APPENDIX A DATA COLLECTION FORM

Carbogen Treatment for pH-Stat Management in Cardiopulmonary Bypass

Date: _____

Perfusionist: _____

Surgeon: _____

Patient Sticker

MRN

Anaesthesiology: _____ Weight: _____ kg

Operation: _____ Height: _____ cm

X Clamp Time: _____ min Oxygenator: _____

Bypass Time: _____ min Please circle the below data:

Cir. Arrest Time: _____ min Carbogen : Used / Unused

Hemofiltration: _____ ml Capnography : Used / Unused

P/Cell Bld Added: _____ml CDI 500 : Used / Unused

Bypass Urine: _____ ml Mild Hypothermia : 33°C - 35°C

Haematuria: Y / N Moderate Hypothermia: 25°C - 32°C

$NaHCO_3$: _____ml Deep Hypothermia : 15°C - 20°C

Time	Nasal Temp (°C)	Art Temp (°C)	$PaCO_2$ (Corrected temp)	$PeCPBCO_2$ (mm/Hg)	pH	Gas Sweep	FiO_2 (%)	5% CO_2 Carbogen Flow (ml/min)	Hct (%)	Pump Flow (L/min)
Pre		–		–				–		–
Cooling										
Stable										
Warming										
Off		–		–				–		–

Patients undergoing any emergent procedure/surgery are excluded from the study. Patient who are greater than 5 kg of weight are disqualified from this study. Patients with jaundice, ECMO usage during surgery, Jehovah's Witnesses cases or hemoglobinopathies disease such as sickle cell anaemia and thalassaemia are excluded from this study. Perform ABG 5-10 min after $NaHCO_3$ is added. Please stick ABG result at the back of this form.

APPENDIX B PARENT INFORMATION SHEET

(English Version)

Patient/Parent/Guardian/Conservator Information Sheet

Please read the following information carefully, do not hesitate to discuss any questions you may have with your Doctor.

1. Study Title

   Carbogen Treatment for pH-stat Management in Cardiopulmonary Bypass

2. What is the purpose of this study?

   a) To assess whether carbogen usage to regulate the pH-stat management would increase the percentage of $PaCO_2$ and pH level falling within the reference range as compared to control group;
   b) To evaluate pH-stat management strategy with and without carbogen in infant undergoing hypothermic bypass;
   c) To investigate correlation between temperatures with arterial pCO_2 in pH-stat management for infant undergoing cardiopulmonary bypass (CPB).

