Bioethics Advisory Committee

20 YEARS OF BIOETHICS Singapore

Conference Book

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Welcome Message

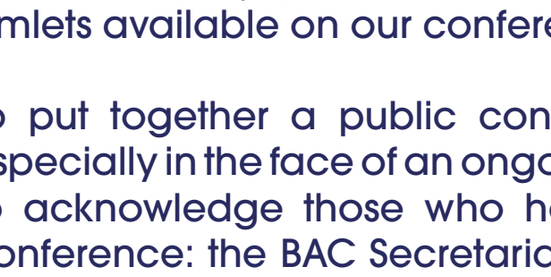
On behalf of the Bioethics Advisory Committee (BAC), I warmly welcome you to the BAC's 20th Anniversary Virtual Public Conference on 17 and 18 June 2021.

This year, the BAC celebrates its 20th Anniversary. The public conference provides us with the opportunity to look back on our achievements and contributions to Singapore over 20 years since the BAC's establishment in 2000. As we commemorate the past accomplishments of the BAC, we must also look forward and prepare for the future. As biomedical sciences continue to develop, novel ethical issues will arise on the horizon, and bioethics continues to play an integral role in protecting the rights and welfare of research participants. It is essential to prepare our future generations to address these new challenges adequately and ensure Singapore continues to practise good and robust science with high ethical standards.

Themed '**Bioethics Future: Empowering Our Next Generation**', this conference aims to help educate and raise the awareness of our future generations on the importance of bioethics and be an interactive platform for us to exchange ideas on the future of bioethics. We have an exciting two-day programme lined up, featuring a wide range of local and international speakers discussing current and emerging issues in bioethics. I hope that you will also enjoy the Virtual Exhibition, the bioethics videos and anniversary filmlets available on our conference website.

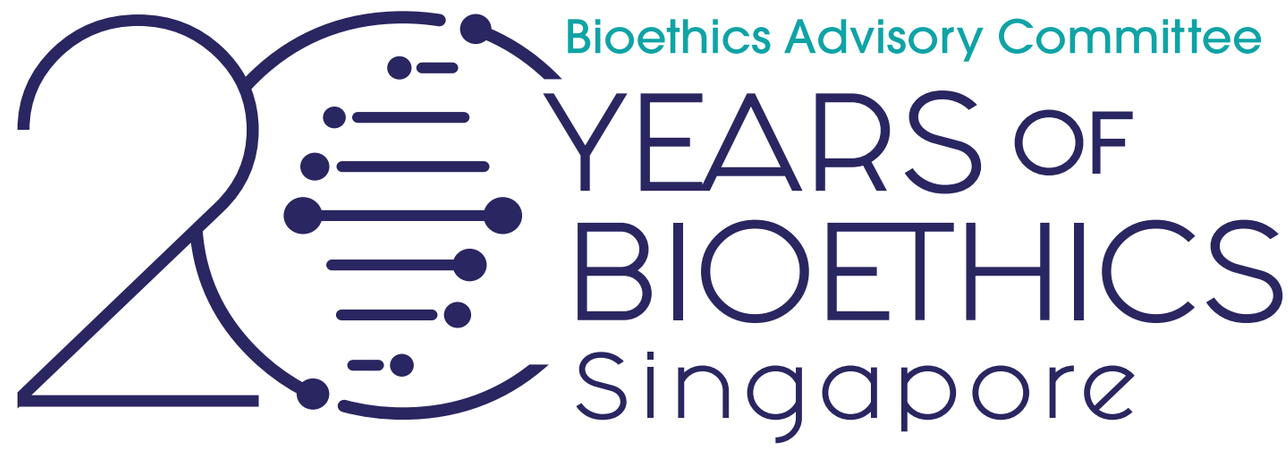
To put together a public conference of this scale is not a small task, especially in the face of an ongoing pandemic. I wish to take this opportunity to acknowledge those who have supported the BAC in organising this conference: the BAC Secretariat under the Ministry of Health; the National Research Foundation; the National Medical Research Council; event partners Anthology, Starcom, and Sheraton Towers Singapore; and many others who have supported us in one way or another.

All of us have a part to play in building an ethically conscious society in Singapore and I hope that this conference serves as a stepping stone to this goal for our next generation. I thank you again for joining us on this occasion, and I wish you a fulfilling time at the conference.



Chief District Judge (Ret.) Richard Magnus
Chairman
Bioethics Advisory Committee, Singapore

ABOUT



13 local and international speakers.
3 topics of discussion. 2 conference days.

Themed ‘Bioethics Future - Empowering Our Next Generation’,
the BAC’s 20th Anniversary Virtual Public Conference aims to raise
public awareness on the importance of bioethics and empower
the next generation of researchers, students and members of the public.

It is also an opportunity to celebrate the BAC’s achievements and
work in the past 20 years, and recognise that Singapore conducts
human biomedical research with high ethical standards.

Bioethics Advisory Committee

Singapore

The Bioethics Advisory Committee (BAC) was established by the Singapore Cabinet in December 2000 to address the ethical, legal and social issues arising from biomedical sciences research in Singapore.

The BAC currently comprises 15 members from diverse backgrounds such as law, biomedical research, medicine, philosophy, sociology, education, as well as representatives from religious groups and the media.

The terms of reference of the Bioethics Advisory Committee are:

- To examine ethical, legal and social issues arising from research on human biology and behaviour and its applications; and
- To develop and recommend policies to the Singapore Government on ethical, legal and social issues, with the aim of protecting the rights and welfare of individuals, while allowing the biomedical sciences to develop and realise their full potential for the benefit of humankind.

The Committee will focus on the following three thrusts:

- Protection of the rights and welfare of individuals;
- Public education and a source of information on bioethical issues; and
- Identify broad principles to govern the ethical, legal and social implications of human biology research.

Key Milestones

Dec 2000
BAC is formed

Jun 2002
BAC publishes its first report titled, 'Ethical, Legal and Social Issues in Human Stem Cell Research, Reproductive and Therapeutic Cloning'.

Jul 2002
Former DPM Dr Tony Tan announces the Government's acceptance of BAC's recommendations on human stem cell research and cloning.

Jan 2010
BAC's 10th anniversary of establishment

Jul 2010
The BAC organises and hosts the 10th World Congress of Bioethics.

Apr 2012
BAC Chair, Chief District Judge (Ret.) Richard Magnus, is the first Singaporean appointed as a member of UNESCO's International Bioethics Committee (IBC) for the 2012-2015 term.

Nov 2013
Singapore is elected as a member of UNESCO's Intergovernmental Bioethics Committee (IGBC) at the 37th Session of UNESCO's General Conference for the Nov 2013 - Nov 2017 term.

Oct 2017
Singapore is re-elected as a member of UNESCO's IGBC at the 37th Session of UNESCO's General Conference for the 2018-2021 term, and re-elected as Rapporteur to UNESCO's IGBC for the 2018-2019 term. Singapore is represented on the IGBC by BAC member Mr Charles Lim.

