



THE UNIVERSITY OF  
MELBOURNE

**AUSTIN RESEARCH PRIZE  
SURGERY AND ANAESTHESIA**



**SATURDAY, 4 DECEMBER, 2004**

**LECTURE THEATRE  
LEVEL 8, LANCE TOWNSEND BUILDING  
AUSTIN CAMPUS**

**PROUDLY SPONSORED BY**

**Johnson & Johnson**  
MEDICAL PTY. LTD.

---

It's in our nature to care.

# AUSTIN RESEARCH PRIZE SURGERY AND ANAESTHESIA



THE UNIVERSITY OF  
MELBOURNE

SATURDAY, 4 DECEMBER, 2004

LECTURE THEATRE  
LEVEL 8, LANCE TOWNSEND BUILDING  
AUSTIN CAMPUS



- |       |  |
|-------|--|
| 9.00  | Introduction   |
| 9.05  | <b>Khoi M. Bui</b> – Is the Radial Artery Graft a Predictor of Angiographic Failure Compared with Saphenous Vein Graft   |
| 9.15  | <b>James Chiu</b> – Tibial Bone Tunnel Enlargement Following Anterior Cruciate Ligament Reconstruction: A Comparison Between Metallic and Bio-absorbable Interference Screws |
| 9.25  | <b>Daryl Jones</b> – Myoglobin Clearance by Super High-Flux Hemofiltration in a Case of Severe Rhabdomyolysis  |
| 9.35  | <b>Nathan Lawrentschuk</b> – Tumour Hypoxia in Renal Cell Carcinoma Using Polarographic Oxygen Sensor Measurements, Immunohistochemistry and Serum Osteopontin               |
| 9.45  | <b>Forbes McGain</b> – Management of Severe Snakebites at Port Moresby General Hospital, Papua New Guinea  |
| 9.55  | <b>Mehrdad Nikfarjam</b> – Altered Growth Patterns of Colorectal Liver Metastases Following Focal Hyperthermia Ablation  |
| 10.05 | <b>Stephen Warrillow</b> – A Randomised, Double-blind, Placebo-Controlled Crossover Pilot Study of Glibenclamide in Patients with Septic Shock                               |
| 10.15 | <b>Edward Wong</b> – Complement Regulation by CD55, But Not CD46, Is Limited by Homologous Species Restriction   |
| 10.25 | <b>Andrew Newcomb</b> – Spontaneous Pneumomediastinum – An Uncommon, Anxiety producing Entity.   |
| 10.35 | <b>David Pan</b> – Outcome from Percutaneous Nephrolithotomy in a Spinal Cord Injured Population using a single stage dilator.   |
| 10.45 | <b>Adjudication</b>  |
| 10.55 | Announcement of successful trainees  |
| 11.00 | <b>Presentation of Prize</b>   |

PROUDLY SPONSORED BY

*Johnson & Johnson*  
MEDICAL PTY. LTD.

It's in our nature to care.

# Is the Radial Artery Graft A Predictor Of Angiographic Failure Compared With Saphenous Vein Graft

**Authors:** Khoi M. Bui, Brian Buxton, Shane Blackmore, John Fuller, Ian Gordon, George Matalanis, Alex Rosalion, Siven Seevanayagam, Pallav J. Shah

## Background

In a group of 310 patients who had a coronary artery bypass grafting (CABG) with at least one radial artery, Khot et al. recently demonstrated that the patency of the saphenous vein graft was 64%, compared with a radial artery patency of 51% at 565 days after surgery ( $p=0.0016$ ). Our aim is to define the status of the radial artery (RA) and saphenous vein (SV) in a similar cohort.

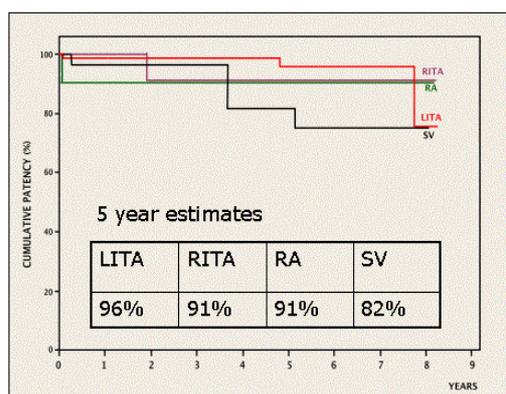
## **Method**

We selected patients who underwent primary CABG with at least one RA. We reviewed all symptom-directed angiographic procedures on these patients. A total of 6456 patients were operated on between 1996 and 2003, of these, 4782 received RA grafts.