3. What is best method for acid-base management during open heart surgery?

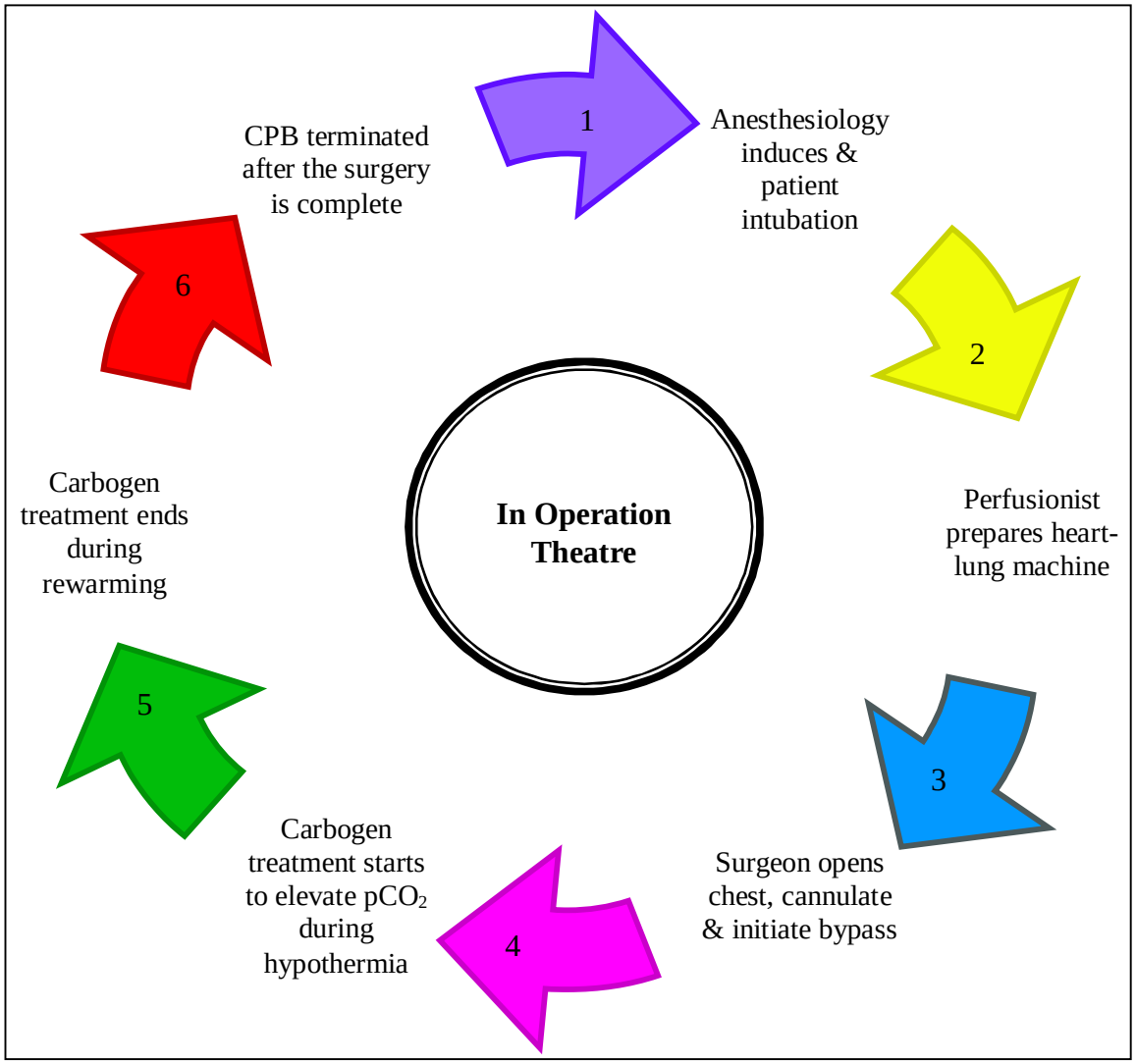
Two specific forms of management may be used during hypothermia: α-stat strategy or pH-stat strategy. In order to define the differences of these two methods, it is necessary to understand the alterations in acid-base homeostasis as a function of temperature. The physiologic reaction to progressive hypothermia is that CO_2 solubility increases and partial pressure of carbon dioxide (CO_2) decreases resulting in an alkaline shift of blood pH. The α- stat pH management strategy maintains a pH of 7.40 ± 0.05

when measured by a gas analyzer at 37°C. In the pH-stat strategy carbon dioxide is added to oxygenator gas flow during cooling to achieve a pH of 7.40 ± 0.05 when corrected to the actual hypothermic temperature. In numeous literature for peadiatric surgery it is recommended to apply pH-stat strategy which has been utilize in this study.

4. What are the procedures to be followed?

Preparation for this experiment involves daily routine procedure with extra treatment (carbogen) and blood gas monitoring devises'. First intervention is carried-out by anaesthesiology to induce patient and later intubation of patient in operation theatre. Second intervention is carried-out by perfusionist in setting-up, priming of the circuit and initiating bypass with the aid of monitoring devises'. Third intervention engaged by surgeon to cannulate and performing the surgery.

For this study (treatment group), perfusionist will perform the carbogen treatment to correct pCO_2 in arterial blood gas when patient is cooled down to preferable temperature as requested by surgeon. Carbogen gas contains a mixture of 95% oxygen and 5% carbon dioxide. Respiratory alkalosis is common for pH-stat management in hypothermic patient and in this study we correct arterial blood gas to normal range according to temperature. Carbogen treatment will be terminated when rewarming is initiated. Data collection will be done from pre-operation until post-operation (refer to next page diagram).



5. What will be benefits of the study:

a) To your child as the subject?

- Patient will have better vascular dilation during hypothermic bypass.
- Contribute to improvement in systemic organ perfusion and cerebral perfusion.

b) To the investigator?

- Comparison within oxygenators evaluated in term of carbogen transfer efficiency to minimize carbogen usage but to optimize blood gas analysis.

- Evaluate relationship between temperature and arterial pCO_2 according to pH-stat management to infant going through CPB.

