

Cross-Cultural Biotechnology

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ROWMAN & LITTLEFIELD PUBLISHERS, INC.
Lanham • Boulder • New York • Toronto • Oxford

ROWMAN & LITTLEFIELD PUBLISHERS, INC.

Published in the United States of America
by Rowman & Littlefield Publishers, Inc.
A wholly owned subsidiary of The Rowman & Littlefield Publishing Group, Inc.
4501 Forbes Boulevard, Suite 200, Lanham, Maryland 20706
www.rowmanlittlefield.com

PO Box 317
Oxford
OX2 9RU, UK

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British Library Cataloguing in Publication Information Available

Library of Congress Cataloging-in-Publication Data

Cross-cultural biotechnology / edited by Micheal C. Brannigan.
p. cm.

Includes bibliographical references and index.

ISBN 0-7425-3266-6 (hardcover : alk. paper) — ISBN 0-7425-3267-4

(pbk. : alk. paper)

1. Biotechnology—Cross-cultural studies. I. Brannigan, Michael C., 1948-
TP248.23.C76 2004
660.6—dc22

2004003350

Printed in the United States of America

™ The paper used in this publication meets the minimum requirements of
American National Standard for Information Sciences—Permanence of Paper
for Printed Library Materials, ANSI/NISO Z39.48-1992.

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Why Is This Gene Different from All Other Genes? The Jewish Approach to Biotechnology

Edward Reichman

The opinions expressed herein represent those of the Orthodox Jewish tradition. While the voice of Orthodox Judaism is not monolithic and, indeed, a plurality of approaches, within accepted boundaries, is the norm, one can nevertheless distill immutable principles and values deriving from the Bible, Talmud, and legal codes, which inform the discussion and guide the decisions of rabbinic authorities. Debate and nuanced textual interpretation are the hallmarks of Jewish legal discourse, and this chapter provides a glimpse, albeit limited, into these processes. This chapter is intended solely for educational purposes and not for legal extrapolation. Each individual case in Jewish law should be presented to a rabbinic authority for adjudication.

JEWISH LAW AND APPROACHES TO MODERN BIOTECHNOLOGY

For Jewish law, the starting point is the Bible, or Torah, which was given directly from God to Moses and the Jewish people at Mount Sinai. But the word "Torah" has a broader meaning, referring to Jewish teachings and traditions that have been passed down throughout the centuries. In the second century of the Common Era, Rabbi Judah the Prince compiled the Mishna, a collection of rabbinic teachings transmitted since the giving of the Torah. In the fifth century, the Talmud, an expansion of the Mishna, containing thousands of pages of rabbinic discourse, was completed. This work, along with its myriad of supercommentaries, still serves as a focal point of rabbinic legal discussions and is studied daily throughout the world in the halls of the Yeshiva (school for Torah study). The method of Talmudic analysis is unique and involves partners discussing or arguing over passages of text for hours

at a time. Indeed, it is common for only a few pages of Talmud to be completed in a semester's course.

In the twelfth century, Maimonides codified the law. The codification process was further developed in the sixteenth century, culminating with the authorship of the definitive code of Jewish law, known as the *Shulchan Aruch*. Rabbinic literature subsequent to this period has largely taken the form of questions and answers on specific practical issues, and this corpus has come to be known as the *responsa* literature. In approaching issues of contemporary law, and in particular Jewish medical ethics, rabbinic authorities draw upon all of the aforementioned sources.

In the story of creation, God enjoins man to "fill the land and conquer it" (Genesis 1:28). Jewish theological predisposition is not only to welcome but to aggressively pursue new technologies that improve our lives and our world. Yet, we cautiously evaluate each technology on its own legal merit to determine if its exploration or application entails violations of Torah principles. The Jewish approach is guided by the legal analysis of any issues stemming from the technology and its application. If, after careful and thorough analysis, no clear legal impediment exists to the use of the technology, then its use may be permitted. However, overarching philosophical or theological concerns, buttressed by rabbinic texts or the weight of traditional interpretation, may militate against the use of certain technologies, despite their technical, legal permissibility.

FUNDAMENTAL LEGAL PRINCIPLES

There are a number of legal principles that serve as the foundation for decisions in the field of biotechnology.

The License to Heal

Medieval commentators debated the propriety of the practice of medicine in the face of a divine decree of illness, and clearly resolved that the practice of medicine and the treatment and cure of human disease is a mandate of humanity. The Talmudic discussion about the "license" to heal has also defined the parameters of permitted medical intervention. Curative or palliative interventions clearly fall under the rubric of the medical license. Whether body-enhancing procedures are included in this category is a matter of debate. Some authorities forbid purely cosmetic procedures as their attendant risk cannot be justified as therapeutic. Others, however, allow certain cosmetic procedures that are considered psychologically therapeutic. This distinction may impact the approach to biotechnology since many interventions straddle the fence between therapeutics and enhancement.

