Professor Seah Cheng Siang (1922-1990)

- MBBS, Singapore
- Member, Royal College of Physicians of Edinburgh
- Head, Department of Medicine, Thomson Road General Hospital (1960-71)
- Head, Department of Medicine III at the Singapore General Hospital (1971-87)
- Master of the Academy of Medicine (1970-73)
- Clinical Professor and Deputy Director, Postgraduate Medical School, National University of Singapore
- Founder, Gastroenterological Society of Singapore

Following his demise in June 1990, the Council of the Academy established the Seah Cheng Siang (SCS) Memorial Research Fund, to perpetuate the memory of the distinguished Physician, Academician and Past Master of the Academy of Medicine.

The primary objective of the Fund was to promote medical research in Singapore. In early 1991, the SCS Memorial Research Fund was renamed the SCS Memorial Fund and included:

- An endowed annual lectureship: “The Seah Cheng Siang Memorial Lectureship”
- A Gold medal to be awarded annually to the top candidate in the Master of Medicine (Internal Medicine) exams.
- Research/Travelling Fellowships
My Personal Perspectives

- As I was a foreign medicate graduate, I was posted by MOH to MUIII, SGH as a house officer, specifically to be assessed by Prof Seah for fitness to practice in Singapore.

- My first GWR with him, he asked me how I would induce diabetes in rats. Thankfully I knew the answer: (Alloxan / Streptozotocin - having managed a diabetic rat during 2nd year medical school physiology). Indeed I must have passed the litmus test!

My Personal Perspectives

- **Master Clinician** – He did not need a CT scan to diagnose abdominal masses or neurological deficits. The CT scans that were so cleverly and expeditiously obtained by my registrar and consultant were merely to confirm Prof’s findings.

- The Combined Medical Rounds held in turn at SGH by the 3 Medical Units were a showcase of his abilities. Often in an auditorium with standing room only, Prof Seah could extract from patients the crucial and most elusive piece of history that everyone else had missed, or dissect the most complex of cases and come up with the final diagnosis. These were far better than any Case Records of the Mass General Hospital that are published in the NEJM.
My Personal Perspectives

- **Caring** – Class status of patients was not a criterion for receiving Prof Seah's undivided attention. He would spend as much time with a vegetable seller as a civil servant.

- **Meticulous** – Then there is that legend that, before his GWRs, HOs and MOs would iron case notes so that they would not have dog ears and that the ward sister/NO would position bedside tables at ruler measured distances. Whether urban legend or otherwise, this was really about setting standards.

- **Teacher** – Prof Seah taught by inspiring awe, respect and setting standards. One tried one's best simply to please him.

Seah Cheng Siang Lecturers

<table>
<thead>
<tr>
<th>Title</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inaugural</td>
<td>The life and times of Seah Cheng Siang</td>
</tr>
<tr>
<td>2nd</td>
<td>Clinical skills in an age of technology</td>
</tr>
<tr>
<td>3rd</td>
<td>Research &amp; the practising physician – Gastroenterological perspective</td>
</tr>
<tr>
<td>4th</td>
<td>Primary gastrointestinal lymphoma in Hong Kong</td>
</tr>
<tr>
<td>5th</td>
<td>Human immunodeficiency virus and the respiratory system—pulmonary manifestations of acquired immunodeficiency syndrome</td>
</tr>
<tr>
<td>6th</td>
<td>Autoimmunity and the Nervous System</td>
</tr>
<tr>
<td>7th</td>
<td>The aetiology of gallstones</td>
</tr>
<tr>
<td>8th</td>
<td>New antithrombotic agents</td>
</tr>
<tr>
<td>9th</td>
<td>Gastric cancer—where are we now?</td>
</tr>
<tr>
<td>10th</td>
<td>Going places—a rheumatological odyssey</td>
</tr>
<tr>
<td>11th</td>
<td>Temporal lobe epilepsy – The past, present and future</td>
</tr>
</tbody>
</table>

