

Derech

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Acknowledgment of Dr. Babich

Stern College for Women (SCW) at Yeshiva University offers an educational model that includes secular classes and a strong Torah foundation. Yeshiva University is the only Jewish University where these two are incorporated together. At Yeshiva University, the mission is Torah Umadda, which is to bring wisdom to life through all that we teach, all that we do, and for all those we serve. YU's unique dual curriculum allows students to thrive academically and lead a Torah life. Students have many opportunities to merge these concepts.

Derech Hateva is a prime example of this. This publication was started in 1997 by Dr. Harvey Babich. With his help, guidance, and support, Stern students have published 28 volumes of the journal. Without Dr. Babich's ongoing support and encouragement, this journal would have not been possible.

Dr. Babich, a distinguished professor and mentor, is very dedicated to his student's success. As the Chair of the Biology Department, Dr. Babich goes above and beyond the standard responsibilities. Dr. Babich is committed to ensuring his students are set up for success in his class, professionally and religiously. His passion for Torah and science is evident in his personal connection with students and his encouragement of their scholarly contributions. Dr. Babich is extremely inspirational, and a mentor to many.

The success of Derech Hateva owes much to Dr. Babich and we are so grateful for his continued guidance and support.

We thank you for making this opportunity possible.

Editor-in-chief: Avivit Nsiri

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Dedication

Dean Karen Bacon, a Scholar, a Leader and a Visionary

On September 13, 2023, the faculty was informed that Dr. Karen Bacon was stepping down as Dean of Stern College for Women (SCW) and of Yeshiva College (YC) and would assume the new role as Associate Vice President for Academic Affairs. Certain of many upcoming University events acknowledging Dean Bacon's contributions to Yeshiva University and to modern Orthodox Jewry, I wish to stress the Dean's role in promoting the healthcare professions to Orthodox Jewish young women. Trained as a microbiologist, Dean Bacon understood the intricacies of science and, more importantly, saw the void of modern Jewish women in the healthcare industry. Always encouraging the faculty of the Biology Department to teach high level courses, as well as being financially supportive of the purchase of modern laboratory equipment, SCW science majors have become highly competitive – both in obtaining competitive summer research internships and in entrance to prestigious graduate programs. Dean Bacon was particularly supportive of *Derech HaTeva, a Journal of Torah and Science*, as it allowed our science majors to combine their two strengths – Judaic studies and science.



Since the 2006-2007 academic year, the Biology Department has recorded the progress of our graduates, primarily those majoring in biology or in chemistry/biochemistry, in their entrance to professional schools. The data presented below are limited, in that our records only go back to the 2006-2007 academic year and are not complete for this academic year. Thus, these statistics should be considered as an underestimation of the accomplishments by our graduates. Our data indicate that from the graduating class of 2007 through April, 2024: 6 SCW graduates pursued dual Ph.D./M.D. degrees and a minimum of 232 graduates entered medical school (including 112 to Albert Einstein College of Medicine), 36 entered a program in osteopathic medicine, 120 entered dental school, 15 entered optometry school, 1 graduate entered podiatry school, 96 entered a program in physician assistant, 62 entered physical therapy school, 106 entered occupational therapy, 304 entered nursing school, 3 entered veterinary science, and 1 graduate entered a program in holistic medicine. In addition, graduates chose careers in genetic counseling (18), nutrition (17), pharmacy (8), and prosthetics (2). Graduates also pursued a M.S. degree in biotechnology (7), biomedicine (22), public health (2), bioengineering (4), computer biology (1), and biology (3).

Dean Karen Bacon is a true role model for the modern Orthodox Jewish woman. Her impact on the role of the American Orthodox Jewish woman in the healthcare sciences is unparalleled and is a true fulfillment of the YU mission, *Torah U'Madda*.

Harvey Babich

Harvey Babich, Ph.D.
Professor of Biology
Chair, Department of Biology

Dedication

October 7th will forever mark a dark day in Jewish calendars around the world. Not since the Shoah have so many Jews been murdered. Hostages, our brothers and sisters, still remain captive. That tragic day and the following military campaign has left an indelible impact on all of us. As global support for Israel wanes and anti-Israel, indeed anti-Jewish demonstrations rage across institutions of higher learning, things seem darker than ever.

Despite this, through the darkness, the light that is the Jewish People shines. From equipment drives to letter-writing campaigns, from rallies to media advocacy, Jews everywhere, old and young, secular and observant, have mobilized. The message is clear. Though we are few, though our detractors are many, though anti-semitism has once again reared its ugly head, one thing will always be true: The Jewish Nation will remain untrammled, as we have time and time again.

As we write this, our brave soldiers, many not older than ourselves, are fighting to protect the Jewish State, and frankly all of us. Thousands are in Gaza at this very moment, praying before picking up their weapons to risk their lives for their country and people. For those of us in the diaspora, supporting them is integral. Though we are not on the front lines, contributing through advocating, fundraising, and donating is our responsibility.

This edition of Derech Hateva is dedicated to the victims of October 7th, the hostages still in captivity, and our soldiers fighting for our nation's survival. May all of the Torah learning that composed this publication merit a speedy return of our hostages and the safe homecoming of our soldiers.

Sincerely,

Editor-in-chief: Avivit Nsiri

Co-Editors: Allison Warren, Emily Kohanbash, Gwen Caplan, and Prisylla Mutchnik

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The question of “is animal testing ethical?” might be better rephrased as “what are the ethical parameters that define animal testing?”. To save human lives, we unfortunately need to test new drugs on animals, which poses an ethical dilemma. This paper will examine Jewish sources on the concept of *tzaar baalei chayim*—the imperative not to harm animals—and how these sources could inform modern animal testing for biomedical research.

Biblical and Talmudic Framework

Shabbat 128b asserts that *tzaar baalei chayim* originates in the Torah, *i.e.* constitutes a Biblical prohibition. The *gemara* states:

Rav Yehuda said that Rav said: With regard to an animal that fell into an aqueduct, one brings cushions and blankets, and throws them into the water ditch, and places them beneath the animal in the aqueduct [on Shabbat]... Does he not, by placing the cushions and blankets, negate a vessel's preparedness? The cushions and blankets are no longer fit for their designated use on Shabbat, and this negation of their designated use is similar to the prohibited labor of dismantling. The [g]emara answers: Rav holds that negating a vessel's preparedness is prohibited by rabbinic law. Causing a living creature to suffer is a Torah prohibition. And a matter prohibited by Torah law comes and overrides a matter prohibited by rabbinic law [1].

Rashi there comments that the prohibition against causing pain to animals derives from a verse in Exodus. The full verse reads: כִּי־תִרְאֶה חֲמֹר שֹׁנֵאֵךְ רֹבֵץ תַּחַת מְשָׁאוֹ וְהִדַּלְתָּ מֵעֲנֹב לּוֹ :עֲנֹב תַּעֲזֹב עִמּוֹ- when you see the donkey of your enemy falling under its burden and you would not want to lift it, you still need to lift it [2]. Rashi references an additional gemara that also states that the prohibition against harming animals is Biblical. In Bava Metzia 32b, Rava says: “From the statements of both of these *tanna'im* it can be learned that the requirement to prevent suffering to animals is by Torah law” [3]. Other commentators suggest other verses as possible indicators of the Biblical nature of *tzaar baalei chayim* [4].

Another commandment, that of *shiluach hakan*—the injunction to send away the mother bird if you would like to take the eggs from the nest—speaks to the theme of avoiding cruelty toward animals. Brachot 33b presents two opinions regarding this commandment, one of which seems to connote that G-d in establishing this injunction had mercy on the birds. The *mishnah* states that we should quiet one who, while leading prayer, says “עַל קֹן צִיפור” “יִגְיעוּ רַחֲמֶיךָ”, that G-d has mercy on the bird's nest. The *gemara* offers two opinions as to why we should object to this prayer: One opinion, that of Rabbi Yosi bar Avin, states that this prayer invites jealousy amongst the other animals, for whom no similar injunction exists, and another opinion, that of Rabbi Yosi bar Zevida, states that this prayer attributes mercy to G-d, when really we do not understand the reason for the commandments. According to the first

opinion, the commandment of *shiluach hakan* promotes mercy to animals; Rambam considers this first opinion as the correct of the two [5].

As an additional imperative to treat animals kindly, the Rabbis learn from a *pasuk* that one should feed one's animals before eating one's own food. The verse in question in Deuteronomy states: "I will also provide grass in the fields for your cattle—and thus you shall eat your fill" [6], in which the order of the verse places feeding your animal first. Brachot 40a states: "As Rav Yehuda said that (Deuteronomy 11:15) [7]. Gittin 62a uses even stronger language: "Geneiva said to them: So says Rav Yehuda that Rav says: It is prohibited for a person to taste anything until he gives food to his animal, as it is stated in the verse: 'And I will give grass in the field for your animals' (Deuteronomy 11:15), and only afterward is it written in that verse: 'And you shall eat and be satisfied'" [8]. Whereas the discussion in Brachot mentions eating, the discussion in Gittin stresses not even to taste anything, to strengthen the point [9].

On a more philosophical note, traditional Jewish sources discuss learning from the animals, a concept that originates in Mishlei: לְדֹאֵל־נְמֻלָּה עֵצֶל רְאֵה דְרָכֶיהָ וּתְחַכְּמוּ: אֲשֶׁר אֵין־לָהּ קִצִּין שִׁטֵּר וּמֵשֶׁל: תִּכְוִן בְּקוֹץ לְחִמָּה אֲגִרָה בְּקִצִּיר מְאֻכְלָה: "Lazybones, go to the ant; Study its ways and learn. Without leaders, officers, or rulers, It lays up its stores during the summer, Gathers in its food at the harvest" [10]. The Malbim on this verse comments that just as an ant diligently gathers material, so too humankind should work to gather knowledge [11]. Eruvin 100b discusses that

were we not to have received the Torah, we still would have learned from the ant not to steal; Rashi adds, as the ant does not take food from other ants [12]. Likewise, Pirkei Avot teaches a similar theme: "יְהוּדָה בֶּן תִּימָא, אָמַר, הָיִי עַז כְּנֶמֶר, וְקַל כְּנֹשֶׁר, וְרַץ כְּצִבִּי. וְגִבּוֹר כְּאַרִי, יְהוּדָה בֶּן תִּימָא אָבִידָה שְׂבִשְׂמִים. "Judah ben Tema said: Be strong as a leopard, and swift as an eagle, and fleet as a gazelle, and brave as a lion, to do the will of your Father who is in heaven" [13]. Rav Ovadiah MiBartenura likewise applies this comparison to the pursuit of knowledge, in that one should have boldness like a leopard in asking questions of one's teachers to learn better and the endurance of an eagle to pursue one's studies [14].

Later Rabbinic Sources

The Terumat Hadeshen discusses the use of animals for human purposes. He addresses the question of whether one can pull feathers from a live chicken since perhaps this action merely resembles shearing sheep, and whether one can clip the ears/tail of a dog. On the one hand, he comments that animals were created to serve people. However, he adds, one can only cause them pain if doing so serves something essential for humans; one cannot aimlessly mistreat animals. "There is no prohibition of *tzaar baalei chayim* if one does so for one's needs and usage, because all of the animals were only created to serve humankind." However, even though certain actions are allowed, humankind has taken it upon themselves not to treat animals cruelly by these actions. He adds at the end of his answer that "rather, that the world is careful and desists, and possibly the reason is that the world does not

want to act with cruel character traits against the creatures, because they are afraid that they will receive a punishment” [15]. The punishment in question alluded to by the Terumat Hadeshen refers to an incident that occurred to Rabbi Yehuda Hanassi, discussed in Bava Metzia (85a): Rabbi Yehuda Hanassi saw a calf on its way to slaughter, the calf wept and put its head in the corner of Rabbi Yehuda Hanassi’s clothing, and Rabbi Yehuda Hanassi responded with, “you were created for this purpose”; for this, Rabbi Yehuda Hanassi received a punishment of thirteen years of kidney stones and another affliction [16]. Perhaps of significance, the calf actually wept directly at Rabbi Yehuda Hanassi and specifically was a calf rather than a grown cow.

The Ramah describes the same case as does the Terumat Hadeshen but shifts the focus away from the fear of punishment and more toward actual alleviation of suffering:

Any [action] needed for healing or other reasons, there is no prohibition of "causing pain to animals" (Issur V'Heter Extended 59). And therefore it is permitted to pluck the feathers of wild geese, and there is no potential problem of "causing pain to animals"(Mahar"i105). Nevertheless, the world withholds from it because of its cruelty [17].

This shift of focus from fear of punishment as described by the Terumat Hadeshen to lack of cruelty as described by the Ramah adds a new dimension to the discussion on animal treatment. Once it has become voluntary but encouraged to avoid even

permitted activities, how should we proceed?

History and Practice

The use of animal testing dates back to the beginning of medicine: “Humans have been using other vertebrate animal species (referred to henceforth as animals) as models of their anatomy and physiology since the dawn of medicine. Because of the taboos regarding the dissection of humans, physicians in ancient Greece dissected animals for anatomical studies.”

Subsequently, changes in the approach to medicine caused a shift away from animal testing: “Beginning with the decline of the Roman Empire and continuing throughout the Middle Ages, physiological experiments—along with scientific activity in general—would fall almost entirely into disuse and medical knowledge would become dogmatic.” This practice reverted during the Renaissance, through the seventeenth century: “The use of animal experiments to satisfy scientific inquiry would only re-emerge in the Renaissance...Physiological experiments on animals carried on throughout the seventeenth century, in the period favorable to scientific progress now known as the Age of Enlightenment.” The Enlightenment philosopher Immanuel Kant argued that while vivisectionists acted cruelly, their doing so for a beneficial end justified their actions, whereas doing so for sport did not [18], an argument that somewhat echoes that of the Terumat Hadeshen and the Ramah.

The nineteenth century saw a turning point for animal rights:

In 1875, the first animal protection society with the specific aim of abolishing animal experiments was founded and led by Irish feminist, suffragist, and animal advocate Frances Power Cobbe (1822–1904). Vivisection became a matter of public debate, only matched in Great Britain that century by the controversy around the 1859 publication of Charles Darwin’s (1809–1882) *On the Origin of Species*...[18]

As the antivivisectionist argument that animal research did not increase medical knowledge “began to lose strength,” emphasis instead began to form around preventing animal harm [18]. Again, this paradigm fits with the later Rabbinic sources that suggest that animals can serve human exigencies, including healing, but that people should minimize animal pain to the extent possible.

In the twentieth century, regulations became more established for drug marketing, including the stipulation for animal testing. An impetus for these regulations occurred in 1937, when toxic levels of antifreeze in the antibiotic sulfanilamide resulted in loss of life and illness; in response, in 1938 the United States passed the Food, Drug, and Cosmetics Act, which mandated FDA oversight for drugs. “Although the Act did not include requirements for animal research or testing, or for human clinical trials, the FDA began requesting animal as well as human safety and efficacy data for new drug applications” [19]. As animal research became a more important part of drug

marketing, concurrent with a better understanding of animal behavior, the United States began to pass federal regulations regarding animal welfare:

Ethical considerations and new scientifically validated animal behavior insights led to the passage of the 1966 Animal Welfare Act (AWA). The 1985 AWA Amendment instituted federal requirements for enriching the lives of research monkeys and established the federal Animal Welfare Information Center (AWIC). Along with the 1985 Public Health Service Act for federally funded research, it also required the establishment of an Institutional Animal Care and Use Committee (IACUC) at every institution that conducts animal research and testing in the USA to ensure the humane and responsible use of animals [19].

This progression continued in the 1980s with more emphasis on the three R’s that originated in 1959 by Russel and Burch—“reduction, refinement, and replacement”—followed by additional initiatives over the years to minimize animal suffering [20, 21]. In particular, discussions began to focus on using fewer animals, not duplicating studies, and using other models instead, though the latter has its limitations [20]. A 2022 retreat [22] brought together researchers to discuss ways to further an ethical approach to animal research; findings included moving toward reporting negative results, which would decrease duplication (reduction), using animal-free substances, such as an animal-free-synovium-on-a-chip

for arthritis research (replacement), and using big data/AI to assess where animal research would most help (harm-benefit analysis (HBA)) [22,23]. These later practices align with the Ramah's imperative that "[n]evertheless, the world withholds from it, because of its cruelty" [17].

Some researchers and ethicists argue that scientists can take more steps away from harming animals and move toward a better animal ethic. For example, Robinson *et al.*, while acknowledging that "many modern advancements simply would not have been made possible without a high fidelity, highly reproducible model, with the added benefit of preventing potential human harm," call for more attention and commitment to animal welfare in research. The authors point to methodological problems, such as lack of similarity or relevance to the human condition; they also find flaws in allowing pain in animals if considered necessary to the experiment, as not always does this process get properly justified. The authors also emphasize the importance of the three R's, with the need for still more improvement [20]. Zarrintan and Shahnaee respond to Robinson *et al.* by pointing out the necessity of animal models in particular in testing new surgical procedures, though they strongly highlight the importance of maintaining a high ethical standard in doing so [23]. The imperative to continue to strive for improved animal treatment harmonizes with the original concept of *tzaar baalei chayim*.

Can We Assess Animal Pain?

Determining in the laboratory to what extent animals feel pain has proven difficult. A

variety of possible methods—in the form of either behavioral or physiological assessments—exist to assess rodent pain but all have their limitations. For example, from the behavioral side, ethograms, which monitor for "loss of normal behaviors" and "presence of new-pain specific behaviors" face the limitation that some prey animals suppress their pain behavior in the presence of humans; using video could resolve this issue. Lack of burrowing behavior, which could indicate pain, also could stem from a number of other non-pain factors. Likewise, physiologically, body weight and hypothalamic-pituitary-adrenal gland axis (HPA) changes could indicate pain but could also manifest from other causes, while face grimace scale assessment works better with specialized training for observers. Ultimately, a better understanding of animal pain assessment methods can lead to better animal welfare [24].

