

**SENARAI SEMAKAN UNTUK BUKU LAPORAN AKHIR GERAN USM JANGKA PENDEK**

<b>NAMA PENYELIDIK UTAMA</b>	: Wan Mohd Izani Wan Mohamed
<b>NAMA CO-RESEARCHER</b>	: Prof Madya Zurkurnai Yusof : Prof Madya Zainal Darus
<b>TAJUK GERAN</b>	: STUDY ON N-ACETYLCYSTEINE IN PREVENTION OF CONTRAST NEPHROPATHY IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY IN HUSM
<b>NO.AKAUN</b>	: 304/PPSP/6131493



**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	✓	
	ii) Salinan surat/email bukti penghantaran kepada mana-mana journal	✓	
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:**

- \* Sila buat 3 salinan buku laporan Akhir
- \* No. 1-5 - Perlu dimasukkan dalam Buku Laporan Akhir
- \* No.6 - Hantar terus Kepada Cik Amra Othman (RCMO) hanya salinan sahaja kepada Bhg. R&D, PPSP

My doc/checklist borang2/sue



**LAPORAN AKHIR PROJEK PENYELIDIKAN JANGKA PENDEK**

*FINAL REPORT OF SHORT TERM RESEARCH PROJECT*

Sila kemukakan laporan akhir ini melalui Jawatankuasa Penyelidikan di Pusat Pengajian dan Dekan/Pengarah/Ketua Jabatan kepada Pejabat Pelantar Penyelidikan

<p><b>1. Nama Ketua Penyelidik:</b> Wan Mohd Izani Wan Mohamed <i>Name of Research Leader</i></p> <p> <input type="checkbox"/> Profesor Madya/ <i>Assoc. Prof.</i> <input checked="" type="checkbox"/> Dr./ <i>Dr.</i> <input type="checkbox"/> Encik/Puan/Cik <i>Mr/Mrs/Ms</i> </p>						
<p><b>2. Pusat Tanggungjawab (PTJ):</b> Pusat Pengajian Sains Perubatan, Jabatan Perubatan Dalam <i>School/Department</i></p>						
<p><b>3. Nama Penyelidik Bersama:</b> Prof Madya Zurkurnai Yusof, Prof Madya Zainal Darus <i>Name of Co-Researcher</i></p>						
<p><b>4. Tajuk Projek:</b> STUDY ON N-ACETYLCYSTEINE IN PREVENTION OF CONTRAST NEPHROPATHY IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY IN HUSM <i>Title of Project</i></p>						
<p><b>5. Ringkasan Penilaian/Summary of Assessment:</b></p>	<p><b>Tidak Mencukupi</b> <i>Inadequate</i></p>		<p><b>Boleh Diterima</b> <i>Acceptable</i></p>		<p><b>Sangat Baik</b> <i>Very Good</i></p>	
	1	2	3	4	5	
<p>i) <b>Pencapaian objektif projek:</b> <i>Achievement of project objectives</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<p>ii) <b>Kualiti output:</b> <i>Quality of outputs</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<p>iii) <b>Kualiti impak:</b> <i>Quality of impacts</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<p>iv) <b>Pemindahan teknologi/potensi pengkomersialan:</b> <i>Technology transfer/commercialization potential</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>v) <b>Kualiti dan usahasama :</b> <i>Quality and intensity of collaboration</i></p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>vi) <b>Penilaian kepentingan secara keseluruhan:</b> <i>Overall assessment of benefits</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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)*

The research was conducted to ascertain the proportion of patients developing Contrast Induced Nephropathy (CIN) or acute renal failure post coronary angiogram, and to assess the efficacy of an antioxidant, oral N-acetylcysteine in prevention of this event. Contrast induced nephropathy is not uncommon and may cause significant morbidity and occasionally mortality. The study showed the rate of CIN was 15 percent. This randomized placebo controlled trial also showed N-acetylcysteine associated with improvement in renal function after coronary angiogram but not statistically significant compared to placebo. The predictor of the occurrence of contrast induced nephropathy is the contrast volume used during procedure. This study provides evidence for safety profile of N-acetylcysteine for its use in advanced chronic kidney disease where the studies are lacking.