*Lim SH, Ng KY, Chew CH, Annals Academy of Medicine 2007; 36 (7): 525-40*
## Seah Cheng Siang Lecturers

<table>
<thead>
<tr>
<th>Title</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>12th Inflammatory bowel disease: Are we different from the West</td>
<td>Ng Han Seong</td>
</tr>
<tr>
<td>13th The rocky road from Dolly to human embryonic stem cells: Has it been a worthwhile and justifiable scientific pursuit?</td>
<td>Alan Colman</td>
</tr>
<tr>
<td>14th Systemic sclerosis: State of the Art</td>
<td>Carol M Black</td>
</tr>
<tr>
<td>15th Liver transplantation—lessons learnt and future horizons</td>
<td>Roger Williams</td>
</tr>
<tr>
<td>16th The changing face of cardiology practice, training and research in Singapore</td>
<td>Chia Boon Lock</td>
</tr>
<tr>
<td>17th Chronic disease management – Lessons learnt from the treatment of diabetic nephropathy</td>
<td>Napier Thomson</td>
</tr>
<tr>
<td>18th Advances in the management of viral hepatitis in the last decade</td>
<td>Liaw Yun-Fan</td>
</tr>
<tr>
<td>19th Post antibiotic era: Bad bugs, no drugs</td>
<td>Victor Yu</td>
</tr>
<tr>
<td>20th Obesity is a problem – what do we have to do to tackle it?</td>
<td>Ian Caterson</td>
</tr>
<tr>
<td>21st Improving survival outcomes for gastric cancer</td>
<td>Yeoh Khay Guan</td>
</tr>
</tbody>
</table>

Adapted from Lim SH, Ng KY, Chew CH, Annals Academy of Medicine 2007; 36 (7): 525-40

### The 22nd Seah Cheng Siang Memorial Lecture

**Renal Transplantation in Singapore:**

**A Historical Perspective, Controversies, Challenges and Future Directions**

A Vathsala, National University Health System
# Timeline of Transplantation in Singapore

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>First Cadaveric Renal Transplant</td>
<td>July 8 1970</td>
</tr>
<tr>
<td></td>
<td>Medical Therapy, Education and Research Act</td>
<td>May 1973</td>
</tr>
<tr>
<td></td>
<td>First Living - Related Renal Transplant</td>
<td>July 31 1976</td>
</tr>
<tr>
<td>1980</td>
<td>First Bone Marrow Transplant</td>
<td>July 25 1985</td>
</tr>
<tr>
<td></td>
<td>Human Organ Transplant act</td>
<td>June 1987</td>
</tr>
<tr>
<td></td>
<td>First Pediatric Renal Transplant</td>
<td>February 18 1989</td>
</tr>
<tr>
<td></td>
<td>First Bone Transplant</td>
<td>June 14 1989</td>
</tr>
<tr>
<td></td>
<td>First Cardiac Transplant</td>
<td>July 6 1990</td>
</tr>
<tr>
<td></td>
<td>First Liver Transplant</td>
<td>September 29 1990</td>
</tr>
<tr>
<td></td>
<td>First Spousal Renal Transplant</td>
<td>March 4 1991</td>
</tr>
<tr>
<td></td>
<td>First Skin Transplant</td>
<td>March 1998</td>
</tr>
<tr>
<td>1990</td>
<td>Interpretation Act</td>
<td>June 1998</td>
</tr>
<tr>
<td></td>
<td>First Lung Transplant</td>
<td>November 19 2000</td>
</tr>
<tr>
<td>2000</td>
<td>Human Organ Transplant Act, Amendment</td>
<td>January 5 2004</td>
</tr>
<tr>
<td></td>
<td>Human Organ Transplant Act, Amendment</td>
<td>January 1 2008 (Muslims)</td>
</tr>
<tr>
<td></td>
<td>Human Organ Transplant Act, Amendment</td>
<td>November 2009 (Age &gt;60)</td>
</tr>
</tbody>
</table>

### July 8 1970:

The first cadaveric kidney transplant in Singapore
1948: University Department of Medicine formed under the leadership of Prof Ernest Monteiro with the able assistance of Dr Khoo Oon Teik with subspecialties of Renal Medicine and Cardiology.

