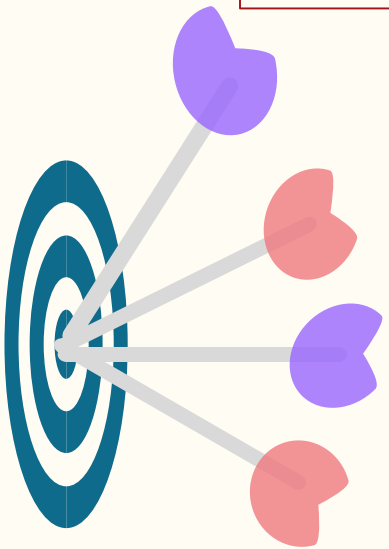
Problem Statement

Lack of evidence-based data to support the **superiority** of material in enhancing bone regeneration (Chen *et al* 2015).

PLGA microspheres as **substitute** for bone graft materials and its **combinatory effect with CGF** on **bone regeneration** remains comparatively **unclear.**

Research Gaps

Limited concrete evidence on the **role of CGF** in promoting **bone regeneration**.



Data paucity on the role of **PLGA** scaffold on **bone regeneration**, mainly the porous particles as an **alternative** to other bone substitutes.

Limited data on the role of **PLGA** as a **carrier** for **platelet concentrate.**

Most of the studies investigating application of materials in **socket preservation** procedure **focused** on the **radiographic and histomorphometric** investigations.

Objectives of the Study

To evaluate the effects of CGF, PLGA, and CGF + PLGA on **radiographic bone regeneration outcomes.**

To measure the **release of ALP** from each treatment group as an indicator of osteoblastic activity during bone regeneration.

