

The *Kashrut* of Synthetic Meat: Fleshing Out the Culture of Artificial *Fleish*

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The Problems With Traditional Meat?

The ecological impact of the way in which we produce food has increased enormously in recent years. For example, according to various sources, it takes between fifty-two¹ and one hundred and fifty gallons of water to produce one quarter-pound hamburger.² Today, approximately “twenty-six percent of the Planet’s ice-free land is used for livestock grazing and thirty-three percent of

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1. <https://www.npr.org/sections/thesalt/2012/06/27/155527365/visualizing-a-nation-of-meat-eaters>.
 2. www.gracelinks.org/1361/the-water-footprint-of-food.

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croplands are used for livestock feed production. Livestock contribute to seven percent of the total greenhouse gas emissions through enteric fermentation and manure.”³ As the population of the world expands and developing countries move from plant-based diets to meat-based diets as a sign of entering the middle class, the damage to the environment will increase. And as demand for meat increases, more animals will suffer in mainstream factory farm production and in the slaughterhouses.

Mass consumption of meat presents other threats to humans. “Of all antibiotics sold in the United States, approximately eighty percent are sold for use in animal agriculture; about seventy percent of these are ‘medically important’ (i.e., from classes important to human medicine).”⁴ The World Health Organization has called this “an increasingly serious threat to global public health that requires action across all government sectors and society.”⁵ Overuse of antibiotics in factory farms has led to increased bacterial resistance to antibiotics which are entering the food chain and causing serious illness in humans.⁶

The Oxford University’s Wildlife Conservation Research Unit concluded that “Cultured meat could potentially be produced with up to ninety-six percent lower greenhouse gas emissions, forty-five percent less energy, ninety-nine percent lower land use, and ninety-six percent lower water use than conventional meat.”⁷ In comparison to conventionally-produced European meat, the team estimate cultured meat would involve approximately seven to forty-five percent lower energy use, seventy-eight to ninety-six percent lower greenhouse gas emissions, ninety-nine percent lower land use, and eighty-two to ninety-six percent lower water use depending on the type of meat.⁸ The use of water, increase in foodborne disease which leads to the overuse of antibiotics, and the high level of greenhouse gas emissions mandate that alternative sources of meat must be considered.

3. www.fao.org/docrep/018/ar591e/ar591e.pdf.

4. <http://www.fda.gov/downloads/ForIndustry/UserFees/AnimalDrugUserFeeActADUFA/UCM338170.pdf>.

5. <http://www.who.int/mediacentre/factsheets/fs194/en>.

6. <https://www.cdc.gov/narms/faq.html>.

7. <http://www.ox.ac.uk/news/2011-06-21-lab-grown-meat-would-cut-emissions-and-save-energy>.

8. *Ibid.*

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As citizens of the world, Jews cannot sit by and ignore the environmental issues around us. Cape Town, South Africa is due to run out of water by this summer. The United Nations World Water Development Report 2018 states “The world population is expected to increase from 7.7 billion in 2017 to between 9.4 and 10.2 billion by 2050 ... Global demand for agricultural and energy production (mainly food and electricity), both of which are water-intensive, is expected to increase by roughly 60% and 80% respectively by 2025.”⁹ We are citizens of the world and will be affected by those trends.

We are obligated not only by our desire to live in the world but also by our Torah. In Genesis 2:15 we are told, “G-d took the man and placed him in the Garden of Eden, to work it and guard it.” In Deuteronomy 20:19, we are commanded, “Do not [needlessly] destroy.” The Talmud,¹⁰ Rambam,¹¹ and the *Shulchan Aruch*¹² all discuss needless destruction and prevention of pollution. Since we are the *shomrei ha’adama* we are obligated to do what we can to lower our environmental impact. Furthermore, the warming of the planet, scarcity of water, and increase of disease could surely become a matter of *pikuach nefesh* if we do nothing.

The Origins of Synthetic Meat

In 1981 stem cells were discovered in mice. Since that time the idea of cells that could continue to reproduce and become specific cells has intrigued scientists. Some have been inspired to produce meat in laboratories as a way of finding a sustainable, eco-friendly, and perhaps healthier alternative to most meat on the market.

Lab synthesized meat starts with muscle stem cells, sourced either from mature cells or fetal cells, from either a live or newly dead animal. The cells are then put in a medium of either animal-based or vegetable-based substances.¹³

9. <http://unesdoc.unesco.org/images/0026/002614/261424e.pdf>, p.10.

10. Talmud Bavli, *Bava Kama* 82b; *Mishnah Bava Batra* 2:1

11. Maimonides, *Mishneh Torah, Sefer Kinyan*, Laws of Neighborly Relations 11:1; *Mishneh Torah, Sefer Shoftim*, Laws of Kings 6:8–10, 14–15.

12. *Shulchan Aruch, Choshen Mishpat* 155:21, 155:36.

13. Developers are eager to move towards solely vegetable-based substrate because it reduces the need for more animals and it is cheaper.

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Once the cells begin to reproduce they are put on a biodegradable structure like a trellis to help them form meat-like texture. The resulting meat is tasteless and needs the addition of fats and flavorings to taste like meat. In 2013 the first “hamburger” made from lab synthesized meat cost about \$330,000 dollars. When it eventually reaches the markets by 2021 it should cost closer to \$11 a burger,¹⁴ with synthetic sausage and chicken nuggets also expected to be available.¹⁵

While burgers from this meat are not yet commercially available they will be in the next ten years. Generally *halacha* does not weigh in before a question from reality is posed but many *poskim* have already begun to discuss the *kashrut* of lab-synthesized meat. So far there is no consensus about the status of such meat and even if it should be considered meat at all! This paper will discuss the variety of halachic arguments and thought on the subject to date.

Will synthetic meat be kosher? Although the majority of producers will be non-Jewish companies, there are several companies in Israel already developing lab synthesized meat. The simplest and most halachically conservative argument requires that lab synthesized meat comes from a kosher animal and retains that identity throughout its development from stem cell to “hamburger”. Since we call it meat and it eventually looks like meat then the stem cells should be sourced from properly *shechted* kosher animals just after death and the resulting food should be considered *besari*. This *psak* may seem prudent because with any new technology *halacha* likes to take a wait and see approach even if it is a technology that is foreseeably going to be popular.¹⁶

However, there are those who argue that this conservative approach is not correct. They believe that the process of creating synthetic meat is so far removed from the traditional manners of raising meat that the product is something new entirely, and so the initial sample of stem cells is not

14. Lab synthesized meat will eventually be cheaper than traditionally raised meat.

There is an important principle that “אין שמחה אלא בבשר ויין” “there is no joy without meat and wine.” As the expenses of an observant lifestyle increases that may become unattainable for many. As a community as a whole, we have an obligation to make sure that people can afford to keep kosher. We do not want people to opt out of observance because of the cost of kosher meat.

15. <https://www.cnn.com/2018/03/01/health/clean-in-vitro-meat-food/index.html>.

16. Igrot Moshe, *Orach Chaim* 3:52 “משתמשים” “כזה תנור להם שיש להם תנור כזה משתמשים” “בו יתברך מבשול דבאש ומה שלא נתפשטו תנורים אלו עדיין הוא משום דלא מצוי עדיין הרבה תנורים וכשיהיו “מצויין ודאי ישתמשו בהם כו”ע”.