1961: The first use of haemodialysis in Singapore was on a patient with acute renal failure, an RAF serviceman who had been involved in a motor accident while preparing for the Grand Prix.

1968: Chronic hemodialysis for end stage renal failure was initiated. Led by Dr Lim Cheng Hong and the support of prominent citizens such as Tan Sri Rumme Shaw, an attic above Medical Unit II at SGH was converted into a chronic hemodialysis unit in 1970.

1968: However, the high costs of dialysis prompted consideration for a renal transplant programme.
Deceased Donor Kidney Transplantation in Singapore, 1987

Legislation Covering Deceased Donor Donation in Singapore

Expressed consent

The Medical Therapy, Education and Research Act, 1972

“Any person of sound mind and eighteen years of age or above may give all or any part of his body for education,… transplantation… The gift takes effect upon death.”
The Human Organ Transplant Act, 1987

Presumed consent

“... makes provision for the removal of kidneys from the bodies of persons who are citizens or permanent residents who have died from accidents, for transplantation purposes only. Muslims and persons over 60 years old are exempted from the provisions of the Act.”

Legislation Covering Deceased Donor Transplantation in Singapore

Presumed consent

The Human Organ Transplant Act, Amendment 2004
- Extension to non-accidental causes of death
- Extension to liver, heart and cornea donation

The Human Organ Transplant Act, Amendment 2008
- Extension to Muslims

The Human Organ Transplant Act, Amendment 2009
- Removal of 60-year upper age limit
Deceased Donor Renal Transplantation in Singapore, 1976-2011

4.7/yr pre HOTA

41.6/yr post HOTA, 11 pmp

HOTA

HOTA^a

Live-Donor Renal Transplantation in Singapore, 1976-2011

31 Singaporeans/PR transplanted in 2011 = 8.2 pmp
Outcomes of Renal Transplantation in Singapore (1999-2009)

**SRTR USA, 2004 1 Yr (%) 5 Yr (%)**
- **Living-donor Graft**: 95.4 82.9
- **Deceased-donor Graft**: 90.7 72.1

**SRTR USA, 2010, Singapore Renal Registry 2009**
- **Living-donor Patient**: 98.5 93.8
- **Deceased-donor Patient**: 95.8 85.5

**Factors Contributing to Success of Renal Transplantation**

- More potent immunosuppression
- Better stratification of immunological risk
- Better prophylaxis against infections
Outcomes of Renal Allografts

- Radiation
- Prednisone
- 6-MP
- Cyclosporine Emulsion
- Tacrolimus
- MMF / MYF
- Dacluzimab
- Basiliximab
- Thymoglobulin
- Sirolimus
- Everolimus
- Belatacept
- AZA
- ATGAM
- Rejection <12 mo
- 1 Year Survival

Adapted from Stewart F, Organ Transplantation, 1999; Vincenti et al 2012

AFFERENT

INDIRECT ALLORECOGNITION

Self antigen presenting cell

Self MHC class II + allopeptide

Co-Stim

TCR

CD4 T cell

TCR

Alloantigen presenting cell

DIRECT ALLORECOGNITION

The Allo-immune Response

Denton MD, Lancet 1999
Antigen Presentation: Direct Allorecognition

Recipient Lymphocyte from circulation → Allograft → Donor Antigen Presenting Cell

CD4+ T Cell → MHC → Donor Macrophage

Antigen Presentation: Indirect Allorecognition

Recipient Lymphocyte from circulation → Recipient Regional Lymph Node

Recipient Antigen Presenting Cell

CD4+ T Cell
Antigen Recognition

Antigen Signal Transduction / Cytokine Synthesis

Cytokine Signal Transduction

Clonal Expansion
The Efferent Response

**EFFERENT**

- T Cell Activation and Clonal Expansion
  - Activated B cell
  - Alloantibody production
  - Perforin / Granzyme B
  - Activated macrophage
  - Delayed type hypersensitivity
  - Cytotoxic T cell
  - MHC class I
  - TCR