Feb 2020
BAC member Professor Lee Eng Hin is appointed as a member of UNESCO's IBC for the 2020-2023 term.
He succeeds Chief District Judge (Ret.) Richard Magnus as Singapore's representative on the IBC.

Jun 2021
BAC's 20th Anniversary Virtual Public Conference

To view an in-depth timeline of the BAC's achievements, **click here**.
https://www.bacvirtualconference.com/20th-anniversary-exhibition/

PROGRAMME OVERVIEW

Day 1

Thursday, 17 June 2021

9:00 am	**Session 1a: Conference Opening** Welcome Address by BAC Chair, Chief District Judge (Ret.) Richard Magnus
9:15 am	Opening Address by Guest-of-Honour, Deputy Prime Minister Heng Swee Keat
9:30 am	Keynote Lecture: 'Our Bioethics Future: Empowering the Next Generation' by Professor Paul Root Wolpe
10:00 am	Panel Q&A
10:15 am	Break
10:30 am	**Session 1b: Fire-side Chat** Opening Address and Talk: Past of BAC by Dr Tony Tan, Patron of the BAC
10:40 am	Short Video Message from Professor Lim Pin, BAC Emeritus Advisor, former BAC Chair
10:45 am	Talk: Present and Future of BAC by Chief District Judge (Ret.) Richard Magnus, BAC Chair
11:00 am	Fire-side Chat with Q&A
11:30 am	Break
11:45 am	**Session 1c: Panel Discussion with Religious Leaders** Panel Discussion and Q&A
12:35 pm	Closing of Session
12:45 pm	Lunch Break
2:00 pm	**Session 2: Artificial Intelligence (AI)** Introductory Presentation: 'AI and Bioethics' by Professor Simon Chesterman
2:15 pm	Presentation on Research Ethics: 'Research Ethics for AI in Health Applications' by Dr Pavitra Krishnaswamy
2:30 pm	Presentation on Clinical Ethics: 'Responsible AI in Healthcare' by Professor Peter-Paul Verbeek
2:45 pm	Presentation on Public Health Ethics: 'Impact of AI on Population Health and Its Ethical Considerations' by Associate Professor Ngiam Kee Yuan
3:00 pm	Panel Discussion and Q&A with Speakers
3:30 pm	Closing of Session
3:40 pm	**End of Conference Day 1**

Day 2

Friday, 18 June 2021

2:00 pm	**Session 3: Gene Editing** Introductory Presentation: ‘Genome Editing - Ethical Issues’ by Dr Andy Greenfield
2:15 pm	Presentation on Research Ethics: ‘Gene Editing Research and Its Bioethics’ by Dr Chew Wei Leong
2:30 pm	Presentation on Clinical Ethics: ‘Overview of CRISPR/Cas Gene Editing for Clinical Applications: Potential Benefits, Risks and Concerns’ by Associate Professor Lai Poh-San
2:45 pm	Presentation on Public Health Ethics: ‘Gene Editing and Public Health Ethics’ by Professor Henry T. (Hank) Greely
3:00 pm	Panel Discussion and Q&A with Speakers
3:30 pm	Closing of Session
3:40 pm	Break
4:00 pm	**Session 4: Assisted Reproduction Technology (ART)** Introductory Presentation: ‘Ethical Issues in ART: The Importance of Transgenerational Genomics’ by Professor Peter Braude
4:15 pm	Presentation on Research Ethics: ‘The Next Reproductive Revolution’ by Professor Glenn Cohen
4:30 pm	Presentation on Clinical Ethics: ‘Clinical Ethics of ART’ by Associate Professor Mahesh Choolani
4:45 pm	Presentation on Public Health Ethics: ‘ART Through a Public Health Lens’ by Adjunct Associate Professor Bernadette Richards
5:00 pm	Panel Discussion and Q&A with Speakers
5:30 pm	Closing of Session
5:40 pm	**End of Conference Day 2**

SPEAKERS

Professor
Paul Root Wolpe

Keynote Speaker
Day 1

Paul Root Wolpe, Ph.D. is the **Raymond Schinazi Distinguished Research Chair of Jewish Bioethics**, **Professor of Medicine, Paediatrics, Psychiatry, Neuroscience** and **Biological Behaviour**, and **Sociology,** and the **Director of the Center for Ethics at Emory University.**

Prof Wolpe served for 15 years as the first Senior Bioethicist for NASA. He is Editor-in-Chief of American Journal of Bioethics Neuroscience, the leading journal in neuroethics, and he sits on the editorial boards of over a dozen professional journals in medicine and ethics. Prof Wolpe is the Immediate Past President of the Association of Bioethics Program Directors, a past President of the American Society for Bioethics and Humanities, a Fellow of the Hastings Center, and a Fellow of the College of Physicians of Philadelphia, the country's oldest medical society.

Prof Wolpe publishes widely in sociology, medicine, and ethics, and has contributed to a variety of encyclopedias on ethical and bioethical issues. Trained as a social scientist – rare for an ethicist – Prof Wolpe's work focuses on the social, religious, ethical, and ideological impact of medicine and technology on the human condition. Considered one of the founders of the field of neuroethics, which examines the ethical implications of neuroscience, over the last decade he has shifted his attention to the ethics of artificial intelligence, machine learning, and big data. He founded BEINGS, 'Biotechnology and the Ethical Imagination: A Global Summit,' which brought together thought leaders from around the world to reach consensus on a set of ethical principles and policy standards for human genetic engineering. Prof Wolpe also writes and teaches in Jewish Bioethics, and co-authored the guide to Jewish end-of-life issues, Behoref Hayamim: In the Winter of Life.

Prof Wolpe sits on national and international boards, and is a consultant to the biomedical industry. He has twice testified to the President's Commission on the Study of Bioethical Issues in Washington, DC. A dynamic and popular speaker internationally, he won the 2011 World Technology Network Award in Ethics, has recorded a TED Talk with over 1.5 million views, and was profiled in the November, 2011 Atlantic Magazine as a 'Brave Thinker of 2011.'

Professor Simon Chesterman

Speaker for Artificial Intelligence
Day 1

Professor Simon Chesterman is **Dean of the National University of Singapore Faculty of Law**. He is also **Editor of the Asian Journal of International Law**.

Educated in Melbourne, Beijing, Amsterdam, and Oxford, Prof Chesterman's teaching experience includes periods at the Universities of Melbourne, Oxford, Southampton, Columbia, and Sciences Po. From 2006-2011, he was Global Professor and Director of the New York University (NYU) School of Law Singapore Programme.

Prior to joining NYU, he was a Senior Associate at the International Peace Academy and Director of United Nations (UN) Relations at the International Crisis Group in New York. He has previously worked for the UN Office for the Coordination of Humanitarian Affairs in Yugoslavia and interned at the International Criminal Tribunal for Rwanda.

Prof Chesterman is the author or editor of seventeen books, including 'Law and Practice of the United Nations' (with Ian Johnstone and David M. Malone, Oxford University Press (OUP), 2016); 'One Nation Under Surveillance' (OUP, 2011); 'You, The People' (OUP, 2004); and 'Just War or Just Peace?' (OUP, 2001).

