

HALACHIC AND HASHKAFIC ISSUES IN CONTEMPORARY SOCIETY

62 - SYNTHETIC MEAT OU ISRAEL CENTER - SUMMER 2017

A] WHAT IS SYNTHETIC MEAT?

1. The world's first lab-grown burger is to be unveiled and eaten at a news conference in London on Monday. Scientists took cells from a cow and, at an institute in the Netherlands, turned them into strips of muscle which they combined to make a patty. Researchers say the technology could be a sustainable way of meeting what they say is a growing demand for meat. BBC News has been granted exclusive access to the laboratory where the meat was grown in a project costing £215,000 [then over \$350,000]
He starts with stem cells extracted from cow muscle tissue. In the laboratory, these are cultured with nutrients and growth promoting chemicals to help them develop and multiply. Three weeks later, there are more than a million stem cells which are put into smaller dishes where they coalesce into small strips of muscle about a centimetre long and a few millimetres thick. These strips are collected into small pellets which are frozen. When there are enough¹, they are defrosted and compacted into a patty just before being cooked. The scientists have tried to make the meat - which is initially white in colour - as authentic as possible.
.... An independent study found that lab grown beef uses 45% less energy than the average global representative figure for farming cattle. It also produces 96% fewer greenhouse gas emissions and requires 99% less land.

World's first lab-grown burger is eaten in London 5 August 2013²

The prospect of synthetic meat becoming available (assuming that it is also producible at an economic cost³) raises certain issues:

- The ethical concerns of cruelty to animals could be alleviated by synthetic meat.
- The environmental 'footprint' for synthetic meat is significantly lower.
- Health concerns - balancing the potential dangers of Genetically Modified (GM) production, with the existing health risks of conventional meat production - growth hormones etc

B] HASHKAFIC AND HALACHIC ISSUES

- The major hashkafic issue is the opportunity to reduce tzar ba'alei chaim. So much meat is produced today in environments which are unacceptably cruel. To reduce this would be a significant gain for humankind.
- Ultimately, some thinkers (notably Rav Kook) see the world moving towards an ultimately vegetarian diet. Would a move to synthetic meat precipitate this?

The major halachic issues are as follows:

- If the cell is taken from a non-kosher animal, will the synthetic burger be non-kosher?
- If the cell is taken from a kosher shechted animal, will the burger be meaty?
- If the cell is taken from a live animal, would that constitute 'aver/basar min hachai' - taking a limb or flesh from a live animal. This could be a Torah prohibition and render the burger treif.
- Even if we decide that the burger is kosher and parev, will there be a ma'arit ayin problem to eat it with cheese?
- Are the ingredients of the medium used to grow the tissue kosher?

1. 20,000 strips are needed to make one burger.

2. <http://www.bbc.com/news/science-environment-23576143>

3. A number of start-up companies are working on this, including Supermeat in Israel - see https://en.wikipedia.org/wiki/Cultured_meat

C] WHEN IS MEAT REALLY 'MEAT'?

- Kosher meat generally comes from (i) a kosher animal; (ii) which is healthy (ie not a treifa) and; (iii) which was properly shechted.⁴

2. רבי שמעון בן חלפתא הוה קאזיל באורחא, פגעו בו הנך אריותא דהוּו קא נהמי לאפיה, אמר: (תהלים קד:כא) הַכִּפְיִרִים שָׁאֲגִים לְטָרְף. נחיתו ליה תרתי אטמתא, חדא אכלוה וחדא שבקוה. איתיה ואתא לבי מדרשא, בעי עלה: דבר טמא הוא זה או דבר טהור? - אמרו ליה: אין דבר טמא יורד מן השמים.

סנהדרין נט:

The Gemara tells of an episode where meat fell from heaven to save R' Shimon ben Chalafta from wild animals. Some of the meat was left over and the psak was that such meat is kosher since it fell from Shamayim.⁵

- Of course, synthetic meat is NOT miraculous, so this source appears to be irrelevant, unless it establishes that only meat from a regular living creature is subject to the laws of kashrut.

3. כדרב חנינא ורב אושעיא. כל מעלי שבתא הוּו עסקי בהלכות יצירה, ומיברי להו עיגלא תילתא ואכלי ליה

סנהדרין סז:

The Amoraim were able to use the mystical Sefer Yetzira to create a choice calf to eat on Shabbat. Apparently, that meat was kosher. According to the Shelah, the resultant cow does not even need shechita!

