Established in tandem with Singapore's national Biomedical Sciences Initiatives, the Bioethics Advisory Committee (BAC) was established by the Singapore Cabinet in December 2000 to examine the potential ethical, legal, and social issues arising from Singapore's biomedical research sector, and to recommend policy to Singapore's government. BAC's deliberations on embryonic stem cell research helped shape the government policies that helped Singapore pursue its goal of becoming one of the biggest investors of embryonic stem cell research in the early twenty-first century.

At the turn of the twenty-first century Singapore's government, under Prime Minister Goh Chok Tong, decided to develop the city-state into an international focal point of biomedical research. The government planned to expand Singapore's economy through science industries by funding public, university, and private research institutions. One biomedical endeavor the government sought to fund was embryonic stem cell (ESC) research. ESC was one of the topics on which the BAC deliberated.

By 2000, several countries had declared their stances on the legality of conducting and funding embryonic stem cell research, many with the aid of institutional bioethics boards. Prior to 2000, no formal bioethics review board or guidelines existed at Singapore's national level. The government decided that the work of its local scientists must adhere to clear, ethical standards. The government created the Bioethics Advisory Committee to define these ethical standards and to formulate policies that supported the values of Singapore's citizens.

The Bioethics Advisory Committee consisted of thirteen members who contribute expertise from many professions including law, medicine, politics, journalism, and university research. Lim Pin, endocrinology researcher, became the first chairperson of the BAC, which Pin from December 2000 until March 2010. Pin also became the president of the National University of Singapore in 2001.

Over time, the BAC formed several topic-specific subcommittees. For example, the Human Genetics Subcommittee was created in 2001 and the Subcommittee on Research Involving Human Participants was created in 2007. The International Panel of Experts (IPE) was created in 2001 and continues to assist BAC in forming recommendations that align with international policies. The IPE is composed of bioethicists from places like the UK, Canada, and the US.

Whenever the deliberations of BAC and all of its subcommittees are finalized, they send their recommendations to the Agency for Science, Technology and Research (A*STAR). A*STAR is Singapore's lead government agency that connects scientific research to economic policies. A*STAR is one of Singapore's statutory boards, which have been given autonomy by the Singapore Government. Politicians may not serve on statutory boards, a policy that provides independence for the scientific professionals in charge of A*STAR. While the BAC has no
legislative powers, the relationship between the BAC, A*STAR, and the Singapore Cabinet results in the implementation of many recommended policies.

In December 2000, BAC began to examine embryonic stem cell research. This examination established the framework by which BAC addressed subsequent bioethical issues. First, the group sought to identify challenges that would likely arise while coming to a consensus among its members that satisfied what it considered as Singapore's religiously diverse citizens, progressive researchers, cautious regulators, and the international community. BAC planned to work closely with the International Panel of Experts to ensure that Singapore's biomedical policies aligned with international standards. However, BAC argued that Singapore's culture differs from those of many Western nations, and the committee members said that Singapore's policies should fit within Singapore's particular value system.

BAC stated that an important part of Singapore's value system is how citizens view themselves within a larger system of social relationships and roles. According to national surveys conducted over the past decade, citizens of Singapore strongly trust their government officials. Similarly, the government supports the autonomous decisions of industry and of academia.

Over the course of their first meetings, BAC outlined five guiding, ethical principles with which all of their policy recommendations must align. These principles are: justice, sustainability, respect for individuals, reciprocity, and proportionality. The principles of justice and proportionality meant that views deriving from all backgrounds would be heard and considered. The principle of sustainability indicated BAC's role as an adjudicator of opposing views, and the BAC sought to obtain consensuses.

Although there is less controversy over embryonic stem cells in Singapore than in much of the Western world, the city-state is composed of a diverse population holding diverse views. Citizens come from Chinese, Indian, Malayan, and Eurasian backgrounds and practice Buddhism, Islam, Christianity, Taoism, Hinduism, or have no religious affiliation. Of the mentioned religions, individuals who associate with Christianity, who are approximately eighteen percent of Singaporeans, were most likely to oppose embryonic stem cell research when they said that human life begins at conception and must be preserved from conception onwards. Apart from Christianity, the other religions take one of two general stances. They either officially support stem cell research, or take no official stance regarding the potential immorality of using embryos for research. The BAC professed to provide accurate and accessible information to Singaporeans as well as to learn from their different religious perspectives.

Assisted by Reaching Everyone for Active Citizenry at Home (REACH), BAC sought input from the public during the stem cell research deliberations, which took place from the beginning of 2001 until June 2002. REACH is a government organization that encourages citizens to participate in public policy matters and gauges public support for governmental projects. BAC also sought input from researchers. Researchers in Singapore had conducted in vitro fertilization related embryo research for decades prior to 2001. BAC interviewed scientists and sociologists about their current stem cell research and asked about the effects potential stem cell regulations would have on their research.

In November 2001 BAC sent a draft of the "Consultation Paper on Human Stem Cell Research" to thirty-nine religious and professional groups across Singapore. BAC received
twenty written responses and eventually met with all of the thirty-nine groups. Additionally, three focus group sessions with approximately forty participants from various ethnic, religious, and professional backgrounds were held. The government-owned media in Singapore publicized the Bioethics Advisory Committee’s activities, and reported on all discussion sessions and all drafts of BAC’s reports, which they posted online for open comments. In the past twelve years there have been over 220 reports on BAC in Singapore’s newspapers.

On 21 June 2002 BAC published the final version of "Ethical, Legal and Social Issues in Human Stem Cell Research, Reproductive and Therapeutic Cloning." The report recommended that embryos less that fourteen-days old could be used for research purposes. BAC recommended that the derivation of stem cells\[14\] from in vitro fertilization\[13\] and non-reproductive cloning\[15\] technologies would be permitted by Singapore legislation. BAC also supported the use of embryos created solely for research purposes, but only if there was what it deemed as strong scientific reason to do so. BAC called for the creation of a regulatory committee to approve and oversee all research using embryonic stem cells\[5\] in Singapore. In July 2002 Deputy Prime Minister Tony Tan announced the government’s acceptance of BAC’s report, which remains the nation’s guidelines for embryonic stem cell research\[3\] as of 2014.

Within one year of this announcement, the government spent more than 500 million Singapore dollars on Biopolis, located in One-North in Buona Vissta, near the National University of Singapore. The New York Times describes Biopolis as a biomedical research haven that attracts biomedical scientists from around the world. Several US cancer researchers moved to Singapore to conduct research after US President George W. Bush\[16\] announced that US federal funds for embryonic stem cell research\[3\] were only permitted for stem cell lines created before 9 August 2001. Alan Colman, who helped clone Dolly the sheep\[17\] in 1996, and David Lane, who helped discover a protein that suppresses some tumors, relocated their research programs from Edinburgh, UK, and from the University of Dundee, Scotland, respectively, to Singapore.

As of February 2014, Singapore’s Bioethics Advisory Committee had published a total of nine consultation papers, seven reports, and several books and articles about issues such as human egg\[18\] donations, chimeras\[19\], and genetic research. While the committee’s membership periodically changes, the BAC’s mission has persisted. Framed within the city-state’s sociopolitical context, the deliberations of Singapore’s Bioethics Advisory Committee provide an example of how a board that mediates between scientists, government, and business can address biomedical policies.

**Sources**

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