He is a recognised authority on international law, whose work has opened up new areas of research on conceptions of public authority - including the rules and institutions of global governance, state-building and post-conflict reconstruction, the changing role of intelligence agencies, and the emerging role of artificial intelligence and big data. He also writes on legal education and higher education more generally.

Dr Pavitra Krishnaswamy

Speaker for Artificial Intelligence
Day 1

Dr Pavitra Krishnaswamy leads **R&D efforts in Artificial Intelligence (AI) for Healthcare applications at the Institute for Infocomm Research (I2R), Agency for Science, Technology and Research (A*STAR), Singapore.**

Her research focuses on statistical machine learning and inference, interpretable machine learning, and predictive analytics for multimodal clinical data with a view to applications in clinical diagnostics and digital health. Her work has led to several publications, patent filings, and contributed new tools for medical imaging, clinical monitoring, and decision support applications.

Dr Pavitra's training includes a postdoctoral stint at the Massachusetts Institute of Technology (MIT) Department of Brain and Cognitive Sciences, a PhD in Electrical and Medical Engineering at the Harvard-MIT Division of Health Sciences and Technology, an S.M. in Electrical Engineering and Computer Science at MIT, and dual B.S. degrees in Electrical Engineering and Physics from the University of Southern California, USA. Her graduate work was supported by the Dupont MIT Alliance Presidential Fellowship and the MIT Shilman Fellowship, and recognised with best paper awards from the Institute of Electrical and Electronics Engineers (IEEE) and the National Science Foundation (NSF). She was nominated as a Future Leader of the Science and Technology in Society (STS) Forum in 2017, and recognised as one of three finalists for the L'Oréal Singapore For Women in Science National Fellowship (2018, Physical & Engineering Science category).

Professor
Peter-Paul Verbeek

Speaker for Artificial Intelligence
Day 1

Professor Peter-Paul Verbeek is **Distinguished Professor of Philosophy of Technology at the Department of Philosophy of the University of Twente.**

He is the Chair of the Philosophy of Human-Technology Relations research group and Co-director of the Design Lab of the University of Twente. He is also Honorary Professor of Techno-Anthropology at Aalborg University, Denmark. His research focuses on the philosophy of human-technology relations, and aims to contribute to philosophical theory, ethical reflection, and practices of design and innovation.

Prof Verbeek is the Chairperson of the UNESCO World Commission on the Ethics of Science and Technology (COMEST). He is currently one of the six Principal Investigators of a 10-year research programme on the Ethics of Socially Disruptive Technologies.

Among his book publications are 'Moralizing Technology: Understanding and Designing the Morality of Things', in which he analyses the moral significance of technologies, and its implications for ethical theory and for design practices, and 'What Things Do: Philosophical Reflections on Technology, Agency, and Design', which investigates how technologies mediate human actions and experiences, with applications to industrial design.

More details can be found at his website: www.ppverbeek.nl

Associate Professor
Ngiam Kee Yuan

Speaker for Artificial Intelligence
Day 1

Associate Professor Ngiam Kee Yuan is the **Group Chief Technology Officer at the National University Health System (NUHS) Singapore** overseeing technology deployment in the Western Healthcare Cluster of Singapore.

In his role, he assists the Chief Executive to implement new technologies throughout NUHS and serves as the Chief Advisor to the Centre for Innovation in Healthcare in NUHS.

A/Prof Ngiam is concurrently the Deputy Chief Medical Information Officer at the NUHS with a special focus on Artificial Intelligence research and information technology implementation in healthcare.

In his capacity as Associate Professor, Department of Surgery, Yong Loo Lin School of Medicine NUS, A/Prof Ngiam engages in research on endocrine and metabolic surgery as well as Artificial Intelligence applications in healthcare.

A/Prof Ngiam promotes interdisciplinary collaboration throughout the National University of Singapore campus, particularly between the schools of medicine, engineering and computer science for various healthcare applications. He was awarded the ExxonMobil-NUS Research Fellowship for Clinicians in 2007 and numerous teaching awards for his work in research and education.

Dr Andy Greenfield

Speaker for Gene Editing
Day 2

Dr Andy Greenfield has been a **programme leader at MRC Harwell** since 1996. His central research focus is the genetics of embryonic and foetal development and genetic diseases arising from abnormalities of development. His laboratory uses genome editing and other genomics tools.

Over the last decade, Dr Greenfield has also made significant contributions to regulation and policy in reproductive medicine. From 2009 to 2018, he was a member of the Human Fertilisation & Embryology Authority (HFEA) and chaired its licence committee. In 2014 and 2016, he chaired two expert panel assessments of the safety and efficacy of mitochondrial donation techniques (aka 'three-person IVF'), paving the way to their being made lawful in the UK.

He was a member of the Nuffield Council on Bioethics (NCoB) from 2014-2020 and chaired its 2016 working group that examined ethical issues associated with genome editing applications in a variety of contexts; he is currently a member of the NCoB working group examining genome editing and farmed animals. He was also a member of the international commission, convened by the National Academies of Sciences and the UK Royal Society, that in 2020 made recommendations on prospective uses of heritable human genome editing. He is also a member of the UK Regulatory Horizons Council.

He regularly gives talks in international settings on the topics of the science, governance and ethics of genetic technologies.

Dr Chew Wei Leong

Speaker for Gene Editing
Day 2

Dr Chew Wei Leong is the **Principal Investigator at the Genome Institute of Singapore.**

His team develops technologies that make pinpoint changes to genes. His work provided the first demonstrations of multi-organ gene editing, disease gene correction with CRISPR-Cas9, and insights into the safety profile of these new nucleic acid therapeutics. He holds more than 10 patents and technology disclosures in the areas of gene editing, gene therapy, and nucleic acid technologies.

Dr Chew is the recipient of the President's Science and Technology Awards – Young Scientist Award 2020. He graduated with a Bachelor of Science (Magna Cum Laude; Phi Beta Kappa) from Duke University and obtained his Doctor of Philosophy from Harvard University with Professor George Church. While pursuing his doctoral studies, he conducted research on therapeutic genome-editing.

More information can be found on the lab website: http://chewlab.github.io.

Associate Professor Lai Poh-San

Speaker for Gene Editing
Day 2

Associate Professor Lai Poh-San heads the **Human Molecular Genetics Lab of the Department of Paediatrics in the Yong Loo Lin School of Medicine, National University of Singapore (NUS).**

Her main interests are in neuromuscular disorders, congenital diseases and undiagnosed disorders. Her other interests are in behavioural genetics and exploring psychosocial, lifestyle and biological determinants related to various traits. She is an Adjunct Faculty of the Genome Institute of Singapore (GIS) and Adjunct Principal Member of Technical Staff with the Defence Medical and Environmental Research Institute (DMERI), Defence Science Organisation (DSO), Singapore. She serves on a number of international consortiums, advisory committees, editorial journal boards and societies.

