INTRODUCTION

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1 Few would deny the dynamism in medicine and science as governments around the world increasingly rely on technological measures to address a wide range of challenges, whether economic, social or environmental. In June 2000, the Singapore government identified the biomedical sciences cluster as one of the key pillars of Singapore's economy, alongside electronics, engineering and chemicals.[1] By the end of that year, the Bioethics Advisory Committee ("BAC") was established to provide the Government with recommendations on the ethical, legal and social implications of biomedical research. Important advances in areas such as stem cell research and genomics will continue to (re)define biomedical sciences in the years to follow.[2]

2 Less apparent are the ethical and regulatory norms and structures that have enabled and arguably shaped this dynamism. Since its establishment, the BAC and the Ministry of Health ("MOH") have put in place an intricate system of governance for human biomedical research. This has been a formidable task as the system must not only be suitable for and responsive to local conditions and requirements, it must also be consistent with international norms.[3] An objective of this special

1 Agency for Science Technology and Research, "The Biomedical Sciences Initiative" at <http://www.a-star.edu.sg/AboutASTAR/BiomedicalResearchCouncil/BMSInitiative/tabid/108/Default.aspx> (accessed 30 October 2010).

2 For a discussion on the impact of international norms on genetics and stem cell research, see Bartha Maria Knoppers, Emily Kirby & Rosario Isasi, "Genetics and Stem Cell Research: Models of International Policy-making" in *Bioethics in Singapore: The Ethical Microcosm* (John M Elliott, W Calvin Ho & Sylvia S N Lim eds) (Singapore: World Scientific, 2010) at pp 133–163.

3 International norms have been important in influencing the development of national policies and in fostering international collaborations. See Bartha Maria Knoppers, "Biobanking: International Norms" Journal of Law, Medicine & Ethics 2005; 33(1): 7–14. See also Bartha Maria Knoppers, Ma'n H Abdul-Rahman &

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issue is to consider the ways in which the law has contributed to the governance of human biomedical research. Indeed, the contributors to this special issue best illustrate this point.

3 This introduction is not intended to be a comprehensive summary, but serves to highlight the legal contributions to a number of key features of the regulatory framework for human biomedical research that have emerged – both international and local. Some of the articles in this special issue are revised versions of the papers presented at the 8th Global Summit of National Bioethics Advisory Bodies[4] and at the 10th World Congress of Bioethics, both held in 2010. This also included the symposium: "Ethical Considerations in the Legal Construction of Life, Death and the Commercialisation of Biomedical Research" sponsored by the Singapore Academy of Law ("SAL").[5]

4 We begin with a paper by Professor Alex Capron, who was appointed by US President Bill Clinton to the US National Bioethics Advisory Committee, and was also the Director of Ethics, Trade, Human Rights and Health Law at the World Health Organization ("WHO") in Geneva. Professor Capron indicates that the US has taken the lead among nations in adopting a system of ethical review conducted by committees known as institutional review boards ("IRBs"). The "Common Rule" implemented by the Office for Human Research Protections ("OHRP") specifies the requirements for the establishment of the IRBs, their operation and the standards for decisions on research protocols and for overseeing ongoing research. More importantly, all research or whose staff collaborates on such research must have obtained a "Federal Wide Assurance" ("FWA").

5 Professor Capron highlights that the present rules are a product of human action and of politics, law and bureaucracy, rather than of a rational scientifically directed process. There is as such "nothing magical" about the US regulatory approach, although this system has been influential in a number of jurisdictions. Even if influential,

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Karine Bédard, "Genomic Databases and International Collaboration" (2007) 18 King's Law Journal 291.

4 The 8th Global Summit was held on 26 and 27 July 2010, at Suntec Singapore International Convention and Exhibition Centre. It was jointly organised by Singapore's Bioethics Advisory Committee and the Ministry of Health, and supported by the World Health Organization ("WHO") and the European Commission.

5 The 10th World Congress of Bioethics was held from 28 to 31 July 2010, also at Suntec Singapore International Convention and Exhibition Centre. It was organised under the auspices of the International Association of Bioethics and principally hosted by Singapore's Bioethics Advisory Committee. The Symposium that was sponsored by the Singapore Academy of Law was held in the afternoon of 28 July 2010.

US practices and requirements cannot constitute global norms because the regulatory reach of the OHRP is limited and the current regime reflects conditions and concerns that are unique to the US. It is also the responsibility of the government of each country to ensure that research conducted within its jurisdiction is ethical.