*Denton MD, Lancet 1999*

---

**Acute Cellular Rejection**

- Acute Tubulo-Interstitial Rejection
- Acute Vascular Rejection
Factors Contributing to Success of Renal Transplantation

- More potent immunosuppression
- Better stratification of immunological risk
- Better prophylaxis against infections
Evolution of Anti-HLA Antibody Detection

Cytotoxicity

Enhanced Cytotoxicity

Flow Cytometry

Luminex Assay: Detects Anti HLA Antibodies

Alloantibody

PE anti-IgG

Purified HLA protein

Dual-colored bead

Immunosuppressive Protocol post Renal Transplantation

Mycophenolate

PREDNISOLONE 30 mg/day

p.o. CYCLOSPORINE / TACROLIMUS

HYDROCORTISONE 1 g/day

CYCLOSPORINE / TACROLIMUS LEVELS

Transplant

Acute Rejection in 1st year Post Transplant

Scientific Registry of Renal Transplants (SRTR), USA 2010
Outcomes of Kidney Transplantation at NUHS: 1987-Present

- 1987-Present
- T1/2 = 20.6 years
- 6 mth AR (2008-2012) = 5%

Factors Contributing to Success of Renal Transplantation

- More potent immunosuppression
- Better stratification of immunological risk
- Better prophylaxis against infections
- Cytomegalovirus
Efficacy of Valganciclovir in Preventing CMV Disease

Factors Contributing to Success of Renal Transplantation

- More potent immunosuppression
- Better stratification of immunological risk
- Better prophylaxis against infections
- Lifelong funding for immunosuppression and anti-infectives for Singaporeans/PRs
Financial Support for Renal Transplantation in Singapore

- **3 M's**
  - Medisave - Hospital expenses, Monthly deductions for immunosuppressive drugs ($300/month)
  - Medishield - Monthly deductions for immunosuppressive drugs ($200/month, lifetime limit)
  - Medifund - for the needy
- **Government subsidy for immunosuppressive drugs**
  - 50% subsidy for Cyclosporine, FK506, Mycophenolate
  - Life of the kidney
  - Subsidy for Valganciclovir for CMV prophylaxis since 2007

Strategies to Increase Access to Renal Transplantation in Singapore - 1

**Living Donor:**

- Pre-emptive transplant
- Laparoscopic donor nephrectomy

- Flank Approach
- Laparoscopic Approach
Strategies to Increase Access to Renal Transplantation in Singapore - 2

Living Donor:
- Reimbursement of costs of donor evaluation, surgery and follow-up (removes disincentives)
- Cross match positive transplant
- ABO incompatible transplant

<table>
<thead>
<tr>
<th>Component</th>
<th>Average Cost</th>
<th>Payment options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-surgery evaluation</td>
<td>$2500</td>
<td>Paid directly to hospital</td>
</tr>
<tr>
<td>Donor Surgery &amp; Hospitalization</td>
<td>$2000-8000</td>
<td>Paid directly to hospital</td>
</tr>
<tr>
<td>Loss of income</td>
<td>$2500-5000</td>
<td>From KDF/PDC Donor Fund (for needy donor)</td>
</tr>
<tr>
<td>Medishield / Insurance</td>
<td>$200-300 per annum</td>
<td>From NKF (for needy donor)</td>
</tr>
<tr>
<td>Post donation follow-up</td>
<td>$100-300 per consult</td>
<td>From NKF (for needy donor)</td>
</tr>
</tbody>
</table>

Immunosuppressive Protocol for ABO Incompatible Living Donor Transplants

- Mycophenolate
  - iv HYDROCORTISONE 1 g/day
  - PREDNISOLONE 30 mg/day

- Tacrolimus
  - iv Immunoglobulin 1 g/kg/dose
  - iv Thymoglobulin 1.5 mg/kg/day