4. (ב) בבהמה. זשל"ה דף ש"ג כתב דבהמה שנבראת ע"י ספר יצירה, כמו דמלינו בגמרא דברא עגלא תילתא בכל ערב שבת, מותר לאכלו בעודו חי. וזה היה מעשה השבטים שהביא יוסף דתם רעה אל אחיהם שאכלו אמ"ה, כי יוסף סבר שהיא בהמה גמורה ע"ש. ונראה דמ"מ אסור לאכלו בלא שחיטה מדרבנן משום מראית עין ...

פתחי תשובה יורה דעה סימן סב

This story is in fact quoted in the Pitchei Teshuva on Shulchan Aruch in the halachot of Ever Min Hachai. Although the mystically created cow does not need shechita according to Torah law, it still requires shechita Derabbanan because of ma'arit ayin. The Pitchei Teshuva uses this halacha to explain the midrash about Yosef speaking lashon hara about the brothers eating ever min hachai.

5. שלקח חמאה וחלב ובן הבקר אשר עשה ר"ל יען שעשאו ע"י ספר יצירה היו יכולים לאכלו עם חלב. אבל בפשוט לא קשה כי נתן לפניהם תחלה חמאה וחלב ואכלו ואח"כ שעשה בן הבקר נתן לפניהם הבשר ...

מלבי"ם בראשית יח:

Many mefarshim have questioned how Avraham could serve meat and milk to the melachim. One answer given by the Malbim is that the beef in question was created through the Sefer Yetzira and was therefore parev!

6. ודע דבשר בהמה שנברא ע"י ספר יצירה מותר לבשל בחלב דאין לו דין בשר כלל. וכן כתב הגאון אמתי מו"ה מלבי"ם

חשק שלמה על הש"ך יו"ד סימן צח ס'ק ז

The Malbim's apparently mystical drash is also brought in the halachic sources!⁶

- Do these sources impact on the issue of synthetic meat? This meat is NOT made through mystical access to the Sefer Yetzira but scientifically in a lab. As such, the sources may not be not directly relevant, but they DO indicate that there could be a something which looks like meat and tastes like meat, but is which is not halachically meat. Again, does 'meat' have to come from a normal source through a normal process?

7. בשיחה [עם הרב צבי שכטר שליט"א] בכ"ב באדר תשע"ב הבהיר הרב שכטר שלדעתו בשר הוא רק דבר שמקורו מבעל חיים שנוגד מאם בדרך הטבע. כל בשר שמוצר בדרך אחרת אינו בשר לעניינים הלכתיים

דר' חנוך קאהן, כשרותו של הבשר המלאכותי, המעין 216 (טבת 5776)

Rav Herschel Schachter is quoted⁷ as saying that only meat which came from a normal animal through natural means has the halachic status of meat. Of course, synthetic meat DOES come from a normal animal and is derived through natural means.

4. Of course, the meat needs to be kashered by draining the blood etc.

5. It is not clear if the meat was made by a miracle and thus not at all natural, or whether a miraculous storm lifted regular meat from somewhere else and dropped it on him.

6. The broader question of how midrashic sources impact on halacha will iy'H be the subject of a separate shiur.

7. This and many other relevant sources can be found on an excellent source sheet by Rabbi Mordechai Torczyner - see Further Reading below.

D] 'PANIM CHADASHOT'

8. אמר רב פפא: האי מאן דגזל עפרא מחבריה ועבדיה לבינתא - לא קני, מאי טעמא? דהדר משוי ליה עפרא. לבינתא ועבדיה עפרא - קני, מאי אמרת? דלמא הדר ועביד ליה לבינתא, האי לבינתא אחריתי הוא, ופנים חדשות באו לכאן

בבא קמא צו:

If a person stole a brick and ground it into dust, that would be considered an irreversible change which could effect a transfer of ownership such that the thief would be liable to pay back the value rather than return the original stolen property. The Gemara asks - could the dust not be turned back into a brick!? The answer is that this would be a Panim Chadashot - a new entity which no longer has the same status as the first.

- This is one of the key halachic issues concerning the status of gelatin⁸. Gelatin is derived from collagen obtained from various animal by-products, including the bone and skin of cows and pigs. These are soaked in hydrochloric acid, then soaked in lime for a month, after which they are washed in sulfuric acid. Some poskim permitted gelatin made from cow bones⁹ or even cow skins¹⁰ on the basis that the original substance had been totally broken down and rendered entirely inedible, then reconstituted into something new - *panim chadashot*.
- Some poskim wish to apply this to synthetic meat. As such, EVEN if the source of the cells is treif meat or ever min hachai the final product will be kosher.