MATERIALS AND METHODS

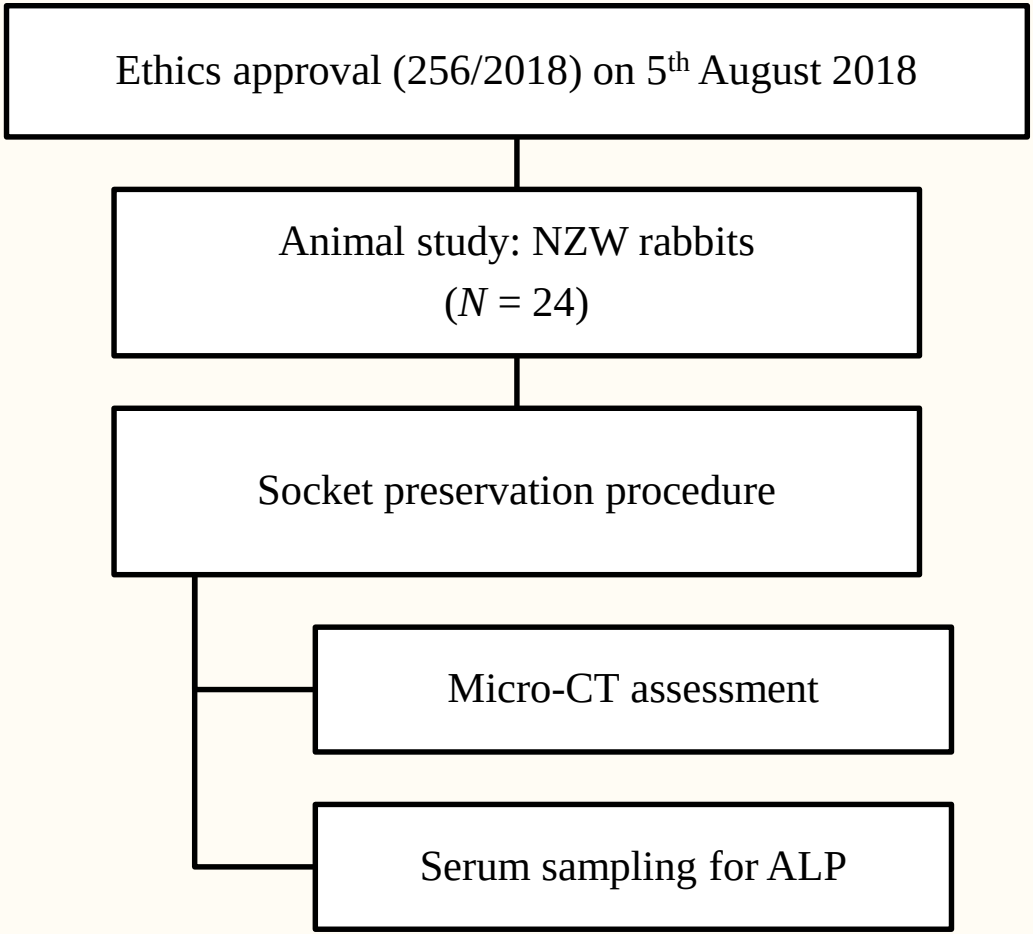


Figure of Flow Diagram of the study

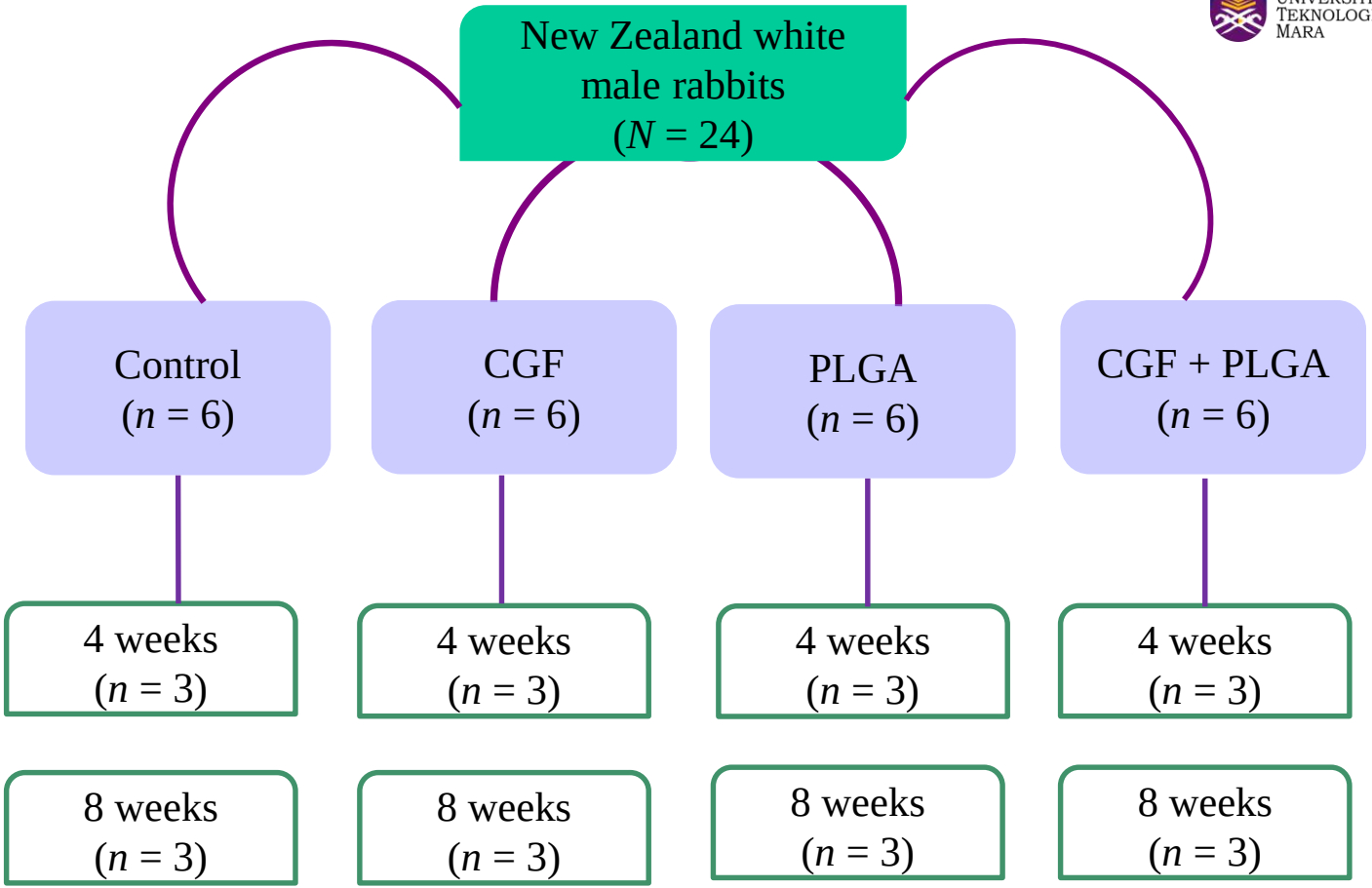
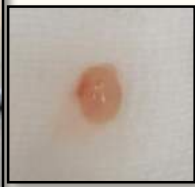