6 Professor Capron argues that some means of common governance is needed to ensure that there will not be a "race to the bottom". All countries should have and enforce basic standards of research ethics and accountability for sponsors and investigators.[6] Governance includes less formal means of directing action or regulating behaviour, not necessarily through law. International arrangements can take four forms: formal or informal at either a governmental or non-governmental level. Professor Capron considers a possible arrangement is for governments to agree on a common framework that would set enforceable standards and then proceed to develop a system akin to the WHO's International Health Regulations – with enforceable obligations and defined decision-makers.[7]

7 The contribution of Justice Michael Kirby to the common law during his time on the bench of the High Court of Australia needs no elaboration. His paper in this special issue makes clear his lasting contribution to international law as well. Justice Michael Kirby recounts his personal experience as Chair of the drafting group of the International Bioethics Committee of the United Nations Educational, Scientific and Cultural Organization ("UNESCO") – responsible for drafting the Universal Declaration on Bioethics and Human Rights adopted on 19 October 2005 at the 33rd Session of the General Conference of UNESCO by representatives from 191 countries. It was the first international document to provide a comprehensive link between human rights and bioethics. UNESCO has for some time assumed the role of a normative body for bioethics, with arguably, a more general remit than the WHO, which is more focused on medical concerns. Hence, Justice Kirby identifies as perhaps one of the most innovative provisions in the Declaration, the broadening of international public discourse on bioethics from a largely medical outlook to one that encompasses all living beings and the biosphere. The introduction of a human rights framework, however, is not without

6 Adriana Petryna, *When Experiments Travel: Clinical Trials and the Global Search for Human Subjects* (Princeton and Oxford: Princeton University Press, 2009) at p 189: in ailing health-care systems of Poland and Brazil, resources-strapped administrators and researchers find the possibility of introducing clinical trials to be attractive.

7 WHO, *International Health Regulations* (Geneva: WHO, 2005, Reprinted 2008).

its fair share of criticisms.[8] While there is likely to be little controversy that human rights are important to any society as ideals, the political implications that arise from their invocation has proven to be extremely contentious. Yet, however imperfect this framework may be, it is likely – similar to the Universal Declaration of Human Rights – to have a profound impact.

8 Drawing on UNESCO's Universal Declaration, Professor Roger Brownsword sets out a "bioethical triangle" which maps out a bioethical ideological space, comprising the ethical discourses of consequentialism, a duty-based notion of human dignity and a rights-based notion of human dignity as the principal conceptual constraints. This has the effect of recasting and expanding the scope of biolaw and bioethics, previously shaped by the shifting sands of utilitarian and paternalistic ethics.

9 Within this triangular space, he points out the limits of deliberative democracy. While capable of securing some level of legitimacy for issues that are in the nature of "prudential pluralism" and closed "ethical pluralism" (a situation where there is some level of consensus over baseline principles or values), deliberative democracy has more difficulty in securing legitimacy in "ethical pluralism" that is open. A response has been to rely on proceduralism, but Professor Brownsword argues that this procedural strategy will not overcome the legitimacy crisis unless each ethical constituency can be persuaded to adjust its own position reflectively in order to reach an accommodation with the others. In the context of regulatory legitimacy, therefore, regulatory actions must be judged by a diverse moral community to better serve their moral aspirations (*ie* taking their varied moral constituencies seriously) in order to gain the legitimacy of all. Hence, he observes that the ancient maxim of *divide et impera* ("divide and rule") still has a modern resonance.

10 In the context of adjudication, Supreme Court Judge, Justice Choo Han Teck gives jurisprudential recognition to the difficulty of securing an "objective" moral basis in a pluralistic moral environment. In his keynote address delivered at the SAL Symposium, Justice Choo attempts to set out two difficulties that judges encounter when having to decide bioethical cases: the difficulty or impossibility of ascertaining moral facts, and the difficulty or impossibility of ascertaining objective law. Due perhaps to the limited scope within which ethical values can be accommodated within the normative framework of law, he argues that every legal judgment must necessarily

8 R Andorno, "Global Bioethics at UNESCO: in Defence of the Universal Declaration on Bioethics and Human Rights" Journal of Medical Ethics 2007; 33(3): 150–154.

be interim and intermediate unless certain impasses which he labels as "fundamental obstacles" can be surmounted. But in order to do so, a judge is faced with the problem of an objective meta-ethical and an objective legal solution.