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halachically significant. Compounding the halachic arguments, some *poskim* see the overwhelming human and animal costs to us and our planet as compelling reasons to declare that it can be sourced from any animal and be *pareve*. Rav Cherlow argues that the cruelty to animals and the spread of disease are compelling arguments to allow this meat.¹⁷ Rav Aviner makes the argument that world hunger is a compelling reason for the *kashrut* of this meat because it will eventually become so inexpensive that we will be able to feed the poor of the world and of Israel.¹⁸

This paper will analyse the various halachic considerations relating to the *kashrut* of lab synthesized meat based on the source of the stem cells and the means of production and the practical reality of the laboratory. These arguments fall broadly into three categories. Does this synthesized product meet the halachic threshold of meat? Does the fact that the mode of production differs radically from traditional animal raised meat make a difference halachically? Finally, what are the traditional *kashrut* issues that do or do not apply?

אין העין שולטת — Not Visible by the Human Eye

As with all considerations of *halacha* relating to technology, ascertaining the *metziut*, or reality, is fundamental. Lab synthesized meat is created by first:

... carefully removing muscle tissue from ... a[n] animal. Muscle precursor cells, such as myosatellite cells, are then separated from the other cells in the tissue sample and grown in vitro in a bioreactor. When muscle precursor cells are separated to be grown in a bioreactor, they are placed in a medium, where they have all the necessary nutrients to multiply. These stem cells rapidly divide and eventually differentiate to generate muscle fibers that form the essential component of animal derived meat. The cell multiplication creates thin layers of cells or loose cells. To turn these cells into muscle tissue, they must be injected into a scaffolding gel through which they can organize and connect to form muscle tissue.¹⁹

17. <https://www.ynet.co.il/articles/0,7340,L-5185466,00.html>.

18. <https://www.youtube.com/watch?v=4uzaFm7vAdM>, last accessed June 4, 2018.

19. John D. Loike, Ira Bedzow and Moshe D. Tendler, "Pareve Cloned Beef Burgers: Health and Halachic Considerations," *Hakirah* 24 (Spring 2018): 193.

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Lab synthesized meat harvests mature stem cells sometimes from biopsies but usually from recently slaughtered animals. The reason stem cells are used in lab synthesized meat development is that, given the right conditions, they continue to divide and multiply indefinitely. The stem cells are put into a medium on a structure on which to grow, and they are kept warm and occasionally given electric shocks to stimulate the muscle cells.

While the stem cells come from the body of an animal, whether or not they are halachically significant is the first question that must be considered. The halachic principle of אין העין שולטת בו²⁰ states that if something is not visible to the human eye the thing has no legal significance — it is as if the thing does not exist. As the *Aruch Ha-Shulchan* explains, “In truth, the Torah did not forbid anything that the [naked] eye cannot perceive, for the Torah was not given to angels...”²¹

R. Moshe Feinstein, confirmed this:

לגבי תולעים שמה שלא נראה לעין האנושי אלא בעזרת מיקרוסקופ וזכוכית מגדלת הוא לא נחשב מבחינה הלכתית	In regards to worms that cannot be seen by the human eye but rather by the aid of a microscope ... [such worms are] not considered halachically significant.
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The worms that Rav Moshe was discussing are multi-celled living organisms. In the case of lab synthesized meat the whole growth is based on a few cells. Since the original stem cell does not reach the threshold of significance then it does not have halachic significance. Therefore it is not halachically meat of any sort.

R. David Bleich²² notes that according to R. Jonathan Eibenschutz,²³ “the movement by a ‘swarming creature’ while yet subvisual renders the organism a prohibited creature once it does mature and become visible. Earlier motion is deductively demonstrable and hence cannot be disregarded by human intellect.” In other words, bugs that we do not see at first but then we do see, do become significant. We cannot ignore our minds. Yet again we are talking about multi-celled whole organisms that live on their own, not as individual

20. *Shulchan Aruch, Yoreh Deah* 36:84.

21. *Aruch Ha-Shulchan, Yoreh Deah* 84:36.

22. J. David Bleich, “Survey of Recent Halakhic Periodical Literature: Stem-Cell Burgers”, *Tradition* 46:4 (Winter 2013): 53.

23. Kereti u-Peleti, *Peleti, Yoreh Deah* 84:5.

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cells. The stem cells are not a *beriah* or creature in their own right. Rabbi Bleich and others use this to argue that even though the stem cell is not originally seen, the fact that once it has multiplied hundreds of thousands of times it is seen, it thus loses the status of *אין העין שולטת בו*. While that may be true by that time, Rabbi Tzvi Reizman argues that given the original lack of halachic significance a state of *issur* cannot be created.²⁴

Rabbi Yehoshua Neuwirth, in *Shemirat Shabbat Ke-Hilchatah*, relates that Rabbi Shlomo Zalman Auerbach originally opined that an organism that can never be perceived as living or mobile cannot be regarded as a “creeping thing that creeps upon the earth” (Vayikra 11:41).²⁵ Rabbi Bleich further notes that R. Moshe Feinstein said, “ש אפשר שדבר שלא נראה למעשה לעינים אינו אסור — it is possible that something that cannot actually be seen by the eye is not forbidden,” and continues to declare “ולכל הפחות אינו בחשיבות בריה” — and at the very minimum does not have the status of a *biryah*.²⁶ Again a cell is not the same as a *biryah*.

In contrast, Rav Shlomo Zalman Auerbach writes:

בענין שאלתו בדבר הנדסה גנטית שמכניסים חלקיקי תאים מבריה אחת לשניה, וזוה משנים את תכונותיה של השניה. ועיי"ז להתיר איסור כלאים מכיון שאין חלקיקים אלו נראים לעין האדם. כיון שאנשים מטפלים בחלקיקים האלה ומעבירים אותם ממין אחד לשני הרי זה חשיב ממש כנראה לעינים ולא דמי כלל לתולעים שאינם נראים.

On the question of genetic engineering, that we put in parts of cells from one living being into another, and in doing so change the plan of the second. And in this way allow the *issur* of *kelayim* because these parts are not visible to the eye. Because people are working on these parts and transferring them from one to the other, they are considered visible to the eyes and not the equivalent to worms that are not seen.²⁷

In lab synthesized meat we are not manipulating the “plan” of the stem cells we are growing so that they fall into another category.

24. Tzvi Reizman, “Meat from Stem Cells”, *Techumin* 34 (5774) 112.

25. R. Yehoshua Neuwirth, *Shemirat Shabbat Ke-Hilchatah*, I, 2nd edition (Jerusalem, 5739) 3:37, note 105 as originally cited in J. David Bleich, “Survey of Recent Halakhic Periodical Literature: New York City Water” *Tradition* 38:4 (Winter 2004):79, reprinted in Bleich, *Contemporary Halakhic Problems: Volume VI* (Jersey City: Ktav, 2012), 216.