6. What are the possible drawbacks?

- Common complication or risk due to cardiac surgery.
- As CO_2 levels increase, CO_2 retention or hyperventilation after CPB might be intervene.

7. Can I refuse to take part in the study?

   Voluntary participation via written consent by patient/parent/guardian/conservator

8. Who should I contact if I have additional questions during the course of the study?

   Researcher Name: Vijay a/l Sundra Kumuran Tel: 016-2538867

(Malay Version)

Maklumat Pada Pesakit/Ibubapa/Penjaga

Sila baca maklumat berikut dengan teliti dan sebarang soalan yang berkaitan boleh diajukan kepada doktor anda.

1. Tajuk kajian

   Rawatan Carbogen bagi Pengurusan pH-stat dalam Pembedahan Pintasan Jantung

2. Apakah tujuan utama kajian ini?

   a) Penilaian adalah berdasarkan penggunaan carbogen untuk regulasi pengurusan pH-stat bagi meningkatkan peratusan $PaCO_2$ and pH dalam lingkungan normal jika dibandingkan dengan kumpulan kawalan.
   b) Membandingkan perhubungan diantara kumpulan kawalan dan kumpulan yang menggunakan karbogen bagi menguruskan strategi pH-stat.
   c) Untuk mengkaji perhubungan antara suhu dengan pCO_2 arteri dalam pengurusan pH-stat bagi bayi yang menjalani pintasan jantung.

3. Apakah cara terbaik bagi mengendalikan perubahan asid-bes semasa pintasan jantung pesakit?

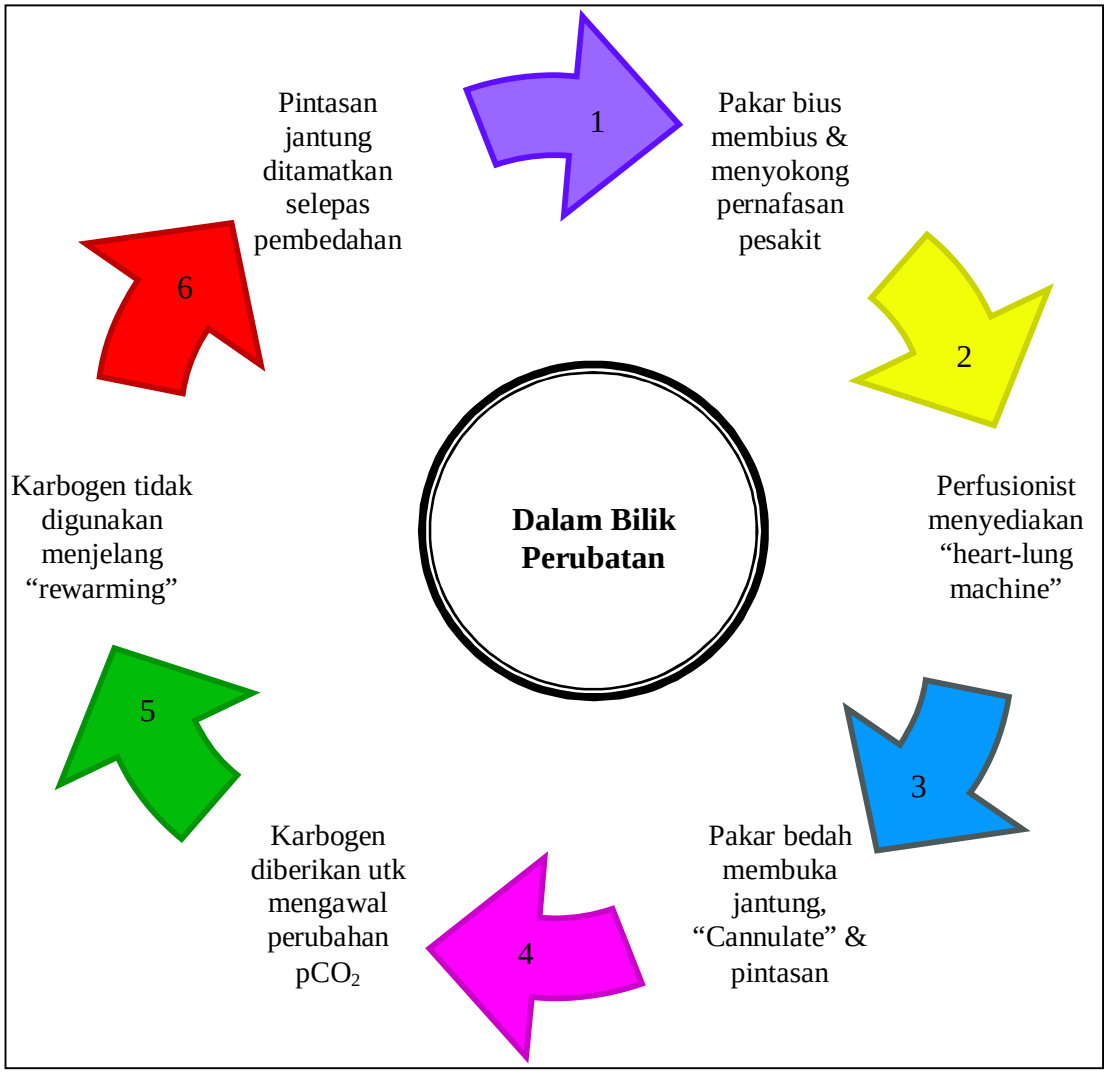
   Terdapat dua cara bagi pengendalian asid-bes semasa hipotermia iaitu α-stat dan pH-stat. Bagi mendefinasikan kedua cara tersebut, ianya penting untuk memahami perubahan dalam homeostasis asid-base dan kaitannya pada suhu. Reasksi fisiologi pada hipotermia mendadak ialah pemerlarutan CO_2 meningkat dan pCO_2 menurun. Ini menyebabkan perubahan pH darah kepada alkali. Alpha-stat merupakan pengendalian pH pada 7.40 ± 0.05 apabila diukur melalui mesin pengukur gas