Miller argues for the difficulty of determining whether animals feel pain, in spite of the fact that they demonstrate pain behavior. He points out that studies have shown that when one draws one's hand away from a hot surface, one does so even before processing pain, which could indicate that one can display pain behavior without necessarily feeling pain. However, he questions the relevance of feeling pain to inflicting pain, as it might still prove morally wrong to inflict pain even in the absence of feeling pain [25].

A similar logic motivates the Ramban when he offers as an explanation for the prohibition against slaughtering an animal

and its young on the same day: “[T]hat we should not have a cruel heart and be discompassionate” [26]. Regardless of the effect on the animal, we ourselves should not carry out cruel actions, because in doing so we would become cruel. He disagrees with Rambam, who, in keeping with his opinion on *shiluach hakan*, attributes the commandments of not slaughtering an animal and its young on the same day (and ritual slaughter) to the actual pain that the animal might feel [27, 28].

Conclusion

Policy advocates Taylor and Alvarez estimate that 192.1 million animals were used in research worldwide in 2015, a 36.9 percent increase from their 2005 estimate [29]. Over time, the discussion has become more and more involved regarding best practices that should inform how to treat animals ethically. Traditional Jewish sources have outlined in broad strokes principles and guidelines on how to treat animals, which can help us to navigate uncharted territories in the field of animal research.

Acknowledgments

This author would like to dedicate this article in memory of her parents, Sylvia and Zev Krautwirth. She would like to thank her family and friends for their support. Thank you as well to Dr. Babich for suggesting the idea to write the article.

References

[1] Shabbat 128b. Sefaria.org

[2] Exodus 23:5

[3] Bava Metzia 32b. Sefaria.org

[4] For other opinions that suggest different sources for the prohibition against causing pain to animals, see <https://www.torahmusings.com/2023/06/animal-cruelty/>

[5] Moreh Nevuchim 3:48:12. Sefaria.org

[6] Deuteronomy 11:15. Sefaria.org

[7] Brachot 40a. Sefaria.org

[8] Gittin 62a. Sefaria.org

[9] The Petach Einayim cross references the two *gemarot* (Petach Einayim. Brachot 40a. Sefaria.org). The text of the Rif matches the *gemara* in Gittin (Rif. Brachot 40a. Sefaria.org).

[10] Mishlei 6:6. Sefaria.org

[11] Malbim ad loc.

[12] Rashi Eruvin 100b

[13] Avot 5:20. Sefaria.org

[14] Rav Ovadiah MiBartenura ad loc.

[15] Terumat Hadeshen 2:105. Translation my own.

[16] Bava Metzia 85a. Sefaria.org

[17] Rabbi Moshe Isserles, Shulchan Aruch, Even Ha'Ezer 5:14. Sefaria.org

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- [25] Miller, C. (2021). Do Animals Feel Pain in a Morally Relevant Sense? *Philosophia: Philosophical Quarterly of Israel*, 49: 373–392.
- [26] Nahmanides. Deuteronomy 22:6. Sefaria.org
- [27] Maimonides. Guide for the Perplexed 3:48. Sefaria.org
- [28] “It is also prohibited to kill an animal with its young on the same day (Lev. 22:28), in order that people should be restrained and prevented from killing the two together in such a manner that the young is slain in the sight of the mother; for the pain of the animals under such circumstances is very great. There is no difference in this case between the pain of man and the pain of other living beings, since the love and tenderness of the mother for her young ones is not produced by reasoning, but by imagination, and this faculty exists not only in man but in most living beings” (*Guide*, 3:48. Sefaria.org)
- [29] Taylor K, Alvarez LR. (2019). An Estimate of the Number of Animals Used for Scientific Purposes Worldwide in 2015. *Alternatives to Laboratory Animals*. 47:196-213.

In Jewish history, persecution and discrimination have often been enduring themes, propelling Jews across continents and oceans in a relentless search for refuge and acceptance. This tumultuous journey has given rise to a diverse array of Jewish communities, albeit united by a shared genetic heritage. Among these varied groups, Ashkenazi and Sephardic Jews have forged distinct identities: the former originating from Eastern and Central Europe, while the latter trace back to origins of Middle Eastern and Spanish ancestry [1, 2]. Yet within the Sephardic Jewry lies a subgroup with its own unique identity and genetic makeup — the Persian Jews. Shaped by historic migrations and centuries of geographic isolation, Persian Jews have been associated with a prevalence of genetic disorders that mirror the intricate interplay between heritage and health. Delving into the realm of Iranian Jewish Persian genetic diseases, the challenges and complexities faced by this vibrant community are highlighted. Among the many disorders prevalent among Persian Jews, some that stand out are β -thalassemia (β -thal), pseudocholinesterase deficiency E1, congenital hypoaldosteronism type 2, autoimmune polyendocrinopathy syndrome type 1, as well as hereditary inclusion body myopathy (HIBM), each illuminating the relationship between genetics and cultural heritage.

Iranian Jews date all the way back to biblical times when King Nebuchadnezzar conquered Babylon in the year 586 BCE. Jews from Judah, or modern-day Israel, were banished to Babylon a few times and

only when Cyrus the Great came to power in 539 BCE were the Jews allowed to return to their homeland [1]. From here, some Jews returned to Israel, but some fled to Iran, setting up the foundation for a Persian Jewish community there. For centuries on end, the Persian Jews stayed together in Iran, practicing their religion and common beliefs in isolation. As time went on, larger communities developed in various cities in Iran, including Hamedan, Shiraz, Mashhad, and the capital city, Tehran.

In the ancient city of Hamadan, Iran, the Purim story unfolds, a narrative intertwined with the legendary bravery of Queen Esther and her uncle, Mordechai. Their courageous actions prevented Haman's sinister plot to annihilate the Jewish population of Iran and beyond. The festival of Purim commemorates this miraculous deliverance, celebrating the indomitable spirit and unwavering faith of Persian Jews in the face of grave danger. Remarkably, the events of the Purim story resonate with the genetic predispositions observed among Persian Jews today. Centuries of selective pressures, including persecution and geographic isolation, have left an indelible mark on the genetic landscape of this community, contributing to the prevalence of certain inherited diseases. Thus, while the saga of Purim stands as a testament to the resilience and fortitude of Persian Jewry, it also offers profound insights into their genetic challenges.

Following the establishment of the Jewish State of Israel in 1948, a surge of anti-Semitism swept across regions in the

The Middle East, compelling many Jews to seek refuge elsewhere. In Iran, a population of approximately 150,000 Jews faced the repercussions of this tumultuous period. Between 1948 and 1953, a significant number of Persian Jews opted to emigrate to Israel, resulting in a notable reduction of one-third in their community's size [3]. Under the rule of Shah Mohammad Reza Pahlavi, Persian Jews experienced a period of relative tranquility. The Shah was among the first monarchs to formally recognize Israel as an independent state, allowing Persian Jews to live freely within their communities. However, the 1979 Iranian Revolution abruptly disrupted this peaceful coexistence, led by Ayatollah Ruhollah Khomeini.

With the overthrow of the Shah, Khomeini imposed strict Islamic ideologies on Iran, including harsh treatment of religious minorities. Persian Jews were compelled to comply with these oppressive measures, prompting a mass exodus to the United States and Israel. As a result, only a small fraction of the Jewish population remained in Iran, constituting approximately 0.01% of the total population. This period marked a significant chapter in the history of Persian Jews, as they faced challenges and upheaval in their homeland.

It's important to recognize that within the cities of Iran, Persian Jews not only maintained a sense of isolation from non-Persians but also from non-Jewish/Muslim Persians. Consequently, there was a significant prevalence of intermarriage or consanguineous unions among Persian Jews residing in the same

community. This practice, while culturally rooted, also exacerbated the risk of inheriting deleterious autosomal recessive disorders, posing serious reproductive health challenges. Genetic issues can arise from various sources, including alterations in DNA copy numbers, single gene mutations leading to simple and complex disorders, chromosome abnormalities, and epigenetic regulation disturbances [4]. These categories encompass a wide range of potential causes for genetic abnormalities.

Among the myriad of risks, one of the most prevalent genetic disorders is known as β -thalassemia (β -thal), a condition with grave implications. β -thalassemia is characterized by a deficiency in the production of beta-globin, a key component of hemoglobin - the molecule responsible for oxygen transport in red blood cells [5]. This deficiency stems from genetic inheritance and can lead to severe anemia and other complications. As evident, this disorder carries significant implications and is alarmingly common among consanguineous marriages, particularly within the Iranian Jewish community. This highlights the urgent need for increased awareness, genetic screening, and accessible healthcare resources to address the challenges faced by this population.

Another prevalent genetic disorder among Persian Jews is pseudocholinesterase deficiency, also known as butyrylcholinesterase deficiency (OMIM #177400), which follows an autosomal recessive inheritance pattern. This condition arises from mutations in the BCHE gene locus. Studies indicate that approximately

one in every ten Persian Jews carries a heterozygous mutation in this gene. Furthermore, the statistics reveal that one in every hundred couples will both carry the mutant gene, resulting in a 25% chance for each of their offspring to inherit two mutant genes and develop the disorder. Consequently, the overall incidence of this disease within the Persian Jewish population is estimated to be one in every 400 individuals [6].

Sadly, many affected individuals remain unaware of their condition until they encounter specific drugs that trigger symptoms. Ether-based anesthetics, such as succinylcholine, pose a particular risk as they are not effectively metabolized in individuals with pseudocholinesterase deficiency [6]. This failure to break down the drugs efficiently can lead to prolonged presence in the body, resulting in respiratory difficulties and muscle weakness.

Furthermore, Iranian Jews are commonly associated with the disorder, congenital hypoaldosteronism type 2, known as CMOII deficiency (OMIM #124080). This condition arises from insufficient levels of the corticosterone methyl oxidase II enzyme, encoded by the gene CYP11B2 located on chromosome 8q22. Manifestations of the disorder typically manifest in individuals homozygous for two-point mutations at separate allelic loci on the CYP11B2 gene. When two point mutations occur in a *cis* configuration, heterozygosity is indicated [6].

Research indicates that approximately one in every thirty Persian Jews carries a heterozygous mutation for CMOII

deficiency. This statistic implies that approximately one in every nine hundred Persian Jewish couples carries the risk of their offspring inheriting the disorder. The ramifications of homozygosity for the mutation are profound, often leading to severe dehydration and shock shortly after birth [6]. Without timely intervention, newborns affected by this condition face life-threatening complications. Additionally, milder symptoms may include weakness, dizziness, irregular blood pressure, or cravings for salt.

An autosomal recessive disorder known as autoimmune polyendocrinopathy syndrome type 1 (OMIM #240300) has emerged as a prevalent concern within the Persian Jewish population. This condition is linked to mutations in the AIRE gene, which regulates autoimmune responses and facilitates fetal thymus "self" recognition. A single point mutation in this gene is observed in approximately one in every fifty Persian Jewish heterozygotes, suggesting that around one in every 2,500 Persian couples carries the risk of their offspring developing this disorder [6]. The manifestations of autoimmune polyendocrinopathy syndrome type 1 vary widely, depending on the glands affected by the autoimmune attack. Symptoms may include skin infections, anxiety, depression, infertility, and muscle weakness, among others. The diverse presentation sheds light on the complexity of this disorder and its profound impact on affected individuals' quality of life.

Hereditary inclusion body myopathy, HIBM (OMIM #600737), stands as another notable autosomal recessive disorder prevalent

among Persian Jews. Studies indicate that approximately one in every twenty individuals of Persian Jewish descent is affected by this debilitating condition. HIBM is characterized by a single-point mutation in the GNE gene [6]. The prevalence of HIBM among Persian Jews suggests that around one in every 400 couples within this community is at risk of conceiving a child with this disorder. The disease manifests with progressive muscle weakness, primarily affecting the arms and legs. Individuals typically experience difficulty walking by their 20s and 30s, with the condition steadily worsening over time until walking becomes impossible. The chronic and progressive nature of HIBM underscores the significant impact it has on affected individuals' daily lives and highlights the pressing need for further research and intervention strategies within the Persian Jewish community.

Given these complexities, it is crucial to emphasize the importance of genetic counseling, screening, and accessible healthcare resources to address the challenges faced by Persian Jews and mitigate the risks associated with these inherited disorders. By fostering awareness and providing support, we can strive to improve the health outcomes and well-being of individuals within the Persian Jewish community, ensuring a brighter and healthier future for generations to come.

As evident from the diverse origins of Jews — Ashkenazi, Sephardic, and their respective subgroups — it becomes clear that despite our varied backgrounds, we must rise above our differences and come

together in our shared devotion to serving a higher power, *Hashem*. *Pirkei Avot* (6:6) emphasized the importance of empathizing with others' pain; we are reminded of our collective responsibility to support one another. This principle, encapsulated in the phrase "גושא בעל עם הבירו", calls upon us to prioritize inclusivity over exclusivity within our community. By embracing this compassion and solidarity, we can work towards realizing the vision of the holy Mashiach, transcending the divisions of animosity and hatred that may threaten our faith.

Through Persian Jewish genetic diseases, we uncover a profound interplay of history, culture, and health. From ancient migrations to modern-day challenges, Persian Jews have navigated a myriad of adversities, yet their resilience and tenacity shine through. The genetic heritage of this community, illuminated by disorders like β -thalassemia, pseudocholinesterase deficiency E1, congenital hypoaldosteronism type 2, autoimmune polyendocrinopathy syndrome type 1, and hereditary inclusion body myopathy (HIBM) displays the need for proactive measures. Genetic counseling, screening programs, and accessible healthcare resources emerge as crucial methods to address the unique challenges faced by Persian Jews. By fostering awareness and providing support, we can pave the way for a healthier future, where the burdens of inherited diseases are alleviated, and the vibrant legacy of the Persian Jewish community continues to thrive for generations to come.

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There is no aspect of daily life or routine that goes unmentioned or unexplored by the Talmud. Jewish law, or *halacha*, permeates every aspect of daily life. Therefore, it is of no surprise that the Talmud and Jewish traditions speak at length about sleep. What is more fascinating, however, is that much of our modern-day understanding of sleep and its cycles, which modulate states of consciousness, were accurately described by the Talmud and analyzed by Jewish tradition long ago.

The first mention of sleep is in the Book of Genesis when Adam's rib was removed in the creation of Eve. Here, G-d caused "a deep sleep to fall on Adam, and he slept..." (Genesis 2:21). This description of sleep, which was sent by G-d, suggests that sleep includes varying levels of consciousness, such as the level of consciousness (or unconsciousness) accomplished by use of anesthesia [3].

It is now known that a complete sleep cycle is composed of two stages: active and quiet sleep. The active sleep stage is also known as the rapid eye movements (REM) stage of sleep. The quiet sleep, also known as non-REM (NREM), is subdivided into four stages based on the depth of sleep [1]. Stage 1 is the lightest stage of sleep, while stages 2-4 get progressively deeper [3]. Although the first documentation of the differing stages of sleep was in the 1950s, the Talmud knew long before that sleep contained various stages, each with its own level of consciousness. For example, when Rabbi Yosi addressed the time at which one is

allowed to eat on Passover, he seemingly described stage 1 of the sleep cycle:

"If they fell into a light sleep, they might eat; if they fell fast asleep, they must not eat. What is meant by "a light sleep"? - said R' Ashi. A sleep which is not sleep, a wakefulness which is not wakefulness, *e.g.*, if he answers when called, cannot make a reasoned statement, yet recollect when reminded (*Talmud Pesachim* 120b) [3].

Additionally, in the Bible, there are different Hebrew words that describe sleep in a way that corresponds to the different stages of sleep as we know them today. "*Tenumah*" often connotes drowsiness, corresponding to stage 1 of sleep, such as dosing off or engaging in a light sleep. "*Yashen*" and "*Shenah*" correspond to stage 2 sleep since they connote a switch from conscious thought to one that becomes involuntary and unconscious. "*Radum*" connotes a deep or heavy sleep, such as in stage 3 and 4 sleep, as well as divinely induced sleep [3]. For example, a word with the same root is used when G-d casts an involuntary sleep upon Adam to remove his rib (Genesis 2:21). Lastly, "*tardeimah*" indicates a stage of sleep where thoughts flow into revelation or dreams, which perfectly describes today's understanding of REM sleep.

The normal sleep cycle at night and sleep-wake cycles during the day are both controlled by chemical substances in various nuclei in the brain. Sleep is understood

today as a necessary interruption in our normal functioning and vital to the body's health. Consistent with modern-day medicine is the rabbinic understanding of the value of sleep. In Genesis 1:31, the verse states, "And G-d saw everything that He had made and, behold, it was very good". The *midrash* interpreted this verse as a reference to sleep, since when a person sleeps for some time, he arises rejuvenated and can study *Torah* rigorously (*Midrash Rabbah* 9:8) [1].

One modern theory of sleep is for physiological restoration and renewing the ability to remain awake. This is described in *Pirkei D'Rabbi Eliezer*, when stated that G-d "created the sleep of life, so that man lies down and sleeps while He sustains him and heals and [gives] him life and repose". Another modern scientific theory regarding the purpose of sleep is that of a "homeostatic process". The Talmud states that a wise individual finds a balance between wakefulness and sleep, saying that "... a man sometimes sleeps a little and arises and toils much in the study of Torah" (Genesis R. 9:6). Similarly to the homeostatic theory, this idea suggests that the inclination for sleep builds up during the waking hours and is relieved by sleep. In other words, the more one sleeps, the more alert he will find himself the following day [3].

Another theory for the purpose of sleep is healing. There are many quotes from the rabbis that emphasize the healing nature of sleep, such as "sleep is like food and medicine to the sick" (*Pirkei D' Rabbi Eliezer*) and "Sleep is the best medicine. It strengthens the natural forces and

diminishes the injurious fluids" (*Sefer Shaashu'im* 9). Lastly, the Talmud lists sleep as one of the six actions that will heal a sick individual (*Talmud Berachot* 57b). The rabbis understand that sleep is necessary for a person's sustenance and health.