26. Bleich, *Contemporary Halakhic Problems: Volume VI*, 216n27, citing to *Igrot Moshe, Yoreh Deah* 4:2.

27. Responsa *Minchat Shlomo, Tanina* (2–3), Siman 100.

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Rabbi Reizman, in *Techumin* 34,²⁸ argues that a stem cell is a kind of proto-cell. The Talmud in *Yevamot* 69b calls a fetus less than forty days old “מיא בעלמא” that is of no significance at all. If the stem cell is not significant at all and is not readily visible to the eye can it even be called meat? Rav Yaakov Ariel rejects this comparison, saying that a fetus goes through many changes after forty days while the stem cell is a muscle stem cell which replicates but does not evolve or change in any way besides quantity.²⁹ Rabbi Ze’ev Whitman³⁰ argues that the stem cells are too small to eat and so cannot be called the *shem* of meat and certainly do not constitute any *shiur* of meat.

Rabbeinu Tam, in justifying the local practice of eating honey into which some bees’ legs were mixed, explains by way of an analogy with ass bones.³¹ The Mishnah implies that the rabbis held that unlike its flesh, the bones of an ass are not ritually impure.³² Per Rabbeinu Tam, the same distinction between “flesh” and “bone” applies to the legs of bees. If the bones of an ass are not prohibited as part of the flesh of a prohibited animal, than neither should the legs of bees. Rabbi Yom Tov Lipmann Heller³³ explains, in turn, that according to Rabbenu Tam, bees’ legs are “fleshless.” Or, to use the language of Rabbenu Asher ben Yechiel who concurs with Rabbenu Tam, bees’ legs are “*afra b’alma*,” mere dust, that is, dietarily irrelevant. Stem cells, similarly fleshless, would thus be no different than bees’ legs.³⁴

One could conclude that stem cells are not halachically significant because they are not visible to the human eye. Furthermore, that stem cells are even smaller than an embryo which is considered ‘*maya b’alma*’ which is nothing at all.

28. Tzvi Reizman, “Meat from Stem Cells”, *Techumin* 34 (5774): 103.

29. Yaakov Ariel, “The Kashrut of Cultured Meat: Response”, *Techumin* 36 (5776): 453.

30. Ze’ev Whitman, “Cultured Meat: Review and Response”, *Techumin* 36 (5776): 458.

31. Tosafot on *Avodah Zarah* 69a, s.v. *ha-hu*.

32. *Yadayim* 4:6.

33. *Pilpulei Charifta*, *Avodah Zarah* 69a, subsection 20.

34. http://utj.org/viewpoints/responsa/the-kashrut-of-laboratory-produced-meat/#_ftn31.

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Is it halachically considered meat?

The Rambam in his discussion of *basar b'chalav* states:

אין אסור מן התורה אלא בשר
בהמה טהורה בחלב בהמה
טהורה שנקאמר (שמות כג יט)
(שמות לד כו) (דברים יד כא)
"לא תבשל גדי בחלב אמו". וגדי
הוא כולל ולד השור ולד חיה
ולד העז ... ולא נאמר גדי בחלב
אמו אלא שדבר הקטוב בהונה.

According to Torah Law, the prohibition is only of [a mixture of] meat from a kosher animal and milk from a kosher animal, as it is written: "Do not cook a kid in its mother's milk." The term "a kid" includes the offspring of an ox, the offspring of a sheep, and the offspring of a goat ... The [general] term "a kid in its mother's milk" [is used not to exclude other situations, but rather as] the Torah is speaking regarding the ordinary circumstance.³⁶

In this case, we are not discussing a food that is created in an ordinary circumstance. Rabbi Chanoch Kahan cites this Rambam as an argument that since there is no mother or baby the meat should not be prohibited.³⁶

Rav Chanoch Kahan also cites Rav Hershel Schachter, noting that, "in his opinion, meat is only something that comes from an animal that was born naturally from a mother. Every meat produced in a different way is not meat for halachic matters."³⁷ Rav Shlomo Aviner says that if we look at the process the meat is not at all like meat and could be *pareve*.³⁸ Rav Dov Lior and Rav Yuval Cherlow are even more emphatic that such meat is *pareve* because it is so far removed from the usual production of meat.³⁹

If the original cell is gone does the meat product share its identity?

One might argue that one does not need a *shiur* of non-kosher stem cells to render lab synthesized meat non-kosher. Let us compare this to a substance where even a *de minimis* amount of the substance is not allowed. For example, *tevel* is not allowed for consumption even in minute quantities. *Mishnah Terumot* 9:6 states:

35. Rambam, *Mishneh Torah*, Forbidden Foods 9:3.

36. https://www.machonso.org/hamaayan/?gilayon=40&id=1201#_ftnref21.

37. https://www.machonso.org/hamaayan/?gilayon=40&id=1201#_ftnref27.

38. <https://www.kipa.co.il/2-יהדות/הלכה/על-מה-מסכימים-הרב-ליאור-הרב-שרלוי-והרב-א-2>.

39. *Ibid*.

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הטביל, גדוליו מותרין בדבר
שזרעו כלה. אבל בדבר שאין
זרעו כלה, גדולי גדוליו, אסורין.
איזהו דבר שאין זרעו כלה, כגון
הלויף והשום והבצלים. רבי
יהודה אומר, השום, פשעונים:
Non-tithed produce, its growths (*gidulim*) are
permissible in a kind whose seed disintegrates. But
in a kind whose seed does not disintegrate, [even]
the growths of its growths are forbidden. Which is a
kind whose seed does not disintegrate? For
instance, *Luf* [plant], garlic, and onions. Rabbi
Yehudah says: onions are like barley.

Just as the *zerah kaleh*/disintegrated seed disintegrates but its genetic material is passed on to the new cells so to the lab synthesized meat has the genetic material of the original cell but is not the same as the original stem cell. As the biologist Thomas Schwarz stated, “if the essence is the physical material of the cell, then no. That would get diluted beyond recognition. Every time the cell replicates, it does so by division. First it needs to make a copy of its DNA and then to double the amount of protein that it has and it will do that by taking up and using the nutrients in the broth. Then, when the cell divides, each new cell will get half of the old DNA and old proteins and half of the new copies of each... If the only thing that happened was this doubling and dividing, it will be perhaps a millionth part of every cell in the meat. But in practice it would be even less because the old proteins would be destroyed and broken down and replaced constantly so that really the only trace would be very small sections of DNA scattered among all the cells that were present in the meat.”⁴⁰

Rambam states:

ואם צמח אין מחייבין אותו
לעקור והגידולין חולין ואם
היה דבר שאין זרעו כלה
אפילו גידולי גידולין
אסורין
עד שלש גרנות והרביעי
מותר.
[If the seed decomposes], should it grow, we do not
require him to uproot [the plants]. The growths
(*gidulim*) are considered as ordinary produce. If the
produce is of a type whose seed does not decompose,
even the produce that grows from the growths
— indeed, even until the third generation — is
forbidden. The fourth generation is permitted.

Even if one did argue that the stem cells were more like *gidulim* that did not decompose, in the processing of lab synthesized meat the scientists could easily ascertain when the fourth generation has replicated itself.

40. In private conversation with the author.

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R. Yaakov Ariel in *Techumin*⁴¹ said that the *gidulim* metaphor is not strong because with stem cells there is no connection to the earth and *gidulim* are concerned with the land. He compares the stem cells more closely to mushrooms upon which the blessing *shehakol* is said because their nature is so disconnected from the natural state. He also objects because the *gidulim* are derivatives of *gidulim* whereas the cells are a continuous chain. However, an onion can grow by planting the bulb of the onion which has the same genetic code as its parent.