Figure of Allocation of Treatment Groups

Preparation of research materials

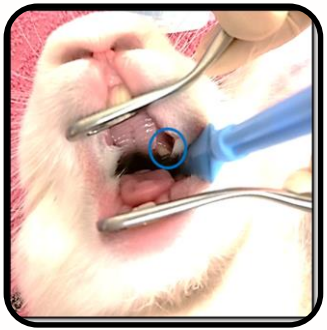
- PLGA particles fabrication and observation (Qutachi *et al* 2013).
- CGF preparation (Kim *et al* 2014, Takeda *et al* 2015).
- Incorporation of PLGA with CGF (Lee *et al* 2015).
- Blood sampling for ELISA (ALP analysis) (Leung *et al* 1995).

SEM

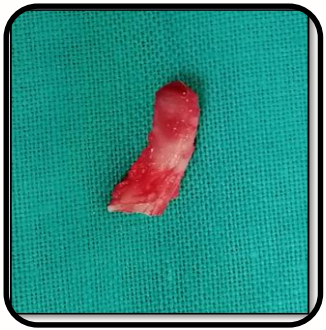


Marginal ear vein for blood collection and CGF fabrication

Animal Experimental Procedure

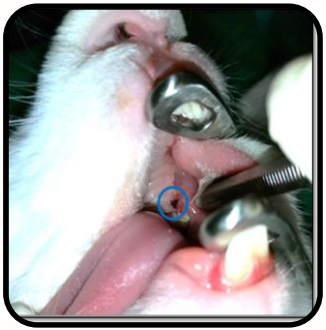


Surgical site on upper left first premolar tooth.

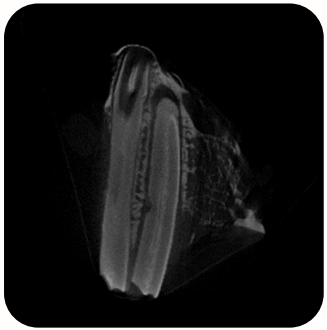


Extraction of the tooth with treatment accordingly:

- CGF
- PLGA
- CGF + PLGA
- empty socket

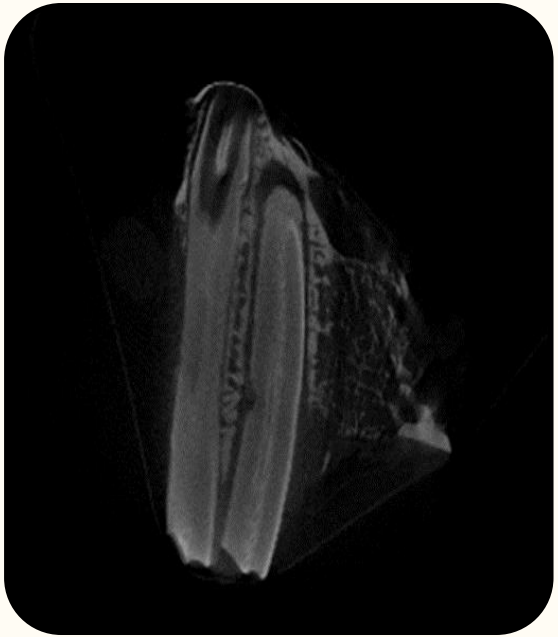


Simple interrupted suture.



Micro-CT assessment

- 80 kV of voltage
- 0.5mm Al filter
- 18 µm resolution
- 480 ms exposure.



Variables analysed using CTAn software (Version 1.14)

- Horizontal bone width
- Vertical bone height
- Bone volume
- Fraction of bone volume.

