

**UNIVERSITI SAINS MALAYSIA
GERAN PENYELIDIKAN UNIVERSITI
PENYELIDIKAN
LAPORAN AKHIR**

**A PRELIMINARY INVESTIGATION ON THE
BIOCOMPATIBILITY STUDIES OF CELLULOSE
FROM OIL PALM RESIDUE AS SURGICAL
BIOMATERIAL**

PENYELIDIK

PROFESOR MADYA DR. MOHD KHAIRI MD DAUD

PENYELIDIK BERSAMA

**PROFESSOR AB RANI SAMSUDIN
DR. WAN ROSLI WAN DAUD
DR. NOR SHAMSURIA OMAR**

2013

BAHAGIAN PENYELIDIKAN
Pusat Pengajian Sains Perubatan

**SENARAI SEMAKAN UNTUK BUKU LAPORAN AKHIR GERAN USM JANGKA PENDEK
(untuk di isi oleh penyelidik)**

NAMA PENYELIDIK UTAMA	: PM DR. MOHD KHAIRI MD. DAUD		
NAMA CO-RESEARCHER	: Prof. Ab Rani Samsudin, Dr. Wan Rosli Wan Daud, Dr. Nor Shamsuria Omar		
TAJUK GERAN	: A Preliminary Investigation on the Biocompatibility Studies of Cellulose From Oil Palm Residue as surgical Biomaterial		
NO.AKAUN	: 304/PPSP/6131407		
SENARAI SEMAKAN SEMASA PENYERAHAN BUKU LAPORAN AKHIR (Sila Tandakan (✓) Pada Kotak Yang Berkenaan)			
NO.	PERKARA	ADA	TIADA
1.	Borang Laporan Akhir Projek Penyelidikan USM Jangka Pendek	/	
2.	Borang Laporan Hasil Penyelidikan, PPSP	/	
3.	i) Salinan Menuskrip dan Salinan surat/email bukti penghantaran dan penerimaan manuskrip oleh mana-mana journal atau		
	ii)Kertas penerbitan disertakan	/	
4.	Penyata Perbelanjaan (Financial Statement) (Sila dapatkan daripada Jabatan Bendahari)	/	
5.	Laporan Komprehensif (termasuk kertas persidangan atau seminar dan penerbitan saintifik hasil daripada projek ini)	/	
6.	Surat pemakluman penghantaran Laporan Akhir ke Bhg. Penyelidikan	/	

Nota:

- 1) Sila buat 2 salinan buku laporan Akhir
- 2) No. 1- 5 - Perlu dimasukkan dalam Buku Laporan Akhir
- 3) No. 6 - Hantar terus Kepada En.Ahmad Imran Khamis(RCMO) hanya salinan sahaja kepada Bhg. R&D, PPSP

LAPORAN AKHIR PROJEK PENYELIDIKAN JANGKA PENDEK
FINAL REPORT OF SHORT TERM RESEARCH PROJECT

Sila kemukakan dua (2) salinan laporan akhir ini melalui Jawatankuasa Penyelidikan di Pusat Pengajian dan Dekan/ Pengarah/ Ketua Jabatan kepada Pejabat Pengurusan dan Kreativiti Penyelidikan (RCMO)

1. Nama Ketua Penyelidik: Mohd Khairi bin Md Daud <i>Name of Research Leader</i>				
<input checked="" type="checkbox"/> Profesor Madya <i>Assoc. Prof.</i>		<input type="checkbox"/> Dr. <i>Dr.</i>		<input type="checkbox"/> Encik/Puan/Cik <i>Mr/Mrs/Ms</i>
2. Pusat Tanggungjawab (PTJ): Sains Perubatan <i>School/Department</i>				
3. Nama Penyelidik Bersama: 1- Ab Rani Samsudin 2- Wan Rosli Wan Daud 3- Nor Shamsuria Omar <i>Name of Co-Researcher</i>				
4. Tajuk Projek: A preliminary investigation on the biocompatibility studies of cellulose from oil palm residue as surgical biomaterial <i>Title of Project</i>				
5. Ringkasan Penilaian/Summary of Assessment				
	Tidak Mencukupi <i>Inadequate</i>		Boleh Diterima <i>Acceptable</i>	Sangat Baik <i>Very Good</i>
	1	2	3	4 5
i) Pencapaian objektif projek: <i>Achievement of project objectives</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>
ii) Kualiti output: <i>Quality of outputs</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
iii) Kualiti impak: <i>Quality of impacts</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
iv) Pemindahan teknologi/potensi pengkomersialan: <i>Technology transfer/commercialization potential</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
v) Kualiti dan usahasama : <i>Quality and intensity of collaboration</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>
vi) Penilaian kepentingan secara keseluruhan: <i>Overall assessment of benefits</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>

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)

Lampiran 1

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)

Lampiran 2

Senaraikan kata kunci yang mencerminkan penyelidikan anda:

List the key words that reflects your research:

Bahasa Malaysia

Bahasa Inggeris

Selulos fosfat

cellulose phosphate

Keracunan sel

cytotoxicity

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 diterbitkan/diserahkan)

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

Lampiran 3

(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.