11 This "objectivity" in the sense of "truth" cannot be attained where the central concern of legal adjudication is confined to the construction of legal "objectivity" for the often limited purpose of administrating justice. As the ethical basis for a judge and for a bioethicist need not necessarily be convergent, the solutions that they come up with would inevitably be interim or intermediate. An interim solution is not without merit, however. As Justice Choo has indicated elsewhere:[9]

> Laws, be they custom or black-letter regulations, notional or actual, will … provide a band-aid bond until the answer is found … The truth might be out there somewhere, but until a sure path to it is found, the best that we can do in the meantime is to continue with the construction of modular structures with reason as their foundation. The provisional moral structures built on reason and proof should adequately stave off moral anarchy in the interim.

12 Also owing to the interim nature of adjudication, Justice Choo further observes that a judiciary that is sufficiently competent in moral-ethical discourses could better define its own role in addressing bioethical issues as opposed to the legislature.

13 In an instructive review of law-making activities in the past decade, Parliamentary Counsel and BAC member Mr Charles Lim sets out six areas relating to health and biomedicine that received legislative attention. While many of the developments are concerned with safeguarding the welfare of patients, a number of these are directed at biomedical research. At the turn of the century, the Traditional Chinese Medicine Practitioners Board was established under a legislative framework put in place to regulate the practice of Traditional Chinese Medicine ("TCM"). This regime effectively puts the notion of "patient" in TCM on par with that in Western Medicine.[10] The regulatory regime for the medical profession has itself undergone a number of changes, including legislative provision for a legally trained person to sit as one of

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9 Choo Han Teck, *Law and Morality in the Age of Bioscience* (Singapore: Marshall Cavendish Academic, 2007) at p 112.

10 As Professor Paul Unschuld observes: "Chinese medicine of today is characterized by a plurality of concepts and practical approaches … [that] … mirrors the multiplicity of ideological tendencies in Chinese society itself". Paul U Unschuld, *Medicine in China: A History of Ideas* (Berkeley and Los Angeles: University of California Press, 2010) at p 260. This new regulatory approach is likely to further align the therapeutic goals and practices of Traditional Chinese Medicine in Singapore with those of scientific medicine, which continues to set the standard.

the members of the Disciplinary Committee of the Singapore Medical Council.

14 Both international norms and high profile local developments have contributed to legislative changes that now enable the provision of "comprehensive reimbursement" to organ donors, although with harsher penalties against organ traders and brokers. There is due concern that allowing payment to be made to organ donors could be a backdoor to organ trading, and developments in Singapore will undoubtedly be closely observed by the international community. Experience with Severe Acute Respiratory Syndrome and avian flu have contributed to the curtailment of the patient's individual liberty in the public interest through amendments to the Infectious Diseases Act,[11] whereas the Mental Capacity Act has empowered patient autonomy in other situations.[12] Consequently, the notion of the "patient" has undergone significant legal reconstruction in the past decade.

15 In the area of biomedical research, the recommendations of the BAC have contributed to two new sets of legislative provisions. The first prohibits human reproductive cloning and creates a broad regulatory framework for human embryonic stem cell and embryo research.[13] The second set of provisions is essentially directed at setting the disclosure of medical information to national disease registries on a firm legal basis.[14] Aside from these, legislation has been introduced to address concerns over biosafety. All of these changes are consistent with international norms, although they also bear characteristics that reflect local conditions and requirements. These changes have also shaped the ways in which "life" and "death" are understood.

16 Associate Professor Terry Kaan[15] provides an illustration of the way in which the legal notion of the beginning of life has had a profound impact on human embryonic stem cell research. His historical analysis shows that since the early notion of "life" in the common law doctrine of *en ventre sa mere*, a foetus in the womb was not a creature in

11 Cap 137, 2003 Rev Ed.

12 Cap 177A, 2010 Rev Ed.

13 See Recommendations 7 and 10 of the Bioethics Advisory Committee's report, *Ethical, Legal and Social Issues in Human Stem Cell Research, Reproductive and Therapeutic Cloning* (Singapore: Bioethics Advisory Committee, June 2002) at p viii. This report was produced by the BAC's Human Stem Cell Research Subcommittee, which was chaired by the former head of the Subordinate Courts, Senior District Judge (retired) Mr Richard Magnus.

14 This legislative change was made following Recommendation 7 of the Bioethics Advisory Committee's report, *Personal Information in Biomedical Research* (Singapore: Bioethics Advisory Committee, May 2007) at p 7.