יחי אבר מן החי *Ever Min Ha-Chai* — Limb from a Live Animal

Stem cells need to be fresh to be cultured. One option is to harvest the cell in a biopsy. If the cells are taken from a live animal, some argue that we must consider whether the stem cells would or could be considered *ever min ha-chai*. Genesis tells us that “אך-בִּשְׂרֵךְ בְּנִפְשׁוֹ דָּמוֹ לֹא תֹאכְלוּ” “You must not, however, eat flesh with its life-blood in it” (Bereshit 9:4). Furthermore Devarim tells us “בְּקִיּוֹם לֶבְלֵתִי אֲכַל הַדָּם כִּי הַדָּם הוּא הַחַיִּים וְלֹא תֹאכַל הַנֶּפֶשׁ עִם הַבֶּשֶׂר” “But make sure that you do not partake of the blood; for the blood is the life, and you must not consume the life with the flesh” (Devarim 12:23).

Rashi on *Chullin* 102b refines the definition and notes that the *ever* must be something that cannot be replaced:

לא תאכל הנפש עם הבשר זה אבר מן החי – דאבר חי מקרינן נפש שאם יחתכנו אינו עושה חליפין שלא ישוב עוד כנפש הנטולה שאינה חוזרת והכי משמע לא תאכל הנפש בעודו עם הבשר בעוד החיות עם הבשר:	While stem cells do not regenerate, a cow has many and would not be harmed with the harvesting of an eraser sized piece of flesh in a biopsy administered with anesthetic
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The *Tur* identifies two *issurim*: *ever min hachai* and *basar min hachai*. He specifically says *issur* only applies to kosher animals.⁴² The *Tur* does not require that *ever min ha-chai* flesh have a bone or be a whole limb:

41. Yaakov Ariel, “The Kashrut of Cultured Meat: Response”, *Techumin* 36 (5776): 449.

42. *Tur Yoreh Deah* 62:1; Rambam, *Mishneh Torah*, Forbidden Foods 5:1.

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לפיכך אבר הפורש מן החי, בין שיש בו בשר וגידים ועצמות בין שאין בו אלא בשר לבד, כגון הלשון והטחול והכליות והביצים – אסור לאוכלו, בין אם יש בו כזית בין אם אין בו כזית.

Therefore a limb that is separated from a live animal, whether or not it is meat, sinews, or bones, or a limb that has no bones like a tongue, spleen, kidneys or testicles — are forbidden to eat. Whether a *k'zayit* or less than a *k'zayit*.

The *Tur* explicitly says that *ever min ha-chai* refers to kosher animals. This distinction is not mentioned in the *Shulchan Aruch* but the *Bach* agrees while the *Shach* says that one cannot offer *ever min ha-chai* to a non-Jew.⁴³ So, ironically, it may be more acceptable to use the cells from a non-kosher animal. The mention of a *k'zayit* means that we are talking about food, but in our case the stem cell cannot be considered food because it is so small and not able to be seen by the naked eye.

Based on *Sanhedrin* 59b one might argue that since it would primarily be non-Jews taking such biopsies they would then be *over sheva mitzvat bnei Noach* and that we would be accessories in *lifnei iver*.⁴⁴

In the *Bayyit Chadash* on *Tur*, *Yoreh Deah* 62, Rabbi Sirkes views “flesh” as applied narrowly when considering the violation of the law against “taking a limb from a living being.” Flesh must be actual meat. What may also be deduced from Rabbi Sirkes’s view is that flesh is defined to be meat of sufficient substance to be offered on the altar. This would clearly not apply to “stem cells”⁴⁵ since they cannot be seen, held, or intentionally eaten.

So although *ever min ha-chai* is a concern, it is not a concern in the case of lab synthesized meat. In addition, once the original cells are harvested, they are separated and manipulated to “immortalize” the cells.⁴⁶ The process of immortalization changes the cell so that it continues to reproduce forever and so obviating the need to harvest any more cells.

Although it is clear that blood is not allowed for consumption⁴⁷ according

43. *Shach* *Yoreh Deah* 62:3

44. *Talmud Bavli, Sanhedrin* 59b; Christine Hayes, *What’s Divine About Divine Law?* (Princeton UP, 2015), 361–365, as cited in Rabbi Daniel Nevins CJLS YD 87:10.2017.

45. http://utj.org/viewpoints/responsa/the-kashrut-of-laboratory-produced-meat/#_ftn28

46. <http://elliott-swartz.squarespace.com/science-related/invitromeat> for more of a scientific description of the process.

47. *Genesis* 9:4; *Pesachim* 74b; *Shulchan Aruch, Yoreh Deah* 67.

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to the Torah, in the process of preparing the cells for the lab synthesized meat process any extraneous cells will be removed, including any blood cells since they are not necessary.

Furthermore, Rabbi Tendler cites Rav Moshe Feinstein as saying, “The blood that was absorbed within the meat would lose its prohibitory taste when the meat became inedible.” Since, he continues, the stem cells are inedible throughout the culturing process “when the muscle tissue regains its gustatory status in becoming cloned meat, it would no longer be prohibited because of the blood within it.”⁴⁸

Not born of parent — *Ben Pakua*

Halacha does have precedence for meat that is not quite meat. A *ben pakua* calf is a calf that is found in its mother’s uterus at the time of *shechting*. *Chullin* 75b describes a live calf found in a *shechted* mother. If the animal is not born through the cow’s vaginal canal or as the Gemara describes it “touches the ground”, that animal does not need *shechita* and its milk is *mutar*. Its blood, however, is forbidden. If the *ben pakua* animal mates with a similar animal the offspring never need *shechita*.⁴⁹ The *Shach* there⁵⁰ says that the exemption from *shechita* continues even if the parent is a *treifa*. Currently there is a controversy surrounding an effort in Australia to develop a herd of *ben pakua* cows which would be exempt from *shechita* in perpetuity.⁵¹ This would enable kosher meat to be available in countries in Europe where *shechita* is outlawed.

Ben pakua meat is relevant to the discussion of lab synthesized meat because the nature of the animal can be changed. The *Shach* discusses the lack of *simanim* that the *ben pakua* has that eliminate the need for *shechita*. Clearly lab synthesized meat has no *simanim* of *shechita*. Lab synthesized meat is not developed in the womb of an animal and it has no neck or blood. Therefore it should be considered something new entirely.

48. John D. Loike, Ira Bedzow and Moshe D. Tendler, “Pareve Cloned Beef Burgers: Health and Halachic Considerations”, *Hakirah* 24 (Spring 2018): 200, citing *Igrot Moshe, Yoreh Deah* 2:23

49. Shulchan Aruch, *Yoreh Deah* 13:3–4.

50. *Shach, Yoreh Deah* 13:4:13.

51. <http://www.5tjt.com/the-new-commercially-produced-ben-pekuah-meats/>.