A/Prof Lai sits on the Institutional Review Boards for DSO and Singapore Armed Forces (SAF), and Lee Kong Chian School of Medicine, Nanyang Technological University (NTU). She is co-Chair of the Ethics of Gene Modifying Technologies Working Group under the Science, Health and Policy-relevant Ethics in Singapore (SHAPES) initiative of the Centre for Biomedical Ethics, NUS. She also serves as President of the Biomedical Research and Experimental Therapeutics Society of Singapore, President Emeritus of the Asia-Pacific Society of Human Genetics, Deputy Chair of the NUS Institutional Biosafety Committee, Executive Committee member of the International Federation of Human Genetics Societies (IFHGS), member of the Nominating Committee of the American Society of Human Genetics (ASHG), and American College of Medical Genetics and Genomics (ACMG). She has also previously served as Director of HUGO (Human Genome Organisation) and Co-chair of the Policy and Ethics Review Board of the HUGO – Pan Asian SNP Initiative (HUGO-PASNPI).

Professor Henry T. (Hank) Greely

Speaker for Gene Editing
Day 2

Professor Henry T. (Hank) Greely is the **Deane F. and Kate Edelman Johnson Professor of Law**; **Professor, by courtesy, of Genetics; and Director of the Center for Law and the Biosciences at Stanford University**. He specialises in ethical, legal, and social issues arising from the biosciences.

He is a founder and immediate past President of the International Neuroethics Society, and chairs the California Advisory Committee on Human Stem Cell Research and the Ethical, Legal, and Social Issues Committee of the Earth BioGenome Project. He currently serves on two National Academy of Sciences Committees, one on developing a research agenda and research governance approaches for climate intervention strategies that reflect sunlight to cool Earth and the second on ethical, legal, and regulatory issues associated with neural chimeras and organoids. He serves on the National Institutes of Health (NIH) BRAIN Initiative's Multi-Council Working Group and co-chairs the Initiative's Neuroethics Work Group. He has published two books: 'The End of Sex and the Future of Human Reproduction' (2016) and 'CRISPR People: The Science and Ethics of Editing Humans' (2021).

Prof Greely graduated from Stanford in 1974 and Yale Law School in 1977. He served as a law clerk for Judge John Minor Wisdom on the United States Court of Appeals for the Fifth Circuit and Justice Potter Stewart of the United States Supreme Court. After working during the Carter Administration in the Departments of Defense and Energy, he entered private law practice in Los Angeles in 1981. He joined the Stanford faculty in 1985.

Professor
Peter Braude

Speaker for
Assisted Reproduction Technology
Day 2

Professor Peter Braude OBE MB PhD FRCOG FMedSci FRSB, **Emeritus Professor of Obstetrics and Gynaecology at Kings College London (KCL)**, was formerly Head of the Department of Women's Health at KCL and directed the Centre for Preimplantation Genetic Diagnosis for the Guy's and St Thomas' NHS Foundation Trust until 2011. He has been involved in assisted reproduction and embryo research in Cambridge and London for over 40 years.

He was a member of the Human Fertilisation & Embryology Authority (HFEA) (1999–2004), Chair of the Royal College of Obstetricians & Gynaecologists (RCOG) Scientific Advisory Committee (2004–2007), a member of the Nuffield Council on Bioethics working group that considered the ethics of Novel Techniques for the Prevention of Mitochondrial DNA Disorders and is an external advisor to the Singapore Bioethics Advisory Committee.

He served on the HFEA core panel that reviewed and reported on the scientific methods to avoid mitochondrial disease, and now chairs the RCOG Genomics Taskforce. He was awarded an Officer of the Most Excellent Order of the British Empire (OBE) in 2015 for his services to Reproductive Medicine.

Professor
Glenn Cohen

Speaker for
Assisted Reproduction Technology
Day 2

Professor Glenn Cohen is the **James A. Attwood and Leslie Williams Professor of Law at Harvard Law School and Faculty Director of the Petrie-Flom Center for Health Law Policy, Biotechnology and Bioethics.**

Prof Cohen is one of the world's leading experts on the intersection of bioethics and the law, as well as health law. He also teaches civil procedure. From Seoul to Krakow to Vancouver, Prof Cohen has spoken at legal, medical, and industry conferences around the world and his work has appeared in or been covered on PBS, NPR, ABC, CNN, MSNBC, Mother Jones, the New York Times, the New Republic, the Boston Globe, and several other media venues.

He was the youngest professor on the faculty at Harvard Law School (tenured or untenured) both when he joined the faculty in 2008 (at age 29) and when he was tenured as a full professor in 2013 (at age 34), though not the youngest in history.

Prof Cohen's current projects relate to big data, health information technologies, mobile health, reproduction/reproductive technology, research ethics, organ transplantation, rationing in law and medicine, health policy, FDA law, translational medicine, and to medical tourism – the travel of patients who are residents of one country, the 'home country', to another country, the 'destination country', for medical treatment.

Associate Professor Mahesh Choolani

Speaker for
Assisted Reproduction Technology
Day 2

Associate Professor Mahesh Choolani is the **Head of the Department of Obstetrics & Gynaecology at the National University of Singapore**. He is also the **Group Chief of Obstetrics & Gynaecology at the National University Health System.**

A/Prof Choolani has published over 200 peer-reviewed articles, including top journals such as Nature, Blood, and The Lancet. His principal areas of research are maternal fetal medicine, non-invasive prenatal diagnosis, and fetal therapy. In 2010, he delivered the prestigious Benjamin Henry Sheares Memorial Lecture in Singapore.

A/Prof Choolani is the President-Elect of the College of Clinician Scientists, and Vice-President of the College of Obstetricians and Gynaecologists in Singapore. He is also the President-Elect of the International Society of Prenatal Diagnosis, and past President of the International Fetal Medicine and Surgery Society.

A/Prof Choolani is a member of the Human Nuclear Genome Editing Review Group, Bioethics Advisory Committee. He is also a member of the Genetic Testing Advisory Committee of the Ministry of Health and a member of the Clinical Ethics Committee, National University Hospital.

Adjunct Associate Professor Bernadette Richards

Speaker for
Assisted Reproduction Technology
Day 2

Adjunct Associate Professor Bernadette Richards, BA, LLB (Hons), PhD is an **Adj. Associate Professor of Law at Queensland University of Technology**, **Australian Centre for Health Law Research and Adelaide University.**

She is the President of the Australasian Association of Bioethics and Health Law and is a member of the National Health and Medical Research Council's (NHMRC) Australian Health Ethics Committee, the Embryo Research Licensing Committee and Dietary Guidelines Governance Committee and was the Chair of the Mitochondrial Donation Expert Working Committee.

An active researcher, she has completed major projects on organ donation, consent to treatment and legal issues around innovative surgery. She is a chief investigator on three current major grants, NHMRC Partnership Grant, 'Strategies for the inclusion of vulnerable populations in developing complex and sensitive public policy: A case study in Advance Care Planning', NHMRC Ideas Grant, 'The algorithm will see you now: ethical, legal and social implications of adopting machine learning systems for diagnosis and screening' and ARC Discovery Grant, 'Support or Sales? Medical Device Representatives in Australian Hospitals'. She is currently writing a book 'Technology, Healthcare and the Law: An evolving relationship' to be published in the first half of 2021 and has published over 80 journal articles, book chapters and books.

