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DEDICATION & ACKNOWLEDGEMENTS

DEDICATION

The co-editors of Derech HaTeva dedicate this volume to the memory of the 26 victims of the deadly shooting in Newtown, Connecticut. On December 14th, 2012, twenty children and six adult staff members were fatally wounded in a mass shooting at Sandy Hook Elementary School. We hope that the words of Torah contained in this journal bring an aliyah to their *neshamot*, and that soon there will be fulfilled the hopeful words of the prophet Zechariah: “And the streets of the city [Jerusalem] will be filled with boys and girls playing in its streets...They will be a people unto Me, and I will be a G-D unto them, in truth and in righteousness.”

Dr. H. Babich personally dedicates this volume of Derech HaTeva to the memory of Rabbi Herbert W. Bomzer,^{z”l}, RIETS Class of 1951 and former Rav of the Young Israel of Ocean Parkway, Brooklyn, NY. Rabbi Bomzer had a profound impact on Dr. Babich’s involvement and growth in the world of Torah.

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Hannah Marmor

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PASUK

ורחבות העיר And the streets of the city [Jerusalem]
ימלאו ילדים וילדות will be filled with boys and girls
משחקים ברחבתיה... playing in its streets...
והיו-לי לעם, They will be a people unto Me,
ואני אהיה להם לאלקים and I will be a G-D unto them,
באמת ובצדקה. in truth and in righteousness.

-Zechariah 8:5, 8:8

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AN INSIGHT INTO THE TWIN DYNAMIC OF JACOB AND ESAU

Rebecca Benhaghazar

The interplay between human genetics and the environment is so dynamic that it is possible for two people to produce offspring whose phenotypes vary dramatically from one another. The Torah offers an example of this phenomenon in the differences between Esau and Jacob, the twin sons of Rebecca and Isaac. Rebecca was barren for the first twenty years of her marriage, but G-d blessed Isaac and her with twin boys. As mentioned in Genesis 25:24-25, "... there were twins in her womb. And the first came forth, ruddy, all over like a hairy mantle; and they called his name Esau. And after came forth his brother, and his hand had hold on Esau's heel and this name was called Jacob."

Esau and Jacob are described as having profoundly differing phenotypes, suggesting they were dizygotic, or fraternal, twins. Yet, there remains a possibility that they were monozygotic, or identical, twins who may have shared the same amniotic sac [1]. Monozygotic twins develop when a single fertilized egg, or zygote, splits into two totipotent units. The chorion, the outermost extraembryonic membrane, surrounds the amnion and forms the fetal part of the placenta. The amnion is a membrane that surrounds and protects the embryo which functions in building the amniotic sac [2]. Roughly one percent of monozygotic twins share the same chorion and amnion, in this case, the separation occurred after the ninth day of fertilization, at which time the amnion and chorion have already formed [3]. Both the amnion and the chorion are part of the extraembryonic membranes that function in the embryo's overall development.

Dr. Azila Talit Rosenberger suggests that Esau and Jacob were indeed monozygotic twins, and their differing phenotypes can be attributed to twin-twin transfusion syndrome. This rare condition occurs in monozygotic twins who share the same chorion and a single placenta. Such twins have an interconnected blood circulation. Even though each fetus has its own portion of the placenta, their placental blood vessels are connected, allowing blood to pass from one twin to the other. Blood may be transferred disproportionately from one twin to the other, creating a system where there is a "donor twin" and a "recipient twin." When born, the donor twin has a decreased blood volume

and will be anemic and dehydrated; the recipient twin, conversely, will have an abundance of red blood cells [4]. The recipient twin weighs more and appears redder at birth, which would fit Esau's biblical description as being ruddy in appearance. Furthermore, the recipient twin may exhibit an aggressive character. This points to Esau's temperament, as described later in Genesis. Esau was known to be deceitful hunter who was unable to impede his gratification for food, as seen during the episode in which Esau sold his birthright to his brother Jacob for a pot of lentils.

For the commentators who believe that Esau and Jacob were monozygotic twins, the twins' difference in personalities may be categorized as an environmental difference as opposed to a difference in genetics.

The nineteenth century German rabbi and philosopher Rabbi Samson Raphael Hirsch, in his commentary on the story of Jacob and Esau, stated, "The surprising thing was that they were really identical twins." Rabbi Hirsch continued to explain that Jacob "looked almost exactly like Esau," and that they only differed in their constitution in that Esau was much more developed and stronger than Jacob. Esau was red-cheeked and ruddy, which was an indication of radiant health. The name Esau is derived from the word *asab*, indicative that at birth, Esau was a "made man." Esau was born with a body covered with hair, like that of a developed man. Hirsch further explained that the real difference between Esau and Jacob laid "deep below the surface" as they chose different paths in life.

The behavioral differences between Esau and Jacob were clearly noted in the Torah: "And the boys grew; and Esau was a cunning hunter, a man of the field; and Jacob was a quiet man dwelling in tents" [5]. It is known that Esau grew up to become a man of the fields. Rashi notes that he was a "cunning hunter" skilled in the art of deception and manipulation. On the contrary,

Jacob had a subdued demeanor, as he stayed indoors, focusing his time studying at the Academy of Shem and Aver [6]. For the commentators who believe that Esau and Jacob were monozygotic twins, the twins' difference in personalities may be categorized as an environmental difference as opposed to a difference in genetics [2].