Meat from Another Source: *Sefer Yetzira* Meat

There are several text in our *mesorah* that discuss meat that is even further removed from the natural development of animal products than *ben pakua* meat. *Sanhedrin* 59b discusses meat that comes from heaven. “Rabbi Yehuda ben Teima would say: Adam, the first man, would dine in the Garden of Eden, and the ministering angels would roast meat for him and strain wine for him... the meat descended from heaven.” The Gemara goes on to describe meat that fell from heaven in answer to Rabbi Shimon ben Halafta’s prayers to be saved from a marauding lion. When the heavens generously provide him with extra food “He took it and entered the study hall, and inquired about it: Is this thigh a kosher item or a non-kosher item? The Sages said to him: Certainly it is kosher, as a non-kosher item does not descend from heaven.” While we do not usually use *aggadata* to decide *halacha*, the Gemara does take seriously the idea that there can be various origins of the things that we consider “meat”.

Sanhedrin 65b takes this one step further and describes meat created using *Sefer Yetzira*

מותר לכתחלה כדרך חנינא ורב אושעיא כל מעלי שבתא הו עסקי בהלכות יצירה ומיברי להו עיגלא תילתא ואכלי ליה.	What is permitted <i>ab initio</i> is to act like Rav Hanina and Rav Oshaya: Every Shabbat eve they would engage in the study of the <i>halakhot</i> of creation, and a third-born calf would be created for them, and they would eat it in honor of Shabbat.
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Sefer Yetzira reflects God’s secrets of nature. By making *Sefer Yetzira* meat humans are partnering with God in creation. Malbim on Bereshit 18:7 describes that Avraham used this same method to create the animal that he fed to the angels and concludes that *Sefer Yetzira* meat must be *pareve* since they also had milk and butter at that meal. The *Cheshek Shlomo* on the *Shach Yoreh Deah* 98:7, concretizes this ruling “And know that meat from an animal created by means of *Sefer Yetzira*... can be cooked with milk because it is not considered meat. And that is according to the ruling of the Malbim.”

As science advances we are increasingly intertwining ourselves with God’s secrets.⁵² Lab synthesized meat is one manifestation of a product that does not

52. See R. Dov Lior’s assertion that by doing this scientific research we are drawing closer to God, especially at minute 2, at <https://www.youtube.com/watch?v=MAp5o3HFVIM&t=14s>. Last accessed June 10, 2018.

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occur naturally. Like *Sefer Yetzira* meat, it does not come from two parents, nor is it born from a womb. Therefore we should regard lab synthesized meat as something new and therefore kosher and *pareve*.

Rav Aviner writes about lab synthesized meat:

הוא לא התהליך הרגיל, זה לא שלקחו תא ושכפלו ממנו פרה, אלא ישירות התא יתרבה. לכן, אמנם בסופו של דבר יש בשר, אבל הוא לא בשר שנוול בתהליך הרגיל.	This is not a normal process, it is not as if they took a cell and cloned it into a cow, rather the cell directly multiplies. Therefore, even though in the end there is meat, it is not born in the usual way. ⁵³
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R. Aviner also cites R. Chaim Soloveitchik of Brisk who said that miracle oil is not kosher for the lighting of the menorah since the miracle of the Hannukah oil was that the quality of the oil was such that it burned extremely slowly, not that it was miraculously increased.⁵⁴

Rav Aviner concludes from R. Chaim's statement that:

נמצא שהתוצאה לא קובעת, אעפ"י שזה ממש נראה, אלא התהליך קובע. לכן, אם הדבר עובר שינוי ישניתוק מן המקור והוא נחשב כדבר חדש.	The result is not what is halachically determina- tive... but rather the process. So if the thing undergoes a process that severs it from its origins it is thought of as something entirely new.
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The stem cells are separated from the original source, manipulated in a laboratory and grown in an artificial substrate. Even though they may come to resemble meat, they surely are not like any meat we have seen before.

Things that Grow From Air or Other Different Ways

Halacha considers certain food items that grow in unusual ways to essentially "jump" to a new category of food. For example, *Nedarim* 58a discusses onions that grow during the *Shemita* year.⁵⁵ If the leaves are dark in color they are *assur*

53. <https://tinyurl.com/y8kdu5pu>.

54. ס' ימי חנוכה להגר"י שכטר סי' א.

55. "בצלים שירדו עליהם גשמים וצמחו, אם היו עלין שלהן שחורין – אסורין, הוריקן – מותרין... וכנגדן למוצאי שביעית – מותרין."

and the Ran says that is due to the onions growing directly in the ground. If they are light in color they are allowed. The Ran⁵⁶ explains that the lighter colored onion leaves indicate that the onions grew without being connected to the earth and are thereby exempt from the laws of *Shemita*.

Rav Ovadia Yosef says that the *bracha* for these onions should be “*shehakol*”. “Since there is no suction from the ground, that the water stops between the seeds and the ground, the blessings of the fruit and vegetables should not be blessed.”⁵⁷ Similarly, Rabbi Shlomo Zalman Auerbach states: “A tomato on a tree requires us to bless the creator of the fruit of the tree on such a tomato, since it is actually grown on a tree, even though the same species grows mainly from the ground and not from wood, and even though it is done only by a person.”⁵⁸ Hydroponically grown vegetables in Israel are exempt from *maasrot*⁵⁹ and are allowed to be eaten if grown during *Shemita*.⁶⁰

If growing a tomato in water as opposed to earth put that fruit into a separate category, even though it looks and tastes like a tomato and in fact we still call it a tomato, then lab synthesized meat should certainly not be considered like regular meat since it is much more manipulated and removed from the normal manner in which meat is grown and produced.

יוצא מן האיסור *Yotzei min ha-Issur* — Issue from a Forbidden Animal

The principle that something that comes out of *issur* is itself *issur* is well established. It includes the meat, milk, and eggs of a forbidden animal.⁶¹ Rabbi Bleich explains, “*Yotzei* as applied to growth, i.e., accretion of tissue and the

56. ופלי הר"ן: הוריקו מותרין – שכיון שהם ירוקים לאו מחמת יניקת הקרקע נתגדלו אלא מחמת הבצל עצמו.

57. Ovadia Yosef, *Yechaveh Da'at* 6:12.

58. *Minchat Shlomo Tanina*, 2: 2.

59. Rav Yechiel Michel Tuchetzinski (*Zeriah* 3:4) and others cited in *Mishpatei Aretz* (*Terumot* 1:19). *Teshuvos Har Tzvi* (*Zeraim* 2:31), however, requires *maasrot*. See also discussion in *Derech Emunah* (*Terumot* chap. 2, *Biur Halacha* s.v. *Ochel*).

60. *Yechaveh Da'at* 6:12 citing Rav Yechiel Michel Tuchetzinski (*Sefer Ha-Shmitta* vol 2, pg. 104) and others.

61. *Mishnah Bekhorot* 1:2, ויהי צאן טהור ויהי צאן טהור ויהי צאן טהור; *Chullin* 64b; Rambam, *Mishneh Torah*, Forbidden Foods 3:1.