- Rituximab mab
- Immunoabsorption

- D-8 POD 2 POD 6 POD 10
Strategies to Increase Access to Renal Transplantation in Singapore

Deceased Donor:
- Use of older donors
- Explant biopsy of marginal kidney
- Dual kidney transplant for suboptimal biopsy scores

Rao P Set al. Transplantation 2009; 88(2):231-6
Remuzzi G, NEJM 2006; 354:343-352

Are there unmet goals in transplantation?
Challenge # 1: Chronic Allograft Failure

Graft Survival for Deceased Donor (Non-ECD) Kidney Transplants

Cecka M, Clinical Transplants 2008: 2

SRTR 2010
Patient Survival for Living Donor Kidney Transplants

Immunosuppression Use Post Transplant

SRTR 2010
Acute Rejection in 1st year Post Transplant

Scientific Registry of Renal Transplants (SRTR), USA 2010

- Immune responsiveness
- Tissue incompatibilities
- Pre-sensitisation
- Immunosuppression

Non-Immunologic Mechanisms
- Delayed Graft Function
  - Cold Ischemia Time
  - Ischaemia reperfusion
- Donor Health
  - Donor Age, Size

Immunologic Mechanisms
- Cold Ischemia Time
- Ischaemia reperfusion
- Donor Health
  - Donor Age, Size

Chronic Rejection

Pre-existing Donor Injury: Hypertension, Reduced Renal Mass

Adapted from Vathsala A. Annals Academy of Medicine (Singapore) 2005

Adapted from Vathsala A. Annals Academy of Medicine (Singapore) 2005
Impact of Donor Specific Anti HLA Antibodies on Graft Survival

![Graph showing graft survival rates with and without antibodies.](image)

- **No antibodies (550)**: 89% at 4 years, p < 0.0001
- **NDSA (152)**: 70% at 4 years, p < 0.0001
- **DSA (66)**: 51% at 4 years

Patients were tested once, post Tx in 2002, and followed for 4 years.

*Lachmann, Terasaki et al. Clinical Transplants 2006:189*

Calcineurin Inhibitor Induced Nephrotoxicity

![Graph showing nephrotoxicity rates over time.](image)

- **Calcineurin Nephrotoxicity (%)**: Increases with time, p < 0.0001

*Nankivell BJ et al. NEJM 2003. 349: 2326-33*
Co-Stimulatory Blockade: Belatacept

Challenge #2: Immunosuppressive Complications—Mortality due to Infections and Malignancy

Causes of Death in Renal Transplant Patients

Singapore Renal Registry, 2008
Incidence of Malignancies

**TABLE 3.** Treatment-emergent adverse events* in the study population

<table>
<thead>
<tr>
<th>Event</th>
<th>Sirolimus conversion (n=551)</th>
<th>Calcineurin inhibitor continuation (n=273)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>79 (14.2)</td>
<td>14 (5.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Herpes simplex</td>
<td>46 (8.7)</td>
<td>12 (4.4)</td>
<td>0.012</td>
</tr>
<tr>
<td>Fever</td>
<td>24 (4.4)</td>
<td>1 (0.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Aphthous stomatitis</td>
<td>21 (3.8)</td>
<td>1 (0.4)</td>
<td>0.002</td>
</tr>
<tr>
<td>Stomatitis</td>
<td>21 (3.8)</td>
<td>1 (0.4)</td>
<td>0.002</td>
</tr>
<tr>
<td>Acute</td>
<td>10 (1.8)</td>
<td>0</td>
<td>0.016</td>
</tr>
<tr>
<td>Non-malignancies, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21 (3.8)</td>
<td>30 (11.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Skin carcinoma</td>
<td>12 (2.2)</td>
<td>21 (7.7)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Schena F et al. Transplantation 2009;87: 233-42