GUEST-OF-HONOUR

Guest-of-Honour:
Mr Heng Swee Keat

Deputy Prime Minister and Coordinating Minister for Economic Policies

Mr Heng Swee Keat is Deputy Prime Minister and Coordinating Minister for Economic Policies. He is also Member of Parliament for East Coast GRC.

Mr Heng chairs the tripartite Future Economy Council which oversees the on-going restructuring of our economy, through upgrading the skills of our workers and transformation of industry, to create better career prospects for our people. He leads a team to oversee the design and implementation of national strategies in areas such as skills and capabilities development, innovation and productivity, as well as internationalisation of our companies.

He is also the Chairman of the National Research Foundation, which sets the direction for Singapore's research, innovation and enterprise (RIE) strategies. In this role, Mr Heng oversees the closer integration of our RIE and industry transformation efforts.

In addition, Mr Heng oversees the Strategy Group within the Prime Minister's Office which coordinates policies and plans across the government. He also oversees the Singapore Together movement, which seeks to partner Singaporeans in new ways to design and implement policies, and to create a shared future together. Mr Heng also serves as Adviser to the Multi-Ministry Taskforce on COVID-19 and the National Jobs Council.

Mr Heng has an MA in Economics from Cambridge University. He also holds a Master in Public Administration from the Kennedy School of Government, Harvard University.

FIRE-SIDE CHAT
INVITED PANELLISTS

Associate Professor Kenneth Mak

Director of Medical Services
Ministry of Health, Singapore

Associate Professor Kenneth Mak is **Director of Medical Services at the Ministry of Health Singapore**. In this role, he oversees the provision of all health services in Singapore. Since the beginning of COVID-19 pandemic, A/Prof Mak has been heavily involved in our national efforts to control the outbreak in Singapore. As Director of Medical Services in MOH, he advises the Multi-Ministry Taskforce as well as other governmental agencies in crafting our overall strategy for managing the outbreak and oversees our public health response to combat spread of COVID-19 in our community. A/Prof Mak is a familiar face as he has appeared regularly in the media conferences of the COVID-19 Multi-Ministry Taskforce. A/Prof Mak was previously Deputy Director of Medical Services (Health Services Group) in MOH from 2015 to end-2019. He worked closely with the Regional Health Systems and healthcare institutions in Singapore on care integration as well as on Singapore's long-term healthcare transformation strategy. A/Prof Mak was trained as a general surgeon with subspecialty interests in hepatobiliary and pancreatic surgery, as well as in trauma surgery. He maintains his clinical practice as a Senior Consultant surgeon in the Department of Surgery, at Khoo Teck Puat Hospital, Singapore.

Professor Tan Chorh Chuan

Chief Health Scientist
Ministry of Health, Singapore

Professor Tan Chorh Chuan holds concurrent appointments as the **Executive Director of MOH Office for Healthcare Transformation (MOHT), and the first Chief Health Scientist at the Ministry of Health (MOH)**. Before joining MOHT, Prof Tan served as President of the National University of Singapore (NUS) from 2008 to 2017. Prior to that he also held the positions of NUS Provost, then Senior Deputy President between the years of 2004 and 2008. He was former Dean of the NUS Faculty of Medicine and served as the Director of Medical Services, MOH, from 2000 to 2004, where he was responsible for leading the public health response to the 2003 SARS epidemic. His awards include the Public Service Star in 2003 for outstanding contributions to overcoming SARS in Singapore; the Public Administration Gold Medal in 2004 for his work as Director of Medical Services in MOH; and the Meritorious Service Medal in 2015. He was awarded the National Science and Technology Medal in 2008 and is the first Singaporean to be elected as an International member of the US National Academy of Medicine. A renal physician, Prof Tan obtained his medical training at NUS, and research training at the Institute of Molecular Medicine, Oxford.

Chief District Judge (Ret.) Richard Magnus

Chief District Judge (Ret.) Richard Magnus is the current **Chair for the Bioethics Advisory Committee** (BAC) and has been appointed since 2011. He has served the BAC as a member for over 15 years. Under his leadership, the BAC published its 2015 Ethics Guidelines for Human Biomedical Research, where the recommendations formed the core principles of the regulatory framework for the Human Biomedical Research Act (2015) and the guidelines serves as a consolidated ethics resource for researchers and members of Institutional Review Boards (IRBs). Chief District Judge (Ret.) Magnus also served as Member of the International Bioethics Committee (IBC) of UNESCO for 8 years and was the first Singaporean to be a Vice-Chairman in this UNESCO committee. He contributed to numerous IBC reports as an independent expert in bioethics during his IBC membership and tenure.

Chief District Judge (Ret.) Magnus is currently the Chairman of the Public Transport Council (PTC), and has served on the Council since February 2012. He was also the First Chairman of the Public Guardian Board for about 5 years. He had headed several legal departments and sat on a few Boards of Government-linked companies and statutory bodies.

While on the Bench, he became General Editor of The Practitioner's series of law books on sentencing, evidence, damages, family and juvenile justice and contributed to the White Book (the Supreme Court Practice).

Chief District Judge (Ret.) Magnus was Singapore's First Representative to the ASEAN Intergovernmental Commission on Human Rights where he successfully helped to conclude the ASEAN DECLARATION ON HUMAN RIGHTS. He participated, on behalf of Singapore, in other international fora on human rights.

He was awarded the Meritorious Service Award for his exceptional public service by the State in 2009 and awarded the Outstanding Volunteer award by the Ministry of Social and Family Development; and the Public Service Star by the State in 2015. He is a Justice of the Peace.

Professor Lee Eng Hin

MD, FRCS(C), FRCS(Edin), FRCS(Glas), FAMS

Professor Lee is currently **Professor of Orthopaedic Surgery in the National University of Singapore and Emeritus Consultant in Orthopaedic Surgery at the National University Hospital.** Prof Lee specialises in Paediatric Orthopaedics and is acknowledged internationally as a leader in his field by being elected a member of the International Paediatric Orthopaedic Think Tank.

Prof Lee is currently the Programme Leader of the NUS Tissue Engineering Programme and is internationally known for his research on Stem Cell Biology and Cell-based therapy for Cartilage Repair and Regeneration. He is a member of the Bioethics Advisory Committee and is the Chair of the MOH Advisory Committee for Restricted Human Biomedical Research. He is a member of the MOH Regulatory Advisory Panel as well as the MOH-HSA Cell, Tissue, Gene Therapy (CTGT) Services and Products Working Committee.

Prof Lee is a Deputy Editor of the Journal of Bone and Joint Surgery, Co-Editor of the Journal of Bone and Joint Surgery Open Access, and is on the editorial boards of several international refereed journals in orthopaedics. He has over 150 publications in refereed journals and over 350 conference papers. He has co-authored a book titled "Stem Cells: from Bench to Bedside" which is now in its second edition. For his professional standing, achievements and contributions to research on the musculoskeletal system and a role model amongst his peers, he was conferred the Fellowship of International Orthopaedic Research (FIOR) and admitted into the International College of Fellows by the International Combined Orthopaedic Research Societies in 2019.