RESULTS AND DISCUSSION

Summary of Study Objectives and Its Measurement

Study Objectives	Methods	Statistical Analysis
To evaluate the effects of treatments on the radiographic outcomes.	Micro-CT assessment	Repeated measures ANOVA
To evaluate the release of ALP from each treatment group as an indicator of the osteoblastic activity.	ELISA	

1st objective: radiographic outcomes of bone regeneration

Time effect

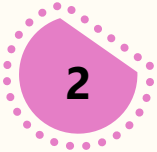
Comparison	Control	CGF	PLGA	CGF + PLGA
4 weeks – 8 weeks	*p*-value	*p*-value	*p*-value	*p*-value
Horizontal bone width	0.914	0.319	0.944	0.019*
Bone height	<0.001*	<0.001*	0.034*	0.032*
Bone volume	0.391	0.025*	0.066	0.046*
Fraction of bone volume	0.034*	<0.001*	0.312	0.021*

* Significant

Treatment effect

Variables	Comparison	Mean Difference (95% CI)	*p*-value
Horizontal bone width	Control and CGF	-0.30 (-0.71, 0.11)	0.228
	Control and PLGA	-0.70 (-1.11, -0.29)	<0.001*
	Control and CGF+PLGA	-0.42 (-0.83, -0.01)	0.045*
	CGF and PLGA	-0.40 (-0.81, 0.01)	0.057
	CGF and CGF+PLGA	-0.12 (-0.53, 0.29)	0.862
	PLGA and CGF+PLGA	0.28 (-0.13, 0.69)	0.272
Bone Height	Control and CGF	-0.77 (-1.68, 0.14)	0.122
	Control and PLGA	-1.01 (-1.92, -0.10)	0.024*
	Control and CGF+PLGA	-1.39 (-2.29, -0.48)	0.001*
	CGF and PLGA	-0.24 (-1.15, 0.67)	0.894
	CGF and CGF+PLGA	-0.62 (-1.53, 0.29)	0.276
	PLGA and CGF+PLGA	-0.38 (-1.29, 0.53)	0.680

PLGA alone is able to act as **scaffold** in facilitating bone formation.



The **role of PLGA as a scaffold** for bone regeneration (Zhao *et al* 2021):

1. Excellent biocompatibility.
2. Excellent processability.
3. Adequate mechanical strength.
4. Various bioactive materials can be incorporated with the PLGA.

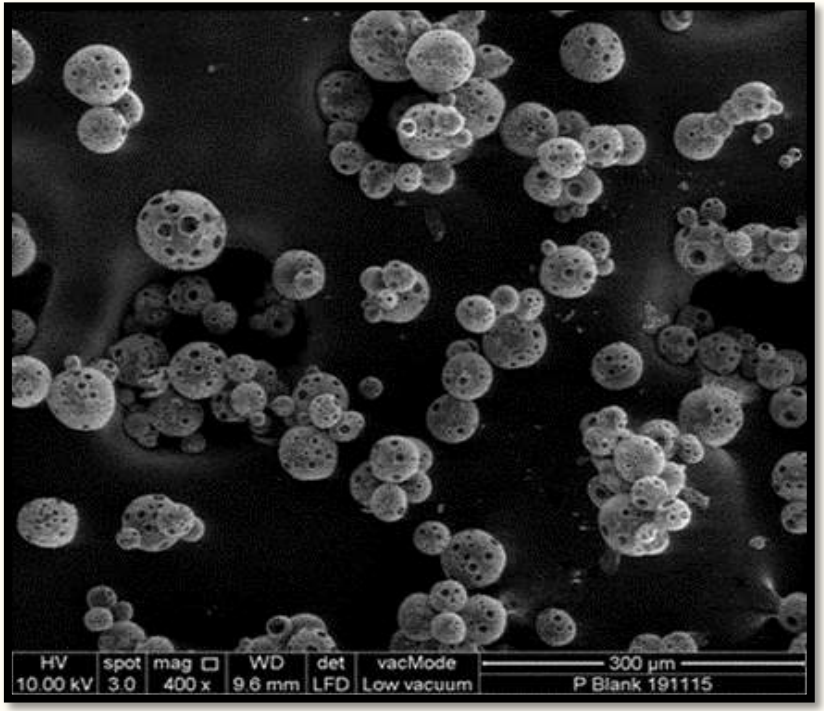


Figure of SEM Image Observation of Porous PLGA Microspheres (400x Magnification)

- ✓ PLGA as scaffold in promoting bone regeneration.