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enhanced bulk of a mature animal, serves as a halakhic categorization of a living animal and of its descendants. There seems to be no source that would serve to extend that concept to some hypothetical post-mortem synthetic growth of additional non-kosher animal tissue or to tissue (or cells) plucked from a living animal and made the subject of artificial reproduction in its severed state.”⁶²

All the examples of *Yotzei* are of natural processes of the animal such as milk, eggs, or reproduction. Rav Aviner⁶³ and others see this process as so different from natural reproduction that the stem cells can no longer be considered *yotzei*.

ביטול — *Bitul* — Nullification

Some thinkers have discussed the question of whether, if the stem cells are somehow halachically significant, could they be *batel* in the growth medium. At first the growth medium that scientists used was composed of fetal bovine blood. Now the companies are working towards an algae or vegetarian based medium not only for health reasons, but also to keep down costs. At present the recipes of the media used are a closely held trade secret. Given that the medium will be vegetable base, will the stem cells be *batel* in the medium?

By one estimate, from ten source cells it could be possible, in ideal conditions, to culture 50,000 tons of meat in two months. But even at the time of creating the mixture the stem cells are certainly *batel b'shishim*. The stem cells could not possibly meet the threshold of *noten ta'am*, especially, as noted above, in that they impart no taste even when fully cultured. There are opinions that a *neveila* is not *ma'amid* unless it is *noten ta'am*. In that case there would not be a need for *bitul* at all, similar to the subvisual category.

ויש חולקים וסוברים שאף בנבלה אין מעמיד אוסר אלא בנותן טעם, ובטל בששים.⁶⁴

If one were to decide that *bitul* was necessary one would have to contend

62. J. David Bleich, “Stem-Cell Burgers”, *Tradition* 46:4 (2013): 56.

63. <https://tinyurl.com/y8kdu5pu>.

64. מרדכי חולין צט ב, ותשובות מיימוני למאכלות אסורות יח, בשם רבנו תם; מנחת כהן ספר התערוכות ג ג, ופרי. חדש יר"ד צח סק"ז, בדעת תוספות חולין צט ב ד"ה לא במאה; ים של שלמה חולין ח קו. בטעמם ראה ים של שלמה שם, וראה ש"ך יר"ד פז ס"ק לה שחולק.

with *bitul issur l'chatchila* because the scientists are intentionally putting the stem cells into the growth medium. *Bitul issur l'chatchila* is *assur* for Jews and is considered a *d'rabanan* according to most Rishonim.⁶⁵ There seem to be three main concerns about *bitul issur l'chatchila* in the halachic discussions; that the ratio of *issur* to *heter* might be miscalculated, that there is a broader disapproval of eating *issur*, or that we should not be eating *issur l'chatchila*. In the case of lab synthesized meat the ratio of stem cell to substrate is carefully measured and moderated because the cells are being cultured in a lab and the people doing the culturing want consistency of the product. The Rashba⁶⁶ carves out an exception for when the *issur* is so tiny compared to the *heter* which seems likely to apply here. The Nodeh B'Yehuda says that in wet mixtures the *issur* is certainly *d'rabanan*.⁶⁷ The *metziut* seems to argue against the need for *bitul* in lab synthesized meat. The *mamashut* of the *issur* is not recognizable by the human eye and could not even be considered *issur* because it does not reach the halachic threshold of a meat. It has no taste and is derived from an unusual process. These *sefekot* on an *issur d'rabanan* would allow Jews in the Israeli companies developing lab synthesized meat to proceed. The residual feeling of *genai* that we are employing *issur* for *heter* could be outweighed by the overwhelming issues of the health of our planet, *tzar ba'alei chaim*, and potentially *pikuach nefesh*.

A non-Jew is allowed to mix *issur* and *heter* in *bitul* proportions for herself. The non-Jews in the case of the majority of lab synthesized meat are clearly creating lab synthesized meat for their own commercial gain as well as saving the planet by creating food to feed the growing population of the world. If Jews make up 0.15% of the world population it is hard to argue that the intent of the developers is targeted at the Jewish market. The Radbaz discusses the concern that a Jew might instruct a non-Jew to do the *bitul* on the Jew's behalf and wonders whether we should prohibit such food to avoid such an eventuality. However, he rejects this possibility when a non-Jew is doing the *bitul* on his own initiative. It is clear that in this situation that the primary market for this food is not the kosher market. The Radbaz notes that such a

65. See *Beitza* 4b; *Shulchan Aruch, Yoreh Deah* 99:7.

66. Cited in *Aruch Ha-Shulchan, Yoreh Deah* 98:2, 7.

67. *Nodeh B'Yehuda Yoreh Deah, Mahadura Tinyana* 45.

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mixture made by gentiles on behalf of gentiles without being instructed to do so by Jews would be permitted.⁶⁸

The Rema further argues that such a mixture is allowed if not available from a Jewish source:

בסי קח, כתב הרמ"א שקנייה מגוי נחשבת	Whether that remains true once the
כלכתחילה, אך שם הוא התיר כשאין	Israeli companies start production is
אפשרות לקנות דבר דומה מישראל. ⁶⁹	another matter.

Maharam and Radbaz debated whether a Jew can buy such a mixture. Maharam said it is *mutar*⁷⁰ to buy food that is already *nitbatel* by a non-Jew because the *bitul* is considered *b'dieved*.⁷¹ The Rema says that buying food containing an *issur* which is *batel* from a non Jew is always *b'dieved* and the Radbaz says that one should not buy such food.⁷² But the *Darchei Teshuva* says that it is *b'dieved* and allowed.⁷³

Tashbatz argues that if it is the non-Jew's consistent behavior and is his job, it is thought to be *l'chatchila* — as if one says to another, “cook for me.” American halachic practice seems, according to the OU, that once a product becomes commercial and *hechshered*, we can no longer consider the *bitul* *b'dieved* but rather the *bitul* is performed for us and the *bitul* is *l'chatchila*.⁷⁴ The Taz argues that such a mixture is not *bitul issur l'chatchila* if you are doing it for another purpose.⁷⁵ In lab synthesized meat the mixture is not an end in itself but rather to create another kind of food altogether. Rabbi Ezekiel b. Yehudah Landau⁷⁶ ruled that the bladder of a non-kosher fish could be used

68. שו"ת רדב"ז חלק ג סימן תקמז (תתקעח). וא"ת כיון שהוא מכירו נגזור שמא יאמר לעכו"ם לבטלו כדאמרין לגבי שבת. לא קשיא חדא דהתם איסורו מן התורה דהיינו למלאות מים מרשות היחיד לר"ה או לעשות כבש או ללקוט עשבים אבל בנ"ד לא הוי אלא מדרבנן דהא מהתורה כבר נתבטל. ותו דהתם גזרינן בעכו"ם המכירו שמא יאמר לעכו"ם לעשות ואמירה לעכו"ם יש בו שבות אבל בנ"ד אפי' שיאמר לו לבטל אין באמירה זו איסור ואין האיסור אלא באכילה ודוק ומ"מ מודה אני שאם אמר לעכו"ם לבטל דקנסינן ליה ואסור לאותו שאמר לעכו"ם לבטל ולאחרים שרי וכדכתיבנא:

69. שדיחמד (כרך א עמ' 92 הוצאת בית הסופר תשכ"ג) כתב בשם רוב הפוסקים שהתירו ושכן המנהג למעשה.

70. הכתב-סופר (שו"ת או"ח סי' פז ד"ה ואפילו).