darah pada 37˚C. Dalam cara pH-stat CO_2 ditambahkan pada oksigenator semasa pesakit disejukkan untuk mencapai pH pada 7.40 ± 0.05 apabila suhu berkenaan diambil-kira bagi pengiraan pCO_2 pada suhu pesakit.Dalam kebanyakan journal ianya disyorkan pembedahan bagi bayi mengunakan cara pH-stat dan kami mengaplikasikan dalam kajian kami.

4. Apakah langkah-langkah yang perlu diikuti?

Persediaan bagi eksperimen ini melibatkan prosedur rutin dengan tambahan carbogen dan alat untuk mengukur parameter darah. Langkah pertama melibatkan pakar bius dengan “membius” dan “intubation” pesakit dalam bilik pembedahan. Langkah kedua, merupakan tugas perfusionist bagi menyediakan pump dan memintas darah daripada jantung dengan bantuan alat khas. Langkah ketiga, melibatkan pakar bedah yang melakukan pintasan pada jantung dan melakukan pembedahan.

Bagi kajian ini, perfusionist akan membekalkan carbogen dalam darah pesakit bagi penyelengara pCO_2 arteri apabila pesakit telah mencapai suhu badan yang rendah mengikut garis panduan pakar bedah. Karbogen mengandungi 95% oksigen dan 5% karbon dioksida. “Respirasi alkalosis” adalah keadaan yang biasa berlaku pada regulasi pH-stat dan memerlukan karbogen untuk meregulasi pCO_2. Pemberian carbogen akan ditamatkan sebaik prosedur “rewarming” dijalankan. Pengumpulan data akan dibuat dari masa ke semasa (sebelum, menjelang dan selepas pembedahan) (rujuk gambarajah muka-surat berikut).



5. Apakah kebaikan melalui kajian ini?

a) Pada anak anda sebagai subjek?

- Salur darah pesakit akan mengembang semasa hipotermia.
- Ini menyumbang kepada peningkatan penerimaan darah kepada keseluruhan organ khasnya otak pesakit.

b) Pada penyelidik?

- Perbandingan dalaman kedua oksigenator dapat dijalankan dari segi pertukaran carbogen dapat dinilai bagi mengetahui oksigenator yang memerlukan carbogen yang minimum.

- Mengkaji perhubungan antara suhu dan pCO_2 arteri mengikut pengurusan pH-stat bagi bayi yang melalui pintasan jantung.

6. Apakah kemungkinan keburukan yang dapat dinilai?

   - Kesan risiko biasa berkaitan dengan pembedahan jantung.
   - Jika karbon dioksida dalam darah meningkat dan mungkin pesakit perlu ditingkatkan pernafasannya melalui alat sokongan pernafasan.