**Challenge #3: Non Immunosuppressive Toxocities of Immunosuppressive Drugs**

- **Cyclosporine**
  - Nephrotoxicity
  - Neurotoxicity
  - Hypertension
  - Hyperlipidemia
  - Ectodermal

- **Azathioprine**
  - Cytopenias
  - Liver dysfunction
  - Alopecia
  - Pancreatitis

- **Steroids**
  - Osteoporosis
  - Weight gain
  - Hyperglycemia
  - Body changes
  - Cataract
  - Easy bruising

- **Tacrolimus**
  - Nephrotoxicity
  - Neurotoxicity
  - Hypertension
  - Hyperglycemia
  - GI toxicity

- **Mycophenolate**
  - Cytopenias
  - GI toxicity

- **mTOR inhibitors**
  - Hyperlipidemia
  - Cytopenias
  - GI toxicity
Campasia: A Pilot Randomised Controlled Trial of the Effectiveness and Safety of Campath-1H (MABCAMPATH®) as an Induction Agent for Prevention of Graft Rejection and Preservation of Renal Function in Patients Receiving Kidney Transplants

Vathsala A et al. Transplantation 2005, 90:765

Challenge # 4: Large Gap between Supply and Demand for Organs

Singapore

206/pmp

Singapore

18.5/pmp

USRDS 2011, SRR 2009
Number of Patients Waiting for a Deceased Donor Renal Transplant in Singapore

Outcome of Potential Donors Referred in 2007

<table>
<thead>
<tr>
<th></th>
<th>HOTA Donors</th>
<th>MTERA Donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of potential donors referred</td>
<td>60</td>
<td>26</td>
</tr>
<tr>
<td>Non-actualised donors</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>Actualised donors</td>
<td>24</td>
<td>2</td>
</tr>
</tbody>
</table>

Reasons for Non-actualisation of Referred Donors

<table>
<thead>
<tr>
<th>Reason</th>
<th>HOTA Donors</th>
<th>MTERA Donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain death criteria not met</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Life support withdrawn or died prior to brain death certification</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Medically unsuitable</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>No consent from coroner</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>No next of kin available</td>
<td>Not applicable</td>
<td>3</td>
</tr>
<tr>
<td>No consent from next of kin</td>
<td>Not applicable</td>
<td>6</td>
</tr>
</tbody>
</table>


Patient with Irreversible Brain Injury

Hospital - ICU
Brain death

Donor
Organ
Organ Transplant
Recipients with Organ Failure
Challenge # 5: Ethical Practice of Medicine

Transplantation is superior to Dialysis with respect to survival &

There is a large gap between supply and demand

USRDS 2007

Singapore Renal Registry

Transplant Commercialism is now a Regrettable and Unfortunate Consequence of the Success of Transplantation
“In the late 1700s, before the invention of the porcelain denture, wealthy Europeans flocked to surgeons who would replace missing or damaged teeth with fresh ones bought from another person. The sellers were typically the poorest of the poor…. The 18th century caricaturist Thomas Rowlandson expressed his disdain in his famous drawing, “Transplanting of Teeth,” which depicts a soot-covered chimney sweep sitting amid a gaggle of bewigged surgeons and patients. One surgeon is removing the poor sweep’s tooth while, nearby, a ruddy-cheeked woman impatiently awaits its delivery into her vacant tooth socket. “

Focus online, News from Harvard Medical, Dental and Public Health Schools, March 7 2008

Desperate Britons are buying kidneys overseas

Who buys organs?

In Singapore
Who sells organs?

Location Where Transplant Was Performed

<table>
<thead>
<tr>
<th>Year of Transplant</th>
<th>Restructured</th>
<th>Private</th>
<th>Overseas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>21.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>34.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>34.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>39.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>45.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>41.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>41.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>31.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>25.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>29.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>28.1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SRR, 2009
Live-Donor Renal Transplantation in Singapore, 1976-2011

The Real Price of Transplant Tourism

- Infections (Hepatitis, AIDS, Other)
- Other complications
- Imbalance of access to healthcare
  - Rich vs. poor
  - Men vs. women
  - Race
- Fewer altruistic donations
- Cost to professionals and society
- Loss of moral compass
Live Donors

Deceased Donors

You didn't tear up your tuition notes. Someone else also learnt from them.