Porosity characterized by **presence of pores** (Xu *et al* 2016, Abbasi *et al* 2020).

Microparticles size were **53.709 µm to 120.375 µm** → as **10 to 200 µm** particle size precipitate **optimum active agent release** from the PLGA (Lemperlee *et al* 2004, Han *et al* 2016).

Pore size >30 µm → as **10 to 50 µm allows zero order release** (Molavi *et al* 2020).

Treatment effect

Variables	Comparison	Mean Difference (95% CI)	*p*-value
Horizontal bone width	Control and CGF	-0.30 (-0.71, 0.11)	0.228
	Control and PLGA	-0.70 (-1.11, -0.29)	<0.001*
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Combinatory effects on the **benefits of CGF and PLGA** (La and Yang 2015).

PLGA as a **carrier** of active agent **(CGF)** (Yasunami *et al* 2015, Okada *et al* 2019).

Treatment effect

Variables	Comparison	Mean Difference (95% CI)	*p*-value
Bone Volume	Control and CGF	-7.21 (-46.11, 31.68)	0.933
	Control and PLGA	-34.92 (-73.81, 3.98)	0.080
	Control and CGF+PLGA	-46.85 (-85.75, -7.95)	0.020*
	CGF and PLGA	-27.71 (-66.60, 11.19)	0.184
	CGF and CGF+PLGA	-39.64 (-78.54, -0.74)	0.046*
	PLGA and CGF+PLGA	-11.93 (-50.83, 26.97)	0.769
Fraction of Bone Volume	Control and CGF	-2.92 (-12.98, 7.13)	0.795
	Control and PLGA	-7.15 (-17.20, 2.91)	0.185
	Control and CGF+PLGA	14.61 (-24.66, -4.56)	0.007*
	CGF and PLGA	-4.22 (-14.28, 5.83)	0.569
	CGF and CGF+PLGA	-11.69 (-21.74, -1.63)	0.024*
	PLGA and CGF+PLGA	-7.46 (-17.52, 2.59)	0.161

1

The **role of CGF** as (Qiao *et al* 2016, Fang *et al* 2020):

1. Source of **growth factors.**
2. **Scaffold** for cellular migration.

2

- **CGF** as an **osteogenic inducer** (Chen et al 2015).
- Cross-linked structure protects its from rapid degradation (Rodella et al 2011).

Treatment effect

Variables	Comparison	Mean Difference (95% CI)	*p*-value
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	PLGA and CGF+PLGA	-7.46 (-17.52, 2.59)	0.161

2nd objective: ALP expression as indicator of osteoblast activity

ALP (Buchet *el al* 2013, Vimalraj 2020):