Maimonides, a great Torah scholar and medical doctor, emphasized that if a person tries to sleep to rest his mind and body to prevent illness, his sleep is considered a service to G-d. To such an extent, according to the *Mishnah Berurah*, it is permitted to extinguish a light on Shabbat to help an ill person sleep. In Psalms [127:2], King David also considers sleep a blessing. The Book of Lamentations [3:23], describes that when a man sleeps, his soul returns to his body refreshed and healthy [1]. Thus, whether throughout Tanach, Gemara, or other various rabbinic sources, there was an understanding of the value of sleep.

Research today shows that sleep deprivation can cause "impairment in concentration, memory, social, business, and personal relationships and overall diminishment in quality of life". The rabbis not only emphasized the importance of sleep as described previously, but they also considered abstinence from sleep to be a sin. For example, in Tractate *Nedarim* [15a] it stated, "If someone swears not to sleep for three days, he is flogged..." This statement, in addition to implying the necessity of sleep, also implies that this individual is lying, since it is impossible to stay awake for three days. This is also in line with the scientific understanding that it is impossible to remain awake for too long [4].

Nonetheless, just like it is known today that sleeping too much is a cause for alarm, the rabbis in *Pirkei Avot* stressed a similar practice of moderation in sleep habits [1]. Many rabbinic sources warn against sleeping in excess, expressing that it is beneficial in small amounts but harmful in excess [2]. The Talmud Moed Katan [11a] suggested that one should take a walk after eating and not sleep immediately after a meal, consistent with today's recommendations. It is also known today that anxiety can negatively affect one's sleep. As also noted in Genesis [31:40] and *Megilat Esther* [6:1], anxiety over bad thoughts during the day or misfortune interferes with sleep [1].

Sleep disorders, such as insomnia, are mentioned in the Bible and discussed by the rabbis. In Ecclesiastes [5:11], it is stated, "A worker's sleep is sweet, whether he has much or little to eat; but the rich man's abundance doesn't let him sleep". An interpretation of this verse is sleep being compared to a blessing G-d gives the worker to "soften his difficult life". The rabbis here are suggesting physical exercise as a cure for insomnia, which is strongly supported by today's research [4]. The laboring man is physically active and will, therefore, sleep better as opposed to the wealthy man who is constantly counting his money.

In conclusion, whether it is the stages of sleep, the purpose and importance of sleep, the serious consequences of sleep deprivation, or knowledge of sleep disorders, the rabbis presciently understood basic concepts of sleep.

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Restoring Balance: Shabbat's Influence on Stress Reduction

By: Prisylla Mutchnik

It's simple to find ourselves drowning in stress as the unrelenting pace of modern life pushes us through endless loops of deadlines, notifications, and constant communication. Imagine a world in which the continuous demands of work and the constant hum of technological devices are replaced with tranquility—a sanctuary that is known as Shabbat. This *halacha* extends beyond a religious commandment; it serves as a hiatus for the mind, body, and soul offering a temporary escape from our perpetual busy lives. Through exploring the physiological implications of observing Shabbat, we begin to understand how this simple *mitzvah* can bring many profound benefits to our overall health.

Despite the initial perception of Shabbat as demanding and constrictive, its ability to promote calm and relaxation might not be immediately apparent. One might assume that adhering to its observance would induce greater stress due to the long list of prohibited activities, which can impede regular daily routines such as eating, transportation, and communication. However, contrary to appearances, this is not the case. The prohibited activities serve as a protective barrier against external stressors that trigger our bodies' stress response.

Stress in America

Stress, a natural part of being human, has a negative impact on our health. Two of the most commonly reported mental health issues are stress and anxiety, and they interact with one another [1]. In its yearly report on the condition of stress in the

United States, the American Psychological Association (2020) defined the problem as a “national mental health crisis”. The Anxiety and Depression Association of America (ADAA) described anxiety as the “disease of stress” [2]. Americans self-report stress as their top concern for their overall health and well-being, citing a variety of issues, including money, relationships, employment, crime, violence, and concern for the future, as major sources of worry [3].

Many Americans reported that technology has enhanced their lives, and over half of adult Americans claimed they could not fathom living without their smartphones. In addition, a great deal of research has documented the detrimental effects of technology use on both mental and physical health. The impact of stress on the health and well-being of American adults was studied by the American Psychological Association's Stress in America™ survey. It revealed that 99% of adults own one or more electronic devices, including televisions. According to survey results, over 80% of Americans are dependent on their devices on a daily basis (86% indicated they check their social media, emails, and texts frequently or constantly) [4].

Their persistent reliance on and commitment to technology was linked to increased levels of stress. Less than one-fifth of Americans (18%) reported that using technology was a very or somewhat major source of stress. Furthermore, 20% of Americans claimed that they were most stressed when technology malfunctioned. Stress levels were higher for people who used technology constantly than for people who used it less

frequently. On a scale of 1 to 10, where 10 represents "a great deal of stress," those who checked their electronics regularly reported an average overall stress level of 5.3. The average reported stress level for non-constant users was 4.4. Employed Americans reported an overall stress level of 6.0 when they continuously checked their work email on non-workdays [4].

Implications of Technological Devices

Concerns over the short- and long-term health risks of radiofrequency radiation exposure have been raised by wireless communication devices such as mobile phones and other handheld phones that use frequencies. Oxidative stress is a biochemical state resulting from an imbalance between reactive oxygen species and antioxidant defenses. Some research showed that oxidative stress resulted from the usage of mobile phones, with oxidant damage to DNA induced by radiofrequency exposure. Numerous processes in the body, including altered heart and brain functions, circadian rhythms, healing, and hormone balance, can be negatively impacted by this kind of stress [5].

Reducing Stress

When dealing with stress, it is often suggested that rest is one of the many ways to help reduce stress and anxiety. Setting aside time for rest can be challenging, though, especially as our regular schedules provide limited opportunity for it. Stress has become a dreaded companion in our hyper-connected world, infiltrating all facets of our lives. According to the American Psychological Association, 76% of adults in

America reported that they experience stress on a regular basis, emphasizing this widespread problem [6].

The concept of Shabbat originated from the Bible, when G-d ceased from work on the Seventh Day of Creation, declaring it holy (Genesis 2:1-3). The central commandment of the Ten Commandments (Exodus 20:1-7) is to observe Shabbat. It also serves as a reminder of the freedom that was obtained when G-d freed the Israelites from slavery in Egypt. To observe Shabbat - *shamor*, in Hebrew - is to let go of all efforts to exert control. The outcome is that you have the opportunity to be present in the immediate world surrounding you. Liberated from your devices, this designated time provides relief from the relentless flow of information coming from every corner of the world, the continuous influx of opinions, updates, and details about other people's lives. Observing Shabbat means truly being present and appreciating the world that was given to us.

Furthermore, according to Rambam, remembering Shabbat serves as a constant reminder of the existence of a Creator. It is considered a *mitzvah*, a religious duty, to remember Shabbat each day to prevent forgetting or confusing it with any other day. By consistently recalling Shabbat, we remain ever-aware of the act of Creation and acknowledge the presence of a Creator in the world. This principle forms the central foundation of belief in God [7].

Rabbi Eliyahu Dessler, in *Michtav M'Eliyahu*, highlighted the profound significance of Shabbat, asserting that its spiritual power transcends all mundane concerns as it represents the ultimate the

spiritual goal of Creation. According to Rabbi Dessler, a person's connection to Shabbat should be so profound that even if deeply engrossed in important matters upon its arrival, they should feel no desire to dwell on worldly affairs once Shabbat begins. In the face of Shabbat's sacredness, everything else pales in comparison. All efforts throughout the week, he suggests, are merely preparatory for the spiritual climax that is Shabbat. Every facet of Shabbat should distinctly differ from the routine of the week. This encompasses one's engagement, personal needs, and adherence to the laws and customs of Shabbat [7].

Many studies have attempted to find a correlation between this religious custom and positive health benefits. A study examined the perceived benefits of Shabbat observance among Orthodox Jews in the UK and the USA. Thirteen orthodox Jews, seven men and six women, were selected for a purposive sample in New York, USA (n = 4) and London, UK (n = 9). To evaluate the psychological and mental effects of Shabbat, interviews were set up and participants were asked questions. The participants explained that observing Shabbat (which involves refraining from work, handling money, using a cell phone, computer, or transportation, among other prohibited activities) offered not only rest and relaxation but also a strong sense of freedom, improved spirituality, and the chance to reflect on life values. Most people also reported feeling happier than they did on a weekday [8].

Another study at Liberty University explored the effectiveness of a

psychoeducational Shabbat intervention. This quantitative study investigated the effects of weekly Sabbath keeping for mental health testing anxiety, stress, and psychological well-being, using a single-subject multiple baseline research design. A psychoeducational Sabbath-keeping intervention with numerous assessment points during the study was adopted for the eighteen participating subjects. Three cohorts (A, B, or C) were randomly assigned to participants, with the start times of each cohort's intervention varying. At the beginning of the study, baseline measurements were taken for each of the four scales that measure the cognitive and physical characteristics of stress, anxiety, and psychological well-being in participants. For the purpose of secondary personality analysis and its influence on research outcomes, a fifth measure was employed at baseline. At week eight, compared to week one, participants from all three cohorts had overall decreased scores for stress and anxiety. The study's findings suggested a possible link between observing Shabbat and benefits for wellbeing, stress management, and anxiety. Participants were also of varying religions, reducing the bias of Jewish associations with keeping Shabbat. Methods of preventing and treating a range of symptoms associated with psychological discomfort are needed, as the number of adult Americans reporting high levels of stress and anxiety is on the rise. There were encouraging signs in this study that maintaining a regular Shabbat practice could have a beneficial impact on one's mental health [9].

In essence, my journey into observing Shabbat has been a transformative experience, marked by commitment, learning, and profound insights. As I settled into its rhythm, the meaning and significance of Shabbat shifted fundamentally for me. Learning the intricacies of preparing food, mastering the art of hosting, and actively cultivating community to ensure Shabbat is shared and celebrated with others has been instrumental in deepening my connection to this sacred day. The restrictions imposed during Shabbat serve as a protective barrier, separating the ordinary from the sanctified, allowing me to exist fully in the present moment, untethered from the distractions of the outside world. It is when I am able to let go of my striving that I remember Shabbat - zachor. Embracing the opportunity to pause, reflect, and engage in activities that nurture the soul—whether it's prayer, meals, or cherished time with loved ones—has brought immense joy and fulfillment. In times of stress, the arrival of Shabbat has become a welcomed sanctuary, offering comfort and a necessary break from the stresses of daily life. Through the observance of Shabbat, I have discovered the enduring value of our rituals and commandments, their significance gradually revealed over time. This sacred union between the Jewish people and the seventh day provides a reliable foundation, a sheltering presence that strengthens and sustains, week after week, year after year.

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Fetal Alcohol Syndrome Disorder and the Talmudic Perspective

By: Allison Warren

Fetal Alcohol Syndrome Disorder (FASD), caused by gestational exposure to alcohol, can lead to a range of disabilities present in the child including, facial abnormalities, developmental, emotional, social, and behavioral challenges. An association between ethanol derivatives and embryotoxicity, teratogenesis, chromosomal anomalies, and mitochondrial damage was proven to exist [1]. When one consumes drugs and alcohol, the absorption of maternal nutrients is interrupted, weakening the quality and quantity of proper nutrient and energy intake of the fetus, causing malnutrition. With the fetus not receiving essential nutrients, fetal abnormalities like intrauterine growth restriction and FASD are possible [2]. When exposed to alcohol, the developing fetal central nervous system may face damage. The amount of alcohol consumption, the timing of the consumption, as well as the mother's health, genetic susceptibility to alcohol, and the rate of ethanol metabolism play key roles in the extent of the damage imposed on the developing fetus. A fetus is particularly at an increased risk when exposed to repeated binge drinking at the beginning of pregnancy [1]. In the United States, FASD is the leading cause of "preventable mental retardation and developmental disability" [1]. Studies have also found that children diagnosed with FASD are at an increased risk of receiving further diagnoses of health conditions than the general population [3]. In Israel alone, it has been reported that more than 17% of Jewish women consumed alcohol during their pregnancies, 21.4% of women thought it was permissible to drink while pregnant if limited to two drinks per

week, and 75% of women stated that they received no education from medical professionals throughout their pregnancy regarding alcohol consumption [4].

The dangers of alcohol consumption during pregnancy are often claimed to be mentioned first in Tanach when the angel approached אשת מנוה to inform her that she will conceive a son, שמשון. The angel instructed her not to drink wine, nor any strong drink, as well as not to eat anything impure, stating "אֵלֶי-תִּשְׁתִּי יַיִן וְשֵׁכָר" (Judges 13:4). Yet this warning against drinking alcohol was because Shimshon was destined to be a nazir, it was not given to advise safe pregnancy protocol [5]. The dangers of consuming alcohol when pregnant were only first noted medically in the 1720s during the "gin epidemic" in Britain. Physicians reported to parliament that alcohol consumption caused "weak, feeble and distempered children". In modern times, a study conducted in 1957 followed 100 children whose parents were known alcoholics and consequently found severe effects in the children studied. Reports suggest that 9.1 out of 1000 live births will be diagnosed as affected by varying degrees of severity of FASD [1].

Contrastingly, when looking at Talmudic sources, many suggest that there is a healing effect to alcohol consumption. The sages recommended alcohol use as a treatment for the ailment of "catarrh", described by Rashi as "רירין הבאין מן החוטם", a nasal mucus, and further described as a "green phlegmy discharge" excreted through the nose and mouth when one has a heavy cold [6]. The gemara in Chullin 105b states the following:

לכרסם דחמרא שיכרא דשיכרא מיא דמיא לית ליה
תקנתא והיינו דאמרי אינשי בתר עניא אזלא עניותא

If one became ill with catarrh, caused by drinking the foam of wine, one can treat it by drinking beer.

Furthermore, some Talmudic sources even suggest that a pregnant woman should consume alcohol throughout her pregnancy. The gemara in Ketubot (60b-61a) recommended pregnant women to drink wine, stating the following:

דְּשִׁתְּנָא שִׁיכְרָא — הוּוּ לֵהּ בְּנֵי אוֹפְמִי. דְּאֶכְלָה בִּישְׁרָא
וְשִׁתְּנָא חֲמֵרָא — הוּוּ לֵהּ בְּנֵי בְּרִנֵּי

Drinking intoxicating liquor during pregnancy will make one have black children, eating meat and drinking wine during pregnancy will make one have healthy children.

These sources seem to suggest that the sages believed one should consume alcohol “as part of a healthy lifestyle” [5]. Yet modern research has found conflicting pieces of evidence regarding the effects of regular alcohol consumption on one's health. A meta-analysis study found evidence of seven beneficial associations between alcohol consumption and one's health, demonstrating that alcohol helps improve renal cell carcinoma risk, dementia risk, colorectal cancer mortality, all-cause mortality in patients with hypertension for low and moderate alcohol consumption, and cardiovascular disease risks. Harmful associations include cutaneous basal cell carcinoma risk, cutaneous squamous cell carcinoma risk, and hemorrhagic stroke risk for high alcohol consumption [7]. Yet a

different study found that the cardioprotective effects of low doses of alcohol may be rejected by large epidemiological evidence supporting otherwise. The study sought to reaffirm the relationship between alcohol use and “cardiac arrhythmias, dilated cardiomyopathy, arterial hypertension, atherosclerotic vascular disease, and type 2 diabetes mellitus” [8]. The study noted the proven beneficial association between cardiovascular health and minimal red wine consumption, yet also urged that due to conflicting literature regarding the benefits of low doses of alcohol, one should be cautious with alcohol, especially those at high risk of cardiovascular disease [8]. The Center for Disease Control (CDC) warned about the harmful associations between alcohol consumption and health risks, advising one not to drink at all or to drink in moderation, with men drinking two drinks or less in a day and women drinking only one drink or less in a day. The CDC also addressed the conflicting research on alcohol and cardiovascular health, stating that although “some studies have found improved health outcomes among moderate drinkers, it's impossible to conclude whether these improved outcomes are due to moderate alcohol consumption or other differences in behaviors or genetics between people who drink moderately and people who don't” [9].

Although Talmudic sources suggest that consuming alcohol as a regular part of one's diet, even while pregnant, remains a healthy decision, modern-day research has suggested otherwise. One should always remain mindful of their alcohol intake and

drink in moderation, and while pregnant, one should avoid alcohol in its entirety.

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“Tess Merrell had breastfed three babies and never expected trouble with her fourth. But after a month of struggling with her newborn, she hired Melanie Henstrom for help...to cut under the baby’s tongue with a laser [1].”

A frenectomy is an oral surgery performed to correct a lip or tongue-tie. While most people have multiple frena, i.e., folds on the underside of the tongue, they typically are unnoticeable. However, some frena are too short or tight, causing discomfort to the individual. This can manifest in an infant in different ways, such as problems with speech, oral health, undesired gaps between their teeth, or breastfeeding, as is the case with Tess’s baby. While it is true that breastfeeding has many benefits, there are wholesome alternatives, such as formula milk. Despite these alternatives, some mothers of babies who are unable to breastfeed due to the child’s tethered tongue are convinced that it is worth putting their child through an oral surgical procedure, a frenectomy, to fix this imperfection [2].

As is the case with most surgeries, there are risks involved in a frenectomy, such as bleeding, infection, pain, injury to salivary ducts, etc. [2]. While serious post-surgery complications are rare, cases have been reported in which babies refused to eat, became dehydrated and malnourished, or had their airways blocked by their newly floppy tongues. For some, this surgery is necessary from a medical standpoint; however, for others, it is considered an elective surgery. Often, doctors try to convince mothers that, because breastfeeding is so important, this surgical

procedure is critical for the baby’s normal development [1]. In some cases, the doctor’s primary motivation is monetary gain, taking advantage of the vulnerable mother. As mothers want the best for their children, many will request this procedure. As Jews, we need to determine whether this procedure is halachically permitted.