Although Rav Hirsch and Dr. Reisenberger maintained that Esau and Jacob were identical twins, other scholars proclaimed that Esau and Jacob were fraternal twins. Fraternal twins occur when two separate fertilized eggs (each fertilized by a different sperm) are implanted in the uterus and each develops its own amniotic sac. Each twin will also have its own placenta and chorion and can be of different sexes. Dizygotic twins may be as similar or as dissimilar as any two siblings [2]. The twelfth century biblical commentator, mathematician, and astronomer Rabbi Abraham Ibn Ezra, explained that Jacob took hold of Esau's heel because during the birth of the twins, Esau and Jacob's amniotic sacs ruptured. However, Ibn Ezra noted that this was "a most unusual occurrence."

The nineteenth century German scholar and physician Dr. Julius Preuss stipulated in his work, *Biblical and Talmudic Medicine*, it is unlikely that Esau and Jacob were identical twins because Esau was depicted as looking markedly different than Jacob. Preuss interpreted "and his (Jacob's) hand had hold on Esau's heel" as being figurative and that it should not be read literally. One may explain the verse metaphorically as describing Jacob and Esau's future relationship when Jacob pursued Esau [7].

Preuss believed that Esau being described as hairy indicated

that he exhibited hypertrichosis [8]. Hypertrichosis, or Ambras syndrome, is an abnormal growth of hair on the body. The rare disease may be congenital or it may be acquired later on in life. Only fifty cases of hypertrichosis have been recorded since the Middle Ages. There are two distinct types of hypertrichosis: generalized and localized hypertrichosis. In generalized hypertrichosis, hair covers the entire body, while in localized hypertrichosis, hair is restricted to a certain area. [9]. In Genesis 27:11 there is another reference to Esau's hairiness, as Jacob misleads his father, Isaac, into believing that he is Esau by covering his arms and neck with goatskins.

Esau and Jacob's differences began in the womb as noted in Genesis 25:22, "the children struggled within her." Rebecca inquired from G-d about the quarrel taking place within her womb; she was informed through prophecy that "two nations are in thy womb, and two peoples shall be separated from thy bowels." As Esau and Jacob matured, they chose different lifestyles, as each had his own aspiration in life. There was tension between the twins, as noted with the birthright which Esau sold to Jacob. After years of separation we find that Esau and Jacob meet in a heartfelt reunion, where Jacob presented gifts to Esau. "And Esau ran to meet him and embraced him and fell on his neck and kissed him and they wept....And Jacob said, Nay, I pray thee, if now I have found grace in thy sight, then receive my present at my hand for therefore I have seen thy face, as though I had seen the face of G-d and thou was pleased with me" [10]. As Jacob and Esau grew older and build families of their own, they matured past their differences as conveyed through their profound encounter. ■

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REFERENCES

- [1] Reisenberger, A.T. (1997). What Kind of Twins Were Jacob and Esau? *South African Med. J.* 87:1548-1549.
- [2] Shulman, L.S., van Vugt, J.M.G (2006). *Prenatal Medicine*. Taylor & Francis, Washington, D.C.
- [3] Lewis, R. (2008). *Human Genetics Concepts and Applications*, 8th edition. McGraw Hill, New York, NY.
- [4] The Twin to Twin Transfusion Syndrome Foundation. http://www.tttsfoundation.org/questions_explained.php. (Retrieved January 23rd, 2013).
- [5] Genesis 25:27
- [6] Breishit Rabbah: 63:10
- [7] Blickstein, I., Gurewitsch E.D. (1998). After Office Hours Biblical Twins. *Obstetrics and Gynecology*. 91:632-634.
- [8] Preuss J. (1978). *Biblical and Talmudic Medicine*. Sanhedrin Press, New York.
- [9] New Zealand Dermatological Society Incorporated. <http://dermnetnz.org/hair-nails-sweat/hypertrichosis.html>. (Retrieved from January 30th, 2013).
- [10] Genesis 33:4, 10

WHEN TIMING IS EVERYTHING: A CLOSER LOOK AT BRIS BIOLOGY

Deborah Farber

The ritual of circumcision is an essential commandment in Judaism. The excision of the foreskin of Jewish males is a sign representing the covenant between the Jewish nation and their Creator. The centrality of this practice in Judaism originates from the book of Genesis, when G-d tells Abraham that every male shall be circumcised at the age of eight days, throughout their generations [1]. G-d told Abraham that he would be lacking perfection until undergoing circumcision [2]. G-d later gives this commandment to the entire Jewish nation just before the Exodus from Egypt, establishing circumcision as a covenant between Him and the Jewish people for all generations to come. This is meant to convey the idea that just as we must physically perfect ourselves through *Brit Milah*, so must we spiritually perfect ourselves as well [3].

The Jewish sages provide many ideas about the significance of waiting eight days to circumcise Jewish males. The *Midrash* teaches that Jews wait eight days in order to provide the newborn with enough strength to have this pivotal commandment performed on him [4]. However, it is unclear what “strength” means in this passage. Maimonides is the only sage to interpret this *Midrash* as referring to physical strength [5]. He focuses on the biological aspect of this teaching, while virtually all other rabbinic opinions focus on the spiritual component.