7. Bolehkah saya menarik diri anak saya daripada kajian ini?

   Kajian ini boleh diketepikan jika sebarang keraguan timbul pada pihak ibubapa/penjaga.

8. Pada siapakah harus saya menghubungi jika saya mempunyai sebarang soalan mengenai kajian berkenaan?

   Name penyelidik: Vijay a/l Sundra Kumuran Tel: 016-2538867

APPENDIX C CONSENT FORM

CONSENT (ENGLISH VERSION)

Consent to Obtain Permission from Child's Parent, Guardian, or Conservator for Clinical Research

I _____, parent(s)/guardian of _____ Identity
(Parent/guardian/conservator) *(Patients Name)*

Card No._____ from_____ *(Address)*
(Parent/guardian/conservator)

hereby agree to grant permission of my child to take part in the clinical research (clinical study/drug trial) specified below:

Title of Study: Carbogen Treatment for pH-Stat Management in Cardiopulmonary Bypass

The nature and purpose of which has been explained to me by Dr. /Mr. _____ and interpreted by _____ to the best of his/her ability in _____ language/dialect.

I have been told about the nature of the clinical research in terms of methodology, possible adverse effects and complications (as per patient information sheet). After knowing and understanding all the possible advantages and disadvantages of this clinical research, I voluntarily consent of my own free will to grant participation of my child in the clinical research specified above.

I understand that I can withdraw my child from this clinical research at any time without assigning any reason whatsoever and in such a situation shall not be denied the benefits of usual treatment by the attending doctors.

Date :_____ Signature or Thumbprint _____
Signature of LAR
(Parent/guardian/conservator)

IN THE PRESENCE OF

Name :_____)

I/C No. :_____) Signature_____
(Witness for Signature of Parent/guardian/conservator)
If available

Designation :_____)

I confirm that I have explained to the parent/guardian/conservator the nature and purpose of the above-mentioned clinical research.

Date :_____ Signature _____
(Attending Doctor)

CONSENT (MALAY VERSION)

Keizinan Daripada Ibubapa/Penjaga Anak Untuk Penyelidikan Klinikal

Saya _____ , ibubapa/penjaga kepada _____ No. Kad
(Nama Ibubapa/Penjaga) *(Nama Pesakit)*

Pengenalan_____ beralamat_____ *(Alamat)*
(I/C Ibubapa/Penjaga)

dengan ini bersetuju membenarkan anak saya menjalani penyelidikan klinikal (penyelidikan klinikal) disebut seperti berikut:

Tajuk Penyelidikan: Rawatan Carbogen bagi Pengurusan pH-Stat dalam Pembedahan Pintasan Jantung

yang mana sifat dan tujuannya telah diterangkan kepada saya oleh Dr. /Mr. _____

mengikut terjemahan _____ yang telah menterjemahkan kepada saya dengan sepenuh

kemampuan dan kebolehannya di dalam Bahasa/ loghat _____ .

Saya telah diberitahu bahawa dasar penyelidikan klinikal dalam keadaan methodology, risiko dan komplikasi (mengikut kertas maklumat pesakit). Selepas mengetahui dan memahami semua kemungkinan kebaikan dan keburukan penyelidikan klinikal ini, saya merelakan/mengizinkan anak saya menyertai penyelidikan klinikal tersebut di atas.

Saya faham bahawa penarikan diri anak saya dari penyelidikan klinikal ini boleh dilakukan pada bila-bila masa tanpa memberi sebarang alasan dalam situasi ini dan tidak akan dikecualikan dari kemudahan rawatan dari doktor yang merawatnya.

Tarikh :_____ Tandatangan/Cap Jari _____
(Nama Ibubapa/Penjaga)

DI HADAPAN

Nama :_____)

No. K/P :_____) Tandatangan_____
(Saksi untuk Tandatangan Ibubapa/Penjaga)
Jika ada

Jawatan :_____)

Saya mengesahkan bahawa telah menerangkan kepada ibubapa/penjaga mengenai sifat dan tujuan penyelidikan klinikal di atas.