Halacha is the “user manual” of the observant Jew. It dictates many aspects of our lives, including the decision to undergo elective surgery. Although cosmetic surgery is the most common form of elective surgery and has been practiced for millennia, it involves inherent risks and thus should be discussed with one’s rabbi. Elective surgery raises many halachic questions, such as transgressing the prohibition of mutilating the body (chovel), the risk of loss of life that is involved in any operation, and the theological implications of ‘improving’ God’s work. Rabbi Jakobovits, amongst other current rabbinical authorities, discusses such concerns [3]. This essay will attempt to explore and analyze each of these concerns in depth.

The performance of cosmetic surgery may be a transgression of the Biblical prohibitions of self-mutilation and of not exposing oneself to risk. In Bava Kamma (91b), the rabbis explained the prohibitions of causing unnecessary harm to oneself (chovel b’atzmo) or of wounding another, (chovel b’chaveiro). Regarding cosmetic surgery, before improving the body, the surgeon inevitably first creates a wound in the healthy individual; therefore, the individual choosing to undergo surgery has

voluntarily accepted the possibility of encountering a health-threatening situation [3]. While this is true, Rabbi Moshe Feinstein commented that regardless of some initial surgical incisions, the prohibition of chovel was transgressed only when it caused a damaging outcome and not when the procedure was meant to benefit the patient. Rav Feinstein quoted the (opposing opinion of the) Rambam (Maimonides) in Hilchot Chovel u-Mazik 5:1, noting that “it is forbidden to cause injury to himself or to others... be it an adult, a minor, a man or woman when done in a damaging manner. The person transgresses a negative commandment...” [5] The Rambam further explained that chovel was only prohibited if blood spilled (often due to incisions) and if there was bruising after the procedure. Therefore, according to Rambam, certain procedures, such as botox injections, did not violate the prohibition of chovel, while most reconstructive procedures were in violation [6].

Another potential halachic problem with cosmetic surgery is the unnecessary risk posed to one’s life. Judaism prioritizes guarding one’s health, as seen in Yavikra (18:5): “You shall keep My laws and My rules, by the pursuit of which human beings shall live.” It is also noted in Mishnah Sanhedrin [4:5] that someone who saved the life of another is as if he sustained the entire world. Furthermore, there is a Biblical prohibition to put oneself into a dangerous situation, a sakkana. Before a surgical procedure, no matter how minor, the patient is given a long medical form to sign, explaining all the potential risks of the operation, such as death from anesthesia.

Therefore, cosmetic surgery poses an inherent risk to the patient. Since there are inherent dangers encountered in surgery, even benign operations, one should only undergo surgery if necessary [3].

Rabbi Judah David Bleich discussed situations where it may be halachically permitted to take a risk. In Mesechet (tractate) Shabbat 32a, we are taught that it is forbidden to put ourselves in situations that involve risk, as stated in Devarim 4:15 that we must guard our lives. Therefore, we must educate ourselves on the risks involved in certain activities and not merely rely on God’s protection. However, one may argue that life is filled with ordinary activities that involve inherent dangers and that we would be limited if we stayed away from potentially risky activities. Therefore, Rabbi Bleich explained that “any activity routinely undertaken by members of society and not perceived by them as hazardous is permitted despite the inherent danger...since the multitude has trodden thereon” [8]. For example, as Jews, we are allowed to drive a car even long distances, despite the statistics found between 2012-2014, showing that on average there were 1,098 deaths per year caused by motor vehicle-related accidents in New York [9].

Specifically, Rabbi Bleich discussed weighing the risks of surgery against the possibility of a prolonged life. Over the years, Rabbis had different understandings of this; Rabbi Ze’ev Wolf Leiter, Bet David, II, no. 340, wrote that if there is a one in one thousand chance that medical treatment can help a patient, he is permitted to go through with it. Meanwhile, Rabbi Joseph

Hochgelehrnter noted that this was only allowed if the person had a minimum of fifty percent chance of survival from the surgery. Overall, it was accepted that when medical attention for a serious health condition was required, even when the risk was significant, the value of preserving life outweighed the risk. In contrast, the allowance for procedures for non-life-threatening conditions required deeper analysis, which will be explored [8].

While it is a Jewish value to avoid risks, one must consider whether minor surgery is a halachic risk. Experts argued that due to rapid advancements in medicine, most current surgical procedures are less invasive than in prior years and the associated adverse health risks are very low. According to a study by the American Society of Plastic Surgeons, only about 0.5% out of 400,000 cosmetic surgeries had “adverse outcomes” [6]. In addition, cosmetic surgery typically involves alterations to the body's outer parts; therefore, there is not much concern that it will impact internal vital organs [4]. Generally, in halacha the rule is to go according to the majority; however, we do not follow the majority when the circumstance (i.e., elective surgery) involves pikuach nefesh, mortal jeopardy [6]. However, Rabbi Breisch explained that if the doctor was reputable and had the necessary experience, then “the prohibition of exposing oneself to danger (Rema, Y”D 116:5) was abrogated.” Rabbi Waldenberg countered that despite the unlikelihood of a negative outcome and the possible benefits to the patient, as long as the patient was naturally healthy and without pain, they were not permitted to seek a procedure

involving risks and injuries. This is especially true in cases of cosmetic surgery because such a procedure falls outside of the basic responsibility of healing [5].

In addition to the previous halachic problems with cosmetic surgery, there is a third, philosophical problem relating to the procedure. Philosophically, God is the ultimate craftsman of humans. Therefore, by remodeling ourselves, it is as if we are denying His perfect judgment, as He created us exactly as we should be [3]. Rashi and the Tosafot (Bama Kama 85b) learned from the Biblical phrase “reshut larofeh lerapote,” (“he shall surely heal”) (Shemot 21:19) that even though God put sicknesses in the world, a doctor is still obligated to cure the sick, even if the operation violated chovel. However, according to the Tzitz Eliezer in Cheilek 11, Siman 41, this did not apply to cosmetic surgery, which entailed altering one’s inherent God-given appearance, a change not driven by the need to address a medical condition but rather for aesthetic purposes [6].

In applying the above rules to practical cases, a distinction must be made in recognizing the two categories of elective surgeries — reconstructive and cosmetic surgery — and it is important to differentiate between them. Reconstructive surgery is usually applied to rectify a deformity that often causes pain, while cosmetic surgery is performed to enhance physical appearance [3]. The Talmud (Shabbos 50b) explained that as long as someone’s scabs are causing pain, he is allowed to remove them; however, scabs such lesions should not be removed for purposes of appearance.

While we try to avoid unnecessary surgeries relating to aesthetics, halacha is also sensitive to our psychological well-being and the reality of our environment. Englard-Schaffer and Zimmerman noted that “in reality, we are indeed visual creatures who initially connect with others based on external presentation” [5]. Rabbi Mordechai Yaakov Breish wrote in Chelkas Yaakov about situations when it was permitted to undergo surgery not medically necessary. According to the Tosfot (Shabbos 50b) and Chelkat Yaakov (3:11), people who experience extreme suffering from a psychological perspective, such as being embarrassed to walk in public due to a self-perceived defect, were permitted to undergo a corrective operation, as they considered it as a medical necessity [3, 7]. Therefore, restorative surgeries that “are done for the sake of human dignity” were permitted. For example, skin grafts following an accident or a fire, breast reconstruction in the wake of a mastectomy, skin removal after significant rapid weight loss, etc. [3]. This idea was emphasized Rabbi Shlomo Zalman Auerbach, who learned based on the Tosfot (Shabbos 50b) that someone in an accident was allowed to undergo surgery to reattach a severed limb “in an attempt to look normal.” Furthermore, Rabbi Menasheh Klein discussed a scenario of a woman who is dating and had a blemish or a facial imperfection that made her feel unattractive. He explained that although there were risks with the surgery and it was considered a chavala, she was still permitted to undergo surgery so as not to be embarrassed and to have an easier time finding a spouse. This is a complicated

topic, and there are other rabbis such as Rabbi Eliezer Yehuda Waldenberg, who disputed Rabbi Klein’s reasons, and explained that physical pain and life-threatening situations are the only considerations to allow surgery and that psychological embarrassment was not enough of a reason for elective surgery [5]. It is important to note that even according to Rabbi Klein, cosmetic surgeries to correct a problem not causing extreme psychological pain were not halachically allowed.

What might be the halachic conclusion regarding a frenectomy, specifically in Tess’s case? Assuming that the frenectomy was not medically required, as the people can live comfortably with an intact frenum, other factors must be evaluated to halachically allow such minor surgery. By undergoing this surgery, the baby’s tongue would be fixed, not mutilated, thereby avoiding the transgression of chovel. Moreover, a frenectomy is a minimally invasive surgery that typically takes only a few seconds and can be done in a dental office with local anesthesia. This procedure does not have the serious innate risks encountered in typical surgeries [10]. According to Rabbi Moshe Feinstein, since the outcome of a frenectomy benefited the patient, the procedure was halachically allowed. However, the theological implications of improving God’s work may challenge the allowance of a frenectomy. In Tess’s case, the only concern was her baby being breastfed. Her baby would function normally without the frenectomy, and, perhaps, this procedure would be an unnecessary attempt to perfect God’s work and would not be halachically permitted.

There is room to argue that later in life the intact frenum may be medically problematic. It is important to note that in a medically required surgery, the concerns of chovel and improving God's work are overlooked. Each case needs to be assessed individually to determine whether the patient should undergo elective surgery. Orthodox Jewish parents like Tess must consult with their Orthodox Jewish rabbi to discern whether their procedure is considered a medical necessity under the parameters of halacha.

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The Rise of Eating Disorders in the Jewish Community

By: Gwen Caplan

In Judaism, the care of the soul, or neshama, is accompanied by a profound respect for the body, known as the *guf* — the vessel for the soul's journey. Despite this emphasis, there exists a troubling lack of awareness regarding the importance of physical well-being. In contemporary times, concerns about health often revolve around issues like drinking, smoking, and exercise neglect. Yet, lurking beneath the surface lies a more insidious threat: the rise of eating disorders. The prevalence of eating disorders within the Jewish community poses a complex challenge, one that is often concealed and misunderstood. The clandestine nature of these disorders not only jeopardizes individual well-being but also undermines the collective health of our community. It is imperative that we shine a light on this issue and take proactive steps to address it.

Within the Torah (Bible) teachings, *Shmiras HaGuf* (guarding of the body) makes an early appearance in *Sefer Devarim* (Book of Deuteronomy), as Moshe Rabbeinu (Moses), at the end of his life, communicates the everlasting wisdom of *Matan Torah* (giving of the Bible) and the commandments to *Bnei Yisrael* (children of Israel). He urges them at this crucial time to “take utmost care and watch yourselves scrupulously, so that you do not forget the things that you saw with your own eyes and so that they do not fade from your mind as long as you live. And make them known to your children and to your children’s children” [1]. There are many different interpretations as to what this *Pasuk* (verse) means when it says that

one should do their utmost to watch themselves. The *Kli Yakar*, for one, suggests that this is referring to taking care of one’s health, as he writes “‘Guard yourself’ means look after your physical body. It does not add ‘exceedingly’ as it does after the second part of the verse which refers to guarding one’s soul, because one must be even more careful to protect one’s soul than one’s body” [2]. In addition to highlighting the critical need of protecting one’s soul, this also highlights the value of taking proper care of one’s body. The delicate equilibrium between the two aspects invites a more sophisticated comprehension, exposing the unbreakable bond between the soul’s health and the careful maintenance of the body.

The Torah provides a meticulous roadmap for managing our sustenance through the intricate laws of *Kashrus*. While numerous dietary regulations, such as abstaining from the consumption of meat and milk together [3] or selecting animals with specific characteristics [4], fall under the category of *chukim* (decrees beyond immediate human comprehension), it is crucial to recognize that these guidelines are inherently designed for our benefit. In the intricate tapestry of the 613 commandments, Hashem (G-d) has bestowed these regulations upon us with our well-being in mind. Although we may not always grasp the precise health or overarching reasons behind these dietary restrictions, the underlying principle remains clear — Hashem imparts these directives for our ultimate welfare.

Beyond the confines of Kashrus laws, the role of food in Judaism transcends mere sustenance, weaving through various aspects of our faith and culture with profound significance. From marking pivotal occasions to enriching communal celebrations, food serves as a conduit for spiritual connection and communal joy. In moments of triumph and fulfillment, such as the completion of Torah study (siyum) or the communal celebration of newlyweds (sheva brachos), food takes center stage as an integral part of the experience. These occasions are connected with the concept of Seudas Mitzvah, where festive meals become expressions of gratitude and spiritual fulfillment, binding individuals together in shared moments of celebration and reflection.

Thus, even via the most joyous of Jewish traditions a paradox arises: food can unintentionally have detrimental consequences on some individuals. “Because of the frequency of Seudas Mitzvah, people with an eating disorder may find an excuse to restrict caloric intake with a religious justification. For example, someone with anorexia nervosa may see there will be a large feast of lamb at an upcoming holiday, so they will practice the disordered behavior of caloric intake restriction in the week before. Or the large meal may prompt purging behaviors or excessive exercise in someone with bulimia nervosa. As a final example, in a person with ARFID, where the individual assiduously avoids certain kinds of food or food groups, Kosher eating laws may provide a built-in excuse to refuse to eat certain foods, effectively

hiding disordered eating symptoms” [5-6]. These unfortunate realities highlight the significance of understanding how eating disorders can quietly creep into religious rituals, even during the holiest and most joyful times in our faith.

Apart from the problems that arise from festive occasions such as seudas (meals), there are other facets of Jewish life that may unintentionally encourage negative conduct. Driven by social expectations, young women searching for a shidduch (soulmate) could feel pressured to meet an ideal of thinness, which could ultimately result in weight loss and, in some situations, the development of an eating disorder. In a similar vein, individuals can grow unsatisfied with the unrelenting quest of perfection in overseeing an exactingly balanced schedule that integrates secular professions or studies with limudei kodesh (Jewish religious studies). Some individuals revert to the destructive cycle of an eating disorder as a means of coping in hopes of reclaiming some semblance of control. Eating disorders can also arise from the juxtaposition of religious traditions, such as the inability to exercise on Shabbos (Sabbath) and Chagim (holidays) as well as the increased food consumption during these periods.

While Judaism highlights the importance of caring for the body, it is intriguing to observe a lack of obedience in this area. Prominent scholars like the Rambam emphasize the significance of food decisions on personal health and the negative effects of both insufficient and excessive consumption in their teachings

[7]. This viewpoint is supported by Rabbeinu Yonah, who cautions against the possible negative effects of overindulging [8]. The Mishnah Berurah supports a conscious attitude to eating, stressing the importance of food for health rather than just for enjoyment, echoing these ideas. He even goes as far as to compare individuals who eat solely for pleasure to animals [9]. An intriguing detour occurs when a study on American Jews finds that the holy day of Shabbos becomes an occasion for overindulgence, which greatly increases the prevalence of overweight and obesity among the American Orthodox Jewish Community [10]. Beyond Shabbos, this excess continues as people use religious justification to defend their eating patterns during the week by stating, “it’s an opportunity to make a bracha (blessing)” or “it’s a mitzvah to partake in a seudas mitzvah”, which is inconsistent with the beliefs of the aforementioned scholars on appropriate nutrition and self-care.

The conflict between our revered commentaries' or mefarshim's teachings and the reality of excessive food consumption presents a profound dilemma, potentially leading to cognitive dissonance. This theory tells us that discomfort arises when our beliefs clash with our actions, often driving individuals to seek resolution. In the context of weight management, this internal struggle can escalate into an eating disorder if left unaddressed. Renowned eating disorder specialist Temimah Zuker, based in New York City, has noted a significant demand for her services among Orthodox clients. She highlights the unique challenges faced

by this community, particularly during Jewish holidays marked by elaborate family feasts [11]. Indeed, these occasions, while deeply ingrained in tradition, deviate from the recommended practice of consistent, moderate meal consumption essential for maintaining optimal health. Recognizing the complexity of these dynamics is crucial in promoting a deeper understanding of the intersection between tradition, belief, and individual well-being within the Jewish community.

While some might attribute this phenomenon to societal pressures on women to conform to a specific appearance rather than cognitive dissonance, compelling evidence challenges such assumptions. Notable conclusions were drawn from a study that concentrated on Chareidi Jews (ultra-Orthodox Jews), a community that is frequently more culturally isolated than other sects of Judaism. The hypothesis that women from culturally isolated backgrounds are not susceptible to disordered eating was refuted by the findings, which showed no discernible variations in the prevalence of disturbed eating between Chareidi and secular Jewish women [12].

According to recent research, observant Jewish women may be more likely than their secular colleagues to experience eating disorders. Although I suggest that this tendency could still be linked to the cognitive dissonance theory, there are other possible causes that could put this group at a higher risk for eating disorders. There is evidence that Jewish women and

their secular counterparts experience similar levels of social pressure to succeed and compete in high-stakes contexts. Nevertheless, various sects may experience this pressure at varying intensities. A study looked into the relationship between self-esteem, amount of religious adherence, and the frequency of disordered eating disorders among Orthodox Jewish females in Israel, and its findings showed an intriguing correlation: a girl's chance of developing disordered eating disorders and body dissatisfaction was inversely correlated with her level of religious observance. This was ascribed to high levels of observance that correlated with a decrease in the emphasis placed on women's physical appearance and a lowering of the pressure to succeed and achieve outside the home. Moreover, the research indicated that girls who practiced more of the faith were less likely to have eating disorders because they internalized traditional Jewish values, including the preference for modesty above outward beauty [13].