- ✓ Deposition of osteoid matrix
- ✓ Bone mineralization

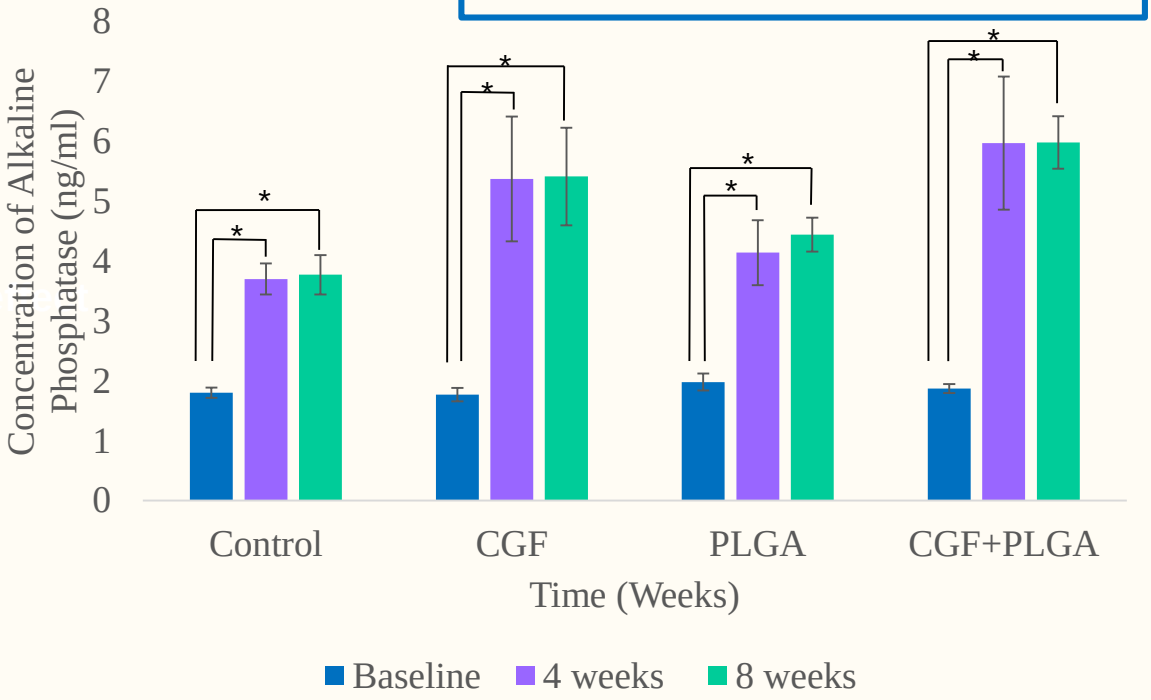

Figure of Mean Concentration of ALP at Three Time Points

Time effect

Comparison	Control	CGF	PLGA	CGF + PLGA
	p-value	*p*-value	*p*-value	*p*-value
Baseline – 4 weeks	<0.001*	<0.001*	<0.001*	<0.001*
Baseline – 8 weeks	<0.001*	<0.001*	<0.001*	<0.001*
4 weeks – 8 weeks	1.00	1.00	0.829	1.00

* Significant

ALP expression is **greater during initial stage** of healing and expressed **gradually** throughout the healing process (Vimalraj 2020, Rodrigues *et al* 2016, Leung *et al* 1995).

Treatment effect

Comparison	Mean difference (95% confidence interval)	*p*-value
Control and CGF	-1.09 (-1.72, -0.47)	<0.001*
Control and PLGA	-0.43 (-1.06, 0.19)	0.273
Control and CGF+PLGA	-1.52 (-2.14, -0.89)	<0.001*
CGF and PLGA	0.66 (0.04, 1.28)	0.034*
CGF and CGF+PLGA	-0.42 (-1.05, 0.20)	0.293
PLGA and CGF+PLGA	-1.08 (-1.71, -0.46)	<0.001*

The role of **growth factors in CGF** in promoting signalling pathway for ALP expression and osteoblast differentiation (Vimalraj 2020).

Treatment effect

Comparison	Mean difference (95% confidence interval)	*p*-value
Control and CGF	-1.09 (-1.72, -0.47)	<0.001*
Control and PLGA	-0.43 (-1.06, 0.19)	0.273
Control and CGF+PLGA	-1.52 (-2.14, -0.89)	<0.001*
CGF and PLGA	0.66 (0.04, 1.28)	0.034*
CGF and CGF+PLGA	-0.42 (-1.05, 0.20)	0.293
PLGA and CGF+PLGA	-1.08 (-1.71, -0.46)	<0.001*

It is **postulated** that the signalling pathways are **enhanced with incorporation of PLGA**.

Greater ALP expression = **greater bone regeneration activity** by osteoblast **with application of grafting materials** compared to **control.**

Limitations

1. Only bone specific ALP was investigated
2. Minimum number of sample sizes
3. Short term studies of 8 weeks
4. Histological and histomorphometric studies were not conducted
5. Growth factor release profile was not investigated

CONCLUSIONS

Elements required for a conducive environment of bone regeneration

i. Target cells
ii. Nature of the biomaterials

PLGA as a **scaffold** that provides a convenient surface area for cellular migration and proliferation and a carrier for growth factors in CGF.

CGF as source of **growth factors** and scaffold to boost bone formation.

CGF + PLGA provides the **best outcome** and as a potential **alternative** regenerative material.

Recommendations

1

Consideration on a larger **sample size** and **long term** investigations.

2

Investigation of other **osteogenic markers**.

3

To complement with **histological and histomorphometric** investigations.

4

To consider additional treatment group with **well-established xenograft** such as Bio-Oss®.

THANK YOU

CERTIFICATE OF PARTICIPATION

Persatuan Periodontologi Malaysia
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