9. This "meat" undergoes many changes to the point that its entire identity is different. This is the same as Gelatin from non-Kosher animals. The bones undergo so many changes that the product is considered an entirely new creation. While some authorities are strict about this issue, the basic Halachah is that Gelatin is Kosher (See Shut Yabia Omer 8:11).

Rav Shlomo Aviner, Torat HaRav Aviner 12 August 2013, Kashrut of Laboratory-Grown Hamburger¹¹

- However, many poskim¹² have ruled that gelatin from non-kosher sources is NOT kosher. They question the applicability of *panim chadashot* since the main element - the collagen - is present throughout. They also raise the issue of '*Achshevei*' - that by relating to the product as food one is effectively treating it as edible.
- Also, in the case of synthetic meat, the product is ALWAYS edible.
- Interestingly, in the case of kosher gelatin, Rav Moshe rules that it is parve whereas R' Aharon Kotler rules that it should be treated (at least lechatchila) as meaty. Would this translate into the debate on synthetic meat which is derived from a kosher source?

E] 'NIRAH L'EYNAYIM'

- Normally halacha does not take account of something which is visible under magnification but too small to be seen with the human eye. E.g.
 - Spots on an etrog.
 - Spots on a bedika cloth for hilchot nidda.
 - Letters in a sefer Torah which are touching only when viewed under a lens.
 - Bugs on vegetables.
 - Fish whose scales can only be seen under a microscope.
- The cell which is taken from the animal is not visible with the naked eye. Does this mean it is halachically irrelevant?

10. בענין שאלתו בדבר הנדסה גנטית, שמכניסים חלקיקי תאים מבריה אחת לשניה, ובזה משנים את תכונותיה של השניה. ועיי' 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.

שר"ת מנחת שלמה תניינא (ב - ג) סימן ק

Rav Shlomo Zalman rules (in the context of grafting plants on a microscopic scale) that where magnification is the normal way to effect a procedure, that becomes halachically relevant.

- Rav Yaakov Ariel in Techumin 35 (see Further Reading) applies this principle to synthetic meat and suggests that the principle of nireh l'eynaim is irrelevant.

8. Which will iy'H be the subject of a future shiur.

9. Including R' Chaim Ozer Grodzinsky (Shu't Achiezer 3:33, 5)

10. Including R' Ovadia Yosef (Shu't Yabia Omer Vol 8, YD 11)

11. <http://www.ravaviner.com/2013/08/kashrut-of-laboratory-grown-hamburger.html?m=1>

12. Most senior poskim in America in the 1950's and 60's - Rav Moshe Feinstein, Rav Aharon Kotler, Rav Yosef Henkin, and almost all senior poskim in Israel. Mehadrin hechsherim in Israel will not permit gelatin from non-kodher sources, but the regular Rabbanut hechsherim could.

F] EVER MIN HACHAI

11. (דברים יב:כג) [וְלֹא-תֹאכַל הַנֶּפֶשׁ עִם-הַבֶּשֶׂר - אֲזָהָרָה לֹא-יִשֵּׁשׁ בֶּשֶׂר מִן הַחַי. וְנוֹהֵג בְּבִהְמָה וְחַיָּה וְעוֹף וְאִינוּ נוֹהֵג אֲלֵא בְטְהוּרִים. לְפִיכֵךְ אֲבָר הַפּוֹרֵשׁ מִן הַחַי בֵּין שֵׁשׁ בּוֹ בֶּשֶׂר וְגִידִין וְעֲצָמוֹת בֵּין שֵׁאִין בּוֹ אֲלֵא בֶּשֶׂר לְבַד כִּגוֹן הַלְשׁוֹן וְהַטְחוּל וְהַכְלִיּוֹת וְהַבִּיּוֹצִים אֲסוּר לֹא-יִשֵּׁשׁ בֵּין אִם יֵשׁ בּוֹ כְּזֵית בֵּין אִם אֵין בּוֹ כְּזֵית. וְכֵן בֶּשֶׂר הַפּוֹרֵשׁ מִן הַחַי אֲסוּר אִף עַל פִּי שֵׁאִין בּוֹ מִשּׁוּם אֲבָר מִן הַחַי אֲסוּר מִשּׁוּם (שְׁמוֹת כ"ל) וְנִבְשֶׁר בְּשִׂדָּה טְרֵפָה לֹא תֹאכְלוּ. ...