Although eating disorders are becoming more common in all branches of Judaism, Jewish women who are exposed to Westernized society are more likely to acquire eating disorders. An investigation on the relationship between extrinsic religious orientation and disordered eating pathology (DEP) in modern Orthodox Israeli adolescents was conducted in a separate study. One hundred twenty adolescent female Modern Orthodox participants filled out an anonymous survey about their religious orientation, DEP, body dissatisfaction, and adherence

to the Superwoman Ideal — a notion of a woman juggling multiple roles, like worker, homemaker, volunteer, student, or other time-intensive occupations. The results show a strong relationship between extrinsic orientation and DEP, which is mediated by a higher degree of Superwoman Ideal adherence. Following this adherence, there is a higher level of body dissatisfaction, which is known to be a proximal risk factor for DEP. The research explores the consequences of these findings, taking into account the relevance of these findings to clinical knowledge as well as particular cultural influences within the Modern Orthodox population [14].

While Judaism advocates for healthy eating, it's crucial to acknowledge that certain traditions, such as the custom of regular large meals, may inadvertently jeopardize community health. To mitigate the risks of health issues like binge eating disorder or excessive weight gain, striking a balance between celebrating joyous occasions and adhering to healthy guidelines is paramount. Additionally, it's imperative to recognize that certain branches of Judaism, particularly modern orthodoxy, may be vulnerable to detrimental influences from Western culture concerning eating habits and body image. Acknowledging the prevalence of eating disorders within Jewish communities is essential, as research emphasizes their significant occurrence. Despite the joy and purpose inherent in Judaism, it's essential to acknowledge our susceptibility to negative societal influences. Understanding these nuances is

key to grasping the intricate relationship between religious practices and mental health within our community. A crucial initial step in mitigating harmful behaviors is to actively raise public awareness about eating disorders. Teaching our children healthy eating habits should be regarded with the same importance as imparting knowledge of halacha. By prioritizing education and awareness, we can promote healthier attitudes towards food and body image within our community.

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From Torah Warnings to Modern Realities: Unveiling Lead Toxicity in the Jewish Community

By: Gabrielle Green

Lead (Pb), a seemingly simple elemental metal, has played complex and often conflicting roles throughout human history. Dating back to its mention in sacred texts to its prevalence in modern society, lead characterizes a historical presence that is both compelling and perilous. This comprehensive exploration will contextualize the biological basis of lead toxicity and poisoning along its path from biblical narratives to contemporary realities.

Lead is a metal found in the archives of Jewish tradition, most notably in ancient scriptures and Rabbinic literature. Numerous references to lead exist in the Bible, where it is mentioned alongside other metals, such as gold, silver, and copper [4]. Prophets and scholars often used lead to symbolize strength and judgment, while practical applications included its use in crafting sacred vessels and writing instruments [8].

Lead's mention in biblical texts often serves as a metaphor for heaviness or affliction. For example, in Exodus, it is compared to the sinking of the Egyptian chariots in the Red Sea:

The enemy said, "I will pursue, I will overtake, I will divide the spoil; my desire shall have its fill of them. I will draw my sword; my hand shall destroy them." You blew with your wind; the sea covered them; they sank like lead in the mighty waters [3].

Here, lead symbolizes the inevitability of

defeat and destruction. Similarly, in the Book of Job, lead is referenced in a context of permanence and affliction:

He has put my brothers far from me, and those who knew me are wholly estranged from me. My relatives have failed me, my close friends have forgotten me. The guests in my house and my maid servants count me as a stranger; I have become a foreigner in their eyes. I call to my servant, but he gives me no answer; I must plead with him with my mouth for mercy. My breath is strange to my wife, and I am a stench to the children of my own mother. Even young children despise me; when I rise they talk against me. All my intimate friends abhor me, and those whom I loved have turned against me. My bones stick to my skin and to my flesh, and I have escaped by the skin of my teeth. Have mercy on me, have mercy on me, O you my friends, for the hand of God has touched me! Why do you, like God, pursue me? Why are you not satisfied with my flesh? neuroOh that my words were written! Oh that they were inscribed in a book! Oh that with an iron pen and lead they were engraved in the rock forever [7]!

Lead is referenced as a symbol of permanence, suggesting the desire for enduring testimony to suffering.

Lead was originally valued for its malleability and durability, but modern science has exposed its negative, dangerous side: neurotoxicity. Research has proven the harmful effects of lead

exposure on human health, specifically on the nervous system and cognitive development. Lead can bind to sulfhydryl and electron donor groups. This affects many proteins and interferes with cell mechanisms that are regulated by cations, such as calcium and zinc. Lead exposure to any degree is unsafe; even low levels present significant risks, especially for children. For example, lead disrupts regular synaptic pruning in young brains, which contributes to behavioral and cognitive abnormalities in children exposed to high levels of lead. Lead exposure can also cause anemia by interfering with enzymes involved in heme synthesis and red blood cell membrane integrity, possibly resulting in decreased production and increased destruction of red blood cells [5].

Lead poses significant health risks by interfering with cellular processes, inducing DNA damage, and generating reactive oxygen species. The enzyme ALAD is a biomarker for lead-induced toxicity, as lead inhibits its function and causes oxidative stress. Industrial workers, such as those involved with welding and brick kilns, are exposed to lead and are at risk of DNA damage and altered gene expression [1].

Lead poisoning results when lead accumulates in the body over time, often through consistent and regular exposures to small amounts of lead-containing materials. Common sources of lead exposure include Pb-based paint and Pb-contaminated soil, dust, and water. Since 1978, there have been restrictions on

lead content in paint, yet lead-based paint remains a significant source of lead exposure in young children. As previously described, children are especially hypersusceptible to lead poisoning due to their developing bodies and tendency to put objects in their mouths. Lead may harm the brain, kidneys, liver, and bone marrow once absorbed, as it binds to red blood cells and incorporates into bone and soft tissues. About 535,000 children in the United States between ages 1 and 5 have elevated blood lead concentrations, which is defined as greater than or equal to 5 $\mu\text{g}/\text{dL}$ [13].

Lead poisoning can be painfully and sometimes irreversibly damaging as it impacts nearly every system in the human body. Lead exposure can cause developmental delays, learning disabilities, behavioral problems, and reduced IQ in the younger population. For older individuals, lead poisoning can cause high blood pressure, kidney damage, reproductive issues, and an increased risk of cardiovascular disease [5]. Triglyceride glucose (TyG) is a surrogate marker for insulin resistance and cardiovascular-metabolic disease. The TyG index was determined using the triglyceride levels of 9,645 adults who participated in the Korea National Health and Nutrition Examination Survey in 2005, 2008–2013, and 2016. The researchers observed an increasing trend in the TyG index as blood lead and cadmium concentrations rose. Participants in the highest quartile of blood lead and cadmium concentrations showed higher TyG index values compared to those in the lowest

quartile. The study highlights the relationship between cardiovascular-metabolic disorders and individuals exposed to heavy metals, such as lead [6]. The correlation between lead exposure and severe health issues, specifically cardiovascular-metabolic disorders, shows the pressing need to take proactive measures to mitigate lead toxicity and safeguard public health.

Williamsburg, Brooklyn, is home to a well-known Hasidic Jewish community composed of individuals with deeply rooted religious and traditional values. Remarkably, lead poisoning is extremely prevalent in this community. Many children in Williamsburg display high rates of lead exposure, even surpassing those found in Flint, Michigan, during its water contamination crisis, which is wildly concerning. Aging infrastructure, lead-based paint, and industrial pollution are all factors that contribute to the elevated lead levels in this community.

Hasidic Williamsburg undoubtedly faces distinctive challenges when navigating its lead poisoning. Religious and cultural practices influence exposure risks since families often live in older homes with lead-based paint. Furthermore, language barriers and limited access to healthcare services create an obstacle in preventing, screening for, and treating lead poisoning [11]. Regardless of these challenges, public health officials and community leaders are working together to raise awareness about lead poisoning and provide resources for testing and treatment. Outreach efforts include educational routine screening,

workshops, home inspections, and partnerships with local healthcare providers. By empowering families with information and support, the Hasidic community in Williamsburg is taking proactive steps to protect its children from the dangers of lead exposure.

As we confront the modern-day challenges of lead toxicity, we cannot ignore the insight derived from ancient texts and teachings. From the metaphorical “sinking like lead” in Exodus to the use of molten lead as an instrument for the death penalty (Sanhedrin, 52a), these ancient texts serve as poignant reminders of lead’s threat.

Rabbinic literature shares further insights into the dangers of lead and its effect on health and society. In the Talmud, lead is associated with many hazards, including injury and toxicity. For example, in (Chullin 8a), lead is described as a naturally hot substance capable of causing harm:

Which wound is a boil and which is a burn? If one was struck with wood, with a stone, with pomace, with the hot springs of Tiberias, or with any item that is not heated by fire, a phrase that serves to include lead that was mined from its source in the ground, which is occasionally hot enough to burn a person, this impression left on the skin is a boil [2].

Again, the Talmud (Sanhedrin, 52a) expressed the usage of lead as a means for the death penalty, Serefa:

מאי פתילה אמר רב מתנה פתילה של אבר - What kind of wick is the Mishnah referring to?

Rav Mattana says: A wick of lead, i.e., a long, thin piece of lead in the shape of a wick, which is melted and poured down into the intestines [12].

In numerous places in the Talmud, the sages describe pouring molten lead down the esophagus as one of the four death penalties executed by the rabbinic courts [8]. The Talmud (Pesachim, 75a) discussed the case of an adulterous woman who is the daughter of a priest. She is sentenced to be burned, but Jewish law obligates the human body to remain intact, so instead of literally burning her body with fire, they would pour molten lead down her throat [10]. The Mishnah (Sanhedrin 7:2) outlined the process of execution by burning. The individual sentenced to death is submerged in manure, so that he is unable to move, and his neck is subsequently wrapped in a scarf, which is then pulled by two witnesses until the individual opens his mouth and molten lead is poured down his throat. His intestines then burn, leading to his death [9].

As is clear from rabbinic literature, lead carries cautionary tales that highlight the need for hypervigilance when handling it. Reinforcing the importance of understanding its properties and dangers, as it is certainly a destructive, corrosive metal.

With a surplus of evidence and dangerous consequences, action needs to be taken to eradicate lead poisoning from modern society. This will require a multi-faceted approach, including thorough lead testing and treatment efforts, public health

education campaigns, and policy interventions aimed at addressing environmental sources of lead contamination [5]. Targeted interventions tailored explicitly to high-risk communities, such as the Hasidic Williamsburg, are of the utmost importance to protecting and ensuring the health of particularly vulnerable populations.

The toxic nature of lead acts as a reminder of the interconnectedness of the past, present, and future. In modern times, as we face the challenges posed by this pervasive hazard, we reflect on the warnings deep in our ancient heritage and draw upon the collective wisdom of scientific inquiry to chart a path forward. By forging partnerships between communities, policymakers, religious thought leaders, and researchers, we can strive towards a world where the dangers of lead will be acknowledged, addressed, and eventually eradicated, relegated to our history and symbolism.

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“Birth is such a beautiful thing,” as many people say. The truth is, birth is an absolute miracle, but is it beautiful? It’s a lot messier than movies and TV shows portray. If your only source of knowledge on the labor and delivery process comes from mass media, you probably have a skewed view of how a baby comes into the world. Yes, most of us understand that labor and delivery is painful, but how many know that women have to birth their placenta after birthing their baby? How many know that many women tear and need stitches? I’ve been fascinated by labor and delivery since I was a little girl, but not until I was a sophomore in high school did I start to really understand what happens when a woman gives birth.

Like I said, the birthing process is a miracle. The way a woman's body knows exactly what it needs to do to bring a new life into the world is astonishing. Labor is a unique experience for every woman. For some, labor merely lasts a few hours, while it can last a few days for others. There are three stages of labor, the first of which is divided into two phases: early labor and active labor. During early labor, the uterus contracts irregularly and as this happens, the cervix begins to dilate and efface (to shorten and thin). Once the cervix dilates to around six centimeters, and contractions become more regular and intense, active labor begins. Often, a woman’s water breaks during active labor, and when it doesn’t do so on its own, a healthcare provider will break it. Typically, once a woman is in active labor her cervix will dilate one centimeter every hour, but some dilate more quickly and others at a slower rate. The final

phase of active labor is referred to as transition and is often very intense. Once the laboring mom has reached ten centimeters, it’s time to push that baby out! [1].

During the second stage of labor, a woman gives birth to her baby. Pushing a baby out can take just a few minutes or a few hours. When it’s time to push, she will either push in time with her contractions, when the doctor or nurses tell her to, or when she feels the urge to push [1]. This painful and intense stage of labor ends emotionally with mom and baby meeting for the first time.

The third and final stage of labor is when the mother births the placenta. The uterus continues to contract after delivering the baby, albeit a lot less painfully. Usually the placenta is birthed within thirty minutes, but it can take up to an hour. The contractions move the placenta into the birth canal, the woman gives a small push, and the placenta is out. Once the placenta has been delivered, the healthcare provider determines if any stitches are needed, and the uterus continues to contract in order to return to its normal size [1].

While the woman’s body is made to do all this, this process can be scary, and complications may arise. Because of this, most women give birth surrounded by nurses and other medical professionals; this has been the case for a very long time. The Torah mentions that we had midwives in Mitzrayim. As Bnei Yisrael multiplied and Pharaoh became increasingly scared of them, he called to him two Jewish midwives, Shifra and Puah. He instructed them to kill all the Jewish baby boys, but

they did not adhere to his command. Instead, they lied and told him the Jewish women were not like Mitzri women; they gave birth on their own before the midwives arrived [2].

So, who were the midwives who had enough courage to lie to Pharaoh and put their own lives at risk? According to Rashi, Shifra was none other than Moshe Rabbeinu's mother, Yocheved, and Puah, who was his sister, Miriam [3]. Their fear of G-d was greater than their fear of Pharaoh and Hashem, "made for them houses" as a reward [4]. Chazal commented on this and noted that Hashem gave them batei kehuna, levia, and malchut. Through this statement, Rashi was able to identify who Shifra and Puah were. The kehuna and levia were given to Yocheved through Moshe, and Aharon, and malchut was given to Miriam, who married into shevet Yehuda [5]. There's a rule in the Torah that every word used has a purpose, so what was the purpose of calling Yocheved and Miriam by the names Shifra and Puah? Different mefarshim have explained that the names were indicative of their roles as midwives. According to Rashi, the name Shifra reflected Yocheved's actions in beautifying the babies, *al shem shemeshaperet et havlad*, and the name Puah suggested that Miriam would soothe the newborn babies to stop their crying [3]. The Ba'al Haturim had a different view on the meaning of the name Shifra. He believed Shifra was derived from the word *shefoferet*, which means tube. When a mother delivered a baby in respiratory distress, Yocheved took a hollow reed, inserted it into the trachea, and blew air into the baby's lungs, thereby resuscitating the infant [6]. It's clear that

having a midwife present during labor was a necessity. Now, we have doctors and nurses as well, but the sentiment is the same: having a professional present during labor and delivery, whether for emotional support or medical assistance, makes all the difference in the world.

Unmedicated labor and delivery can be a particularly painful experience, but it wasn't always like this. Before Adam and Chava ate from the eitz hadaat, bringing a child into the world was not such an arduous task. They were not meant to eat from the eitz hadaat, in fact, that was the one thing they were commanded not to do, so Hashem punished them. Chava's punishment was mentioned in Sefer Bereishit, "*harbe arbe itzvonech v'heronech b'etzev teldi vanim...*", "I will greatly expand your hard labor and your pregnancies; in hardship shall you bear children" [7]. Many mefarshim commented on the word *etzev*. Some noted that Hashem punished Chava by making labor and delivery (and really all of pregnancy) a difficult and painful process. While it's true that unmedicated labor is agonizing and only became so after Chava sinned, it is possible the word *etzev* does not mean pain. Haamek Davar explained that it was not an expression of pain but rather of toil. In Sefer Mishlei, the word *etzev* is mentioned, "*b'chol etzev yehiye motar*," "with all toil there is gain" [8]. Chava's punishment was not the pain associated with labor and delivery but the toil of bringing a child into the world. Today, women have to work very hard to bring a child into this world because of Chava's actions, but it's not because they are being punished, but because so much good comes from toiling.

I once learned that Hashem changed the world after the sin, not because He wanted to punish us, but because once man acquired knowledge from eating from the eitz hadaat, Hashem had to change the world to reflect what we now need instead of what we needed pre-sin. So yes, labor and delivery is painful, and yes, it's painful because Chava sinned, but the pain itself is not a punishment. Hashem is making us toil because that is what this changed world needs. When women scream in pain while delivering their baby, they are toiling for something priceless, they're toiling for one of the biggest gifts in the world. Concentrating on this, rather than the idea that it is a punishment, might just make the whole experience a little more tolerable and a lot more meaningful.

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[8] Haamek Davar on Bereishit 1:16

Amputation has been a topic of discussion in society for a long time, reaching as far back as to biblical times. The discussions and ramifications of amputations come up throughout the Bible and Talmud, discussing the statuses and halachic consequences. With the increase in technological advancements, there are many modern halachic questions that continue to arise regarding prosthetics. These include prosthetic devices that conserve body energy, since they are built with battery powered electric motors, taking less effort to work [1]. These newer advancements add to the halachic questions of prosthetics. There are several opinions of the status of prosthetics, with no clear halachic answer. Before looking into the modern day halachic issues, it is important to see how amputees and prosthetics were seen in biblical times.

There are several references to amputees throughout Tanach, however, many of the amputations were due to punishments. Some examples include: women having their hands cut off after mutilating their husbands' attacker, King David commanding the amputation of the men who killed Ish-Boshet - even though posthumously, the amputations were done as punishment, - and the big toes of a Cannanite king cut off after defeat in battle by the tribes of Shimon and Reuven (Devarim 25:12; Shmuel II 4:12; Shoftim 1:6) [2]. While the meaning of "an eye for an eye" is modified between pshat and drash, on a pshat level, clearly an amputation was a punishment (Vayikra 24:20). It is discussed in Mishnah Kreitut 3:8 that patients suffering from tzaraas in biblical times would undergo amputation if their limbs were too badly

affected [3]. The Torah even had terms for those who were considered to be amputees. In the Torah, a pise'ach is mentioned, which was defined in general, while there are varying nuances between opinions, as someone who "cannot walk at all except with the help of prostheses [4]." The mentioning of amputees in Tanach set the precedent of the discussion of prosthetics in Judaism in the Talmud.