The Sanctity of Life

Jewish law considers life to be of infinite value and zealously guards the sanctity of all human life, from birth to death, whether conscious or comatose, whether of sound mind or profoundly demented. The preservation of human life is paramount in Jewish law, and all biblical and rabbinic prohibitions (except murder, illicit sexual relations, and idolatry) are suspended to facilitate its preservation.

The Preservation of Human Life—*Pikuach Nefesh*

While saving a human life (*pikuach nefesh*) is clearly permitted and even obligatory, the license to violate Torah law for the potential or possibility of saving a life was addressed in the eighteenth century by Rabbi Yechezkel Landau. The question was posed by a family of a man in London who had succumbed to postoperative complications of bladder stone surgery. The surgeons requested an autopsy in hopes of possibly benefiting future patients presenting with the same condition. Jewish law, however, forbids the desecration of the corpse and requires immediate burial of the complete body. Rabbi Landau was asked if these laws could be suspended for the possibility of saving a life in the future. In addressing this request for a post-mortem examination, Rabbi Landau argued that the laws relating to the treatment of the corpse (immediate burial, prohibition of desecration and deriving benefit from a corpse) may only be suspended for a *choleh lifaneinu*, "an ill patient before us," but not for the theoretical possibility of future benefit. The benefit must be direct and immediate. This decision of Rabbi Landau has been widely applied in the area of Jewish medical ethics and is the focal point for discussions on when Torah law can be suspended for the possible preservation of life (*pikuach nefesh*). Limitations of its application have been debated. For example, whether one must have in mind a specific patient who will potentially benefit, or whether potential benefit for unspecified individuals is sufficient to meet the threshold, is a matter of rabbinic debate. In addition, given our advanced communication and rapid dissemination of information, some have attempted to broaden the definition of "an ill patient before us." It has been argued that, since information gleaned from an autopsy may save lives and can be immediately posted on the Internet, perhaps autopsies, or other prohibited procedures, should generally be allowed. This, however, is not the accepted interpretation.

Scientific research does not meet this threshold of *choleh lifaneinu*. Although research may ultimately lead to the cure of human disease, the benefit is neither immediate nor direct. Indeed, the majority of scientific research yields no clinical benefit. As such, one may not violate Torah law in order to perform scientific research. For example, if research on embryonic stem cells would violate Torah law, one could *not* argue that it could be permitted for

the sake of *pikuach nefesh* on the grounds of saving lives in the future as a result. To be sure, most scientific research entails no specific Torah violations whatsoever. Furthermore, according to Jewish law, the fetus in utero is not granted the status of a full human life, and its exact legal status during different embryological or developmental stages is a matter of rabbinic debate. This fact not only impacts on the legality of abortion, but also on the status of the pre-embryo and the permissibility of violating Torah law in order to preserve its existence.

LEGAL APPLICATION

Following are examples of the application of the aforementioned principles, in conjunction with the entire corpus of Jewish law, to some areas of biotechnology. This list is by no means exhaustive and is intended to provide a flavor of the approach of Jewish law to current issues in the use of biotechnology.

Abortion

While I do not wish to revisit the abortion issue here, it is important to reiterate the Jewish position on abortion inasmuch as one of the consequences of evolving prenatal genetic testing relates to the decision whether to abort the affected child. While it is true that the fetus in utero does not enjoy the full status of a human being, according to Jewish law it is nonetheless forbidden to wantonly perform abortions. The nature of the prohibition of abortion continues to be a matter of rabbinic debate, and depending on the various legal positions, abortions may be permitted in limited, extenuating circumstances.

Jewish law explicitly allows abortion for maternal indications (i.e., to save the life of the mother). This permissibility does not extend, however, to cases of abortion for subsequent use of the fetal tissue, organs, or stem cells to save another individual. There is rabbinic debate regarding abortion for fetal indications (i.e., the case of an impaired fetus). Even those in the minority who allow abortion for fetal indications generally restrict their rulings to fetal diseases that are fatal and untreatable, such as Tay-Sachs disease. If Tay-Sachs disease should one day be treatable by enzyme replacement or genetic therapy, then the legal basis for abortion in this case would no longer apply.