Commenting on this same idea, Rabbi David Halevi Segal suggests that “strength” refers to the spiritual strength of the baby, rather than the physical strength. His proof for this idea is found in a *Midrash* that discusses the Biblical commandment forbidding the sacrificing of a newborn animal until it is eight days old [6]. The *Midrash* compares this to a person who must see the queen’s face first before his request to see the king’s face is granted. In this parable, the queen’s face is analogous to the Sabbath. A newborn animal sacrifice can be offered only after the holiness of a Sabbath has passed. Extrapolating from this teaching, Rabbi Segal provides essential insight into waiting eight days for the circumcision of a baby. He teaches that the infant must also experience the Sabbath before entering into this crucial covenant because of the great holiness and spirituality that this day provides. According to this *Midrash*, this is the logic behind the

eight days [7].

Rabbi David Halevi Segal offers another explanation for waiting eight days for circumcision. In the Babylonian Talmud, *Niddah* 30b, the *Talmud* states that *in utero* a baby learns the entire *Torah* and then at birth forgets what he or she learned [8]. Rabbi David Halevi Segal suggests that the infant needs this time to mourn the *Torah* that was forgotten [9]. There is another teaching from The *Talmud* which describes that after giving birth to a boy, the mother is ritually impure for seven days. By the eighth day, when this impurity is no longer relevant, the parents are happier and therefore in a better state of mind to circumcise their son [10].

The Midrash teaches that Jews wait eight days in order to provide the newborn with enough strength to have this pivotal commandment performed on him.

Aside from the spiritual aspects of circumcision, this ritual has biological implications that are important to consider. In humans, vitamin K plays a vital role in the modification of proteins needed for coagulation and other metabolic pathways. In adults, insufficient levels of vitamin K can lead to disproportionately excessive bleeding in response to even a minor injury. In infants, insufficient levels of this critical vitamin can have dire consequences. Lack of vitamin K in newborns can manifest as hemorrhagic disease of the newborn, which can result in severe bleeding, including intracranial bleeding, causing subsequent brain damage to the newborn [11].

While Vitamin K is primarily synthesized by bacteria in the colon, some of the vitamin is gleaned from the diet. Infants, however, have a different vitamin K synthesis dynamic, and they have lower levels of the vitamin for multiple reasons. Firstly, the infant’s gut flora is still developing, so vitamin K production from intestinal bacteria is limited. Additionally, plants, especially green, leafy vegetables, are a major source of vitamin K, and babies do not have sufficient dietary stores, due to their limited ability to intake solid food. In infants, even though vitamin K is formed,

since it is fat-soluble, it is only absorbed on the third or fourth day of life, when digestive functions are almost normal. A newborn's liver secretes less bile, and thus absorbs less fat, during the first week of life [12]. Other causes of vitamin K deficiency in infancy include low vitamin K levels in breast milk and poor passage of the vitamin through the placenta [13].

Prothrombin is a factor essential for blood-clotting. It is a protein precursor which forms thrombin, an active enzyme closely related with globulin. Vitamin K synthesizes prothrombin in the liver in the presence of normal bile [12]. In a study done by Quick and Grossman, it was observed that prothrombin levels in newborn babies were approximately normal at birth. At the end of the first day of life, levels dropped dramatically and only began to gradually rise on the third day [14]. Normal prothrombin can only be produced once digestive functions approach normal, which occurs on the third or fourth day [12]. Between the second and fifth days of life, newborn babies are said to exhibit very low levels of prothrombin, putting all newborn infants in danger of hemorrhage [14]. Normal prothrombin levels are reached between five and seven days of life [16]. Around the end of the seventh day of life, prothrombin levels begin to rise to a new peak [15]. At this time, the accumulation of bacteria in the newborn's

digestive tract allows for Vitamin K production, which is essential for producing prothrombin. On the eighth day, prothrombin levels reach a lifetime peak, the only time prothrombin levels will exceed 100 percent of the normal value [16].

In sum, there are many opinions elucidated by the Jewish sages with respect to waiting eight days before circumcising Jewish males. Many opinions discussed in *halachic* literature, such as those of Rabbi David Halevi Segal, the *Talmud*, and the *Midrash*, give thorough explanations of the significance of waiting these eight days from a spiritual point of view. Maimonides, however, focuses on the physical benefits of waiting eight days before circumcision. While it is impossible to know exactly what Maimonides had in mind when he wrote about physical "strength," these studies help shed light on what he could have alluded to in the *Midrash*. Maimonides understood that it is necessary for the baby to undergo a physiological process for the duration of eight days prior to circumcision in order to gain strength. Today, research has shown that heightened levels of prothrombin, a blood-clotting factor, reach a lifetime-peak on the newborn's eighth day. Moreover, these studies aid our understanding of the divine wisdom presented in G-d's commandment to Abraham and the Jewish nation that was first revealed over 3700 years ago. ■