PANEL DISCUSSION WITH RELIGIOUS LEADERS

Chief District Judge (Ret.)
Richard Magnus

PANEL DISCUSSION WITH RELIGIOUS LEADERS

Moderator: Chief District Judge (Ret.) Richard Magnus

Panellists: Buddhist Fellowship
Catholic Archdiocese of Singapore
Hindu Advisory Board
Majlis Ugama Islam Singapura Council
National Council of Churches Singapore (NCCS)
Sikh Advisory Board
Singapore Buddhist Federation
Taoist Mission (Singapore)

The BAC has actively consulted various religious organisations for their perspectives on ethical issues pertaining to human biomedical research over the past 20 years.

For this session, Chief District Judge (Ret.) Richard Magnus, BAC Chair, will be speaking to various representatives from religious organisations in Singapore to discuss the importance of interfaith dialogue in bioethical deliberations.

THEMATIC DISCUSSION

ABSTRACTS

Societal norms and views on science change over time, and what was once thought of as radical may now be accepted as routine. As novel biomedical technologies emerge, new discoveries, therapies and patient outcomes continue to be generated. Recent advances in areas such as artificial intelligence, human genome editing, and assisted reproduction technology have the potential to create more personalised and effective medical treatments. However, as we increasingly leverage on these technologies, we must ensure they are developed and applied in keeping with our ethical values.

We need to nurture new generations of ethically conscious individuals to continue guiding such conversations anchored in fact and mutual understanding. Discussing what should and should not be permissible, based on a holistic risk-benefit assessment, requires honest conversation in a common language. It is only with an ethically conscious next generation that we can maintain a robust scaffold to evaluate hard questions that frequently arise at the intersections of science and ethics.

Keynote Lecture

‘Our Bioethics Future: Empowering the Next Generation’

by Professor Paul Root Wolpe

Abstract: Modern bioethics has an interesting history, emerging in the 20th century from its roots in medical ethics. Over the last 75 years or so, bioethics has changed its areas of interest and focus many times. We are now undergoing another transformation of bioethics, as it turns its attention more to public health (e.g. pandemics), emerging technologies (e.g. neuroscience, artificial intelligence), greater diversity and inclusiveness, and the changing physician-patient relationship. It is also losing its parochial Western orientation, becoming more international. Where might bioethics take us over the next 10-25 years? What trends might interest a new generation of bioethicists? How do we ensure that future generations contribute to building and sustaining an ethical conscious society?

Thematic Session 2: Artificial Intelligence (AI)

An extraordinary time of progress is being ushered in with the confluence of expansion of big data, acceleration in the speed of cloud computing, and growth of complex machine learning algorithms. The use of AI is increasing across a myriad of industries, including healthcare, research, banking, retail, and manufacturing. Its game-changing promise has been tangled in recent times with concerns that these complex, opaque systems may do more harm than good. This session on ethics in AI will explore these new areas and challenges that AI is bringing to our understanding of ethics in healthcare and research, and some plausible ways forward in managing these changes without unnecessarily stifling its development.

'AI & Bioethics'
by Professor Simon Chesterman

Abstract: AI offers tremendous opportunities in the field of biomedicine, but raises important questions in bioethics. The autonomy and opacity of AI systems pose challenges to regulation in many areas of life — among other things due to the difficulty of attributing responsibility to a legal person (e.g. the doctor, if a machine operates independently) and of understanding how AI systems impact traditional standards (e.g. informed consent, if a machine-learning system is naturally opaque). This presentation will outline some of the ethical issues and challenges and suggest three discrete ways of viewing and addressing them: as risks to be managed, red lines to be enforced, and legitimate processes to be followed. Biomedicine may want to look to transportation as another area that is being transformed by technology, as well as the role that product liability and insurance are coming to address the questions of risk and allocation of costs.

'Research Ethics for AI in Health Applications'
by Dr Pavitra Krishnaswamy

Abstract: AI is poised to significantly impact the healthcare ecosystem by improving efficiency, affordability and clinical outcomes. As such, there is increasing interest and investment in research, development and deployment of AI technologies in the human biomedical domain, particularly for wellness and clinical applications.

To realise the potential value, the community needs to address ethical and regulatory challenges relating to (a) access and use of large but sensitive health or clinical datasets; and (b) evaluation, monitoring and quality control of AI technologies for health or clinical applications. This talk will outline possibilities for addressing the above challenges via a confluence of advanced technology, infrastructure and governance approaches. Specifically, to illustrate some frameworks evolved for our projects, we will highlight AI R&D case studies that leverage patient records, genomic data, and/or consumer health information for screening, allied health, or clinical decision support applications.

'Responsible AI in Healthcare'
by Professor Peter-Paul Verbeek

Abstract: Over the past 20 years – the period in which the Bioethics Advisory Committee has been active, biomedical technologies have been developing at a fast pace. From gene editing to AI, and from clinical robotics to smart hospitals, technologies have kept raising new ethical questions and concerns. This lecture will investigate the moral significance of these technologies and technological developments. Rather than locating ethics only in the human beings who design, implement, and use technologies, it will thematise to what extents there is a moral significance to these technologies themselves. Diagnostic technologies, for instance, help to shape the ethical decisions that healthcare professionals make, and Artificial Intelligence even enables these technologies to make ethical decisions by themselves. At the same time, biomedical technologies are a source of 'value dynamism': they contribute to shifts in meaning of central ethical values, like 'autonomy', 'dignity' and 'vulnerability'. Moreover, such technologies urges us to rethink central ethical concepts and frameworks: what do 'human rights' mean, for instance, for animals with parts of human DNA in them? By developing the approach of Guidance Ethics, this lecture will suggest a responsible way to deal with this moral significance of technologies in biomedical practice.

'Impact of AI on Population Health and Its Ethical Considerations'
by Associate Professor Ngiam Kee Yuan

Abstract: As the use of AI becomes increasingly ubiquitous in healthcare, how do doctors know if the AI tools they use are indeed accurate and unbiased? What is the level of clinical evidence and regulatory compliance that is necessary for it to be used in routine clinical practice? Similar concerns would be shared by patients who consult doctors using AI tools as part of patient care. How do these AI tools affect a doctor's decision-making process? Would these AI based decisions carry the same legal and ethical obligations of provisioning routine medical advice? To realise the benefits of AI at the health system level, these considerations must be incorporated into the training of a new generation of medical practitioners skilled in using these tools for the patients' benefit. Equal emphasis must be placed in supporting the development of beneficial AI tools without stifling its progress with uninformed or overly restrictive regulations.

Thematic Session 3: Gene Editing

Gene editing has gained prominence in recent years as the development of genome editing technologies opens up greater possibility of directly targeting and modifying genomic sequences in almost all eukaryotic cells. Gene editing comprises human somatic gene editing, human germline editing and non-human germline editing. Human somatic gene editing is most common today and used in gene therapies to prevent or treat diseases. Its rapid pace of development and varied applications have led to many policymakers and stakeholders questioning whether appropriate regulatory and ethical frameworks are in place to govern these technologies, as well as how and when the public should be engaged in discussing their social and ethical implications. This session addresses the global interest in genome editing, how it can improve human health, and its ethical challenges.