A group of 219 patients who had a reangiogram were reviewed. A total of 679 anastomoses were assessed. Preoperative characteristics and intraoperative variables were collected in a prospective database. Postoperative angiograms were assessed by a cardiologist and a cardiac surgeon. The mean time from operation to angiogram was  $1104 \pm 761$  days. Graft patency was defined as stenosis  $\geq 50\%$ . Multivariable predictors of graft failure were assessed using the Generalized linear mixed model and longitudinal patencies using Kaplan-Meier and Turnbull's models.

## **Results**

The overall patency of the RA graft at a mean interval of 3 years was 91% and the SV graft was 89%. Chi-squared analysis revealed no significant difference in patencies between the RA and SV grafts. Kaplan-Meier estimates and Turnbull's model (Fig. 1) at 5 years revealed that the RA and SV patencies were almost identical.



## **Conclusions**

The study did not support the findings of Khot et al.; we found the RA and SV results were similar at 5 years. Selection bias, differences in harvesting techniques and statistical analyses may have accounted for these discrepancies.

This study highlights the need for standardized graft reporting and analyses. Routine use of bilateral internal mammary arteries may be the first choice conduits with the RA or SV for additional conduits.

## **References**

Khot, UN, Freidman DT; Petterson G, Smedira NG; Li J; Ellis SG. Radial Artery Bypass Grafts Have an Increased Occurrence of Angiographically Severe Stenosis and Occlusion Compared With Left Internal Mammary Arteries and Saphenous Vein Grafts. *Circulation*. 2004; 109 (17):2086-91.

# **Tibial Bone Tunnel Enlargement following Anterior Cruciate Ligament Reconstruction: A Comparison between Metallic and Bio-absorbable Interference Screws**

*Author:* Dr James Chiu.

*Supervisor:* Mr Julian Feller, Orthopedic Surgeon, La Trobe University Medical Center, Bundoora  
VIC 3083 Ph: 9473 8850

## ***Purpose***

Anterior cruciate ligament (ACL) reconstruction has become a very popular procedure over the last 10 years. As this has occurred, the phenomenon of radiographic tibial bone tunnel enlargement following such an operation has become well documented. This study investigated whether there would be any difference in tibial bone tunnel enlargement with the use of bio-absorbable screws compared with metallic screws.

## ***Materials and Methods***

Between July 2000 and September 2003, a total of 127 patients underwent primary hamstring ACL reconstruction. All patients had the tibial side of their reconstruction fixed with either (1) metallic titanium interference screw or one of two types of a bio-absorbable interference screw - (2) poly-l-lactic acid or (3) hydroxyapatite-poly-l-lactic acid. The femoral fixation was standardized for all groups. Patients were reviewed at twelve months after surgery and had a radiograph taken of their operated knee. Tunnel enlargement was determined by measuring the widths of the tibial bone tunnels with a digital caliper in both anteroposterior (AP) and lateral (LAT) views. Measurements were corrected for magnification and changes in tunnel size were calculated as a percentage of tunnel size drilled at surgery. Standard clinical measures were also noted.

## ***Results***

All three groups of patients demonstrated increases in bone tunnel size in the AP and LAT views - metallic interference screw: (AP)26%±10.6, (LAT)25.9%±15.6; poly-l-lactic acid: (AP)26.7%±18.0, (LAT)22.9%±14.5; hydroxyapatite-poly-l-lactic acid: (AP)23.3%±14.8, (LAT)21.2%±20.2. There was no statistically significant difference between each of the groups ( $p>0.5$ ). There was also no statistically significant difference in the clinical evaluations between the three groups ( $p>0.5$ ).

## ***Conclusion***

In the short term, there does not appear to be any demonstration of a significant difference in the amount of tibial bone tunnel enlargement between metallic interference screws and bio-absorbable interference screws (2 types).

# Myoglobin Clearance by Super High-Flux Hemofiltration in a Case of Severe Rhabdomyolysis

**Author:** Dr Daryl Jones

**Objective:** To test the ability of a novel super high flux membrane with larger pore size to clear myoglobin from serum.