In the discussion on abortion, the relevance of the gestational age of the fetus has received some attention. The Talmud describes a stage of fetal development prior to forty days gestation during which the fetus has a different legal status. For example, during the times of the Temple in Jerusalem, when a woman spontaneously miscarried, she was subject to the laws of rit-

ual purity and impurity just as if she had given birth to a full-term infant. The one exception to this law was the pre-forty-day fetus. If a woman miscarried prior to forty days of gestation, no ritual impurity was generated, since the fetus at this developmental stage was considered "mere water." It is debated whether this pronouncement about the pre-forty-day fetus has relevance to the modern abortion debate. While some authorities maintain that the early developmental stage mitigates the severity of the prohibition of abortion, others see no difference between an abortion before or after forty days of gestation.

This debate may impact on the harvesting of stem cells from pre-embryos, which occurs at a stage prior to forty days of embryological development. However, the forty-day debate may be restricted solely to the fetus in utero, which is considered a "potential" life. In any case, the continued expansion of prenatal genetic testing will undoubtedly test the limits of these rulings. Whether one should allow abortions for a child bearing a gene for an adult-onset disease or a gene for disease predisposition has not received sanction from any rabbinic authority and awaits further rabbinic analysis. Preimplantation genetic diagnosis (PGD) may circumvent some of the legal issues of abortion. Nevertheless, this still has its own attendant legal issues, which will be discussed in the following section.

Assisted Reproduction

The fact that the obligation to procreate, "be fruitful and multiply," is the very first *mitzvah* (commandment) in the Torah reflects its significance in the Jewish tradition. While one is not required to use assisted reproductive procedures to fulfill this obligation, these technologies may be used on a case-by-case basis provided they do not entail Torah prohibitions. One legal obstacle that pervades all discussions of assisted reproduction is the procurement of the male reproductive seed. There is a prohibition against the wasteful emission of male reproductive seed (i.e., outside the context of natural intercourse), and this concern guides many of the rabbinic discussions on this issue. The majority opinion allows sperm procurement to treat infertility, since the ultimate objective is to produce a child and to thereby fulfill the commandment to "be fruitful and multiply." This is not deemed a wasteful emission. However, sperm procurement for the production of pre-embryos from which stem cells would be harvested for research is not allowed.

Most authorities allow any interventions, such as artificial insemination (AI) or in vitro fertilization (IVF), using the gametes of a husband and wife and consider the resulting progeny to be the couple's legal child. When introducing donor gametes, however, either sperm or egg, authorities disagree as to the permissibility. Issues such as legal adultery and bastardy, the definition of maternity in cases of a gestational host (i.e., a woman who serves

only as the gestational mother, while the egg was donated from another woman), and psychological manifestations weigh heavily in rabbinic discussions. IVF procedures invariably yield surplus embryos. This fact is not a legal impediment to the procedure, and authorities have discussed whether the surplus embryos may be discarded.

Genetic Screening and Genetic Testing

In addition to the license to heal, which applies to health-care practitioners, the patient has a reciprocal Torah obligation to seek medical care and practice preventative medicine. This principle is particularly applicable in the Jewish community to premarital genetic carrier testing. One of the first genetic diseases identified with the Jewish community was Tay-Sachs disease. Rabbis initially debated the advantages of testing, and Rabbi Moshe Feinstein, a great Talmudic sage of his generation, considered testing a moral obligation. Not being tested, he maintained, was like closing your eyes to obvious danger. One organization, Dor Yesharim, currently performs routine premarital testing for diseases such as Tay-Sachs, Canavan's, Bloom's, and cystic fibrosis. Through such testing, the incidence of Tay-Sachs disease in the Jewish community has dropped precipitously.

With the preliminary completion of the Human Genome Project, the application of genetic screening will surely continue to expand. Issues for consideration include the following: For which diseases should one screen? Which populations should be tested? And to whom do the results belong and to whom should they be divulged? Jewish law has addressed these issues, but the challenges will continue to grow with the broader application of testing.

Testing for genetic predisposition is perhaps the most vexing problem with respect to genetic testing since many questions still remain unresolved. A small percentage of Jewish women carry the BRCA1 or BRCA2 genes, which have been identified with a predisposition to breast and ovarian cancers. What percentage of these women will develop the disease and at what age, and how effective are prophylactic measures? All these questions are the subject of intense scrutiny and will affect how Jewish law approaches the issue.