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REFERENCES

- [1] Genesis 17:12
- [2] *Bereishit Rabbah* 46:3
- [3] *Sefer Hachinuch* 47
- [4] *Devarim Rabbah* 6:1
- [5] *Moreh Nevuchim* 3:49
- [6] Leviticus 22:27
- [7] *Vayikra Rabbah* 27
- [8] *Niddah* 30b
- [9] *Yoreh Deah* 265:13
- [10] *Niddah* 31b
- [11] State Government of Victoria. Better Health Channel. http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Vitamin_K_and_newborn_babies (retrieved January 20, 2013).
- [12] Grossman, A. (1940). Vitamin K for the Pediatrician with Special Reference to Physiologic Hypoprothrombinaemia of Newborn Infants. *The Journal of Pediatrics* 16.2:239-53.
- [13] Greer, F. (1995). The Importance of Vitamin K as a Nutrient during the First Year of Life. *Nutrition Research* 15.2: 289-310.
- [14] Quick, A. and Grossman, A. (1939). Prothrombin Concentration in Newborn. *Proc Soc Exp Biol Med* 41.1:227-28.
- [15] Fresh, J. W., Ferguson, J. H., Stamey, C., Morgan, F. M. and Lewish, J. H. (1957). Blood Prothrombin, Proconvertin and Proaccelerin in Normal Infancy: Questionable Relationships to Vitamin K. *Pediatrics* 19.2: 241-51.
- [16] Dr. Joseph Mercola. The Dark Side of the Routine Newborn Vitamin K Shot. <http://articles.mercola.com/sites/articles/archive/2010/03/27/high-risks-to-your-baby-from-vitamin-k-shot-they-dont-warn-you-about.aspx> (retrieved January 20, 2013).

THE JEWISH FASTING OBSERVANCE AND ITS RELATION TO CAFFEINE'S EFFECTS

Daniella Forman

A number of beverages enjoyed around the world contain caffeine. Whether it is in their morning cup of coffee or in their late afternoon iced tea, many people rely on this chemical in their drinks to provide them with the energy they need to function daily. However, the common problem that arises with caffeine is that many individuals only consider the positive aspects of caffeine and ignore the harmful effects caffeine may have on their body. This often comes to light during a situation of fasting, when people don't get their daily dose of the drug.

While the morning adrenaline rush that often accompanies one's daily cup of caffeinated coffee can help them jump-start one's day, other considerations apply to an individual who is fasting. There are two commonly known types of headaches: primary headaches and secondary headaches. Primary headaches are usually not attributed to any fundamental conditions, whereas secondary headaches are caused by a present disorder. Fasting, which disturbs the body's homeostasis, is one of the major causes of secondary headaches. Fasting headaches are usually present in the frontal area of the head and are mild to moderate in their intensity [1].

Fasting is a common ritual in many religions, and is practiced by Jews on Yom Kippur. On this Day of Atonement, fasting is done to "afflict" the body and to create a sense of discomfort, known as *enui* [2]. During the Yom Kippur fast, one of the top complaints from fasters is headache. The Department of Neurology at the University of Tel Aviv Medical School conducted a study on the relationship between fasting and headaches. Non-fasters served as a control group; of the 370 participants, 211 fasted for an entire day. When the fast was completed, 29% of the all the participants complained of headache symptoms. This study also revealed that those who normally drink two or more cups of caffeinated tea or coffee a day were more likely to develop a fasting headache on Yom Kippur. The group attributed this headache to a lack of caffeine. However, a fasting headache is the most commonly experienced headache during the fast of Yom Kippur, and its symptoms appear to be similar to a chronic headache, which one may experience year round [3].

There are those who advise [2] that before one fasts, it is crucial to intake a large amount of glucose to provide fuel for the brain. Over the course of glucose consumption, the liver converts excess glucose to glycogen, which is a stored energy fuel for the body. The liver supplies 75% of the glycogen needed for energy when the body is depleted of available glucose. It is highly recommended that before one fasts, one should intake plenty of water to keep the body hydrated so one doesn't wind up with a headache [2].

The common problem that arises with caffeine is that many individuals only consider the positive aspects of caffeine and ignore the harmful effects caffeine may have on their body.

Aside from those who suffer from chronic headaches, short term headaches are most common in those who experience caffeine withdrawal on fast days; therefore, it is recommended for those people to slowly wean themselves off caffeine a few days, or even a week, before the fast to prevent this common discomfort. [2]

The issue of caffeine is discussed in Jewish law when it comes to one who is fasting. Jewish law, or *halacha*, discusses whether or not one is allowed to eat or drink before morning prayers. In the *Shulchan Aruch, hilchot tefillah, siman 69*, (Tefillah 89: 22) it is stated that one can drink water before the morning prayer whether during the week, the Sabbath, or one of the holidays. It also stated that one may eat or drink for one's health. In the *Mishnah Brurah*, this point is elaborated upon in that one can drink water, as long as that person does not get any personal benefit or pleasure from doing so. And one can definitely not add sugar into one's drink. It further explains that coffee and tea are allowed before prayer if these drinks are needed to enhance one's concentration. However, coffee and tea are only permitted if no sugar or milk is used along with the drink [3]. One can conclude from this ruling that coffee and tea are allowed if they are needed to sharpen one's mind, due

to the effect caffeine has on an individual's functional capabilities. Moses Zacuto, a scholar from Italy, was asked a question whether eating or drinking was allowed before morning prayers. He immediately ruled that drinks such as beer and alcohol were prohibited; however, water and medicine were allowed. Along with water and medicine, he also stated that coffee was also placed into that category because of its stimulant effects [4].

The idea that coffee stimulates the mind and promotes wakefulness stems from Muslim mystics of Yemen, known as the Sufis, who relied on coffee to keep them up late at night for their religious rituals. By the mid-16th century coffee became a widely spread phenomenon in the Middle East. In the 18th century, it rapidly spread to the upper and middle classes of Central Europe. Aside from the issue of whether or not one can drink coffee before one has prayed, when coffee first became popular, many *poskim* argued whether coffee was an issue of *bishul akum* or *bishul nokhrim*, also known as cooking done by gentiles. In the 16th century, the rabbinic community made the halachic decision that coffee was kosher because it was prepared only for its sole purpose [4].