You didn't discard your old clothes. Your siblings played in them.

You didn't bury your grandmother's ornaments. Your daughter wore them on her wedding day.

You donated your organs...

Somebody lived

Public and Professional Education

DON'T TAKE YOUR ORGANS TO HEAVEN
HEAVEN KNOWS WE NEED THEM HERE

Pledge your organs with

918864 32630
Call: or
75492 81568
email: santhosh.nair@soit.in
www.soitteachin.org
Society for Organ Retrieval & Transplantation
The Creation of Neo Organs

- Injection of growth factor(s) into a wound or organ may induce regeneration of the organ by pluripotent stem cells.

- Donor (or self cells) are incorporated into three-dimensional scaffolds of biodegradable polymers, such as those used to make dissolvable sutures. The entire structure of cells and scaffolding is transplanted, where the cells could replicate, reorganise and form new tissue.

Cloning

- Donor ewe
- Isolated mammary cell
- Egg provider
- Isolated egg
- Surrogate mother
- Clones
The Future of Cloning

- Completely differentiated cells may be re-programmed to return to multi-potential embryonic cells
- Prospects for Organ Transplantation:
  - Cloning transgenic animals after appropriate genetic manipulations
  - Cloning stem cells or incomplete or body parts
  - Cloning of embryos and complete organisms is likely to remain banned

Dolly and Bonnie

Xenotransplantation

“A cat will look down to a man.
A dog will look up to a man.
But a pig will look you straight in the eye and see his equal.”

Sir Winston Churchill
Conclusions

- Kidney transplantation is the best treatment for end stage kidney failure. However, there are many challenges to achieving this best therapy for all those in need:
  - Achieving best outcomes so as to minimize graft loss and patient death is a challenge.
  - While T cell mediated rejection seems to have been overcome, there are currently no effective therapies for chronic / antibody mediated rejection.
  - Calcineurin inhibitors, the mainstay of immunosuppression in transplant, are invariably associated with renal damage.
  - Immunosuppressant mediated immunosuppressive and non-immunosuppressive complications contribute to morbidity and mortality.
  - New immunosuppressants that minimize toxicities while achieving specific immunosuppression are still needed.

Conclusions

- The search for operational tolerance remains a holy grail in transplantation.
- Stem cell therapies, tissue engineering, cloning and xenotransplantation may hold the promise of an inexhaustible supply of replaceable body parts for the treatment of organ failure.
- Demand for organ parts to replace failing ones far exceeds the supply. Increasing the supply of donor organs is the biggest challenge and doing this ethically is a moral imperative.
- As we work towards the betterment of the lives of our patients, the most critical challenges we face are those to our own humanity and professionalism.
Another major illness (that ails the medical profession today) is the commercialisation of medical practice...

INTRODUCTION
Since the late 40s, Medicine in Singapore has undergone much change both in practice, as well as, in the patterns of diseases. As a house physician in 1951, the common conditions dealt with were infections, like malaria, pyogenic diseases, amoebiasis and pneumonia. One can still remember also the adolescents with acute nephritis and rheumatic fever. The degenerative diseases were not common.

THE PROFESSION’S MAJOR ILLNESSES TODAY
At this juncture, it will not be out of place to examine what is ailing the profession today. This having been done. Medicine tomorrow will be in a healthier state.

The profession has been divided into a private and public sector. This divisive effect has created the “holier than thou” attitude held by one or the other, heightened by righteous indignation. There is no place for this in Medicine. Each doctor in each area has his own pertinent role and therefore there should always be co-operation.

Another major illness is the “commercialisation” of medical practice, with economic objectives set as important goals at the expense of the doctor-patient relationship. For example, massive