Kajian ini dijalankan untuk mengenalpasti kadar kejadian kontras nefropati atau kegagalan ginjal yang akut dikalangan pesakit yang menjalani prosedur koronari angiogram, juga untuk mengkaji keberkesanan antioksidan N-acetylcysteine dalam mencegah kejadian ini. Kontras nefropati boleh menyebabkan kesan morbiditi dan adakalanya kematian, walaupun sangat jarang. Kajian ini menunjukkan kadar kejadian kontras nefropati ialah 15%. Kajian secara rawak dengan picebo ini telah menunjukkan N-acetylcysteine mengurangkan kadar kontras nefropathi tetapi tidak signifikan berdasarkan statistic. Penyebab kepada kejadian ini ialah jumlah kontras yang digunakan. Keputusan kajian ini memberikan maklumat bahawa N-acetylcystein adalah selamat digunakan terutama untuk pesakit buah pinggang yang teruk dimana kajian-kajian masih kurang dijalankan.

**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)*

**Senaraikan kata kunci yang mencerminkan penyelidikan anda:**

*List the key words that reflects your research:*

<u>Bahasa Malaysia</u>	<u>Bahasa Inggeris</u>
Kontras nefropati	contrast nephropathy
Koronari angiogram	coronary angiogram
N-acetylcysteine	N-acetylcysteine

**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)*

**1. Study on oral N-acetylcysteine in prevention of contrast induced nephropathy in patients undergoing**

coronary coronary angiography in Hospital Universiti Sains Malaysia Wan Mohd Izani Wan Mohamed.

Year 2007,USM. MMed Dissertation

**2. Oral N-acetylcysteine in prevention of contrast induced nephropathy following coronary**

angiogram. Accepted for publication Feb 22, 2008 by International Medical Journal (IMJ) Japan

- (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.*

Kajian mengenai anti-oksidan, N-acetylcystein ini boleh dikembangkan untuk digunakan dalam bidang berkaitan radiologi dimana bahan kontras banyak digunakan.

\* Sila berikan salinan/Kindly provide copies

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

- i) **Pelajar Sarjana:**  
*Graduates/Students*  
(Perincikan nama, ijazah dan status)  
(Provide names, degrees and status)

Dr Wan Mohd Izani Bin Wan Mohamed MMED (Internal Medicine) 2007

- ii) **Lain-lain:**  
*Others*

**9. Peralatan yang Telah Dibeli:**

*Equipment that has been purchased*

Notebook Acer Aspire One D250 berharga RM1399.00 – masih digunakan untuk tujuan penyelidikan dan pembentangan.



**Tandatangan Penyelidik**  
*Signature of Researcher*

**30 MARCH 2011.**

**Tarikh**  
Laporan Akhir Projek Penyelidikan Jangka Pendek  
*Final Report Of Short Term Research Project*

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

This project has been completed successfully  
and all objectives achieved.

The output include a publication in the  
International Medical Journal 2008  
and a Mored (Internal Med) dissertation  
project

This report has been assessed by  
an independent assessor and  
approved by the PET panel  
committee

PROFESSOR AHMAD SUKARI HALIM  
Chairman of Research Committee  
School of Medical Sciences  
Health Campus  
Universiti Sains Malaysia

16150 Kubang Kerang, Kedah  
TANDATANGAN PENYELIDIKAN  
JAWATANKUASA PENYELIDIKAN  
PUSAT PENGAJIAN/PUSAT

Signature of Chairman  
{Research Committee of School/Centre}

1/6/11

Tarikh  
Date

**BORANG LAPORAN HASIL PENYELIDIKAN**  
**PPSP**

Tajuk geran: *Study on oral N- acetylcysteine in prevention of contrast induced nephropathy in patients undergoing coronary angiogram in HUSM".*

Penyelidik: *Dr Wan Mohd Izani Bin Wan Mohamed*

Jenis geran: *Geran jangka pendek. Rujukan: 304/PPSP/6131493*

Tempoh geran: *15 Mac 2007 – 14 Sep 2009*

Jenis laporan: Laporan Kemajuan  Alatan di beli  Ya: 1 komputer riba.