As opposed to Tanach only mentioning cases of amputation, the Talmud discussed the halachic ramifications of prosthetics. An obvious question occurs in regard to Shabbos and what would be allowed with a prosthetic. A Mishnah in Shabbos 65b stated, according to Rebbi Meir, "one with an amputated leg may go out with his wooden foot" on Shabbos, since the prosthesis is considered to be like a shoe [5]. However, Rebbe Yosei argued against this in Shabbos 66a and said it was not considered a shoe since it is susceptible to tumah [6]. The discussion of when an object can be susceptible to tumah does not fall within the scope of this paper. He further stated in Yoma 78b that there was a fear that the prosthesis would fall off and be carried in the public domain on Shabbos - both points leading to his view of prosthetics not being permitted on Shabbos [7]. Rebbe Meir did not agree with the aspect of "fear" noted by Rebbe Yosei [7]. An interesting insight can also be gained from this Mishnah, not only regarding the halachic consequences, but also what prosthetics in the Talmudic era looked like. The prosthesis was described as "a log of wood, hollowed to receive the stump, which had a receptacle for pads upon which the stump rested" [8].

Rashi described the supports that someone with amputated feet used as shoes, as extending from his knees down the shins allowing the amputee to walk on his knees (Shabbos 66a) [9]. Interestingly, in Yevamot 102b Rashi stated that the purpose of the wooden foot was not to hold the individual's weight but to hide the fact that they are maimed [10]. The intention behind the prosthetic may have larger ramifications on its halachic status. Even in the Talmudic era, prosthetic limbs were utilized and part of greater discussions regarding their halachic status, creating the basis for our modern day halachic questions.

The discussion of prosthetic limbs continues into modern times, with new questions arising as technology advances. Prosthetics are compared and contrasted against internally implanted devices, shedding more light - and developing more questions - on the status of prosthetics. Opinions regarding the status of prosthetics stem from either viewing the prostheses either as external to the person or as though it is a part of the person. According to R' Elyashiv, internally implanted devices "become completely annulled to the body", making it so they have the same status as all other natural organs. These implanted devices that act as organs would then be able to be 'carried' on Shabbos and have the same ramifications as neutral body parts for tumah and taharah. Since a prosthetic arm "merely simulates the arm but does not fully mirror the natural functioning of the arm" they do not have the same status as internal implants. However, some disagree and state they do have the status of being like the natural organs, creating a large divide in how prosthetic

devices are seen and their halachic statuses [11]. This debate further extends into several aspects of Judaism.

There is an ongoing machlokes about whether or not tefillin should be placed on a prosthetic arm. According to some rabbinic authorities, the criteria for donning tefillin depend on blood flow in the arm (which a prosthesis does not have), while for some it is about functionality and the connection with the brain (which a prosthesis does have). The issue continues in regard to kohanim and whether they can participate in birchas kohanim and do nesias kapayim. In both cases it depends how prostheses are viewed in relation to being a natural body part. The prosthesis will draw people to look at it and therefore gaze at the kohanim out of curiosity which was forbidden during the blessings. The same issue arises for the mitzvah of taking the lulav. A distinction was made between a body powered prosthetic (using one's own body movement to move the prosthesis) and a microprocessor prosthetic (using a battery to enhance the movement of the prosthetic) - since the electric arm, being moved by the battery, is the one doing the "taking" not the person, it would not be allowed to be used in the mitzvah [11].

For all of these questions it comes down to how one paskins and whether a prosthetic device is considered to be a part of the body or not. With even more developments in technological advancements, these questions will continue to be relevant and be further discussed in the future.

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Genetic testing for breast cancer susceptibility was introduced into clinical practice after the BRCA1 and BRCA2 genes were discovered in 1994 and 1995 respectively. The BRCA1 gene participates in several cell functions, including the assembly of the mitotic spindle, centrosome duplication, cell-cycle control, and chromatin remodeling at sites of double-stranded DNA breaks. BRCA2's role includes regulating RAD51 filament formation, a critical step in catalyzing strand invasion and initiating homologous recombination. Both genes are regarded as tumor suppressors necessary for the repair of double-stranded DNA, and therefore cells lacking either gene are unable to repair double-strand breaks and may incur mutations during multiple rounds of cell division. Whilst the majority of these mutations result in cell death, in some cases the cells stabilize and acquire capabilities of autonomous cell division and metastatic potential, two indications of cancer [1].

Two mutations in BRCA1 and one mutation in BRCA2 account for the majority of BRCA mutations in the Ashkenazi Jewish population. In Jewish women, approximately 12% of all breast cancers and 35% of all ovarian cancers are due to a founder mutation, which is a mutant often responsible for the high prevalence of rare genetic disorders in specific populations. In countries with founder mutations, it has been suggested as reasonable to test all breast cancer patients for mutations [1]. Research has suggested that one in a hundred women of Ashkenazi origin may be at high risk of developing breast and/or

ovarian cancer [3]. Hereditary breast cancer and ovarian cancer describe the 10% to 15% of breast cancer caused by germline mutations, most commonly being in the BRCA genes. According to the Centers for Disease Control and Prevention, approximately one of every 40 individuals of Ashkenazi Jewish ancestry has a mutation in the BRCA1 or BRCA2 gene, compared with one of every 800 in the general population [1]. While the carrier rate in non-Jewish populations is too low to consider genetic screening, the carrier rate in Ashkenazi Jews in particular is so high that the lethality of ovarian and early onset breast cancers, as well as the increasing clarity in regards to effectiveness of early medical interventions may indicate that further dialogue and research regarding genetic screening are imperative [2]. In fact, in Ontario, it has actually been proposed that all Jewish women be eligible for genetic testing, regardless of their personal or family history [1]. Prevention and early detection are the two major strategies that are used to decrease cancer morbidity and mortality. Being able to identify those at increased risk for developing cancer allows the population to make informed decisions in regards to screenings and preventive interventions [1]. These are the main factors behind the push to complete a genetic screening.

Due to its prevalence in the Jewish community, the subject of genetic counseling and BRCA mutation testing has come up for many Orthodox Jewish Rabbis, whose opinions can have an immense effect on community healthcare decisions. A study was conducted in which 17 OJ (Orthodox

Jewish) rabbis and rebbetzins participated in 90-minute focus groups, with the ultimate goal of describing the OJ leader's views on testing for the BRCA mutation, with the aim of bettering cancer treatment and awareness, especially in this high-risk group. The study concluded that the community Rabbi's thoughts are crucial to the promotion of culturally sensitive healthcare delivery and that incorporating the Rabbis themselves into healthcare strategic planning early on can translate into the community better utilizing healthcare services. Four primary themes in the Rabbi's answers were noted: concern about cancer, shifting community norms, rabbinic role in medical decisions, and tampering with *Hashem's* plan [1].

Most participating Rabbis were in agreement regarding the importance of promoting cancer awareness, and many acknowledged the changing understandings of genetic contributions to cancer risk as well as the changing attitudes and knowledge of community members. Concerns about the implications of being identified as a mutation carrier were brought up, but many argued that that is not a good enough reason to take the test, as there are many possibilities in regard to response. In regards to a rabbinic role in medical decisions, the discussions focused on the many variables that play into religious law being applied to medical situations. The interactions among patients, rabbinic advisors, and healthcare providers would be of extreme significance for many of the patients. The final theme that was brought up was tampering with *Hashem's* plan, and whether it affects the individual responsibility for safeguarding one's health.

Some participants believed that since BRCA testing is an intervention on the basis of risk assessment, it is different from cancer screening, which would provide an early detection of cancer. In other words, getting a mammogram was okay because it was doing one's due diligence, but going for genetic testing, which may not necessarily tell one anything definite, would be more problematic. Other participants expressed that if G-d made these things, maybe he wants them to be used. Ultimately, the study showed a clear influence of religious beliefs on participant's thoughts regarding genetic screenings for the BRCA mutation. The study also demonstrated the need for a strong alliance between Rabbis and cancer-care professionals in appreciation of each other's roles. It effectively showed that awareness of and sensitivity towards the religious ramifications of genetic testing may be a good next step in providing culturally sensitive cancer education [1].

Focusing on the community's acknowledgment of the difference between a routine genetic screening and a screening for genes such as BRCA1 and BRCA2 is important. Whilst testing positive as a carrier for a recessively inherited disease raises the chance of disease in the carrier's offspring, it does not indicate anything about the carrier's own health. The repercussions of finding a harmful dominant gene, such as the BRCA genes, is that the patient him/herself is at a significantly increased risk of developing that disease during their lifetime. There are many reasons for encouraging mass screening of women for the BRCA genes. If a woman tests positive and is alerted to her increased risk of

developing potentially deadly cancers, she may practice increased diagnostic vigilance. Implementation of preventative measures may also present itself as an option. Reasons to discourage screening include no absolute reliable method of early diagnosis or prevention of breast or ovarian cancer, although several surgeries do significantly decrease the probability of developing these cancers, not all of them are accepted by all Orthodox Rabbis [4].

There is a biblical obligation to guard one's health: "*Venishmartem me'od le'nafshoteichem*," "Be very careful about your lives," (*Devarim* 4:15). Would this include requiring genetic testing for the potential presence of a dominant and possibly life-threatening trait? Due to the recognition that the presence of the BRCA genes only implies that a woman is at a much higher risk for breast and ovarian cancer, and can not definitively determine that she will develop these cancers, this is not likely to be the case. A predisposition to a disease would not be the same as a diagnosis. Since the presence of the gene only creates a statistical risk of developing cancer, it would be hard to argue that there is an absolute obligation to test [4].

Stigma, another of the potential problems brought up in the study, also presents itself as a real fear in regard to problems of stigmatization of the patients as well as their children. Along with those fears, there is a very real issue of confidentiality. Would one be required to tell immediate family members, who are automatically at a much-increased risk of having the gene themselves, or potential suitors, who, if they

knew a woman carried a greater than 50% chance of developing breast cancer during her life, maybe would not date or marry her? In regards to telling family members, there are two potential conflicts. One concern is the obligation against standing idly whilst our neighbor is harmed, "Lo Ta'amod Al Dam Re'echa" (*Leviticus* 19:16), which sitting on this information may be classified as. On the other hand, the Torah very strictly limits disclosing even true information to a third party, and maybe the tester would not want the information shared. Dr. Avraham Avraham, after consulting with Rabbi Yosef Sholom Elyashiv, seemed to imply that due to the testing not providing a definite risk to each family member, the uncertainty that carrying the gene will even result in cancer, and the lack of a completely preventive curative treatment for cancer in relatives who would test positive, a ruling could be issued allowing the patient to maintain her confidentiality. This decision of Rav Elyashiv also seems to insinuate that the individual would not have an obligation to test in the first place. In regards to *Shidduchim*, it seems that a woman would almost certainly be required to tell her prospective spouse of her results. Rav Moshe Feinstein was once asked if a man with Marfan syndrome (a debilitating, dominantly inherited disease) was required to marry. He responded yes, but made clear that his wife would have to be informed of his condition before marriage. This may imply that, whilst one does not have to disclose their testing results to family members, the testing itself would still raise issues of premarital disclosure [4].

It is clear that the subject of genetic screening, in particular for the BRCA genes raises issues within the community. Rabbi Moshe Dovid Tendler has described genetic testing for BRCA genes as an issue of “tyranny of knowledge,” recognizing the incredible power this knowledge gives us, but also the repercussions it has. In the case of BRCA screenings, the patient is faced with the prospect of developing breast or ovarian cancer, diseases which do not provide a completely preventative next course of action. Increased diagnostic vigilance may be helpful, and while invasive, certain surgeries can increase survival rates. If positive results are used to improve health, then testing and sharing the results are justified. If they are kept hidden and only increase anxieties and potential halachic problems, then their purpose may not be beneficial to the Jewish community [4].

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Picture this: a world where cheeseburgers are kosher, bacon finds its way into our grocery stores' kosher section, and lab-grown meat emerges as a potential reality. As cutting-edge food technologies advance, Israeli companies like SuperMeat and Aleph Farms have pioneered the cultivation of chicken and steak, respectively, from just a few stem cells. Lab-grown meat not only sparks curiosity about its taste, but also raises numerous *halachic* questions for kosher observant Jews. Mainly, can this cell-based, *in vitro* meat truly be kosher and would it be classified as *halachic* meat? More practically, will we finally achieve an (almost) authentic cheeseburger experience, a dream harbored by many Jews? Can pork finally find a place on a kosher shabbat table? While lab-grown meat emerges as a tempting option, the process of sourcing stem cells and cultivating these products merits a very complex dissection of *halacha* to determine its kosher status.

First, we must examine the main *halachic* issues regarding the general process of lab-grown meats. Lab-grown meat companies are committed to reducing animal suffering and the amount of animals slaughtered for human consumption. Therefore, stem cells used in the process are intended to be sourced from a living animal. However, in accordance with Jewish dietary laws, Jews are forbidden from eating from any animal that is not kosher or that has not been ritually slaughtered [1]. Most importantly, Jews are also forbidden from eating directly from the limb of a living animal [2], or from meat that has been severed from a living animal [3].

Furthermore, the nutrient broth typically used by lab-grown meat companies to grow the stem cells usually contain fetal bovine serum, a blood derivative. As Jews, we are forbidden from consuming blood whether it be from a kosher or non-kosher animal [4].

With these stringent prohibitions that seem to undermine all aspects of the process of cultivated meat, how can Israeli companies like SuperMeat and Aleph Farms even receive a kosher certification? In fact, SuperMeat has even recently received kosher certification from the Orthodox Union, the largest and most kept kosher certification authority, validating its product as kosher, *fleishig* [5]. However, the Orthodox Union expressed reservations about certifying Aleph Farms, even though Israel's Chief Rabbi, Rabbi David Lau, announced their cultivated meat to be kosher, *parve* [6]. This discrepancy highlights the complicated nature of producing lab-grown meat that complies with all *halachic* prohibitions and dietary laws necessary to obtain kosher certification.

To understand the *halachic* rulings for these companies, we must first understand why lab-grown meat should even require a *hechsher*, since the stem cells taken from the animal are microscopic in size. We know that, "the Torah was not given to ministering angels," and therefore, we are not held accountable for aspects beyond our perception and according to *halacha*, microscopic entities do not exist [7]. Accordingly, these microscopic stem cells should have no *halachic* status according to Jewish law. This implies that it would be

permissible to take the original stem cells from a non-kosher animal and it would still be considered kosher since they lack *halachic* value. However, Rabbi Shlomoh Zalman Auerbach explained the argument of claiming stem cells are *halachically* nonexistent similar to the argument of grafting, the process of mixing species, *kilayim*, of plants which is forbidden according to Jewish law [8]. Similar to this example of grafting, the stem cells used in lab-grown meat are recognized in their eventual development into the visible food product. As a result, they cannot be considered an invisible, nonexistent entity according to Jewish law. If the cells were taken from a live or unslaughtered animal, the resulting meat would be considered *treif*, while if they were extracted from a slaughtered kosher animal, they would be considered kosher, *fleishig*.

Rabbi Shlomoh Zalman Auerbach presented a very reasonable argument that would classify lab-grown meat as *halachic* meat, so how did Rabbi David Lau conclude that it was *parve*? A substance can only have the *halachic* status of being meat if it comes from an animal, which only gains its status as an animal by virtue of its ancestry. However, because lab-grown meat is created through unnatural means, through a unique process of cultivation, *halachically*, one can consider this “unnatural meat” as not being an animal product and not being meat. There is even the opinion among contemporary rabbis that the unnatural growth of the lab-grown meat gives it the same status as “heavenly meat,” which is not *fleishig* and can be eaten with dairy [9].

Malbim’s commentary on the pasuk, “וְאֶל־הַבָּקָר רָצָה אַבְרָהָם וַיִּקַּח בְּוֶרְקָר רֶדֶ וְטוֹב וַיִּתֵּן:” (Genesis 18:7) explains that when it says, “לַעֲשׂוֹת” – “to make”, it is implying that Avraham had *made* the calf he served to the angelic guests that visited him after his circumcision. The Bible then proceeded to say that he prepared cream and milk from the calf that he “*made*” and served them together to his guests. But how can this be? We know that Avraham kept all of both written and oral law even before the Torah was given [10]. Avraham actually created the calf by using a combination of Hashem's Divine Names. This calf was considered “heavenly meat” and did not have the *halachic* status of meat, and consequently, Avraham was able to serve it to his guests alongside dairy. Since Rabbi Lau has labeled lab-grown meat as “heavenly meat,” he considered it as kosher, *parve*. Under this opinion, Jews can finally have their long awaited cheeseburger. The more recognized opinion, held by the Orthodox Union, is that lab-grown meat is not created through miraculous means and certainly is not “heavenly”. Lab-grown meats should be considered “meat” and *halachically* as *fleishig*. Unfortunately, the dream of an authentic kosher cheeseburger remains just out of reach.

Next, it is worthwhile to explore the considerations surrounding lab-grown pork. The discussion about creating lab-grown pork revolves around determining whether these stem cells have the *halachic* status of the animal they were taken from or as something completely detached from its

origin. If they are considered completely neutral, it would be safe to say that they would be allowed to be taken from not only kosher animals, but also non-kosher.