One is surely obligated to take measures to prevent disease. However, if the disease cannot be prevented, one may not be obligated to obtain information about predisposition to that disease. Current medical literature indicates that prophylactic measures can prevent cancer in BRCA-positive women, but these measures vary from medications to imaging studies to radical surgeries. While one may incur a measure of risk to achieve a cure of an existing disease, what risk and how much sacrifice must one take in order to possibly prevent the onset of a disease? Prophylactic medicines and imaging studies may have only a small risk. Surgical procedures are clearly in a dif-

ferent category. On the one hand, if the surgery could prevent disease, it would be permitted, and perhaps even obligatory in Jewish law. On the other hand, if the chance of acquiring the disease is small and the risk of the procedure is high, it might be forbidden, according to Jewish law, to undergo the procedure. While other factors are involved, these decisions depend heavily on current scientific knowledge and will surely work together with the scientific advances.

Genetic Therapy

As mentioned previously, there is a firmly established mandate that humanity has the license to heal. This surely includes measures that would involve genetic manipulation to cure existing diseases, such as severe combined immunodeficiency syndrome. In principle, Jewish law does not differentiate between somatic cell therapy (that is, therapy that affects only the treated individual) and germ-line therapy (that is, therapy involving reproductive cells, the results of which could be transmitted to one's progeny). The fact that the intervention may affect subsequent generations does not, in itself, preclude its use. However, it must be established that the intervention is not only therapeutic for the treated individual, but also not detrimental to future progeny. Due to the current lack of sufficient scientific data that addresses genetic expression in future generations, any pronouncement on this matter is premature.

Status of the Human Embryo and Stem Cell Research

As discussed previously, Jewish law zealously guards the sanctity of human life—all human life—and Torah laws are suspended to preserve it. However, this legal protection is only afforded to those who meet the definition of "human life" according to Jewish law. Does a human embryo in the laboratory meet the definition of "human life"? If so, then one would not be allowed to use this embryo for research, as it would be tantamount to homicide. Homicide is forbidden, even if it means saving another life. As the Talmud states, "who is to say your blood is redder than his!" Is an embryo's "blood" indeed as red as a born, living human being? At what stage does human life begin, according to Jewish law, such that one can suspend other Torah prohibitions to preserve it?

To illustrate, imagine the following case. A fertility bank reports a malfunction of the embryo preservation system on the Sabbath. Failure to act promptly will invariably lead to the destruction of hundreds of human embryos. Yet repair of the problem requires the violation of the Sabbath. May one violate the Sabbath to preserve the embryos? The answer to this question will shed light on the legal status of the embryo. We will answer it by reviewing the rabbinic

approach to other cases of Sabbath violation, beginning with the adult and going in reverse chronological order. To save the life of a born human being, one may, and indeed is obligated to, violate all the Torah precepts including keeping the Sabbath (excluding those precepts barring homicide, illicit sexual relations, and idolatry). The operative legal principle in Jewish law is termed *pikuach nefesh*. *Pikuach nefesh*, saving or preserving a human life, as mentioned previously, is a principle of paramount importance in Jewish law and pervades many areas of Jewish medical ethics. According to Maimonides, if a practical case presents itself, the sage of the community should specifically be the one to violate the Sabbath in order to demonstrate the importance of human life in the eyes of the law.

Does this legal protection apply to a fetus in utero? The Mishna teaches that if a woman's life is in danger during labor, as long as the fetus is still in utero, one may dismember the fetus limb by limb to save the mother. However, the Mishna adds, if the head of the fetus exits the birth canal, one cannot harm the fetus even to preserve the mother's life. The reason: One cannot extinguish one life to save another. The implication from this teaching is that while the fetus remains in utero, it is not accorded the legal status of a full human life. If such is the case, may one violate the sacrosanct Sabbath to preserve a fetus in utero? The current accepted opinion is that one may violate the Sabbath to preserve the life of a fetus, even if the mother's life is not at risk. The decision is based, in part, on the notion that while the fetus is not an "actual" life, it is a "potential" life, and we may violate one Sabbath in order for the fetus to ultimately observe future Sabbaths after birth.

What about the pre-embryo? Is this definition of potential life applied to the pre-embryo such that one may violate the Sabbath to preserve the existence of the pre-embryo? The answer here is a clear and emphatic no. All authorities agree that the Sabbath may not be violated to preserve an embryo outside the woman's womb, as the so-called pre-embryo, in the eyes of the law, does not have a status of even potential life. In the absence of human intervention (i.e., implantation), the pre-embryo will not develop into a full-fledged human being. Does this mean that all human embryos can be discarded or used for research with impunity? Not necessarily. Since the pre-embryo ultimately derives from the reproductive seed, and, as mentioned above, there is a prohibition against the wasting of this seed, some authorities forbid its wanton destruction.