Aside from coffee's stimulating effects and contribution to one's concentration, coffee may have many harmful effects on the body. Studies have found that caffeine can lead to an increase of anxiety in an individual. Caffeine makes people anxious, and for those who already suffer from mental or behavioral disorders, caffeine may aggravate their personal issues. Caffeine increases restlessness and jitteriness. Upon caffeine withdrawal, the level of stress can increase drastically due to lack of its consumption. Withdrawal can also lead to an increase of anxiety and depression, as well as hindering normal sleep patterns and interfering with the duration of sleep. [5]

The negative physiological effects of caffeine are numerous. Not only does caffeine have an effect on the central nervous system, but it also affects the cardiovascular and gastric systems. Regarding the cardiovascular system, caffeine can induce tachycardia, also known as an extremely fast heart rhythm, and can eventually lead to an arrhythmia. Furthermore, caffeine stimulates

the central nervous system, thereby causing insomnia by disturbing of the deep stages of sleep. [6]

Various studies have been done on caffeine intake during pregnancy and its effect on fetal growth. A fetus is exposed to caffeine intake because the caffeine passes the placental barrier. Research has shown that maternal caffeine intake may lead to Sudden Infant Death Syndrome (SIDS). Further studies have shown that caffeine intake, especially during the third trimester of pregnancy, causes decreased birth weight or possibly lead to abortion. Mothers with heavy caffeine intake in their first trimester were more prone to babies who died due to SIDS. Heavy caffeine consumption was defined by 400 mg or more a day. Studies also revealed that most caffeine intake was from coffee intake [7]. Another study had shown that only those women who consumed a large amount of caffeine, had children with 105 gram reduced birth weight. However, those mothers who consumed moderate amounts of caffeine a day did not produce babies with reduced birth weight [8].

Aside from the adverse effects of caffeine, various scientific research studies have identified some positive effects of caffeine on the human body. Caffeine increases alertness due to its stimulating activity on the central nervous system. Its stimulating characteristic enhances cognition and causes one to be more attentive. Caffeine also contributes to alertness throughout the day by reducing daily fatigue. Most probably, this explains why so many people throughout society are reliant upon this commonly used drug [9].

Although caffeine may seem like a necessity upon awaking in the morning, there are many other considerations to consider before becoming addicted to this drug. Though caffeine provides one with the stimulant needed, it also has various side effects that are hazardous to life. However, *halacha* takes into consideration that some may need their morning caffeine intake to have proper respect and meaning while praying; therefore, under various circumstances, one is allowed to consume caffeine before prayer. So for all you coffee drinkers out there, don't worry, the side effects are not terrible enough to have you stop drinking immediately! ■

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REFERENCES

- [1] Torelli, P. Evangelista, A. Bini, A., Castellini, P., Lambro, G., and Manzoni, C. (2009). Fasting Headache: A Review of the Literature and New Hypotheses. *Headache* 49: 744-752.
- [2] Isenberg, S. (2008). A Few Fasting Fixes. *Wellness Report. Jewish Action.* 69: 70-71.
- [3] Mosek, A. and Korczyn, A.D. (1995). Yom Kippur Headache. *Neurology.* 45: 1953-1955.

- [4] Soklow, M. Sleepless on Shavuot. Jewish Ideas Daily. <http://www.jewishdaily.com/content/module/2012/24/main-feature/1/sleepless-on-sÖ/> (retrieved May 25, 2012).
- [5] Smith, A. (2002). Effects of Caffeine on Human Behavior. *Food Chem. Toxicol.* 40: 1243-1255.
- [6] Bolton, S. and Null, G. (1981). Caffeine Psychological Effects, Use and Abuse. *Orthomol. Psychiatr.*, 10: 202-211.
- [7] Ford, R.P.K., Schluter, P.J., Mitchell, E.A., Taylor, B.J.; et al. (1998). Heavy Caffeine intake in Pregnancy and Sudden Infant Death Syndrome, *Arch. Dis. Child* 78: 9-13.
- [8] Christian, M.S., and Brent, R.L. (2001). Teratogen Update: Evaluation of the Reproductive and Developmental Risks of Caffeine. *Teratology*. 64: 51-78.
- [9] Thompson, R, and Keene, K. (2004). The Pros and Cons of Caffeine. *ProQuest Science Journals*.17.12: 698-701.

THE HEALING POWER OF FIGS

Naomi Friedman

Israel, the homeland of the Jewish people, lay barren for over 2,000 years after the destruction of the Temple in the year 70 C.E. In the late 19th century, pioneers in the First Aliyah movement began the cultivation of the land of Israel. Now in the year 2013, olive groves and wineries grace the land with their resplendent scents and beauty. The land of Israel was blessed by G-d to provide the *shivat haminim*, the seven species of grain and fruit. The pasuk in Deuteronomy 8:8, which lists the seven species, “A land of wheat and barley, and vines and fig-trees and pomegranates; a land of olive-trees and honey,” provides the foundation for these two grains and five fruits in Jewish practice and cuisine. Furthermore, there are also Jewish laws derived from this pasuk that indicate the order of blessings on food and stipulate the laws regarding the first fruits donated to the temple to these seven species. The seven species, both collectively and individually, are interwoven with Jewish history in the land of Israel to create a rich tapestry of practice and culture.