Laporan Akhir\*:   Tidak

<b>OBJEKTIF SPESIFIK KAJIAN (sama spt dalam proposal asal)</b>	<b>SECARA RINGKAS TERANGKAN PENCAPAIAN/HASIL</b>	<b>OBJEKTIF TERCAPAI ATAU TIDAK</b>
<i>1. To compare the incidence of contrast induced nephropathy following coronary angiography between intravenous hydration alone and in combination with oral N-acetylcysteine</i>	<i>The incidence of contrast induced nephropathy was 4.1% patients in NAC group and 11.8% patients in control group. The difference was not statistically significant (p= 0.269).</i>	<i>Objektif tercapai</i>
<i>2. To determine the associated risk factors of contrast induced nephropathy following coronary angiography in patients with renal insufficiency and/or diabetes</i>	<i>The only significant risk factor for the development of CIN was the contrast volume</i>	<i>Objektif tercapai</i>

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

Nama Penyelidik Utama (PI): *Dr Wan Mohd Izani Bin Wan Mohamed*

Tarikh: *5 April 2011*

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# Oral N-Acetylcysteine in Prevention of Contrast Induced Nephropathy Following Coronary Angiogram

Wan Mohd Izani Wan Mohamed, Zainal Darus, Zurkurnai Yusof

## ABSTRACT

**Objective:** Contrast induced nephropathy (CIN) is defined as acute renal failure within 48 hours of exposure to radiographic contrast media in the absence of other underlying aetiology. The role of oral N-acetylcysteine in prevention of CIN has not been established. This study is aimed to assess the efficacy of oral N-acetylcysteine in prevention of CIN and to determine the associated risk factors of the development of CIN.

**Design:** Randomised controlled trial.

**Materials and methods:** We prospectively studied 100 patients with renal impairment (mean serum creatinine  $124.1 \pm 19.68 \mu\text{mol/l}$ ) who underwent elective diagnostic or therapeutic coronary angiography. Patients were randomly assigned to receive either N-acetylcysteine (600mg orally BD for 4 doses) with 0.45% saline hydration (NAC group) or 0.45% saline alone (control group). Serum creatinine was measured before angiogram, 24 and 48 hours after coronary angiogram.

**Results:** An increase of > 25% in the baseline creatinine level 48 hours after the procedure occurred in 2 of 49 (4.1%) patients in NAC group and 6 of 51 (11.8%) patients in control group. The difference was not statistically significant ( $p = 0.269$ ). The baseline serum creatinine concentration in both groups were similar ( $123.7 \pm 17.08 \mu\text{mol/l}$  in NAC group and  $124.4 \pm 21.89 \mu\text{mol/l}$  in Control group). Changes of serum creatinine after 24 and 48 hours of coronary angiography were not significant between the two treatment groups ( $p = 0.821$ ). The only significant risk factor for the development of CIN was the contrast volume (mean diff -112.44, 95% CI -184.22, -40.66,  $p = 0.002$ ).

**Conclusion:** Addition of N-acetylcysteine to standard hydration therapy is not associated with reduction in incidence of CIN in patients with mild to moderate renal impairment undergoing elective coronary angiography. The amount of contrast agent is a significant predictor of renal function deterioration and incidence of CIN post coronary angiography.

## KEY WORDS

contrast induced nephropathy, N-acetylcysteine, coronary angiography

## INTRODUCTION

Contrast induced nephropathy (CIN) is defined as acute renal failure within 48 hours of exposure to radiographic contrast media in the absence of other underlying causes. The widely accepted definition of CIN is an increase in serum creatinine > 25% from baseline after contrast administration (Rihal *et al.*, 2002). It is one of the recognized complications of diagnostic or therapeutic angiography procedures. Studies have shown that in-hospital mortality is high and long term survival is poor in patients who developed

renal failure due to contrast administration (Levy EM *et al.*, 1996). The mortality rate ranges from 3.8% with an increase in serum creatinine of 0.5 mg/dl to 0.9 mg/dl to 64% with an increase of > 3.0 mg/dl (Berns AS., 1989). The development of contrast induced renal failure leads to increased hospitalization time, including time in the intensive care unit, and increase cost on health care (Iakovou I *et al.*, 2002).

Contrast induced nephropathy (CIN) has been reported to account for 10% of in-hospital acute renal failure, making it the third leading cause of ARF (Hou *et al.*, 1983). The overall incidence of CIN in patients undergoing PCI is reported to be 3.3% (Rihal *et al.*, 2002). Its incidence is

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Department of Medicine, Hospital Universiti Sains Malaysia  
Kubang Kerian, Malaysia

Correspondence to: Wan Mohd Izani Wan Mohamed  
(e-mail: drizani@yahoo.co.uk)