71. Rema, *Shulchan Aruch, Yoreh Deah* 122:6.

72. Responsa of Radbaz 3:547.

73. See *Darchei Teshuva* 108:2.

74. "בדבר המשקה הקאקא-קאלא" מאת הרב טוביה גפן בשו"ת קרני-ההוד.

75. Taz, *Yoreh Deah* 84:18; 99:7; *Shach* ad loc. 38; *Bach, Yoreh Deah* 137:2.

76. *Nodeh B'Yehuda Yoreh Deah, Mahadura Tinyana* 26.

to clarify mead, and that this would not be considered לכתחילה בטל בשישים, since the intention is not to enhance taste but to remove lees. The Chatam Sofer says that when a mixture is not cooked the prohibition is *d'rabanan* when there is no issue of *noten ta'am*, as is the case here.⁷⁷ Rabbi Spitz⁷⁸ argues that soaking kosher food in a forbidden substance (or vice versa) is considered cooking them together which would rise to the level of a *d'rabanan issur*. But Rabbi Spitz assumes a non-kosher bovine fetal blood medium which, as stated above, is not the practice.

There are cases of *bitul issur* that we do allow that could be helpful examples. Rabbi Whitman cites the example of kefir⁷⁹ made from milk from an impure animal, *basar b'chalav*, and *neveila*. The ingredients are combined and then agitated. The result is a starter that grows for several generations until it grows and develops to something called kefir grain which is neither grain nor considered *issur*.⁸⁰ If this case is a permitted mixture why would our lab synthesized meat not be accepted for the same reason? The processes here are more similar to the processes in lab synthesized meat rather than in a cooking example. Both start from non-visible bio-chemical mixtures that replicate themselves for many generations. The *Terumat ha-Deshen* says that in a case where there is a *safek* whether there is *issur* in a mixture then there is no *bitul l'chatchila*.⁸¹ In that case he is describing worms or parts of worms in flour where the likelihood is high. In the case of lab synthesized meat where we have a *safek* that there is any *issur*, in that the stem cells are not visible and there is no *ta'am*, then any mixture is not a mixture with *bitul l'chatchila*.

זה וזה גורם — *Zeh v'Zeh Gorem* — Two Equally Contributing Factors

Another argument comes from the concept of *zeh v'zeh gorem*, when there are two equal contributing factors, one of which is *heter* and one of which is

77. Chatam Sofer, Yoreh Deah 79:81.

78. Yehuda Bezalel Spitz, "Meat from Stem Cells", *Techumin* 35 (5775): 196.

79. Ze'ev Whitman, "Cultured Meat: Review and Response", *Techumin* 36 (5776): 460.

80. Ibid.

81. *Terumat ha-Deshen* 1:171.

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issur.⁸² According to *halacha* the mixture or result of the two is *heter*. According to Tosafot⁸³ in *Pesachim* this works especially when there is no *b'ain* which is similar to the lab synthesized meat case, since there is no *issur* that is visible. Tosafot claims that *zeh v'zeh gorem* only works when both parts are equally important. Here the stem cells would not multiply without the medium and the medium would not feed anything without the stem cells. Rav Yehuda Spitz rejects the argument that the two ingredients are equally important.⁸⁴ R. Bleich wrote that "Were the non-kosher stem cell the sole cause, the cultured meat cells would be forbidden as *yotzei*. But those meat cells are the resultant effect of dual causes, viz., the stem cell and the nutrients introduced into the petri dish in order to make cell division possible. Moreover, the nutrients do not function simply as catalysts that are not present in the effect; rather, the nutrients are physically integrated into the newly produced cells. It therefore follows that the cultured meat is the product of *zeh va-zeh gorem* and hence permissible. This conclusion is correct only if the nutrients are derived from kosher sources."⁸⁵ Furthermore, the Chatam Sofer wrote about rennet: וכיון דלט"ז מותר לגמרי א"כ מותר לכ"ע לבטלו בס' לכתחלה ולהתיר זוז"ג לכתחילה אמנם כל זה אם נתרכך בזמן מועט that we can combine bitul of 1/60 with *zeh v'zeh gorem* and allow rennet in tiny quantities *l'chatchila*.⁸⁶

דבר המעמיד כנגד פנים חדשות — *Davar ha-Ma'amid* (A Coagulant) vs. *Panim Chadashot* (New Faces)

Some argue that the stem cells, like rennet or gelatin, can never be *batel* because they are more like a *davar ha-ma'amid*. They claim that without the stem cells there would be no growth at all. They claim that the cells are similar to gelatin. In that case we enter into an international *safek*. Rav Aharon

82. Talmud Bavli, *Avodah Zarah* 48b; *Temurah* 30a.

83. Tosafot, *Pesachim* 26b s.v. "Chadash Yotatz".

84. Yehuda Spitz, "Meat from Stem Cells: Response", *Techumin* 35 (5775): 193.

85. J. David Bleich, "Stem-Cell Burgers", *Tradition* 46:4 (2013): 58.

86. Chatam Sofer, *Yoreh Deah* 81.

Kotler⁸⁷ and Rav Moshe Feinstein⁸⁸ both forbade gelatin from *neveilot* and *tereifot* of non-kosher animals. They reason that the gelatin started out as something non-edible and through the processes they became *ra'uy l'achila* (edible) so the *ta'am issur* (prohibited taste) came back. They further argue that even though gelatin is a highly processed ingredient, the main element — the collagen — is present throughout.

In contrast, Rav Ovadia said that gelatin constitutes “*panim chadashot*” or an entirely new ingredient.⁸⁹ “The process of making gelatin involves using the animals’ skin and bones after they are well dried, over several months, and then mixing them with chemicals and ground to powder. Then new “faces” arrive and so gelatin is allowed (and pareve).”

So here we have a *metziut* question and a serious *safek d'rabanan*. Is the lab synthesized meat a *davar ha-ma'amid* or *panim chadashot*? One could argue that by creating this food in this novel way, for example by adding healthier Omega-3 fats, a whole new category of food is being created. The fact that the cells are manipulated to become “immortal” puts them in a category that is different from normal cells and is something completely new. Or one could argue that the same cells are still there or at least the same genetic material is still there, since the original cells have long disappeared by the time the food reaches the consumer.⁹⁰

Rabbi Ze'ev Whitman argues that the stem cells are not a *davar ha-ma'amid* but rather more like a plant in soil.⁹¹ The plant cannot grow without

87. *Responsa Mishnat Rabbi Aharon, Yoreh Deah* 16:9, 17.

88. *Igrot Moshe, Yoreh Deah* 2:27.

89. Yabia Omer, *Yoreh Deah* 8:11 see also <https://www.torahmusings.com/2014/07/gelatin-halacha-recent-developments/>.

90. Perhaps it is appropriate here to invoke Rav Moshe in a different context where he said that if there are multiple serious *sefeikot d'rabanan* then we hold *l'kula*.