**Setting:** ICU of a University teaching hospital.

**Subject:** Patient with the serotonin syndrome complicated by severe rhabdomyolysis and oliguric acute renal failure

**Method:** CVVH at 2L/h of ultrafiltration (UF) initially with a standard polysulphone 1.4 m<sup>2</sup> membrane (cut-off point 20 kDa), followed by CVVH with a super high flux (SHF) membrane (cut-off point of 100 kDa) at 2, then 3 and then 4L/h of UF, in an attempt to clear myoglobin.

**Results:** The myoglobin concentration in the ultrafiltrate at 2L/h exchange was five times greater with the SHF membrane than with the conventional membrane (>100,000 µg/L vs. 23,003 µg/L). The sieving coefficients with the SHF membrane at 3L/h and 4L/h of UF were 72.2% and 68.8%, respectively. The amount of myoglobin removed with the conventional membrane was 1.1g/day compared with 4.4 – 5.1 g/day for the SHF membrane. The SHF membrane achieved a clearance of up to 56.4 L/day, and a reduction in serum myoglobin concentration from > 100,000 µg/L to 16,542 µg/L in 48 hours.

**Conclusions:** Super high flux hemofiltration achieved a much greater clearance of myoglobin than conventional hemofiltration, and may provide a potential modality for the treatment of myoglobinuric acute renal failure.

# TUMOUR HYPOXIA IN RENAL CELL CARCINOMA USING POLAROGRAPHIC OXYGEN SENSOR MEASUREMENTS, IMMUNOHISTOCHEMISTRY AND SERUM OSTEOPONTIN.

**Authors:** N Lawrentschuk, C Murone, AMT Poon, J Sachinidis, G O'Keefe, LG Johns-Putra, Z. LIU, I Davis, AM Scott, DM Bolton

*University of Melbourne, Departments of Surgery and Urology; Ludwig Institute for Cancer Research, Austin Health.*

## **Introduction & Objectives**

The purpose of our research is to evaluate oxygen levels and angiogenesis within renal cell cancers (RCC), as evidence suggests they are hypoxic, given their resistance to radiotherapy and chemotherapy. Hypoxia has now been shown in other tumours to correlate with resistance to treatment and poor prognosis. Our study builds on the finding of hypoxia in RCC and explores its relationship with immunohistochemical markers of hypoxia and a new novel marker of hypoxia in tumours, serum osteopontin

## **Method**

Patients who were undergoing radical nephrectomy for RCC had : 1) Evaluation of oxygen levels ( $pO_2$ ) within their renal cell cancers *in vivo* using a Polarographic Oxygen Sensor. 2) Immunohistochemistry including microvessel density to confirm at a sub-cellular level the relationship of hypoxia with the expression of proteins associated with hypoxia and angiogenesis in RCC and 3) Human osteopontin ELISA immunoassay techniques to analyse the serum levels of osteopontin.

## **Results**

30 patients have been recruited thus far and we have demonstrated that RCC are relatively hypoxic (median  $pO_2$  7.2mmHg) compared to normal renal tissue (26.3mmHg). Microvessel density is increased in RCC compared to normal tissue indicating increased angiogenesis. Other markers of hypoxia were also increased. Serum osteopontin in patients with RCC was greater at  $17.65 \pm 5.3$  ng/ml (mean  $\pm$  95% C.I.; range 5-41) compared to controls  $8.75 \pm 2.17$  ng/ml (range 8-12).

## **Conclusions**

Renal cell cancers are relatively hypoxic and more angiogenic compared to normal tissue within the same kidney. This may explain resistance to radiotherapy and chemotherapy whilst helping to identify future therapeutic targets in the management of advanced renal cell cancer. Serum osteopontin has been demonstrated to be raised in RCC and is a novel tumour marker for renal cell carcinoma.

# Management of Severe Snakebites at Port Moresby General Hospital, Papua New Guinea

**Authors:** Dr Forbes McGain, Department of Anaesthesia

**Objective:** Fatal snakebites at Port Moresby General Hospital (PMGH), Papua New Guinea (PNG) were examined to identify interventions that may improve patient survival.

**Design:** Retrospective case-series.

**Subjects and Setting:** Inpatients at PMGH who presented with snakebite; had evidence of envenomation; and died as inpatients between January 1, 1992 and December 31, 2001.

**Outcome Measures:** Ventilation bed days; number and cause of fatalities; antivenom timing, dose and price; other Intensive Care Unit [ICU] treatment modalities.