15 Associate Professor Kaan was a member of the Bioethics Advisory Committee and was Chair of its Human Genetics Subcommittee, which was responsible for four of the Bioethics Advisory Committee's reports.

rerum natura until it was born. This essential point was retained in the codification of the Singapore Penal Code[16] and was unaltered by the Termination of Pregnancy Act.[17] On this basis, an unimplanted embryo *in vitro* would even less likely be regarded as a living human being, even if it has the potential of developing into one. However, this legal notion directly contradicts notions in some religions of when human life begins. Drawing on the public feedback that was conducted by the BAC on this issue, Associate Professor Kaan observes that there is no agreement among the different main religious groups in Singapore as to when human life begins. Whereas human life is taken to begin from the time of conception in some Christian faiths (under the immediate hominisation doctrine), such a view is not uniformly shared in either the Islamic or Jewish faiths.

17 Reflecting on the recommendations of the BAC, Associate Professor Kaan considers its moderate position of attributing the human embryo with a special status to be unhelpful. He argues that as the implantation of research embryos into a womb is already completely prohibited, it was no longer necessary for the BAC to proffer an arbitrary conceptual definition that a human embryo acquires a special status after the 14-day mark, and hence cannot be used in research. Associate Professor Kaan reasons that the BAC could have simply relied on the legal notion of when life begins, given that in a constitutionally secular society, it would probably not be relevant or appropriate for the law to engage or take part in any metaphysical enquiry such as on the moment of ensoulment. Associate Professor Kaan's view provides an interesting contrast to those of Professor Brownsword and Justice Choo.

18 In Japan, Professor Ryuichi Ida indicates that the human embryo has similarly been accorded a special status as the "germ of human life".[18] Consequently, the creation of an embryo was only permitted for the purposes of fertility treatment, but not solely for research. However, surplus embryos from infertility treatment may be used in research provided that proper consent has been obtained. Interestingly, embryos may also be imported into Japan for research from countries that permit the deliberate creation of human embryos for research, as these embryos would have different cultural significance attached to them. Also instructive is Japan's phased-progressive approach to regulating stem cell research. For nearly a decade, therapeutic cloning has not been permitted. However, this prohibition

16 Cap 224, 2008 Rev Ed.

17 Cap 324, 1985 Rev Ed.

18 Professor Ida is a member of the Expert Panel on Bioethics of the Council for Science and Technology Policy in the Cabinet Office of Japan, and was the Chairperson of the International Bioethics Committee of the United Nations Educational, Scientific and Cultural Organization ("UNESCO").

has recently been lifted as regulatory familiarity has been acquired over the years and with greater clarity in the research objectives. In recent years, Japanese stem cell regulations and policies have expanded in scope and detail. These changes arose in part to address the recent scientific breakthrough in induced pluripotent stem cell technology, which was spearheaded by researchers from Kyoto University. This technological development enables an adult cell to acquire pluripotency, and much ongoing research relates to the comparison of its efficacy with pluripotent cells derived from an embryo.[19] Aside from this, regulatory changes have also arisen in anticipation of the application of stem cell technology in therapy.[20]

19 With increased focus on harnessing the therapeutic potential of embryonic stem cell research, the issue of immoral patents inevitably arises. Associate Professor Elizabeth Ng highlights the disagreement over whether certain biotechnological inventions could be excluded from patent applications on the basis that they are immoral or on other grounds of public interest. Under the regulations issued under the European Patent Convention, processes for cloning human beings and the uses of human embryos for industrial or commercial purposes are some of the specific exclusions set out as unpatentable on the grounds of morality or *ordre public*. In contrast, there are no similar exclusions in the US, so that purified and isolated stem cells are considered to be patentable subject matter by the US Patent and Trademark Office ("USPTO"). Associate Professor Ng considers the patent regime to be ill-equipped to deal with issues relating to the "patenting of life" as they were not envisaged in its design. She proposes that the Parliament serves as the "custodian of public values" by delineating the inventions that should be unpatentable on the basis of *ordre public*.

20 Death and dying are no less important than conception and birth in biomedical law and ethics. Senior Counsel Mr Jeffrey Chan's discussion on the framework for living wills or advance medical directives and burial concerns are important considerations in this regard. From the standpoint of a broad assessment of social cost, Mr Chan SC[21] argues that there is a need to introduce means by which

19 Athony Rosenzweig, "Illuminating the Potential of Pluripotent Stem Cells" New England Journal of Medicine 2010; 363(15): 1471–1472; Alessandra Moretti *et al*, "Patient-Specific Induced Pluripotent Stem-Cell Models for Long-QT Syndrome" New England Journal of Medicine 2010; 363(15): 1397–1409.

20 Geron Corporation recently announced what is believed to be the first clinical trial using embryonic stem cells to treat spinal cord injury after it has secured approval from the Food and Drug Administration in the US. Lux Fatimathas, "Human trial to use stem cells to treat spinal cord injury" BioNews (18 October 2010) at <http://www.bionews.org.uk/page_73004.asp> (accessed 30 October 2010).