Tiada

Sila berikan salinan *Kindly provide copies*

(c) **Latihan Sumber Manusia**

Training in Human Resources

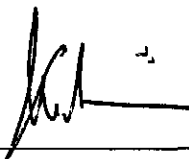
(i) Pelajar Sarjana
Graduate Students
(Perincikan nama, ijazah dan status)
(Provide names, degrees and status)

(ii) Lain-lain
Others Research Assistant

9. Peralatan yang Telah Dibeli:

Equipment that has been purchased

Tiada



Tandatangan Penyelidik
Signature of Researcher

22/7/2013


Tarikh
Date

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

boleh dituliskan

Tuduh Beran.

Dipin
19/9/13



PROFESOR (DR) NIK SORIANI YAACOB
Chairman Of Research committee
School Of Medical Sciences
Health Campus
Universiti Sains Malaysia
16150 Kubang Keratan, Kedah

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

5/2/12
Tarikh
Date

Lampiran 1

Cellulose is the world's most abundant natural, renewable, and biodegradable polymer. An *in vitro* biocompatibility test was carried out to look at cytotoxicity characteristic of our locally produce cellulose phosphate on osteoblast and chondroblast cell lines. Cellulose samples were prepared from the oil palm residues. The cell line used in this study was human osteoblast and Chondroblast obtained from the American Type Culture Collection. An *in vitro* cytotoxicity test was carried out on the cellulose material using extraction/indirect methods. For human osteoblast, the concentration for IC-50 was determined at 60mg/ml while no IC-50 was observed for human chondroblast cells. The results suggest the biocompatibility of cellulose as biomaterial on human cell lines is good and not cytotoxic.

Selulos adalah polimer semulajadi yang mudah didapati di dunia, boleh diperbaharui dan dinyahkan. Ujian kesesuaian *in vitro* dijalankan untuk melihat karakter keracunan sel "cellulose phosphate" tempatan ke atas barisan sel "osteoblast" dan "chondroblast". Barisan sel yang digunakan di dalam kajian ini adalah "human osteoblast" dan "chondroblast" yang diperolehi daripada "American Type Culture Collection". Ujian keracunan sel *in vitro* dijalankan ke atas bahan selulos menggunakan teknik "extraction/indirect". Untuk "human osteoblast", kepekatan IC-50 berada pada 60mg/ml sementara tiada IC-50 dilihat untuk "human chondroblast". Keputusan menunjukkan kesesuaian selulos sebagai "biomaterial" ke atas barisan sel manusia adalah baik dan tidak beracun.

Lampiran 2 (Technical report)

A preliminary investigation on the biocompatibility studies of cellulose from oil palm residue as surgical biomaterial

Abstract

Cellulose is the world's most abundant natural, renewable, and biodegradable polymer. An *in vitro* biocompatibility test was carried out to look at cytotoxicity characteristic of our locally produce cellulose phosphate on osteoblast and chondroblast cell lines. Cellulose samples were prepared from the oil palm residues. The cell line used in this study was human osteoblast and Chondroblast obtained from the American Type Culture Collection. An *in vitro* cytotoxicity test was carried out on the cellulose material using extraction/indirect methods. For human osteoblast, the concentration for IC-50 was determined at 60mg/ml while no IC-50 was observed for human chondroblast cells. The results suggest the biocompatibility of cellulose as biomaterial on human cell lines is good and not cytotoxic.

Introduction:

Cellulose is the world's most abundant natural, renewable, and biodegradable polymer. Polysaccharides, like cellulose, are the polymer group with the longest and widest medical applications experience because of their unique properties: nontoxicity, water solubility or high swelling ability by simple chemical modification, stability to temperature and pH variations, and a broad variety of chemical structures¹. The biocompatibility of some cellulose is well documented. Oxidized cellulose is used as a wound dressing². Regenerated cellulose hydrogels (cellulose regenerated by the viscose process-CRV) have been investigated as implantable materials in orthopaedic surgery. Their good matching with mechanical properties of bone, as well as their biocompatibility has been

demonstrated³. Chemically modification via phosphorylation further stimulates bone induction⁴. Research innovation on the use of cellulose and its derivatives in medical application was conceived and developed all over the country but thus far not in Malaysia.

In vitro cell culture methods are the basic starting point whereby biological responses to materials are determined initially, as required by a number of standardization agencies⁵. These methods have the advantages of simplicity, good sensitivity and reproducibility and are widely used in the initial evaluation of biocompatibility of materials. In this study, an *in vitro* biocompatibility test was carried out to look at cytotoxicity characteristic of our locally produce cellulose phosphate on osteoblast and chondroblast cell lines.

Objective

General

To determine the biocompatibility of a locally produced cellulose phosphate for medical applications.

Specific

To determine the cytotoxic effects of the cellulose phosphate on human osteoblast, fibroblast and chondroblast cell line