**Results:** Eighty-seven deaths occurred amongst 722 ICU snakebite admissions. Of the latter, 82.5% were ventilated - representing 45% of all ventilated ICU cases and utilizing 60% (3430/5717) of all ICU ventilator bed days. The median duration of ventilation in fatal cases was significantly less than in non-fatal cases for both children (3.0 vs. 4.5 days) and adults (3.0 vs. 5.0 days). The case fatality rate for children (14.6%) was significantly greater than for adults (8.2%). Sixty fatalities were examined in detail: 75% received blood products; 53% received antivenom [mostly a single ampoule of polyvalent] but only 5% received antivenom  $\leq 4$  hours post-bite. Major causes of death included: respiratory complications (50%); probable intracerebral haemorrhage (17%); and renal failure (10%). Antivenom unit costs increased significantly over the decade; in 2000 an ampoule of polyvalent antivenom was 40-fold more expensive in PNG on a gross domestic product (A\$) per capita basis than in Australia.

**Conclusions:** The management of severe snakebite remains a major challenge for PMGH. Although multiple barriers to snakebite control were identified in this study, improved antivenom procurement and usage policies (including increased use of appropriate monovalent antivenoms), combined with targeted snakebite education interventions (community- and hospital-based) appear to be key interventions to reduce the ongoing toll from this envenomation.

# Altered growth patterns of colorectal liver metastases following focal hyperthermia ablation

**Author:** Mehrdad Nikfarjam

Department of Surgery, University of Melbourne, Austin Hospital, Melbourne, Victoria, Australia.

## **Background:**

Focal hyperthermia ablation by radiofrequency or laser is increasingly used for the treatment of colorectal liver metastases. Tumour recurrence following focal hyperthermia therapy is common and occurs both locally and at distance sites. One possible cause of this recurrence may be due to focal hyperthermia stimulation of micrometastases in the remainder of the liver and extrahepatic locations. This study examines the impact of focal hyperthermia on the growth patterns of micrometastases in a murine model.

## **Methods:**

Colorectal liver metastases were induced in inbred male CBA strain mice via an intrasplenic injection of a murine derived cancer cell line (MoCR). Focal hyperthermia (400 J) produced by laser (Nd-YAG - wavelength 1064 nm) was applied to the left posterior lobe of the liver to achieve destruction, equating to 30% total liver volume. Focal hyperthermia ablation was performed prior to the development of macroscopic tumours in two separate studies immediately after (Study 1) and at seven days following (Study 2) tumour induction. The distribution, volume, and proliferation rate of developed tumours were assessed 21 days following induction and compared to control animals. The effect of focal hyperthermia on the expression of angiogenic factors and cellular proliferation was assessed in a separate group of animals (Study 3) at specific time points. Focal hyperthermia (100J) was applied to the liver of normal animals or to established tumours in animals with colorectal liver metastases, to produce incomplete tumour necrosis. The expression of vascular endothelial growth factor (VEGF), basic fibroblast growth factor 2 (FGF-2), and transforming growth factor (TGF $\beta$ ) and proliferation (Ki67) in liver and residual tumour were determined by immunohistochemistry between 12 hours and 21 days following therapy.

## **Results:**

Focal hyperthermic therapy did not alter overall tumour volume and was not associated with increased extrahepatic tumour recurrences. There was however a relative increase in tumour growth in the regenerating liver lobe adjacent to the treatment site. The percentage metastasis (mean (S.E.)) in the regenerating left posterior lobe of laser treated animals was significantly greater than the anterior lobes in the same group (Study 1:  $45.6 \pm 4.5\%$  vs.  $30.9 \pm 4.7\%$   $P=0.045$  Study 2:  $54.5 \pm 4.0\%$  vs.  $34.5 \pm 2.8\%$   $P=0.003$ ) and the corresponding left posterior lobe in the control group (Study 1:  $45.6 \pm 4.5\%$  vs.  $29.3 \pm 3.5\%$   $P=0.010$  Study 2:  $54.5 \pm 4.0\%$  vs.  $29.3 \pm 3.3\%$   $P=0.038$ ). The proliferation rate of tumours within the different hepatic lobes and between treated and control animal were not statistically different. Focal hyperthermia treatment of liver resulted in 10% to 15% increase in VEGF and FGF expression adjacent to the treatment site at 12 to 72 hours following treatment. A similar increase in expression of VEGF, FGF and TGF was noted at varying durations between 12 hours and 72 hours following treatment. Focal hyperthermia resulted in a persistent increase in liver proliferation 12 hours following treatment compared to untreated liver ( $11 \pm 2.5\%$  vs;  $1 \pm 0.1\%$   $P < 0.001$ ). In tumour tissue a decrease in proliferation was noted at 24 hours following therapy adjacent to the treatment site compared to untreated tumour tissue ( $40 \pm 2.5\%$  vs.  $57 \pm 2.9\%$ ;  $P < 0.001$ ).