טור יורה דעה הלכות אבר מן החי סימן סב

Ever Min Hachai prohibits taking any limb or flesh from a live animal, no matter how small, and that meat is not kosher. Is removing the cell considered to be Ever Min Hachai?

12. אמר רב חסדא: ... עד ארבעים מיהא בעלמא היא

לבמות ס:

Chazal explain that, until 40 days gestation, an embryo is considered halachically as 'mere fluid'. This is ruled in halacha¹³. Such an embryo contains many cells, including stem cells, and yet is considered to be simply fluid.

- Some poskim have therefore ruled that a cell taken from a cow, similarly, has a halachic status of 'fluid' and not meat from the animal.
- Other poskim counter that the concept of 'maya b'alma' is a specific concept applicable only to human embryos and cannot be transferred to other areas.

G] 'YOTZEI MIN HATAMEI'

13. ... בהמה טהורה שילדה כמין בהמה טמאה מותר באכילה. וטמאה שילדה כמין בהמה טהורה אסור באכילה **שהיוצא מהטמא טמא והיוצא מן הטהור טהור**

משנה בכורות פרק א משנה ב

The Mishna rules that anything which comes out of a non-kosher animal is not-kosher. This would include not only offspring (even if it otherwise looks kosher), but also milk, secretions etc.

- As such, it would seem that any cell taken from a non-kosher or non-shechted animal could not be kosher since it would be a 'yotzei'.
- It also follows that cells taken from an kosher shechted animal will be kosher. But will they be meaty?

14. המבשל שליא או עור וגידין ועצמות ועקרי קרנים וטלפים הרכים בחלב פטור. וכן האוכלן פטור.

רמב"ם מאכלות אסורות פרק ט הלכה ז

The Rambam rules that non-meat parts of an animal may be a 'yotzei' of the animal but they are not meaty!

- Nevertheless, others counter that this would definitely not apply to actual meat taken from the animal. Synthetic meat is a far more similar to the actual meat of the animal and would not be merely a *yotzei*.

H] BITUL

- Even if we say that an original cell taken from a treif animal will indeed be treif, what will be the status of all the other cells grown from that original? Will they be considered new kosher meat or will they take on the same treif status as their 'parent' cell?

15. הטבל - גדוליו מותרין בדבר שזרעו כלה. אבל בדבר שאין זרעו כלה גדולי גדולין אסורין. איזהו דבר שאין זרעו כלה? כגון הלוח והשום והבצלים

משנה תרומות פרק ט משנה ו

The Mishna rules that where a non-kosher seed is planted (in this case 'tevel' - produce which has not yet had terumot and maaserot taken) the growth from that seed is kosher. However, this only applies where the original seed rots away, as in the case of grain. If the original 'seed' remains, as in onions, all future generations of the original are still treif!

13. Shach CM 210:2

- As such, if a cell is taken from a non-kosher source, even if the cell is originally batel (in 60) in the added nutrients, when the cell later replicated and forms a new mass of fibres, this will be considered 'gidulim' and will be treif, and too big to be batel.
- Furthermore, any suggestion of 'bitul beshishim', will be complicated by the following factors within the halachot of bitul:
 - (i) Is the original cell considered to be 'avidei letaamei' - put there purposely to give taste¹⁴ - in which case it may never be batel.
 - (ii) Since the added nutrients are all added for the specific purposes of nourishing the cell, can the cell ever be batel in this substance?
 - (iii) Is the original cell considered to be a 'davar hama'amid' - a key substance or catalyst that gives form to the material - which is never batel?
 - (iv) Can we apply the principle of 'zeh v'zeh gorem'? Where there are multiple catalysts, some kosher and some not, there will be contributing factors and the regular principle of bitul b'shishim will apply.
 - (v) Will we invoke the principle of 'bitul issur lechatchila' - where the prohibited substance was introduced on purpose - and bitul will not apply. Many of the issues that we saw in the shiur on sherry-cask whisky will apply here. Is the non-Jews introducing the issur for other non-Jews? (also) for Jews? just because that's his job?¹⁵

I] OTHER INGREDIENTS

- Although there are conflicting accounts of the different processes involved, in some cases it seems that the synthetic meat is soaked in fresh calf (treif) blood during the growth process. If so, the meat will certainly be treif.