The Gemara (*Sanhedrin 59b*), related Rabbi Shimon ben Chalafta was traveling and came across hungry lions. He then proceeded to recite Psalms 104:21 and two pieces of meat descended from heaven. Feeding one piece to the lions, he took the other to a group of Rabbis inquiring if the meat was kosher. The Rabbis explained that even if the meat were to have descended clearly resembling a non-kosher animal, it would still be considered kosher due to its heavenly origins. From here we learn “a non-kosher item does not descend from heaven”. According to those who *paskin* that lab-grown meat was considered “heavenly meat”, it would not matter if the stem cells came from either a kosher or non-kosher animal. Under this perspective, kosher pork is a definite possibility [9].

While it may seem obvious, we learn from Leviticus 11:8, “of their flesh you shall not eat” that all parts of a non-kosher animal, including tissue grown from the animal that was not present at birth, is not kosher. This natural growth and maturation process of tissue is what *halachically* categorizes a living animal and its descendants. This may seem to imply that if we take stem cells from a non-kosher animal, then the resulting meat has the *halachic* status of that animal and similarly, is non-kosher. However, because the artificial reproduction and division of the cells in lab-grown meat is considered to be synthetic and not of “natural growth”, there

is room to argue that the meat would not have the status of the non-kosher animal and instead be given a completely new, neutral status [11].

Contrarily, the Gemara (*Bekhorot 5b*) elaborates that if the offspring of a kosher animal has the phenotype of a non-kosher animal it is considered kosher and if the offspring of a non-kosher animal has the phenotype of a kosher animal it is considered non-kosher. This is because an animal is not specifically defined as kosher or not kosher simply based on the characteristics of split hooves and chewing cud, but rather by virtue of its ancestry. Therefore, if the stem cells were taken from a kosher animal, then the resulting meat would be kosher and alternatively, if they were taken from a non-kosher animal then the resulting meat would be non-kosher [11].

It is more widely accepted that stem cells are actually considered a product, like eggs and milk, of the animal from which they originated. According to the Gemara (*Chullin 64b* and *Bekhorot 6b*) we concluded that non-kosher animal products are also non-kosher. Cultivated meat using stem cells taken from a non-kosher animal would be considered non-kosher and consequently, forbidden. However, there is the concept of *zeh va-zeh gorem* learned in the Gemara, *Avodah Zarah 49a*. This concept stated that the product of two distinct causes, one permissible and the other prohibited, is considered permissible. This can only be applied when the prohibited substance is at most one-sixtieth of the total product, rendering it null within the mixture.

Regarding cultivated meat, the two distinct causes would be the stem cells and the nutritional culture broth used to support and maintain cell growth. Meaning, if the stem cells came from a non-kosher source but the culture broth was kosher, the resulting grown meat would technically be considered kosher. As previously mentioned, the serum used in the culture broth typically contains a blood derivative, which is forbidden for Jews to consume even if it were to be produced from a ritually slaughtered kosher animal. However, there is a factor that prevents the concept of *zeh va-zeh gorem* from being applied: the stem cells are deemed a *davar ha-ma'amid*. A *davar ha-ma'amid* is a factor in a mixture which acts as a catalyst, changing the perceivable physical properties of a food product and is not subject to nullification. The stem cells, which are undoubtedly essential to the growth and physical development of the meat, are considered a *davar ha-ma'amid* and cannot be nullified. Therefore, it is *paskined* that if the stem cells were taken from a non-kosher source, the resulting product would also be non-kosher. In order to prevent a transgression of Jewish law, it does not seem likely that lab-grown pork will ever make it onto our kosher shopping lists [11].

With a better understanding of the technical *halachic* issues regarding lab-grown meat, we can understand the *halachic kashrut* rulings of Israeli companies SuperMeat and Aleph Farms. Evidently, there are noticeable differences in how these companies source their stem cells which becomes important when determining their kosher status.

SuperMeat uses stem cells from chicken eggs which are in the early stages of fertilization, before the vascular system forms [5]. In contrast, Aleph Farms sources its stem cells from the fertilized egg of a living cow, named Lucy [12]. Despite this significant distinction, both companies cultivate their stem cells in a plant-based nutrient broth within a bioreactor. In the bioreactor, the cells undergo replication and differentiation as they transform into muscle and fat tissue, identical in taste, smell, and appearance to the actual meat from the sourced animal culture.

Since SuperMeat sources its stem cells from fertilized chicken eggs in their early stages of development, they completely bypass the concern of sourcing stem cells from a living animal. By sourcing their stem cells from the eggs before they develop a blood supply and by using a plant-based nutritional broth they can ensure that no blood is involved in the cultivation process. In line with all *halachic* concerns, the Orthodox Union was able to certify SuperMeat to be kosher, *fleishig* [5]. Despite Aleph Farms also using a plant-based nutritional broth, they source their stem cells from a living animal, therefore the Orthodox Union is reluctant to grant the company a kosher certification. In contrast, Rabbi David Lau claimed that Aleph Farm's steak should be recognized as kosher *parve*, asserting that lab-grown meat undergoes "unnatural growth" and should not be categorized as traditional meat [6].

Ultimately, both companies' cultivation processes fulfill the promise of reducing animal suffering and potentially minimizing

the amount of animals slaughtered for human consumption. As food technologies advance in the realm of lab-grown meats, the intricate and difficult process of granting a kosher certification will inevitably evolve alongside this groundbreaking technology. This intersection of science and Jewish tradition presents the ongoing dynamic relationship of adapting age-old tradition to the innovations of the modern world, and who knows, maybe an authentic cheeseburger is just around the corner.

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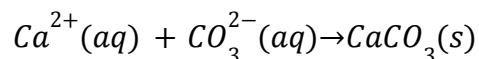
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Salt, the simple mixture between a metal and non-metal ion, has many applications in chemistry and Torah. Salt itself is very significant in Judaism. One of the earliest mentions of salt is when in ספר בראשית, ספר בראשית sent messengers to warn his nephew לוט of the destruction of סדום and עמורה, the city where לוט lived. לוט was instructed to leave the city with his family and to not look back on the destruction while they were running away. Evidently, as seen in בראשית, לוט's wife looked back on the city.

לוט's wife - ותבט אשתו מאחריו ותהי נציב מלח: looked back, and she thereupon turned into a pillar of salt. [1].

לוט's wife was turned into a pillar of salt. Many commentaries struggle with the meaning behind this phrase, and many have come to believe that she turned into a pillar of salt which spilled over into what is known today as the Dead Sea. Dr. Irving Myron Klotz, a highly respected Professor at Northwestern University, completed his Ph.D. in Physical Chemistry at the University of Chicago. He published numerous works, along with the paper "The chemical death of לוט's wife: discussion paper." In this paper, Dr. Klotz wrote about the probability that the salt לוט's wife turned into was calcite [2]. The formation of calcite, as seen below, precipitates from the reaction of Ca^{2+} and CO_3^{2-} . This reaction has a -11.38 kcal/mol free energy change, meaning that the formation of calcite is favored in this reaction. Furthermore, an increase in

temperature and CO_2 pressure shifts this reaction towards the formation of calcite.



The human body has many Ca^{2+} ions, intracellularly, extracellularly, and embedded within proteins and ligands. Dr. Klotz wrote that when לוט's wife turned around, she exposed herself to the intense heat and CO_2 pressure coming from the burning city. That mix of chemicals and heat may have caused her body to precipitate calcite, thereby turning her into a pillar of salt [2].

While this story is the first instance of salt in the Torah, salt extends into many areas of Jewish tradition. The offerings brought in the בית המקדש were all brought with salt, and to remember this, there is a practice to dip bread on שבת into salt. ספר ויקרא stated that we must offer every קרבן with salt.

וְכָל־קָרְבָּן מִנְחָתְךָ בַּמִּלַּח תִּמְלַח וְלֹא תִשְׁפֹּת מִלַּח בְּרִית אֱלֹהֶיךָ מֵעַל מִנְחָתְךָ עַל כָּל־קָרְבָּנְךָ תִּקְרִיב מִלַּח:

You shall season your every offering of meal with salt; you shall not omit from your meal offering the salt of your covenant with God; with all your offerings you must offer salt [3].

Rabbi Immanuel Bernstein commented on the significance of including salt with קרבנות. He wrote that one purpose of the salt on the קרבן is symbolically to preserve Judaism and to experience the בית המקדש. When one goes to the בית המקדש to bring an offering, he becomes inspired by what he sees. That

inspiration is meant to be spiritually preserved even when outside of the בית המקדש, just as salt is used for preservation [4].

Salt has dehydrating and antiseptic properties. Food has both “bound water” and “free water,” with bound water forming spheres of hydration around ions, and “free water” which is the bioavailable water for uptake by living organisms. This relation between bound and free water is expressed as ‘water activity’. Regarding microbial spoilage of food, it is the amount of bioavailable free water that mediates growth of contaminating bacteria and fungi. Before the invention of the refrigerator, salt was used to preserve food from spoilage. Even now, packaged foods have a high sodium concentration that allows them to stay fresh for a long time without refrigeration. Salt on food has the ability to inhibit microbial growth by reducing the amount of free water in the food. As salt influences osmotic pressure, some microorganisms die from osmotic shock, with the osmotic movement of water from within the cells to the higher concentration of salt in the surroundings. A high salt concentration also limits oxygen solubility in cells and thereby interferes with microbial growth [5, 6].

The ספר החינוך offered another explanation for why salt is added to קרבנות. Salt enhances the flavor of food. One way that salt has the ability to improve taste is by the suppression of bitter compounds in food. Sodium in salt reacts with bitter-tasting compounds causing the overall taste of food to improve. Studies have shown that the addition of sodium to a mixture of sugar and urea increased the

sweetness of the mixture. Furthermore, when tested as a mixture of sodium and sugar alone, no difference in sweetness was detected. This showed that sodium decreased the bitterness of food by suppressing bitter tasting chemicals [7]. Another way that salt enhances the flavor of food is by reducing the water activity of foods. By reducing the amount of bioavailable water, the flavors of food are more concentrated, resulting in a tastier meal [8]. When bringing a קרבן, the person is supposed to bring it with flavor, *i.e.*, meaning that the bringing of the קרבן should be with a purposeful intention. The ספר החינוך explained that just like it would be inappropriate to serve a prominent individual food lacking flavor, it would be inappropriate to bring a sacrifice without meaning and sincerity [9].

In conclusion, the properties of salt enhance everyday life. Both scientifically and spiritually, salt gives us the ability to add flavor and reduce bitterness in our lives. The properties of salt allow for the preservation of both food and Judaism.

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The pair *zav/zavah*, referring to a male and a female with unusual genital emissions, is noted in the *chumash (Vayikra)* and is peppered throughout the Talmud. Because a *zav* and *zavah* are discussed together, one assumes that both are equivalent, with gender being the only difference. However, this is false, the difference between this pair is more than the color of their genital emissions, white from a male and red from a female. Their distinction is the etiology of the genital emissions. For a *zav* the emissions, most probably, are due to a contagious bacterial infection, whereas for a *zavah*, the emissions are due to unscheduled uterine discharges, usually of benign consequence. The pair *tumtum/androgynous* is not mentioned in the *chumash* and is described as individuals of indeterminant gender. In reality, the difference between a *tumtum* and an *androgynous* is as great as the difference between night and day. A *tumtum* has a functional urogenital system and is fertile, but due to an unusual, external covering of the genitals, is of indeterminant gender. An *androgynous*, or a true hermaphrodite, has two sets of genitalia and cannot be clearly defined as male or female.

Zav

Specific secretions of the genitals are termed *zov* or *ziva*. A male with such secretions is termed a *zav* and a female with genital secretions (which refers only to blood) is termed a *zavah*. *Vayikra*, chapter 15 discusses the laws of genital emissions from a *zav* and from a *zavah*. Regarding the *zav*, “Any male who will have a discharge from his flesh (i.e., the male organ), his discharge

is contaminated. Thus shall be his contamination when he discharges, whether his flesh runs with his discharge or it becomes stopped up either as a runny secretion or as a thick secretion which obstructs the opening of the urethra.” After discussing rules pertaining to this type of secretion which triggers spiritual contamination, the topic continues, “When the man with the discharge ceases his discharge, he shall count for himself 7 clean days from his cessation, immerse his garments and immerse his flesh in spring water, and become purified. On the 8th day, he shall take for himself two turtle doves or two doves; he shall come before *HaShem* to the entrance of the *Tent of Meeting (Ohel Moed)* and give them to the *Kohen*. The *Kohen* shall make them, one as a sin (*chatas*) offering and one an elevation (*oleh*) offering; thus, the *Kohen* shall provide him atonement before *HaShem* from his discharge” (*Vayikra* 15:13-15). Rashi explained that two emissions make the male a *zav* and impart a level of impurity that requires immersion after 7 clean days but does not trigger the necessity of bringing two offerings. Three distinct emissions up his status to require a count of 7 clean days, immersion, and the bringing of two offerings.

Regarding the *zav*, a few basic questions need answers. If this emission is not the normal seminal emission important in procreation, why and what is it? Upon cessation of the emissions, the *zav* brings two sacrifices, of which one is a sin offering. What sin was committed by the *zav*?

In Talmud (Niddah 35b) note is made of three differences between normal semen from a healthy person and secretions from a *zav*: (a) semen is viscous, *zov* is runny; (b) semen is a bright shade of white, *zov* is a pale shade of white; and (c) semen emits from an erect organ, *zov* from a limp organ. Dr. Avraham Steinberg [1] summarized other characteristics of a *zav* mentioned in the Mishnah, Talmud, and Responsa: (a) secretions of *zov* emerge without cohabitation (*Zavim* 2:2); (b) cohabitation is difficult for a *zav*, (c) while as a *zav*, the male cannot procreate; and (d) perhaps the most informative clue, from *Vayikra Rabba* (18:1), *zov* emissions occur because of sins from his youth. Rav Mordechai HaKohen linked *zov* with inappropriate sexual behavior (*Sifsei Kohen, Vayikra* 15:2).

Dr. Steinberg [1] noted that all rabbinical sources viewed *zov* as a physical, rather than as a spiritual, illness, with some rabbinical authorities farther noting that the illness was contagious. An illness with such *zov*-like genital secretions, that is contagious, is serious and results from sins in one's youth seems to identify *zov* with a sexually transmitted infection. Ramban (*Vayikra* 15:11) described *zov* as "a severe disease, one of the worst among the contagious diseases, requiring a burnt-offering as a way to thank God, Who healed him. He required a sin-offering as well, as to atone for his sin, lest it cause him any additional illness." Ramban also described *zov* as a physical, not as a spiritual, disorder (*Hilchos Mechusrei Kapparah* 2:1). "Zov is a form of semen that results from an infection in the tubes (of the genital tract). When the discharge of the *zav* flows, it does not do so

forcefully like ejaculate and no pleasure is associated with it. Rather, it flows passively like dough."

Drs. Steinberg [1], Preuss [2], and Brown [3] offered an educated guess that *zov* is gonorrhea, a sexually transmitted infection caused by the bacterium, *Neisseria gonorrhoeae*. Gonorrhea is one of the most frequently reported infectious diseases worldwide, with an estimated 1.14 million new infections/year in the United States. The causative agent, *N. gonorrhoeae*, is a Gram-negative diplococcus bacterium that attaches to epithelial cells, penetrating them, multiplying inside, and producing the endotoxin, LOS. The release of LOS induces an intense inflammatory response, which is responsible for most of the symptoms. Gonorrhea can be a serious infection. If left untreated, a male may develop epididymitis (inflammation of the tube that stores and carries sperm), resulting in infertility. Untreated gonorrhea can spread into the bloodstream and cause disseminated gonococcal infection, a rare but potentially life-threatening condition, leading to heart (endocarditis) and brain (meningitis) complications. Today, antibiotics, such as azithromycin and ceftriaxone, are used to treat gonorrheal infections [4, 5].

If one accepts that *zav* is a gonorrheal infection, then the biological difference between a seminal emission from a healthy male and a genital emission from a *zav* is most apparent. A seminal emission consists of sperm cells released from the body in a fluid termed semen. It appears as a cloudy white or gray liquid with a consistency similar to that of a raw egg or of a runny

jelly. Chemically, semen contains amino acids, fructose, enzymes, minerals, antioxidants, and prostaglandins. A *zav*-gonorrheal emission may manifest by a flow of a clear liquid from the urethra, which rapidly changes to a whitish-yellow purulent discharge that turns yellowish-green with time. It consists of pus, dead cells, cell debris, and mucus [1].

Gonorrhea is spread through sexual fluids, both male semen and female vaginal secretions. In contrast to males, gonorrhea is usually asymptomatic in females. Thus, an infected, unsuspecting female, can transmit the bacterial infection to her baby during childbirth. Babies born to infected mothers are at risk for blindness and low birth weight [4]. Gonorrheal transmission through birthing was recognized in the Talmud: a newborn infant becomes *tamei* if a *zov*-like fluid is emitted from him (Arachin 3a; Niddah 32b, 44a).

The *Mishkan* was constructed early in the travels of *B'nei Yisrael* through the Sinai and the laws pertaining to a *zav* were needed to be quickly known, as a *zav* had restrictions upon his movements within the community. In the desert, the encampment was divided into three areas of holiness, with a *zav* restricted from entering two of the three areas. There was the Camp of the *Shechinah* (Divine Presence), which included the *Mishkan* and its Courtyard, the Camp of the *Leviim*, which surrounded the Courtyard, and the third area, which was the rest of the encampment. A *zav*, as long as he was *tamei*, was forbidden to enter into the inner two camps [6]. In the second year of their exodus from Egypt on the day the

Mishkan was erected, “*HaShem* spoke to Moshe saying, ‘Command the *B'nei Israel* that they shall send away from the camp everyone with *tzarass*, everyone who has had a *zav*-emission, and everyone impure by a corpse” (*Bamidbar* 5:2).