Given the lack of human status of the preimplantation embryo, many rabbinic authorities allow for its use in stem cell research. Some voice the concern that using the pre-embryo for stem cell research, which requires destruction of the embryo, is a violation of the prohibition of wasting the male reproductive seed. Others counter that the aforementioned prohibition applies only to wasteful emission of the male reproductive seed, not to already emitted seed, irrespective of its use in the fertilization of an embryo.

All those who allow use of pre-embryos for stem cell research limit this sanction to *existing* pre-embryos only, and they do not permit the *prospective* creation of embryos for stem cell research. It is forbidden to emit sperm for the purpose of creating an embryo that will be destroyed for research purposes. As stipulated above, sperm procurement is approved for assisted reproduction in order to fulfill the commandment to "be fruitful and multiply," but one may not violate Torah prohibitions (e.g., against wasteful, non-procreative emission of male reproductive seed) for research purposes. However, once such an embryo is created, there is no additional prohibition in destroying it. Some authorities place additional limits on which surplus embryos can be used for research, restricting research to embryos either not viable (i.e., unable to fully develop if implanted) or not designated for implantation.

Preimplantation Genetic Diagnosis (PGD) and Genetic Selection

Rabbinic authorities embrace the use of PGD for the treatment of disease because it falls within the purview of the obligation to heal. The use of PGD to produce a "savior sibling" who would serve as an umbilical-cord-blood stem cell donor to treat the disease of an existing sibling would also fall within the parameters of *pikuach nefesh*, as it is a lifesaving procedure. Furthermore, a child is produced accomplishing the fulfillment of the commandment of "be fruitful and multiply." However, Jewish law does not advocate the indiscriminate use of PGD for trait selection or enhancement or for sex selection (excluding sex selection for sex-linked diseases).

To some extent, preimplantation genetic diagnosis circumvents the legal issues relating to abortion. While abortion is considered legally objectionable, with PGD no fetus is destroyed and the tested embryos are not destroyed. While it is true that embryos are created that may never be implanted, failure to implant these extra embryos, which do have the status of human life, is not legally objectionable, especially since the procedure was performed to produce a disease-free child. Jewish authorities do not consider this practice to either disregard or devalue the sanctity of life. As discussed previously, the pre-embryo does not possess the status of human life, and one who destroys it would not be culpable of infanticide. Some authorities would recommend against the active destruction of the pre-embryo, while they would consider passively allowing its decomposition to be less objectionable.

Does this legal advantage of PGD over prenatal testing and abortion allow the use of PGD to select out for fetuses carrying genes for adult-onset diseases or for predisposition to diseases, conditions for which abortion would generally be prohibited according to Jewish law? Despite some legal advantages, PGD still requires in vitro fertilization and the procurement of male reproductive seed. This procedure is not free of legal concern and is only allowed for a legally justifiable benefit. Selecting out for potential or future

disease of progeny may fulfill this criterion, but this matter awaits further rabbinic analysis.

Cloning

The process or "mechanical," aspects of human cloning present no major legal obstacles from a Jewish perspective. Neither somatic cell manipulation nor the subsequent implantation into a woman's uterus constitutes a violation of Torah law. Furthermore, since the reproductive seed is not needed in the process, the concern about the prohibition of wasting male reproductive seed, an issue for assisted reproduction, is irrelevant here. However, the low efficacy and potential adverse outcomes of human cloning are legal concerns that would lead Jewish authorities to reject any human cloning at this time. Even should these medical concerns be resolved, other legal and theological concerns may supervene. Prospectively creating people of legally ambiguous lineage and who may suffer profound social and psychological complications may preclude any future acceptance of cloning despite perfection of the procedure from a medical perspective. Some rabbinic authorities have found a limited use for human cloning, such as in the treatment of infertility.

CONCLUSION

Judaism is a rich, text-based tradition that addresses all aspects of human existence. Contemporary rabbinic authorities have applied its teachings to the fascinating and increasingly complex field of biotechnology. Despite the antiquity of Jewish law, its principles are equally applicable today as they were thousands of years ago. I am inclined to agree with the words of Benjamin Franklin:

The Progress of human knowledge will be rapid and discoveries made of which we have at present no conception. I begin to be almost sorry I was born so soon, since I cannot have the happiness of knowing what will be known a hundred years hence.¹

Whatever discoveries will be made in the coming centuries, the rabbis will continue to address them from a Jewish perspective.

NOTE

1. Benjamin Franklin, "Letter to Sir Joseph Banks," July 27, 1783. Full text at www.tpromo.com/gk/files2/benj-ban.htm.

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