J] MA'ARIT AYIN

- If we conclude that the synthetic meat is both kosher and parev, will there still be a problem to eat it with milk/cheese because of ma'arit ayin - that it looks like the person is doing something prohibited?
- This may depend on how common the new innovation is and whether people will assume that an issue is being done.

16. ואם באנו להוסיף מדעתנו יש לנו לאסור הרבה כיוולא באילו. וכן כתבו התוספות בריש פרק כל הבשר [חולין קד. ד"ה ומנא] דאין לדמות גזירות חכמים זו לזו אלא במקומות שהם מדמה ע"כ

פרי חדש יורה דעה סימן פז ס"ק ז

The Pri Chadash rules that we may not create new Ma'arit Ayin situations today, other than those specifically legislated by Chazal.

K] CONTEMPORARY POSITIONS

17. In sum: It seems that a lab-grown burger is not Treif, not considered a limb taken from a living animal and is Parve (although it is not vegetarian) based on three reasons: A. It is not created in the regular process as the creation of meat. B. It has undergone many changes to the point that its entire identity is different. C. The stem cells from which it is taken cannot be seen by the human eye. However, since this is a new creation, the great Torah scholars must decide on the matter. 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

Rav Shlomo Aviner, Torat HaRav Aviner 12 August 2013, Kashrut of Laboratory-Grown Hamburger¹⁶

- See also an interesting video featuring R' Aviner, R' Dov Lior and R' Yuval Sherlow who all take a lenient view on the issues. <https://www.youtube.com/watch?v=C1a9GHMm2Xk>¹⁷

14. Which raises the question of where the taste for meat come from. Is it the cell or the nutrients which help to grow the cell. Does the cell have any taste at all? Even in regular meat, is the taste a product of the cells in the meat - muscle, fat etc - or of the food that the animal ate?

15. For a detailed analysis of these issues, and a fascinating account of how they related to early hashgacha of Coca-Cola, see the article by R' Spitz - see Further Reading.

16. <http://www.ravaviner.com/2013/08/kashrut-of-laboratory-grown-hamburger.html?m=1>

17. Although note that the video was made by Supermeat, an Israel Biotech start up which is developing synthetic meat products.

18. For kosher-observant Jews, the “cultured” burgers could open the door to radical dietary changes – namely, the birth of the kosher cheeseburger. That’s because meat produced through this process could be considered parve – neither meat nor dairy – according to Rabbi Menachem Genack, CEO of the Orthodox Union’s kosher division. Thus, under traditional Jewish law, the burger could be paired with dairy products.

Has the Era of the Kosher Cheeseburger Arrived? Times of Israel - August 9, 2013

19. בסיכומו של דבר דינו של ההמבורגר המלאכותי יקבע על פי הרכב התאים ש"נולדו" בתהליך. כלומר, אם התא המקורי נלקח מבעל חיים לא כשר או שלא נשחט כדין, הרי שצאצאי תא זה נחשבים אסורים גם כן. ומכאן שגם ההמבורגר המלאכותי במקרה זה אינו נחשב ככשר אף הוא על פי כללי ההלכה היהודית.

Machon haTorah v'haAretz (www.toraland.org.il) - Kislev 5774 - המבורגר מלאכותי כשר או לא כשר?

Other poskim have taken the view that the synthetic meat will follow the original cell. If that was treif, the burger will be treif. If it was taken from a kosher shechted animal, it will be kosher and meaty.

- This is also the tentative conclusion of Rabbi Spitz and Dovid Lichtenstein in their respective articles.

L] FURTHER READING

- *The Kashrut Status of 'Clean Meat'* - R' Mordechai Torczyner, YU Torah¹⁸
- *Genetically Engineered Meat* - R' Yehuda Spitz, Journal of Halacha and Contemporary Society Volume LXXII p.56
- *Pareve Meat* - R' Daniel Friedman, Journal of Halacha and Contemporary Society Volume LIII p.93
- *A Kosher Cheeseburger? The Halachic Status of Synthetic Beef* - Dovid Lichtenstein, Headlines p. 389
- בשר מתאי גזע - R' Zvi Reisman, Techumin 34 (2014)
- בשר מתאי גזע - R' Yehuda Spitz, Techumin 35 (2015)
- בשר מתאי גזע - R' Yaakov Ariel, Techumin 36 (2016)

18. Audio: <http://www.yutorah.org/sidebar/lecture.cfm/881871/rabbi-mordechai-torczyner/the-kashrut-of-clean-meat/>

Source Sheet: <http://www.yutorah.org/download.cfm?materialID=531386>

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