'Genome Editing – Ethical Issues'
by Dr Andy Greenfield

Abstract: Genome editing is almost everywhere; in agriculture, in novel therapies in the clinic, in the research laboratory. But – apart from one infamous exception – it is not (yet) in the in-vitro fertilisation (IVF) clinic. Innovation using genome editing always raises ethical questions, some of which are familiar because they arise whenever an emerging technology is considered: for example, should we use technology to further intensify farming methods? What are our obligations to farmed animals, if we do? In the clinic, how do we secure truly informed consent before use of a novel therapy? Who decides the answers to such questions? And in whose interests do they answer?

But genome editing, in particular, is contentious partly because of attitudes to animal and human genomes. Intervening in the human genome, especially, is sometimes described as if it were an intervention into the human soul. Nowhere is the debate over uses of human genome editing more contentious and sometimes fractious than when heritable uses are proposed. Beginning with animals, the speaker will then move to consider some of the arguments against heritable human genome editing that do not rely on concerns over safety, such as the claim that it is incompatible with what it means to be human.

'Gene Editing Research and Its Bioethics'
by Dr Chew Wei Leong

Abstract: This presentation will share an overview of the state-of-the-art in gene editing research. Our technologies can now make more precise edits in genes, change longer stretches of DNA, interrogate how genes affect traits and diseases, and orchestrate how active or silent these genes are amongst the 20,000 other genes controlling our bodies. The presentation will discuss how these technologies are rapidly advancing towards clinical trials and eventual use in people. The tremendous therapeutic promise brings scrutiny onto - and drives large research endeavours into - the safety, specificity, and efficacy of gene editing technologies. Through understanding the capabilities, limitations, and prospects of gene editing research, we can more clearly deliberate their bioethical implications

'Overview of CRISPR/Cas Gene Editing for Clinical Applications: Potential Benefits, Risks and Concerns'
by Associate Professor Lai Poh-San

Abstract: Gene editing has many biomedical applications including for diagnostics, drug screening and therapeutic treatment. For the purpose of this presentation, we will focus on its use for gene therapy to treat conditions or diseases. In the past few years, CRISPR/Cas technology has emerged as one of the most developed tools for genome editing that have been translated for clinical trials for conditions such as blood disorders, cancers, eye disease and chronic infections. This stems from successful therapeutic rectification in pre-clinical studies that were demonstrated in tissues and animal models for disorders like Duchenne muscular dystrophy, beta-thalassemia, cystic fibrosis and sickle cell disease. Most of these trials involve ex vivo approaches where cells are removed, edited and then returned to the body. The world's first in vivo CRISPR-based therapy that was performed through direct sub-retinal injection on an adult with congenital blindness was announced last year and the results of this clinical trial are expected to be completed by 2022. While current trials using CRISPR-based treatments are still in early stages and focus on somatic cells (non-reproductive cells), attempts at reproductive germline editing have mainly been confined to animal models or non-viable human embryos until the revelation of the birth of a pair of twins that were genome edited in 2018. Human genome germline editing carries additional concerns due to the wider impact to future generations. The successful adoption of any clinical technology with far-reaching impact requires clear communication and engagement of all stakeholders including patients and public. This overview on the current developments in clinical applications of gene editing will also examine the potential benefits, risks and ethical concerns in the potential adoption of CRISPR/Cas and other genome editing technologies for translational use in humans.

'Gene Editing and Public Health Ethics'
by Professor Henry T. (Hank) Greely

Abstract: Attention has been showered on some issues around gene editing, particularly human germline genome editing, as (recklessly) practiced by some. But gene editing raises many other issues and many of them are not at the level of individual patients but of broader publics. This talk will discuss three of them: human somatic cell genome editing, also known as 'gene therapy', and its implications for public health; human germline gene therapy and its (possible) implications if broadly adopted; and non-human gene editing, mainly in non-human germlines. Each raises substantial issues. This presentation will argue, against the common perception, that the most important is likely to be non-human gene editing and the least important human germline editing.

Thematic Session 4: Assisted Reproduction Technology (ART)

ART, the application of laboratory or clinical techniques to treat infertility, is not new and has benefited many individuals with fertility issues. However, as the technology continues to advance with new applications, questions arise about their ethical implications, the need to balance individual patient needs with social and moral responsibility, and the regulations required to protect the rights of individuals involved. For this session on ART, our speakers will discuss the latest ethical issues arising from ART, the impact that it has on couples and society, new research techniques, and their accompanying challenges.

‘Ethical Issues in ART: The Importance of Transgenerational Genomics’
by Professor Peter Braude

Abstract: Since its first application in 1978, in-vitro fertilisation (IVF) technology and its extensions have been the subject of vigorous ethical debate about the techniques used and the varied families created. Many of these controversial issues remain, but as we move into an era of personalised medicine, rapidly advancing genomic technologies and ease of whole genome sequencing now present us with new challenges. While the way we diagnose and treat human disease will be transformed by our improved understanding of genetics through genomics, personalised medicine is wholly about the individual tested (somatic care). This contrasts with ART where uniquely we must consider the information gleaned and treatments which affect additional individuals - the child and subsequent generations - Transgenerational Genomics. We need to transform our ART thinking from solely about achieving a pregnancy for the couple as our measure of success, and deal also with the ramifications and ethical implications of genomic technology for the individual as well as the extended family: for example, preconception genetic testing to enhance reproductive choice, the loss of donor anonymity with direct-to-consumer genomic testing, wider use of preimplantation testing of the embryo, germline genome editing, mitochondrial replacement technology, and post-conception whole genome sequencing of newborns.

‘The Next Reproductive Revolution’
by Professor Glenn Cohen

Abstract: This presentation will discuss emerging legal and ethical issues with three new reproductive technologies: uterus transplants, mitochondrial replacement techniques, and in vitro gametogenesis.

‘Clinical Ethics of ART’
by Associate Professor Mahesh Choolani

Abstract: Ethics surrounding assisted reproduction has been complex, contentious, and controversial from its inception. A tiny, 400-word letter to the Editor of the Lancet in 1978 shook the world by storm when Louise Brown was born. The role of ART within mainstream gynaecology remained tenuous for decades, and only recently gained its rightful place as the bulwark against childless families. It had many detractors, but science and dogged determination has brought IVF into routine clinical practice. Now, we are staring into the face of IVF 2.0; IVF on steroids; IVF made more precise by the use of modern genetics and genomics technologies such as pre-implantation genetic testing (PGT). This testing can be used of chromosomal structural rearrangements, for Mendelian disorders, or for aneuploidy (PGT-A) in general. And here, the debates begin again. The common sense case for PGT-A is undeniable: the science says it’s unreliable. The presentation will discuss the state-of-the-art of the science and related ethical issues behind this herculean technology that could be the next quantum leap for medically-assisted reproduction.