21 Mr Chan SC was a former member of the Bioethics Advisory Committee, and is the President of the Medico-Legal Society of Singapore.

the currency of living wills could be ascertained. He further highlights adverse cost implications that could arise from ambiguity in the legal status of the tissue and body of a deceased person. Their disposal could be made more complex by religious concerns, a point also noted by the BAC in its report in relation to the use of legacy tissue in research.[22] As Mr Chan SC observes, a legislative response may be the most expedient way forward.

21 Since the establishment of the BAC, an elaborate framework on research ethics governance has emerged in Singapore. Assistant Professor Tracey Evans Chan provides a useful overview of the regulatory framework for human biomedical research in Singapore, comprising an intricate mix of ethical guidelines and regulatory requirements. He observes that this framework, like those in other jurisdictions, is faced with competing goals of protecting human participants and enabling progress in research. On the MOH's style of governance, Assistant Professor Chan proposes some calibration to promote "virtuous learning loops" since the current system of governance only provides for the blunt options of a fine or imprisonment in respect of individual actors. There are no specifically tailored responses in respect of institutional lapses, which could include the power to suspend research activities, restrict or ban individuals or institutions from applying or receiving research funds, and order an appropriate enforcement pyramid calibrated to suit the lapse or breach in question.

22 Evaluating the MOH's light-touch approach based on risk, Assistant Professor Chan identifies the regulatory philosophy to be responsive in nature, entrusting institutions with primary responsibility for decision-making and monitoring of research. This regulatory approach is premised on the assumptions that an IRB could be truly independent of institutional concerns, and that there is shared commitment as to the ideals of good science, and on the capacity of research subjects to decline participation. Calling into question the strength of these assumptions, the need to strengthen the independence of IRBs becomes evident, such as through arrangements recently put in place for the Transplant Ethics Committee, including statutory immunity for individual IRB members. In addition, he considers there to be a need to supplement the "minimal risk" definition adopted from the US Common Rule with a list of minimal risk research activities. Special provisions will have to be made for certain categories of research subjects, such as children and the incompetent, as a higher benchmark for risk assessment is likely to be required.

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22 Bioethics Advisory Committee, *Human Tissue Research* (Singapore: Bioethics Advisory Committee, November 2002) at pp 28–29, paras 9.1–9.6, and p 35, para 13.1.7.

23 Reflecting on the framework on research ethics governance, Mr Calvin Ho proposes a similarly structured approach to define and secure integrity in scientific research. Drawing from experiences in the US and the UK, he observes that the ethical and regulatory goals of research ethics do not necessarily converge with those of research integrity. Significant changes to the external environment and internal conditions from which scientific work is generated necessitate the *raison d'être* of ethical and regulatory expectations to be clearly set out. This clarity will in turn better enable a stable policy environment that is required for scientific progress. As with Assistant Professor Chan, Mr Ho indicates the need for an overarching statutory backing for a framework on research ethics and research integrity.

24 The papers in this special issue provide an instructive overview of the rich and vibrant landscape of biomedical law and ethics in Singapore and beyond. As the contributors make clear, the law does not necessarily lag behind medicine and science, but is very much a key co-producer of developments in the biomedical sciences.[23] Contributors to this special issue also demonstrate a growing trend in legal scholarship that reflects, as Professor Annelise Riles observes, the blurring of traditional distinction between the notions of law as a coercive system of social control and that of non-state based normative orders.[24] Important changes have arisen in Singapore since the implementation of the Biomedical Sciences Initiative, and more developments will follow given the strong and sustained investments in the biomedical sciences around the world. A further value of this special issue is the insights of the contributors on the ways in which ethically and legally responsible developments should or are likely to arise.

25 We conclude with a note of gratitude to Justice Chao Hick Tin JA and the other members of the Publications Committee of the Singapore Academy of Law Journal for their receptiveness to this special issue. In addition, we are further indebted to the contributors for generously sharing their knowledge and experiences, as well as to Ms Eileen Khoo, Ms Sandra Tan and to their colleagues at the Singapore Academy of Law for their professionalism, as well as unfaltering patience and assistance in editing this issue.

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23 *States of Knowledge: The Co-Production of Science and Social Order* (Sheila Jasanoff ed) (New York and London: Routledge, 2004).

24 Annelise Riles, "Comparative Law and Socio-Legal Studies" in *The Oxford Handbook of Comparative Law* (Mathias Reimann & Reinhard Zimmermann eds) (Oxford and New York: Oxford University Press, 2006) pp 775–813 at pp 800–801.