Tarikh :_____ Tandatangan _____
(Doktor yang merawat)

APPENDIX D IJNEC ETHICAL APPROVAL

INSTITUT JANTUNG NEGARA
National Heart Institute

IJN Ethics Committee (IJNEC)
INSTITUT JANTUNG NEGARA
145, Jalan Tun Razak, Kuala Lumpur
TEL : 03-26178200 FAX : 03-26973040

Date : 7 February 2011

IJNEC NO. : IJNEC/04/2010 (5)

Vijay A/L Sundra Kumuran
Principal Investigator
Anaesthesiology Department
Institut Jantung Negara

Dear Vijay,

Title : Comparison between Oxygenators on Aretrial PCO2 Correction in Ph-stat Management for Infant Undergoing Hypothermic Study

Thank you for submitting the above project for the IJN Ethics Committee (IJNEC) review and approval. Your re-submission of Patient Information Sheet and ICF dated 3 January 2011 - the reply to EC recommendation EC meeting on 9 Nov 2010, is referred.

Pleased to inform you that the Ethics Committee had reviewed and accepted the amended Patient Information Sheet and informed Consent Form (ICF) and hereby approves this study proposal. You are however requested to give feedback to the committee on the progress of the study quarterly.

For your information, the above project was first considered by the IJNEC on 9 November 2011. This committee is constituted and operates in accordance with the Malaysian Guidelines for GCP and the ICH-GCP guidelines.

The following documentation/items have been reviewed and approved by the IJNEC:

No	ITEM	DETAILS/VERSION DATE
1.	Patient/Parent/Guardian/Conservator Information Sheet	English Version
2.	Informed Consent Form	English Version
3.	Maklumat Pada Pesakit/Ibubapa/Penjaga	Malay Version

I am pleased to inform that the IJNEC has granted ethical approval of the above project.

Date of approval: 7 February 2011

Your Heart...
Our Passion

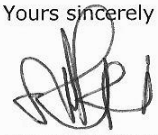
Please note following conditions of approval:

1. Principal Investigator will immediately report to IJNEC any unexpected or any serious adverse events
2. Principal Investigator will submit to IJNEC any changes/amendments to study protocol and conduct of study for ethical approval consideration
3. Principal Investigator will inform the IJNEC, giving reasons, if the study is prematurely discontinued
4. Principal Investigator will provide an annual report to IJNEC and at completion of the study.
5. This approval is for an initial period of 12-months with automatic approval for up to a total three years subject to satisfactory annual report received by IJNEC

Should you have any queries about your project, please contact:

Secretary,
IJN Ethics Committee, Institut Jantung Negara
Tel : 03-26178200 ext 8265 / 8266

Yours sincerely



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Dr. Suhaini Kadiman
Chairman
IJN Ethics Committee (IJNEC)
Institut Jantung Negara, Kuala Lumpur

INSTITUT JANTUNG NEGARA
National Heart Institute

IJN Ethics Committee (IJNEC)
INSTITUT JANTUNG NEGARA
145, Jalan Tun Razak, Kuala Lumpur
TEL : 03-26178200 FAX : 03-26973040

Date of Meeting: **09 November 2010**

Name	Designation/Occupation	Gender (M/F)	Tick (√) if present when above items were reviewed
1. Dr Suhaini Kadiman	Consultant Anaesthesiologist	M	√
2. Mohd Faizal Ramli	Manager, Clinical Research	M	√
3. Dato' Dr David Chew Soon Ping	Consultant Cardiologist	M	
4. Datuk Dr Aizai Azan Abd. Rahim	Consultant Cardiologist	M	√
5. Dato' Dr Venugopal Balchand	Consultant Cardiothoracic Surgeon	M	
6. Mr Mohamed Ezani Md Taib	Consultant Cardiothoracic Surgeon	M	
7. Dr Khairul Faizah Mohd Khalid	Consultant Paediatric Intensivist	F	√
8. Dr Thiru Kumar Namasiwayam	Consultant Anaesthesiologist	M	
9. Dr Mohd Shariff Mohd Shaffie	Consultant Anaesthesiologist	M	
10. Dr Haifa Abd. Latif	Consultant Paediatric Cardiologist	F	
11. Dr Azlan Hussin	Consultant Cardiologist	M	√
12. Jamaliah Non	General Manager, Nursing	F	√
13. Ooi Ping Ping	Senior Manager, Risk & Compliance	F	√
14. Prof. Dr. Abd Rashid Abd Rahman	Professor of Clinical Pharmacology, CUCMS	M	√
15. Prof. Dr. Wan Azman Wan Ahmad	Professor of Medicine, UMMC	M	
16. Salwah Abd Shukor	Lawyer, Zain & Co.	F	√