‘ART Through a Public Health Lens’
by Adjunct Associate Professor Bernadette Richards

Abstract: Fertility, reproduction and family are ordinarily characterised as deeply personal matters linked to personal choice, identity and individual preferences. There is, however, a conceptual shift once an individual (or couple) is found to be infertile and seek assisted reproductive treatment. At this point they are subject to scrutiny and there are established frameworks around available treatments as well as access to, and scope of, treatment. The rationale underpinning this framework is complex and in part, informed by public health ethics. This presentation will provide a brief overview of potential public health ethics challenges arising out of assisted reproductive treatment with an emphasis on emerging issues arising out of increasingly complex interventions.

AWARD RECIPIENTS

Special Partnership Award

Dr Tony Tan Keng Yam
Former President of the Republic of Singapore
Honorary Patron and Distinguished Senior Fellow,
Singapore Management University

15 Year Service Award

Mr Richard Magnus
Chief District Judge (Ret.)
Chairman, Public Transport Council (PTC)

Emeritus Professor Lim Pin
Emeritus Consultant,
Division of Endocrinology, National University Hospital
Professor of Medicine, National University of Singapore

Mr Charles Lim Aeng Cheng
Principal Senior State Counsel,
Legislation Division, Attorney-General's Chambers

10 Year Service Award

Professor Patrick Tan Boon Ooi
Cancer and Stem Cell Biology Programme, Duke-NUS Medical School
Executive Director, Genome Institute of Singapore
Director, SingHealth Duke-NUS Institute of Precision Medicine (PRISM)

Professor Kon Oi Lian
Adjunct Professor, Duke-NUS Medical School

Associate Professor Chin Jing Jih
Chairman, Medical Board, Tan Tock Seng Hospital
Senior Consultant, Department of Geriatric Medicine
Director, Institute of Geriatrics and Active Ageing

Mr Gregory Vijayendran
Equity Partner, Rajah and Tann Singapore LLP
President, The Law Society of Singapore

Associate Professor Lim Tit Meng
Chief Executive, Science Centre Board

Professor K Satkunanantham
Chairman, Health Sciences Authority
Professor, Department of Orthopaedic Surgery,
Yong Loo Lin School of Medicine, National University of Singapore
Emeritus Consultant, University Orthopaedics,
Hand & Reconstructive Microsurgery Cluster,
National University Health System

Professor Alastair V. Campbell
Visiting Professor in Medical Ethics and Emeritus Director,
Centre for Biomedical Ethics, Yong Loo Lin School of Medicine,
National University of Singapore

Professor Lee Eng Hin
Emeritus Consultant,
Division of Paediatric Orthopaedic Surgery,
Department of Orthopaedic Surgery, National University Hospital

Dr Nazirudin Bin Mohd Nasir
Mufti, Office of the Mufti,
Islamic Religious Council of Singapore (MUIS)

5 Year Service Award

Ms Joanne Chang Ai-Lien
Health and Science Editor, The Straits Times

Professor Tan Sor Hoon
Professor of Philosophy, School of Social Sciences,
Singapore Management University

Professor Vineeta Sinha
Head, Department of Sociology,
Faculty of Arts and Social Sciences, National University of Singapore

Associate Professor Nuyen Anh Tuan
Associate Professor, Department of Philosophy,
Faculty of Arts and Social Sciences, National University of Singapore

Mr Han Fook Kwang
Editor, The Straits Times
Senior Fellow, S. Rajaratnam School of International Studies

Professor Ng Soon Chye
Director, O&G Partners Fertility Centre, Gleneagles Hospital
Medical Director, Sincere IVF Center, Novena Specialist Center

Professor Tan Chorh Chuan
Chief Health Scientist and Executive Director,
Office for Healthcare Transformation, Ministry of Health, Singapore

Associate Professor Terry Kaan Sheung Hung
Associate Professor, Faculty of Law,
The University of Hong Kong

Posthumous Acknowledgement
Late Associate Professor John Elliott
Department of Social Work and Psychology,
National University of Singapore

BAC Appreciation Award

Associate Professor Roy Jospeh
Emeritus Consultant, Department of Neonatology,
Khoo Teck Puat – National University Children's Medical Institute,
National University Hospital

Dr Mary Ann Tsao
Chairman & Founding Director, Tsao Foundation
Vice Chairwoman, Tsao Holdings

Mr Alfian Yasrif Bin Kuchit
Ad-hoc president, Syariah Court

Associate Professor Ngiam Tee Liang
Head, Department of Social Work, Faculty of Arts and Social Sciences,
National University of Singapore

Professor Yap Hui Kim
Head & Senior Consultant, Division of Paediatric Nephrology,
Dialysis and Renal Transplantation, National University Hospital
Professor, Department of Paediatrics, Yong Loo Lin School of Medicine,
National University of Singapore
(Research Specialty: Renal Immunology and Genetics)

Emeritus Professor Eddie Kuo Chen-Yu
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Wee Kim Wee School of Communication and Information,
National Technological University

Emeritus Professor Lee Hin Peng
Saw Swee Hock School of Public Health,
National University of Singapore

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Chairman, Maritime and Port Authority of Singapore
Chairman, Mediacorp Board
Board Member, Inland Revenue Authority of Singapore

Mr Ahmad Khalis Bin Abdul Ghani
Member of Parliament, Hong Kah Group Representation Constituency

BAC Appreciation Award

Professor Edison Liu
Executive Director, Genome Institute of Singapore

Mr Cheong Yip Seng
Editorial Advisor and former Editor-in-Chief, Singapore Press Holdings

Mr Zainul Abidin Rasheed
Singapore's ambassador to the State of Kuwait (non-resident) and the
Special Envoy of the Minister for Foreign Affairs to the Middle East

Professor Ong Yong Yau
Emeritus Consultant, Singapore General Hospital

Mr Jeffrey Chan Wah Teck
Part-time Principal Senior Consultant, JLC Advisors
Adjunct Professor, Law Faculty of NUS

Ms Lim Soo Hoon
Senior Fellow, Civil Service College Chairman,
Accounting and Corporate Regulatory Authority (ACRA) Board

Associate Professor David Chan Kum Wah
Department of Philosophy, National University of Singapore

Posthumous Acknowledgement
Late Professor Louis Lim
Executive Director, Biomedical Research Council,
Agency for Science, Technology and Research

GALLERY

DISCOVER

Learn more about bioethics through our videos.

Bioethics Today

In this video, we explore how bioethics impacts our daily lives and BAC's role in protecting people's rights as individuals, while allowing the biomedical sciences to develop and realise their full potential for the benefit of humankind.
http://bit.ly/BACMV1

Bioethics and Us

Hear from Professor Lee Eng Hin, Professor Patrick Tan and Professor Vineeta Sinha as they share stories from BAC's past and present work to inspire and empower the future generation of Singaporeans on the importance of bioethics.
http://bit.ly/BACMV2

Topic Introduction Video

In this video, we explore Gene Editing, Big Data and Artificial Intelligence and Assisted Reproduction Technology. Find out more about these topics surrounding bioethics at the BAC's 20th Anniversary Virtual Public Conference.
http://bit.ly/BACMV3

ACKNOWLEDGEMENT

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