Evidently, the seven species have solid footing in Jewish canon and custom, however, are there advantages to eating these seven species? Interestingly enough the seven species contain unique health benefits. These seven species are part of a ubiquitous movement called the Mediterranean diet. Researchers believe that a diet consisting of the shivat haminim support a healthy life style. Furthermore, studies have shown that eating these seven staple foods specifically lowers one’s risk for cardiovascular disease [1].

While studies show the health benefits of eating these seven blessed fruits, biblical precedence shows that figs, in particular, are curative to anthrax. Anthrax is extremely rare in Western, developed countries, however, it can affect hooved animals such as sheep, cattle, and goats. Historically, the disease has been limited to farming communities in underdeveloped countries. After the September 11th 2001 attacks, anthrax gained new relevance and has since come to the forefront because of its use as a potential biological warfare tool. Over the past decade there have been numerous anthrax scares, often manifested as a white powder of untraceable origin sent to a government building or news agency.

Anthrax causes exceptionally deadly infections in humans

and animals. There are four syndromes associated with anthrax corresponding to four possible modes of entry into the body. Previously there were only three syndromes, classified as cutaneous, gastrointestinal, and inhalational. Another model of infection, however, has come about in the past few years due to infection of soft tissue by injectional drug users [2].

Researchers believe that a diet consisting of the shivat haminim support a healthy life style.

B. anthracis, whose etiologic agent is *Bacillus anthracis*, is a Gram positive, rod-shaped bacterium that can lie dormant in the soil for many decades as a spore. Because it is present in soil, animals ingesting grasses with *B. anthracis* spores may acquire the illness [3]. Furthermore, infected meat eaten by humans typically is a cause of gastrointestinal anthrax. The most common form of anthrax is the cutaneous mode of infection, whereby spores contact an open wound on the skin. Cutaneous anthrax is the simplest to treat. However, if the infection spreads to the blood, the chance of survival drops precipitously. Typically, those infected with cutaneous anthrax are treated with antibiotics [4].

Because of renewed relevance of anthrax and the biblical precedence for treating anthrax, modern treatment methods can improve by looking back at antiquity for the treatment for this disease. Anthrax appears biblically in three places. Anthrax first makes its way onto the scene as the sixth plague (*schin*) of Egypt, afflicting the Egyptians with painful boils and blisters (Exodus 9: 10, 11) [5]. The *pesukim* explain that Moshe and Aharon took ashes from the furnace, Moshe tossed them toward the heavens, and thus the ashes rained down upon humans and animals, causing skin boils. The boils described in the Torah are thought to be representative of cutaneous anthrax, as *B. anthracis* is capable of infecting the skin both of humans and of livestock. Furthermore, the biblical description of the blisters and boils is analogous to that of cutaneous anthrax, where individuals affected suffer from painful fluid filled blisters after one to two days of infec-

tion. Within seven to ten days, the blisters, having become red and swollen, contain a black center of dying tissue [4].

The second reference to anthrax is noted with Job, who apparently was afflicted with a form of anthrax. As described in Job 2:7, “So Satan went forth from the presence of the L-rd and smote Job with sore boils from the sole of his foot even unto his crown” [6]. The verse noted that Job suffered from a systemic disease, possibly anthrax, which affected him from his feet to his head, essentially inflicting his entire body. Because of the similar nature of description in Exodus (9:10, 11), it is thought that Job suffered the same Divine punishment of anthrax as the Egyptians.

Interestingly enough, the third incidence of anthrax, which is noted in Scriptures, is described with its medical treatment. In Kings II:20:1, the king of Judea, Hizkiyahu, fell ill and cried to G-d to save him. “In those days Hizkiyahu was sick unto death. And Isaiah the prophet the son of Amoz came to him, and said unto him: “Thus said G-d: Set thy house in order; for thou shalt die, and not live” [7]. A few verses later it becomes clear that Hizkiyahu was afflicted with schin, the same anthrax ailment that afflicted the Egyptians and Job [8]. The prophet Isaiah had insight into the condition which plagued Hizkiyahu and was able to treat the king for his ailment. The treatment is found a few verses later in Kings II:20: 7, where Hizkiyahu was requested to take a bundle of figs and to lay it on the boil; this facilitated the king’s ultimate recovery. Apparently, figs contained certain remedial chemicals with the power to heal anthrax. The account of this story is repeated in Isaiah 38: 1 and 38: 21 with Hizkiyahu acquiring the illness, praying to G-d for a cure, and healing through the application use of figs.

At first glance it is unclear why Hizkiyahu was punished, as infliction of penalty is usually associated with the transgression of G-d’s will. In the case of Hizkiyahu’s affliction, the reason for his punishment and death sentence is unclear. The Talmud Brachot (10a) attempts to answer this question through developing an inter-text dialogue between Isaiah and Hizkiyahu. The story in the Talmud concludes that apparently Hizkiyahu is punished for his deliberate choice not to procreate. The king sees into the future that his children will worship foreign gods, a very serious transgression, and therefore he chooses to forgo fatherhood. Isaiah explains to Hizkiyahu that this is precisely the reason for his punishment, and that he should have more faith in G-d. The Talmud Sanhedrin (94b) provides another explanation of Hizkiyahu’s punishment of receiving boils, namely that he did not attribute his victory against Sanherev, the king of Assyria, to G-d. Instead, he behaved arrogantly when displaying the spoils from

the war to the Babylonians visiting the Beit Hamikdash. Thus, the Talmudic midrashim attribute the divine anthrax infliction to a grievous transgression on the part of Chizkiyahu.