Notes :
1. IJNEC is constituted and operates in accordance with the ICH-GCP Guidelines and Malaysian Guidelines for GCP
2. Member no. 14, 15 & 16 are external members and they are independent of the Institut Jantung Negara
3. Member indicated (**) is not eligible for voting due to conflict of interest

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Dr Suhaini Kadiman
Chairman, IJN Ethics Committee

INSTITUT JANTUNG NEGARA
National Heart Institute

IJN Ethics Committee (IJNEC)
INSTITUT JANTUNG NEGARA
145, Jalan Tun Razak, Kuala Lumpur
TEL : 03-26178200 FAX : 03-26973040

Date : 20 June 2011

IJNEC NO. : IJNEC/04/2010 (5)

Vijay A/L Sundra Kumuran
Principal Investigator
Perfusion Unit Services
Anaesthesiology Department
Institut Jantung Negara

Dear Vijay,

Study title : " Comparison between Oxygenators on Arterial PCO2 Correction in Ph-stat Management for Infant Undergoing Hypothermic Study "

Application for Title Alteration in Ethics Approval Letter

Thank you for submitting the above project for the IJN Ethics Committee (IJNEC) review and approval. Your submission of application to alter the title of the above-mentioned study dated 06 June 2011, is referred.

Pleased to inform you that the Ethics Committee had reviewed and accepted the application and hereby approves this amended study title as the following :

Previous study title : " **Comparison between Oxygenators on Aretrial PCO2 Correction in Ph-stat Management for Infant Undergoing Hypothermic Study"**

Changed to new study title : " **Carbogen Treatment for pH-stat Management in Cardiopulmonary Bypass "**

You are however requested to give feedback to the committee on the progress of the study quarterly.

Should you have any queries about your project, please contact:

Secretary,
IJN Ethics Committee, Institut Jantung Negara
Tel : 03-26178200 ext 8265 / 8266

Yours sincerely

.....
Dr. Suhaini Kadiman
Chairman
IJN Ethics Committee (IJNEC)

Your Heart...
Our Passion

APPENDIX E BASIC STATISTICS WORKSHOP CERTIFICATE

UNIVERSITY OF MALAYA
The Leader In Research & Innovation
FACULTY OF MEDICINE

Certificate of Attendance

This is to certify that

VIJAY A/L SUNDRA KUMURAN

has attended the

BASIC STATISTICS IN MEDICINE AND THE HEALTH RELATED SCIENCES
A WORKSHOP WITH HANDS-ON APPLICATIONS USING THE STATA STATISTICAL SOFTWARE

5TH – 6TH APRIL 2011

Organised by:
MEDICAL EDUCATION AND RESEARCH DEVELOPMENT UNIT (MERDU)
FACULTY OF MEDICINE
UNIVERSITY OF MALAYA
KUALA LUMPUR

.....
PROF. DATO' DR. IKRAM SHAH ISMAIL
DEAN
FACULTY OF MEDICINE
UNIVERSITY OF MALAYA

APPENDIX F TAPS PARTICIPATING CERTIFICATE

Certificates of Attendance

This is to certify that

Mr VIJAY SUNDRA KUMURAN

Participated in ***The 5th Terumo Academic Perfusionists Seminars (TAPS)***

November 20-21, 2010

The Dusit Thani hotel,

Hua Hin, Thailand

Promporn Petchyungtong

Ms Promporn Petchyungtong
Chairman, Organizing Committee
President, The Society of Thai Perfusionists.

APPENDIX G ASCVTS SPEAKER AT SYMPOSIUM

CERTIFICATE OF ATTENDANCE

20th ASCVTS MEETING BALI 2012

this is to certify that

VIJAY SUNDRA KUMURAN

has participated as

SPEAKER

in the

PERFUSIONIST SYMPOSIUM

Latest Challenges and Opportunities in Asia

8 March 2012

in conjunction with

the 20th Annual Meeting

Asian Society for Cardiovascular and Thoracic Surgery

7 – 11 March 2012

Bali International Convention Centre

Nusa Dua – Bali, Indonesia

Dicky Fakhri,MD
Chairman of Scientific Committee

Tarmizi Hakim, MD
President of The Congress

Chuen Neng Lee
President of ASCVTS