## **Conclusion:**

Focal hyperthermia induced preferential growth of micrometastases in the regenerating liver adjacent to the site of treatment. There was an associated increased expression of VEGF and FGF in liver and increased expression of VEGF, FGF and TGF in tumour adjacent to the treatment site.

# **A randomised, double-blind, placebo-controlled cross-over pilot study of glibenclamide in patients with septic shock**

**Authors:** Stephen Warrillow, Moritoki Egi, Rinaldo Bellomo

Department of Intensive Care, Austin Hospital, Melbourne, Australia.

## ***Background***

Severe sepsis often causes a hypotensive shock state. Hyperpolarisation of the vascular smooth muscle cell membrane, due to the marked  $K^+$  efflux prevents  $Ca^{2+}$  entry into cells and may be responsible for 'vasoplegia'. Glibenclamide (normally an oral hypoglycaemic agent) blocks the ATP-dependent  $K^+$  channel and may prevent hyperpolarization this restoring intra-cellular  $Ca^{2+}$  levels and re-sensitising vascular smooth muscle to noradrenaline. Animal studies have demonstrated that glibenclamide restores vascular sensitivity to noradrenaline. However, this effect has not been previously studied in humans.

## ***Objective***

To test whether glibenclamide restores noradrenaline responsiveness in septic shock patients.

## ***Method***

Prospective, double-blind, placebo-controlled cross-over pilot study, in 10 patients with septic shock requiring an infusion of noradrenaline to receive either enteral glibenclamide 20mg or placebo. After twenty-four hours, each patient crossed over to receive the alternative therapy. The primary end-point was the change in noradrenaline infusion rate over time with maintenance of target mean arterial pressure. Secondary end-points included changes in heart rate and serum lactate levels.

## ***Results***

Glibenclamide was adequately absorbed enterally and, as expected, induced a significant decrease in serum glucose concentration (Mean glucose:  $5.97 \pm 2.17$  vs  $7.65 \pm 2.43$  ( $P < 0.0001$ )) and increased the need for parenteral glucose administration. During glibenclamide treatment mean noradrenaline requirements fell from 13 to 4  $\mu\text{mol}/\text{min}$  compared to a change from 19 to 7  $\mu\text{mol}/\text{L}$  for placebo. The two changes represented a decrease of 78.9% and 71.1% in dose respectively (NS). There were also no significant changes in heart rate, mean arterial blood pressure and lactate concentration.

## ***Conclusions***

Glibenclamide was well absorbed enterally and exerted its hypoglycaemic effect reliably. However, it failed to achieve a greater reduction in noradrenaline dose than placebo. Our observations suggest that, in septic humans, blockade of ATP-potassium dependent channels does not have a potent effect on vasomotor tone.

# **Complement regulation by CD55, but not CD46, is limited by homologous species restriction**

**Authors:** Wong E, Kyriakou P., Loveland B., Jones R.

## ***Background***

Complement activation is involved in ischaemia reperfusion injury. It also promotes organ rejection in xeno-transplantation. Regulators of complement activation such as CD46 and Cd55 have been identified as potential candidates used to regulate these processes. However, the efficacy of these proteins may be limited when used in a heterologous species. This study demonstrates and quantitates homologous species restriction in the function of the recombinant soluble human complement regulator, rsCD55, when used with rat complement, whereas rsCD46 was not species restricted.

## ***Method***

Recombinant soluble forms of human CD46 and CD55 were produced, purified and characterized. Classical pathway activated complement-mediated red blood cell (RBC) lysis assays, using rat and human complement, were performed with these proteins to determine their protective efficacy.

## ***Results***

The data from our study showed that rsCD46 strongly protected RBC against lysis by complement whether from human or rat sources. On the hand, the degree of lytic protection offered by rsCD55 against rat complement was markedly reduced when compared to its control of human complement activation. Both proteins provided similar complement regulation and protection when used with human complement.

## ***Conclusions***

Recombinant soluble human CD46 regulated activation of both rat and human complement. However, the effect of rsCD55 was limited by homologous species restriction. The defect s likely to be in the interaction of the regulators (CD55) with the rat C4b protein, reducing the function of CD55 in accelerating the decay of the classical pathway C3, C4 and C5 convertase complexes. This finding has implications for the interpretation of data from animal studies using these human derived proteins, and provides an explanation for results of our earlier studies of rat liver ischaemia reperfusion.