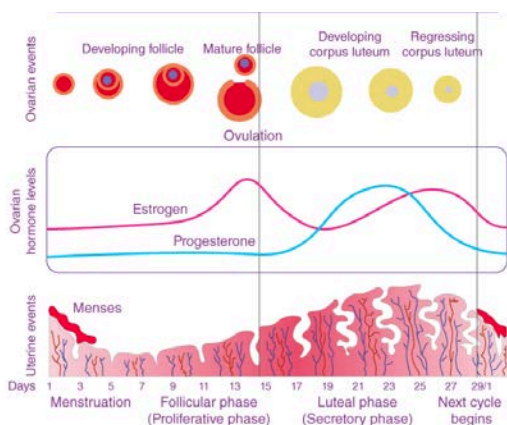
If the illness, *zov*, is an infectious bacterial sexually-transmitted disease, then it can be only acquired through intimate contact with an infected person. From whom did this *zov* acquire the gonorrheal infection; which female served as the reservoir of *N. gonorrhoeae* for transmissions to the male? It was not from a Jewish female, as the *B'nos Yisrael* in Egypt they were praised for their high moral standard, as seen in *parashas Emor* (*Vayikra* 24:10-11). When describing the lineage of the youth who blasphemed the name of *HaShem*, he was described as the son of an Egyptian man and the Israelite woman, *Shelomith* the daughter of *Dibri* of the tribe of Dan. Rashi noted that from all the Jewish women who lived in Egypt for the 190 years, she was the sole female to be intimate with an Egyptian man. If so, from whom and when did these Jewish men, acquire the gonorrheal *zov*-infection? Apparently, these men - now part of the exodus from Egypt - had acquired the gonorrheal infection years earlier in Egypt, from sexual associations with promiscuous female Egyptians (*i.e.*, “sins of their youth”). That some Jewish males had low moral standards was noted in *parashas Balak* (*Bamidbar* 25:1): “Israel settled in the *Shittim* and the people began to commit harlotry with the daughters of Moab.”

Dr. Steinberg [1] noted an interesting statistic on the occurrence of gonorrhea

(zov) in the 1960s/1970s in Israel. Between 1963 to 1967, the incidence of gonorrhoea in Israel was 0.18 cases per thousand. By 1970, this frequency increased to 0.4 cases per thousand. The increase was correlated to the Six Day War, when thousands of young Jewish youth/young adults poured into Israel to serve as volunteers. This world-wide influx of Jewish volunteers arrived from countries where sexual promiscuity was prevalent, thus, causing the increased incidence of gonorrhoeal infections in Israel.

Zavah

To understand the status of a *zavah*, a brief overview of the female reproductive internal anatomy is required. The ovary and the uterus are distinct structures, not physically connected to one another and each with a distinct function. Scientists speak of the menstrual cycle consisting of two components, the ovarian cycle and the uterine cycle, which run concurrently and are coordinated, lasting between 21 and 35 days, with a median length of 28 days. Please refer to Figure 1.



The focus of the ovarian cycle is (a) the maturation of an immature primary oocyte to a secondary oocyte, which is the

forerunner of the egg, and (b) the cyclic production and release of the hormones, estrogen and progesterone. Maturation of a primary oocyte to the secondary oocyte takes 14 days, with the structure housing the mature secondary oocyte, termed the mature or Graafian follicle. The growing Graafian follicle is the source of estrogen. On day 14 of the ovarian cycle the Graafian follicle ruptures and releases the secondary oocyte from the ovary into the oviduct (fallopian tube) of the uterus. This process is termed ovulation. The remnants of the Graafian follicle form the corpus luteum, which produces progesterone (Figure 1).

The uterine cycle oversees the preparation and maintenance of the uterus to receive a multicellular embryo. Rising levels of estrogen released from the ovary stimulate proliferation of the endometrium, *i.e.*, the lining of the uterus, to thicken and to become vascular and glandular. This portion of the menstrual cycle, termed the proliferative phase, is accompanied by engorgement of the endometrium with blood vessels. This is followed by the secretory phase in which the rising levels of progesterone stimulate the development of uterine glands to produce a thick mucoid secretion. The body is orchestrating the construction of a nutritive bedding for implantation of an embryo, should fertilization occur (Figure 1).

Fertilization occurs in the oviduct, in which a sperm cell penetrates the secondary oocyte. Entrance of a sperm into the secondary oocyte is the stimulus for it to complete the maturation process and become an egg. Internal fusion of the egg

nucleus with the sperm nucleus forms the zygote, which immediately starts dividing to form a multicellular embryo. The embryo slowly meanders down the oviduct and, upon entering the main body of the uterus, implants into the thickened endometrium. Blood vessels in the endometrium furnish nutrients to the growing embryo.

If fertilization does not occur, the endometrial lining of the uterus breaks down and endometrial tissue and blood are released, moving down the vaginal canal. This shedding of endometrial tissue and blood, termed menstruation (a "period" in common terminology), is a sign that pregnancy has not occurred; menstruation lasts for about 5 days (Figure 1).

Menstruation is a monthly event experienced by a normal, healthy woman. A woman shedding blood at the beginning of the menstrual cycle, as seen in Figure 1, is deemed a *niddah*, which triggers various halachos of ritual purity (*taharah*) and impurity (*tumah*). As explained by Rambam (Mishnah Torah, *Hilchos Issurei Bi'ah* 6:15) all menstruating women are given a status of *niddah* for 7 days, even if their period lasted from 3 to 5 days. According to Biblical law, there is an 11-day time span from the end of her 7-day *niddah* status to the end of the 18th day from the start of her *niddah* status, termed days of *zivah* (or, days of a running flow). If the woman saw a blood discharge during this 11-day period, she is deemed a *zavah*.

The intent of this long introduction was to clarify that the blood discharge of a *niddah* and the blood discharge of a *zavah*, albeit both from the endometrium, are two distinct

events - one normal and expected and the other unexpected and potentially indicative of a malady. Figure 1 shows that *niddah* blood/tissue is shed from a very thickened endometrium, engorged with blood vessels, and with numerous secretory glands. The entire endometrium that was prepared to receive the embryo is shed. Shedding of *niddah* blood/tissue is under the control of reproductive hormones, and usually lasts from 3 to 5 days (with a range from 1 to 8 days) and about 30 to 80 ml of blood are lost (range 20 to 100 ml) [1]. The discharge of *zavah* blood during the 11-day time frame is unexpected and may involve an endometrium in the proliferative and/or in the early secretory phase of the menstrual cycle, thereby influencing the amount of shed tissue/blood (Figure 1).

For a consecutive 2-day emission of *zivah* blood the woman is deemed a *zavah ketanah* and for a consecutive 3-day emission she is a *zavah gedolah*. Each classification triggers different *halachos*. In this discussion, an important distinction is that a *zavah gedolah*, upon completion of counting 7 clean days and immersion in spring water or in a *mikvah*, requires that she bring two offerings, one a sin (*chatas*) offering and one an elevation (*oleh*) offering women (*Vayikra* 15:19-33).

What sin did she commit that required a *chatas* offering? The *S'forno* (*Vayikra* 15:19) tackles this question and answers as follows: "Thus, the Torah testifies that this (i.e., her being a *zivah gedolah*) does not normally occur with the daughters of His people, except to alert them to the early rebellion in deed and in thought, for it is, in

actuality, merely an extension of the punishment with which Chava was punished for her deed and thought, included in His saying, “I will greatly multiply your pain” (*Bereshis* 3:16). Therefore it is fitting that she will count 7 clean days until a spirit of repentance and purity ‘pours over her’ and then she will immerse herself and achieve atonement for her misdeeds through the *chatas* offering and from her (improper) thoughts through the *oleh* offering.” Targum Yonathan (*Koheles* 10:18) suggested that the *zavah gedolah* state was a Divine punishment imposed upon a woman who was not careful with the laws of *niddah*.

Today, *zavah* bleeding is termed “unscheduled bleeding,” with such uterine bleeding being secondary to menstrual bleeding [1]. Most often, shedding *zivah* blood, albeit unexpected, is of no adverse health significance. The Talmud noted several factors that induce uterine bleeding in some women: jumping, carrying a heavy load, illness, sudden fright (*Niddah* 39a), and desire for intimacy (*Niddah* 20b) [7]. The increased level of the stress hormone, cortisol, during fright, influences the reproductive cycle by creating an imbalance in the levels of the reproductive hormones. Even if a woman has not ovulated, hormonal imbalances confuse the body and may induce irregular bleeding [8]. The Talmud also noted that the consumption of garlic, onions, and peppers (*Niddah* 63b), perhaps acting as uterine irritants, induce shedding of *zivah* blood in some women. A host of other botanicals, *e.g.*, motherwort, ginger, turmeric, *etc.*, act as blood thinners and induce intrauterine bleeding [9]. Ramban (*Vayikra* 15:19) noted that excessive *zavah*

bleeding is indicative of a serious illness (although not contagious, as he mentioned with *zav*). Unfortunately, there are many candidates that may induce unscheduled uterine bleeding, including sexually transmitted infections, such as chlamydia or gonorrhea, endometriosis, cervical polyps, polycyclic ovary syndrome, and malignancy[10].

Before leaving *niddah* and *zavah*, an interesting topic is neonatal menstruation. The Talmud (*Niddah* 32a) noted that menstruation may occur even in a one-day old female neonate. When taught to a class of high school boys or college young men this undoubtedly evokes laughter, as being ridiculous. However, the Talmud noted that this was not so uncommon and current medicine agrees, as it occurs in about 5% of all female newborns and is considered of no clinical significance. Neonatal menstruation, medically termed “neonatal uterine bleeding” or “neonatal menstrual-like bleeding,” is due to placental estrogenic stimulation of the endometrium *in utero* and the sudden withdrawal of in utero progesterone upon birth [11,12]. To make this a bit more interesting, Rashi noted (*Niddah* 32a) that if the neonate menstruant also experienced blood discharges on days 8, 9 and 10 of life, then she would be a *zavah gedolah*. Thus, a *zavah gedolah* can be a 10-day old baby.

To avoid confusion to the reader, it is noted that today the terms *zavah* (an unexpected, abnormal discharge) and *niddah* (a monthly expected discharge, *i.e.*, “menstruation”) are no longer distinguishable. Jewish women adopted the stringency that viewing even

one drop of blood the size of a mustard seed is sufficient to require the counting of 7 clean days as if she was a *zavah gedolah*. This applies even if the bleeding occurred during the normal time of menstruation and whether it was observed on 1, 2, 3, or all 7 days or more, she counts 7 clean days as would a *zavah gedolah* and afterwards immerses in a *mikvah* [1].

Tumtum

According to Rambam (*Hilchos Ishus* 2:24), “Whomever has neither male or female organs visible but is closed (“*atum*”) is called a *tumtum* and this child is a matter of doubt. If the *tumtum* is torn (*i.e.*, the covering is removed) and is found to be a male, then he is certainly a male, and if found to be female, she is a female.” A *tumtum*, as noted by Steinberg [1], is a “rare occurrence.”

The word *tumtum* means closed, sealed, or hidden. A *tumtum*'s genitals are not visible because of a skin membrane covering that area of the body. Therefore, a *tumtum*'s reproductive ability is prevented by this outer covering, but, once removed, would allow the *tumtum* to procreate. For excretory needs, at the site of the male and female urogenital organ, is an orifice on the covering to allow for urination [2]. The Talmud (*Yevamos* 83b) related the incident of a *tumtum* from the town of Bairi, who had the eternal skin covering surgically removed, and fathered seven children. The Talmud is stressing that a *tumtum* is a normal, healthy individual with a functional reproductive system, albeit blocked by an external barrier. As long as the blockage is

present, the *tumtum* is a person of indeterminant gender.

Wiesen and Kulak [13] reviewed whether *halachically* a *tumtum* must uncover its true gender identity (*i.e.*, “*koreyah*”- to rip off the skin), as discussed by the Rashba (*Yevamos* 70a) and Tosafot (*Pesachim* 28b). They noted that in the time of the Talmud, most probably, it was not mandatory due to the danger of an invasive surgical procedure performed by physicians with no prior experience in such operations and that it was an exceedingly uncommon medical condition. However, with the medical proficiency and sophistication of today, such an operation is not problematic and it may be mandatory for a *tumtum* to uncover its true gender.

Tumtum appears in the Mishnah, the Tosefta, Talmud Bavli, and Talmud Yerushalmi, but not in *Ta'nach*. All, if not most, of the references to a *tumtum* refer to an adult, *i.e.*, a post-pubescent individual. If so, and if a *tumtum* is a healthy, normal individual with functional neuroendocrine and genital systems, why was there no mention of the appearance of secondary sexual characteristics that accompany puberty. A male *tumtum* should develop upper body musculature, facial hair, and a deepening voice, whereas a female *tumtum* should menstruate, develop breasts, and show a widening of the hips. At post-puberty the gender of a *tumtum* should be self-evident.

Unable to find an answer to this question, two possibilities are presented. One possible answer is that *Chazal* were aware that the appearance of secondary sexual characteristics crosses genders and thus

cannot be used as proof of the gender of an individual. For example, a woman with facial hair (Kiddush 35b); gynecomastia (female-type breasts on a male), and galactorrhea (male lactation) (Shabbos 53b) were known. Apparently, sexual secondary characteristics are not 100% indicative of gender. A second thought is based upon the Talmud (*Chagigah* 4a; *Yevamos* 72a) which noted a form of *tumtum* for which the testicles were visible, but the male organ was covered. This individual was viewed *halachically* as a *tumtum*, not as a male; for identification as a male, the entire male genitalia must be visible. If the *halacha* is the visibility of the entire genitalia are required for gender identification, then the presence or absence of secondary sexual characteristics is a non-issue. Viewing the entire genitalia avoids mistakes. Consider a woman with Turner's syndrome, thought to be an *aylonis* in Talmudic terminology [14]. Instead of two X chromosomes in each somatic (body) cell, this woman has one X chromosome per cell. She is infertile, lacks a fully mature uterus, does not menstruate, and lacks female-type breasts. Thus, a post-pubescent *aylonis tumtum* would be thought to be a male, thus highlighting, the need to view genitalia to ascertain gender.

A *tumtum* may not marry a *tumtum* as there is the possibility that this would be a same-sex marriage. There is an interesting passage in the Talmud (*Yevamos* 64a, b) in which Rav Ammi offered an explanation as to why it took Avraham and Sarah such a long time to conceive a child. He suggested that they were both *tumtumim*. If so, how could *tumtumim* they marry each other? Perhaps, their outer coverings were

removed, either naturally or surgically, prior to marriage or they relied upon the appearance of their secondary sexual characteristics for gender identity.

Androgynous

An androgynous, i.e., a hermaphrodite, is clearly defined by Rambam: "whoever has both a male sexual reproductive organ and a female sexual reproductive organ is called an androgynous. It is not clear whether he is a male or female; there is no clear sign to indicate whether he is definitely male or definitely female." Rabbi Meir, in Mishnah *Bikkurim* 4:1-5, described an androgynous as a unique creation in its own image (*briah binei atzmo*).

Rambam's definition excludes cases of pseudohermaphroditism, such as androgen insensitivity syndrome (testicular feminization syndrome) in which an XY individual (genotypic male) has an external structure that resembles female genitalia and, at puberty develops female-type breasts, or of congenital adrenal hyperplasia in which an XX individual (genotypic female) has external male-appearing genitalia [16]. A true hermaphrodite as described by Rambam is very rare. About 10-15% of such people may be chimeras, arising from the fusion of two zygotes. In this scenario a woman ovulated two eggs, one was fertilized by an X-bearing sperm and one by a Y-bearing sperm. Two zygotes formed and this woman was expected to carry dizygotic twins, one a female (XX) and one a male (XY). However, *in utero* these two zygotes fused resulting in a tetragametic zygote, with two distinct populations of embryonic cells, some XY

and some XX. Depending on cell migrations during embryo and fetal development there is a possibility that this chimera can develop two distinct sexual genitalia, one male and one female.

Rabbi Weitzman [16] questioned the logic of basing gender solely on viewing the genitalia. Consider individuals with a deficiency of the enzyme, 5- α -reductase, which is an autosomal recessive disorder. A genotypic XY male who is homozygous recessive for the gene encoding for 5- α -reductase is born with all the internal male structures, but externally, the individual appears as a female. The enzyme, 5- α -reductase, catalyzes the conversion of testosterone to dihydrotestosterone (DHT), which is involved in the formation of the male organ. Without that enzyme, at birth, the child appears female. Based on appearance, at this point, the child would be a *halachic* female. At puberty, the adrenal glands produce testosterone and this “female” starts to exhibit signs of maleness - voice deepens, growth of facial hair, upper body musculature develops, and, what was thought to be a clitoris develops into the male organ. Sperm development may be normal and some of these individuals may father offspring. At puberty, based on visible genitalia, this individual would now be a *halachic* male. This is not a fairy tale. In the 1970s, 22 young girls in the Dominican Republic reached puberty and transformed into 22 young boys. In that Central American society, because of consanguinity, this occurrence was not a surprise and was so common that it was even given a special name, “*guevedoces*” - for “male organ at age 12” [17].

Based on situations such as the case cited above, Rabbi Weitzman [16] suggested that a more fluid model, rather than viewing genitalia as the sole criterion, is needed in assessing the gender of a child. He proposed “that each case should be examined individually by *halakhic* authorities, based on both genetic karyotype and the phenotype, and the relationship between the two.” A similar thought was presented by Wiesen and Kulak [13] and Brown [15].

Based upon my readings of the literature, the incidence of these gender issues indicates that pseudohermaphroditism is the more common gender issue, which includes a variety of subgroups, such as androgen insensitivity syndrome (noted in Talmud Niddah 40b [14, 18]) and congenital adrenal hyperplasia (CAH), which occurs in two forms, classical (severe) and non-classical (mild). Non-classical CAH is an autosomal recessive disorder with a high incidence in Ashkenazi Jews, affecting 3.7% of the population and with a carrier rate of 30.9% [19]. True hermaphroditism is extremely rare and *tumtum* is exceedingly very rare [1].

The reader is directed to the article by Cohen [20] for the *halachos* applicable to a *tumtum* and to an *androgynous*.

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