והנה לדידי היה מסתבר שכיון שספק ביה"ש אם הוא יום או לילה ספק בהמציאות איך הוא שהא לא
ידוע לשום אינשי, וספק בהג' מילין ורביע הוא ספק דפלוגתא דרבוותא בדינא יש להחשיב זה לס"ס

“And so it would seem here that because there is a *safek* of whether *bein hashemashot* is day or night, there is a *safek* of *metziut* (reality) since not known to anyone and a *safek* about three *mil* and a quarter is a *safek* about which Rabbis disagree and we can consider this a *safek s'feka*.” *Igrot Moshe, Orach Chaim* 4:62 Since there is a doubt about the reality and also a great disagreement between notable *poskim* with good arguments on both sides then we should rule leniently.

91. Ze'ev Whitman, “Cultured Meat: Review and Response”, *Techumin* 36 (5776): 459.

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the soil and the nutrients and so constitutes *panim chadashot*. Rabbi Wayne Allen wrote “so if the stem cells were categorized as ‘davar ha-ma’amid,’ the entire process of producing “meat” in the laboratory would be called into question. But as noted above, the stem cells are not a catalyst advancing the transformation of a substance into meat. They are the source out of which “meat” grows. Thus, if using cheese making as the operative analogy, the stem cells are not the equivalent of the rennet added to the milk to curdle it. The stem cells are the milk itself.”⁹²

Rabbi Tendler does not see the relationship of the meat culture to the medium as analogous to that of milk and rennet wherein the rennet turns the milk into cheese. The stem cells do not turn the medium into cultured meat but rather “[t]he muscle precursor cells consume the nutrients of the medium and grow into muscle tissue. Therefore, the medium has no substance as part of the cultured meat, and should not be considered as mixed with the cells to prohibit the cultured meat.”⁹³ Therefore the cells are not a stabilizer for the medium. He further suggests that for the lab synthesized meat to be considered *pareve*, the stem cells should be sourced from animal skin with no meat attached, as that is halachically *pareve*.⁹⁴

Bava Kama 96b describes a case that seems to be similar by analogy to stem cells and lab synthesized meat. “By contrast, if he robbed another of a brick, and by crushing it turned it into earth, he has acquired it due to the change. If you say: Perhaps he will return it and fashion it into a brick? This is a different brick, and a new entity [*panim chadashot*] has arrived, i.e., entered into existence, here.” The Gemara here is describing an entity made up of building blocks that are crushed and reformed similar to the process of extracting stem cells from meat, refashioning them with nutrients and a matrix on which to grow and so a new entity emerges.

מְרִית עֵינַי — *Marit Ayin* — Preventing False Assumptions

Marit ayin is the concern that even though you are not doing anything wrong,

92. http://utj.org/viewpoints/responsa/the-kashrut-of-laboratory-produced-meat/#_ftnref26.

93. John D. Loike, Ira Bedzow and Moshe D. Tendler, “Pareve Cloned Beef Burgers: Health and Halachic Considerations”, *Hakirah* 24 (Spring 2018): 201.

94. *Ibid.*, p. 203.

it might appear to another's eye that you are committing a transgression. Within *kashrut*, *marit ayin* seeks to prevent onlookers from mistakenly thinking that one is serving an *assur* mixture.⁹⁵ The *Pri Chadash* warns against adding *gezeirot* of *marit ayin* beyond what is designated in the Talmud because otherwise there will be no end to what is prohibited.⁹⁶ Rav Ovadia Yosef stated that one is allowed to drink synthetic milk and eat *parve* ice cream after a meat meal.⁹⁷ The *Kreiti u-Pleiti* wrote that if it is usual then the food is allowed.⁹⁸ Rav Yehuda Spitz says that lab synthesized meat is still too expensive to say that it is usual. As lab synthesized meat becomes common people will recognize it for what it is and not be confused, just as tofu and other *pareve* “milk” products no longer seem to be governed by *marit ayin*. Rav Aviner says, “And regarding eating such a burger with dairy, there is no problem of *Maarit Ayin*, since we do not add to the list of things forbidden in the Gemara on account of *Maarit Ayin*.”⁹⁹

אֲחֻשְׁבַּי — *Achshevai* — Non-Foods to Foods

The principle of *Achshevai* states that “a person can consciously promote non-foods to a food status by using it as a food.”¹⁰⁰ For example, “during Pesach we permit a scribe to write with ink that contains chametz, notwithstanding the fact that it is expected that the scribe will suck on the pen and ingest some of the chametz ink. We are not concerned about the chametz since, a) the ink is not food; b) the scribe has not consciously chosen to eat the ink. It is not *Achshevei*, considered a food, unless the scribe chooses to use the ink as a regular food.”¹⁰¹ “The Nodah BiYehudah restricts the Halachic definition of

95. Talmud Bavli *Chullin* 104b; Rambam, *Mishneh Torah*, Forbidden Foods 9:20; *Shulchan Aruch*, *Yoreh Deah* 67:3.

96. *Pri Chadash* 461:2.

97. Ovadia Yosef, *Yechavei Da'at* 3:59.

98. *Kreiti u-Pleiti* on *Shulchan Aruch*, *Yoreh Deah* 298:1.

99. Rav Shlomo Aviner, “Kashrut of Laboratory-Grown Hamburger”, *Torat Ha-Rav Aviner* 12 (August 2013).

100. <https://ohr.edu/5518>; Rosh on *Pesachim*, *daf* 21; Gra & Magen Avraham on *Shulchan Aruch* 442; *Aruch Ha-Shulchan* 442:30.

101. <https://ohr.edu/5518>.

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food to those products that are used as a food in themselves. Products that are exclusively used as an adjunct to be used with other foods, are not foods. He limits *Achshevei* to products that are chosen to be consumed in their present form and therefore permits using a food additive derived from non-kosher since it is in itself not an edible product.”¹⁰² Stem cells are not food products at the beginning of the process although the end product is edible. It is not clear that the principle of *Achshevei* applies here, and if it did it would be a *safek* in addition to all the other *sefeikot d’rabanan*.

Conclusion

The original cells from which lab meat is synthesized are not halachically significant. Rather, they should be considered *panim chadashot* because of all the manipulation they undergo in the process. Consequently, lab synthesized meat may be sourced from any meat and the resulting product will be *pareve*.

The conservative nature of *halacha* might compel one to say that the source should be from kosher animals only¹⁰³ or only from fish.¹⁰⁴ This would make synthetic meat more expensive and less easily available to the kosher eating population. *Poskim* have an obligation to consider the financial burden to the community and not impose unduly expensive stringencies. Lab grown meat has the potential to significantly reduce the cost of keeping kosher. In addition, it will reduce greenhouse gases, prevent mass cruelty to animals, and help keep more of the world’s population fed. As Rav Lior wrote, “There will always be those who are *machmir* but we have to balance it with the desire to stop world hunger and the great harm to nature and the *issur* of *Tzar ba’alei chaim*.”¹⁰⁵ Based on all these considerations, I wholeheartedly endorse the *kashrut* of lab produced meat and look forward to the day it becomes a staple of our diet.

102. Nodah B’Yehuda II, *Yoreh Deah* 57 as cited in <https://ohr.edu/5518>.

103. Yehuda Spitz, “Meat from Stem Cells: Response”, *Techumin* 35 (5775): 193.

104. Yaakov Ariel, “The Kashrut of Cultured Meat”, *Techumin* 36 (5776) 454.

105. <https://tinyurl.com/ygsavpcg> (translation by author).