# **Spontaneous Pneumomediastinum – An Uncommon, Anxiety producing Entity.**

*Authors:* Andrew Newcomb, Peter Clarke.

Spontaneous pneumomediastinum is an uncommon but generally benign finding in a small group of young patients who have no obvious precipitating event. As they often present with chest pain or surgical emphysema they can cause a great deal of anxiety and unnecessary investigation. The purpose of this study was to assess the true incidence and investigations required to accurately diagnose this clinical entity, and also to recommend a plan of management.

A retrospective audit of admissions under the care of the two units was undertaken from July 1999 to end Oct 2004. All patients with a diagnosis of spontaneous pneumomediastinum were included for analysis of their demographics, as well as any precipitating and co-morbid conditions. The investigations and outcomes were also assessed.

Eighteen patients were identified. The median age was 20 (range 11-58) and there were 14 males in the cohort. The most common presenting complaint was chest pain in all but one person. Dyspnoea was the next most common complaint for 12 patients. Other presenting complaints were dysphagia, neck pain and swelling, and hoarse voice. Precipitating events were noted in half the patients. These included coughing, retching, and physical exertion. There was also a history of asthma in 7 patients, smoking in 6, illicit drug use in 4, and interstitial lung disease was present in one patient. The most common physical finding on presentation was subcutaneous emphysema of the neck. Hamman's sign was identified in four patients, and it was the only abnormal finding in one patient. All of the patients had at least one radiological investigation, while 10 of the patients received 2 investigations, and 5 of the patients had three investigations. Chest x-ray was the only investigation for seven patients. All patients were discharged from hospital following a period of observation that ranged up to 14 days.

## ***Conclusions:***

This uncommon problem occurs mainly in young males and more serious causes of pneumomediastinum need to be excluded. A CT scan of the chest should be performed in the absence of a convincing chest x-ray. Those with a history of retching or drug use need to have a contrast enhanced swallow to exclude a perforated viscus. The patients should be observed in hospital for at least 24 hours to ensure they don't develop a true pneumothorax or have a perforated viscus.

# **Outcome from Percutaneous Nephrolithotomy in a Spinal Cord Injured Population using a single stage dilator**

**Authors:** David Pan, Nathan Lawrentschuk, Richard Grills, John Rogerson, David Angus, Damien M Bolton, David R Webb.

University of Melbourne, Department of Surgery and Department of Urology  
Austin Hospital, Studley Road, Heidelberg, Victoria, 3084. Australia.

## ***Background***

Percutaneous nephrolithotomy as first-line management of urinary stone disease the spinal cord injury (SCI) population has been challenged in the past decade by the reduced morbidity and improved success rates with stone fragmentation using ESWL. We present our experience of percutaneous nephrolithotomy in the SCI population (the first contemporary series for over 13 years) and compare our results to previous series and ESWL.

## ***Method***

A prospective database of SCI patients having percutaneous nephrolithotomy using a standardised operative technique was examined. Patient data, stone free rates, morbidity and follow-up outcome were all analysed.

## ***Results***

A total of 26 patients underwent 54 percutaneous nephrolithotomies in 32 kidneys. Unilateral stone disease occurred in 20 patients, 6 having bilateral stone disease and 24 staghorn calculi. Major complications occurred in 2 of 54 procedures (4%). Complete stone clearance was 87% for percutaneous nephrolithotomy alone rising to 29 of 32 kidneys (91%) or 24 of 26 patients (92%) with adjuvant procedures. A further 3 kidneys required no further treatment and were monitored having residual fragments no larger than 2mm in size.

## ***Conclusions***

Percutaneous nephrolithotomy is safe, has a high success and acceptable complication rate, compared to ESWL. PCNL in SCI patients remains a valid first-line treatment option for kidney stones in the SCI population and has a higher clearance rate.

# AUSTIN RESEARCH PRIZE SURGERY AND ANAESTHESIA



THE UNIVERSITY OF  
MELBOURNE

SATURDAY, 4 DECEMBER, 2004

LECTURE THEATRE,  
LEVEL 8, LANCE TOWNSEND BUILDING  
AUSTIN CAMPUS



PROUDLY SPONSORED BY

*Johnson & Johnson*  
MEDICAL PTY. LTD.

It's in our nature to care.