From the verses in both Kings II and Isaiah, Hizkiyahu was afflicted, most probably, with a deadly form of cutaneous anthrax. He was deathly ill until Isaiah brought a remedy through the application of figs to the sores. Modern medical cases of cutaneous anthrax indicate that 80% of these cases heal on their own within a few weeks, unless the anthrax infection spreads. In the latter case, the anthrax infection potentially becomes deadly in that it can lead to sepsis, shock, meningitis, and death, accounting for the remaining 20% of cases [4]. Is there a medical reparative function to the figs that Isaiah provides? Is there a therapeutic or curative property to figs?

There are a plethora of other instances in the Talmud that allude to the therapeutic power of figs. The Talmud Menachot (64b) discusses the permissibility of detaching figs from a tree for the benefit of someone who is seriously ill on Shabbat. Rabbah, the amarah who brought the ruling regarding desecration of Shabbat in order to save someone’s life, specifically mentioned figs as the remedial source. Under normal circumstances it is forbidden to remove fruits attached to a tree on Shabbat because of the melacha, or prohibition, of reaping, however in the case of someone who is very ill, one is allowed to desecrate the Shabbat. Rashi, in Menachot, comments that if the invalid eats the fig then he will be healed. Clearly, Rabbah and Rashi realize the curative properties of ingesting figs because they recognized that one is able to cut figs from a tree in order to save someone’s life on Shabbat.

A second case is found in the Talmud Gittin (56a) and involves Rabbi Tzadok’s fasting for forty years to prevent the impending destruction of the *Beit Hamikash*, or holy temple. The Talmud notes that he was so thin that when he ate, the food could be seen going down his throat. After finishing his fast, his caretaker brought him dried figs from which Rabbi Tzadok sucked out the moisture; thereafter, Rabbi Tzadok discarded them because he could not consume solids. After Rabbi Tzadok’s fast, his subsequent eating of the dried figs sustained him. It is interesting that those assisting Rabbi Tzadok provided him with figs to nourish him after an extraordinary number of years during which he refrained from eating. Another idea mentioned in the Talmud Gittin (70a) presents that idea that figs were a useful source for a laxative and strengthened the body. Furthermore, the Talmud Berachot (12a) states that figs are wholesome for the body. Undoubtedly, the rabbis during the time of the Talmud knew that figs contain healing and sustaining powers.

Not only do figs have a background in Judaism, but they also have a rich history in other cultures, as well. The fig tree, *Ficus carica* or as *teana* in Hebrew, is one of the *shivat haminim*. Historically fig trees were initially grown by civilizations originating in the Mediterranean countries [8]. Ancient Greek athletes would eat dried figs when training for the Olympics. Fig trees spread to other continents, as Mexican natives created a mixture of milky fig juice with bark to treat wounds and bruises [9, 10].

From a modern medical perspective, figs contain ficin, a proteolytic enzyme which attacks intestinal parasites, such as *Ascaris*, a small round worm, and *Trichuris*, a whipworm. Figs also serve as a laxative, aiding in digestion [11]. The healing power of figs can be explained by their high amounts of calcium, iron, and vitamin A and lesser amounts of niacin and riboflavin. They also contain high amount of anthocyanins, known for their antioxidant function which maintain a healthy cellular environment [12]. Vitamin A affects many different aspects of the human body and plays a role in bone growth, healthy eye functioning, reproductive processes, embryonic development, and mucus-secreting activities of epithelial tissue. Moreover, vitamin A plays a crucial role in the immune system through its ability to protect against illnesses and reduces the intensity of infectious diseases [13]. Niacin and riboflavin have dermatological effects, as their deficiencies cause dermatitis. Therefore, figs contain potent elements that can change the course of a cutaneous anthrax infection. In Hizkiyahu's case, figs were most probably applied to the skin however it is not known exactly how they were prepared to treat Hizki-

yahu's illness. However, it is known that his ailment was cured through the placement of figs on his anthrax-derived wounds. In the cases noted in the Talmud regarding the use of figs to save a life on Shabbat, the utilization of figs to provide nutritional support for Rabbi Tzadok and the application of figs as a laxative, the figs were ingested, digested, and their nutrients absorbed into the blood stream.

Today, with the advent of modern medicines, healing products derived directly from nature often times are overlooked. However, the well known pain medicine, aspirin, actually originated from the bark of a willow tree. Presently, it is synthesized in laboratories with a slight chemical modification, yet its origin stems from trees. With Hizkiyahu, figs were used to cure his cutaneous anthrax. The method by which the figs were applied to his skin remains unknown. They could have been ground into a powder or formulated as a cream or as a liquid. The Bible is the oldest unchangeable, immutable book that can inform and guide modern medicine. We can learn from historical precedence in the Bible and Talmud and apply the concepts of the fig's healing power to modern medicine through isolating and identifying the therapeutic components in figs in order to enhance treatments and improve quality of life of those suffering from anthrax infections. Medicine today is always changing, perpetually advancing towards groundbreaking discoveries, however sometimes the answer and treatments may be present in the grounded texts of tradition. ■

