

FINAL REPORT

SHORT TERM UNIVERSITY GRANT 304/PPSG/6131401

THE EFFECTS OF BOVINE BONE SCAFFOLD ON THE MICROSCOPIC
BIOLOGICAL RESPONSE OF HUMAN CHONDROCYTES

By

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6. Abstrak Penyelidikan

(Perlu disediakan di antara 100 - 200 perkataan di dalam **Bahasa Malaysia dan juga Bahasa Inggeris**. Abstrak ini akan dimuatkan dalam Laporan Tahunan Bahagian Penyelidikan & Inovasi sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti & masyarakat luar).

Abstract of Research

(An abstract of between 100 and 200 words must be prepared in Bahasa Malaysia and in English).

This abstract will be included in the Annual Report of the Research and Innovation Section at a later date as a means of presenting the project findings of the researcher/s to the University and the community at large)

Please see attachment (Appendix A).

7. Sila sediakan laporan teknikal lengkap yang menerangkan keseluruhan projek ini.

[Sila gunakan kertas berasingan]

Applicant are required to prepare a Comprehensive Technical Report explaining the project.

(This report must be appended separately)

Please see attachment (Appendix B).

Senaraikan kata kunci yang mencerminkan penyelidikan anda:

List the key words that reflects your research:

Bahasa Malaysia

Bahasa Inggeris

kondrosit

chondrocytes

skafol tulang bovin

bovine bone scaffold

8. Output dan Faedah Projek

Output and Benefits of Project

(a) * **Penerbitan Jurnal**

Publication of Journals

(Sila nyatakan jenis, tajuk, pengarang/editor, tahun terbitan dan di mana telah diterbit/diserahkan)

(State type, title, author/editor, publication year and where it has been published/submitted)

1. Published in the Journal of Cell and Tissue Banking 2008 as "THE MICROSCOPIC BIOLOGICAL RESPONSE OF HUMAN CHONDROCYTES TO BOVINE BONE SCAFFOLD". Vol, pg, authors?

2. 1st National Tissue Engineering and Regenerative Medicine Scientific Meeting. "The Effects of Bovine Bone Scaffold on The Biological Response of Human Chondrocytes". Hospital UKM, K. Lumpur. 29-30th August 2006.

3. Malaysian Society of Otorhinolaryngologists-Head and Neck Surgeons (MSO-HNS) Annual Scientific Meeting. "A Study of Human Cartilage and Bovine Scaffold For Usage in Reconstructive Surgery". Le Meridien K.Lumpur 7th April 2007.

4. 3rd Malaysia-Singapore Joint Meeting "Experimental Cartilage Development for Head and Neck Surgery". Le Meridien K.Lumpur. 24th June 2007.

- (b) **Faedah-faedah lain seperti perkembangan produk, pengkomersialan produk/pendaftaran paten atau impak kepada dasar dan masyarakat.**
State other benefits such as product development, product commercialisation/patent registration or impact on source and society.

Bovine bone is packaged in tissue bank and available for use in reconstructive surgery. It can be used for other development and research purposes.

* Sila berikan salinan/Kindly provide copies

- (c) **Latihan Sumber Manusia**
Training in Human Resources

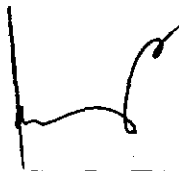
- i) Pelajar Sarjana: **DR ABDULHALIM B. SHIBGHATULLAH**
(Perincikan nama, ijazah dan status)
(Provide names, degrees and status)

MMED ORL-HNS(USM). GRADUATED IN THE YEAR MAY 2008

- ii) Lain-lain:
Others

9. **Peralatan yang Telah Dibeli:**
Equipment that has been purchased

1) FUJITSU CPU FOR DATA ANALYSIS OF GRAPHICAL IMAGES AND THE STUDY
OF THE INTERACTION OF CHONDROCYTES AND BOVINE BONE



DR. BAHARUDIN ABDULLAH
Pensvarah
Jabatan ORL
Pusat Pengajian Sains Perubatan
Kampus Kesihatan
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16150 Kubang Kerian, Ketantan,

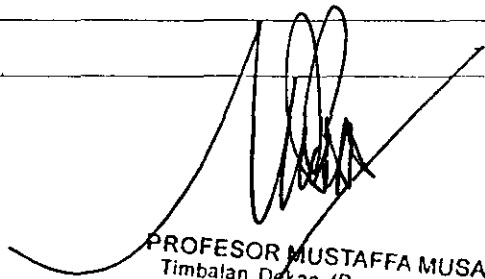
15 hb Jun 2008

Tandatangan Penyelidik
Signature of Researcher

Tarikh
Date

Komen Jawatankuasa Penyelidikan Pusat Pengajian/Pusat
Comments by the Research Committees of Schools/Centres

Objektif projek tercapai dan
hasil penyelidikan diterbitkan



PROFESOR MUSTAFFA MUSA
Timbalan Dekan (Penyelidikan)
Pusat Pengajian Sains Perubatan
Kampus Kesinatan
Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan.

TANDATANGAN PENERUSI
JAWATANKUASA PENYELIDIKAN
PUSAT PENGAJIAN/PUSAT
Signature of Chairman
[Research Committee of School/Centre]

22/1/09

Tarikh
Date

UNIVERSITI SAINS MALAYSIA
 JABATAN BENDAHARI
 KUMPULAN WANG PENYELIDIKAN GERAN USM(304)
 PENYATA PERBELANJAAN SEHINGGA 30 NOVEMBER 2007

| | | | |
|------------------------------|----|-----------|---|
| Jumlah Geran: | RM | 17,448.00 | Ketua Projek: DR. BAHARUDDIN ABDULLAH |
| Peruntukan 2005 (Tahun 1) | RM | 8,724.00 | Tajuk Projek: The Effects of Bovine Scaffold on the Microscopic Biological Response of Human Chondrocytes |
| Peruntukan 2006 (Tahun 2) | RM | 8,724.00 | |
| Peruntukan 2007 (Tahun 3) | RM | 0.00 | Tempoh: 15 Okt 05-14 Okt 07 |
| | | | No.Akaun: 304/PPSG/6131401 |

ORL

| Kwg | Akaun | PTJ | Projek | Donor | Peruntukan Projek | Perbelanjaan Tkumpul Hingga Tahun Lalu | Peruntukan Semasa | Tanggung Semasa | Bayaran Tahun Semasa | Belanja Tahun Semasa | Baki Projek |
|-----|-------|------|---------|-------|----------------------|--|----------------------|--------------------|----------------------------|----------------------------|----------------|
| 304 | 11000 | PPSG | 6131401 | | 1,500.00 | 1,676.90 | (176.90) | - | - | - | (176.90) |
| 304 | 14000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 15000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 21000 | PPSG | 6131401 | | 1,000.00 | 2,278.50 | (1,278.50) | - | 1,277.9 | 1,277.90 | (2,556.40) |
| 304 | 22000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 23000 | PPSG | 6131401 | | 150.00 | - | 150.00 | - | - | - | 150.00 |
| 304 | 24000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 25000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 26000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 27000 | PPSG | 6131401 | | 13,998.00 | 2,635.00 | 11,363.00 | 898 | 1,030.00 | 1,855.00 | 9,435.00 |
| 304 | 28000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 29000 | PPSG | 6131401 | | 800.00 | 1,952.00 | (1,152.00) | - | - | 1,080.00 | (1,152.00) |
| 304 | 32000 | PPSG | 6131401 | | - | - | - | - | - | - | - |
| 304 | 35000 | PPSG | 6131401 | | - | - | - | - | 5,690.00 | 5,690.00 | (5,690.00) |
| | | | | | 17,448.00 | 8,542.40 | 8,805.60 | 898.00 | 7,997.90 | 9,902.90 | 9.70 |

BORANG LAPORAN HASIL PENYELIDIKAN
PPSP

Tajuk geran: THE EFFECTS OF BOVINE BONE SCAFFOLD ON THE MICROSCOPIC BIOLOGICAL RESPONSE OF HUMAN CHONDROCYTES

Penyelidik:

Jenis geran:

Tempoh geran: 15-10-2005 sehingga 14-10-2007

Jenis laporan: Laporan Kemajuan
(setiap 6 bulan)

Alatan di beli

Ya : nyatakan FUJITSU CPU

Laporan Akhir*:

Tidak

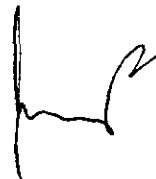
| OBJEKTIF SPESIFIK KAJIAN (sama spt dalam proposal asal) | SECARA RINGKAS TERANGKAN PENCAPAIAN/HASIL | SEBAB-SEBAB JIKA TAK TERCAPAI |
|---|--|-------------------------------|
| 1. To determine the effect of bovine bone on human chondroblast proliferation in vitro. | We have found that the bovine bone is a viable potential scaffold for cartilage tissue engineering as it provides good cell attachment and promotes proliferation and maturity of cells. Furthermore it is non toxic, easily resourced and relatively cheap. | |
| 2. | | |
| 3. | | |
| 4. | | |

* Laporan Akhir perlu disertakan salinan manuskrip dan surat yang dihantar kepada mana-mana jurnal untuk penerbitan.

Nama Penyelidik Utama (PI): DR. BAHARUDIN BIN ABDULLAH Lt.:

Tarikh: 15 hb Jun 2008

DR. BAHARUDIN ABDULLAH
Pensyarah
Jabatan ORL
Pusat Pengajian Sains Perubatan
Kampus Kesihatan
Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan.



PPSP/R&D®/GRANT/Ver. 02- 2008

APPENDIX A

ABSTRACT IN BAHASA MALAYSIA AND ENGLISH

ABSTRAK

Pengenalan

Untuk menghasilkan tisu rawan, pemilihan kerangka yang sesuai masih menjadi cabaran utama. Kerangka yang sedia ada sama ada dari bahan semulajadi atau sintetik masih tidak memenuhi sifat yang diperlukan untuk penghasilan tisu rawan. Kerangka yang baik juga memberi keseimbangan mekanikal kepada sel dalam bentuk gabungan atau jaringan sebelum sel tersebut menghasilkan sendiri jaringan untuk menyokongnya.

Objektif

Tujuan kajian ini adalah untuk menghasilkan kerangka yang dibuat dari tulang lembu yang akan digunakan untuk penghasilan tisu rawan dan juga mengkaji kesan kerangka tersebut keatas sel rawan manusia.

Metodologi

Sel rawan manusia dibiakkan dalam makmal dan sebanyak 1×10^5 sel diletakkan pada setiap kerangka dan dieramkan selama 24 jam, 2 hari, 5 hari dan 7 hari. Perkembangan sel dikaji dengan mengukur aktiviti enzim mitokondria dehidrogenase, pelekatan sel dikaji di bawah Elektron Mikroscope dan kematangan sel dikaji menggunakan Mikroscope Konfokal.

Keputusan

Berlaku perkembangan sel rawan diatas kerangka diantara 24 jam dan 7 hari. Sel rawan juga melekat dengan baik dan meningkat dengan masa pada permukaan dan ruang-ruang kecil pada kerangka. Kematangan sel rawan meningkat mengikut hari dengan ditunjukkan melalui penghasilan serat kolagen jenis II.

Kesimpulan

Tulang lembu berpotensi untuk dijadikan kerangka tiga dimensi untuk penghasilan tisu rawan kerana menunjukkan perkembangan sel, pelekatan yang baik, mencapai kematangan,tidak toksik dan selamat serta mudah diperolehi dan murah.

ABSTRACT

Introduction

In the creation of cartilaginous tissue, the choice of suitable scaffold remains a great challenge. The current available scaffold either natural or synthetic still does not meet the requirement of a scaffold for cartilage tissue engineering. The ideal scaffold provides mechanical stability to the individual cell as a construct or transitional framework before synthesis of new extra cellular matrix.

Objective

The aim of this study was to produce bovine bone as a tissue engineering construct for cartilage reconstruction and to determine the effects of bovine bone on biological human chondrocyte in vitro.

Method

Human chondrocytes were cultured and seeded into bovine scaffold with seeding density of 1×10^5 cells per 100 ul / scaffold and incubated for 24 hours, 2 days, 5 days and 7 days. Proliferation and viability of the cells were measured by mitochondrial dehydrogenase activity (MTT assay), adhesion study was analyzed using Scanning Electron Microscopy (SEM) and differentiation study was analyzed by Immunoflorescent staining using Confocal Laser Scanning Electron Microscopy (CLSM).