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REFERENCES

- [1] Berry, E.M., Aroni, Y., Aviram, M. (2011). The Middle Eastern and biblical origins of the Mediterranean diet, *Cambridge J. Publ. Health Nutr.*, 14: 2288-2295.
- [2] Sweeney, D.A., Hicks, C.W., Cui, X., Li, Y., Eichacker, P.Q. (2011). Anthrax Infection, *Amer. J. Respirat. Crit. Care Med.*, 184:1333-1341.
- [3] Wenner K.A., Kenner, J.R. (2004). Anthrax, *Dermatol. Clin.*, 22:247-256.
- [4] Pile, J.C., Malone, J.D., Eitzen, E.M., Friedlander, A.M. (1998). Anthrax as a potential biological warfare agent, *Arch. Intern. Med.*, 158: 429-434.
- [5] Koch R. (1961). The etiology of anthrax based on the life history of *Bacillus anthracis*. In: *Milestones in Microbiology*, American Society for Microbiology, pp. 89-90.
- [6] Mechon Mamre translation Job:2:7.
- [7] Mechon Mamre translation Kings II: 20:1
- [8] Ben-Noun, L.L., (2003). Figs -The Earliest Known Ancient Drug for Cutaneous Anthrax, *Ann. Pharmacother.*, 37:297-300.
- [9] Grivetti, L.E., Applegate E.A. (1997). From Olympia to Atlanta: a cultural-historical perspective on diet and athletic training, *J. Nutr.*, 127 (5Suppl):860S-868S.
- [10] Lewis, W.H., Elvin-Lewis, M.P.F. (1997), *Skin*. In: *Medical Botany, Plant's affecting man's health*. New York: John Wiley and Sons; pp. 292-342.
- [11] Reynolds, J.E.F. (1993). *Fig*. In: *Martindale: the extra pharmacopeia* 13th ed. London: The Pharmaceutical Press; p. 885.

- [12] Solomon, A., Golubowicz, S., Yablowicz, Z., Grossman, S., Bergman, M., Gottlieb, H.E., Altman, A., Kerem, Z., Flaishman, M.A. (2006). Antioxidant Activities and Anthocyanin Content of Common Fig (*Ficus carica*). *J. Agric. Food Chem.* 54: 7717-7723.
- [13] Marcus, R., Coulston, A.M., Fat soluble vitamins: Vitamins A,K,E. In: Hardman J.G., Limbird, L.E., Goodman Gilman, A. eds. *The Pharmacological Basis of Therapeutics*. 10th ed. New York: McGraw-Hill; 2001: 1773-1783.

GREY HAIR: A STRESS, A DISEASE, AND A BRACHA

Sima Grossman

People often define themselves by their hair color. Folklore tells us that redheads are hot-tempered and blondes like to have more fun. These old adages seem to imply that a person's hair color is determined by their personality. The color of the 100,000 plus hairs on a person's body is determined by the amount of melanin contained in the cortex. The cortex is a layer of the hair that is made up of cells containing the protein keratin. Since melanin is a black or brown pigment, more melanin means darker hair. Hair with a small amount of melanin produces a blonde color. If a person's hair contains trichosiderin, an additional pigment that contains iron, he or she will be a redhead. As people age there is a decrease in the amount of melanin in the cortex of their hair. This lack of pigment causes the hair to appear grey [1].

Why does our hair lose pigment and turn grey as we age? A *midrash* in *Baba Metz'ia* (87a) relates that as Yitzchok Avinu grew older, people would mistake him for his father, Avraham, because they looked exactly alike. Avraham realized that the trouble distinguishing between youth and old age was a problem. He pleaded with Hashem to "make a visible distinction between a youth and an old man, so that the old man may be honored by the youth." Genesis (24:1) relates, "V'Avraham zakein ba ba'yamim." "And Avraham became old." The midrash explains that this verse means Avraham took on the appearance of an old man, and his hair turned grey. When Avraham complained about his new grey locks, Hashem responded that the grey hair was a gift.

The Torah views grey hair in a positive light. The word "*seiva*," which translates to "a hoary head", is frequently used to describe an old person. In fact, Malbim explains (Tehilim 71: 18) that "*seiva*" is a more complimentary term than *zikna*, another word for old age. In Proverbs (20: 29), the phrase "*tiferes bachurim kocham v'badar zakeinim seivah*," was interpreted by Malbim to mean that grey hair, which comes from old age, is a crown, just as strength is the crown of a young man. Another way the Torah expresses its view that grey hair is something positive is that it depicts Hashem as having grey hair. When Daniel had a vision of Hashem (Daniel 7:9), Hashem appeared to him in the form of an old man with white hair. As stated in the *Anim Zemiros* prayer,

"They saw You, now old, then young, Your head with grey, with black hair hung; oldness on the day of judgment, blackness at a time of war." Grey hair is thus associated with wisdom and judgment.

Although the Torah views grey hair positively, many people wince at the first sign of grey hair. Sometimes people react with dismay, and believe that they have acquired grey hair overnight. There is a famous legend about Marie Antoinette which states that the doomed queen turned grey the night before her execution. According to this tale, the stress the queen felt over her hopeless fate caused her hair to turn grey. Similarly, newspapers and magazines are quick to point out the increase in grey hair that is usually visible on a President from one term to the next. Apparently, the trigger that causes this change of hair color is the high stress level associated with being President. The question of whether there is a connection between stress and grey hair has become a scientific debate.

When Avraham complained about his new grey locks, Hashem responded that the grey hair was a gift.

According to dermatologist Dr. Jack Green, there is "not a shred of scientific research" to support such an assertion that stress and grey hair are connected. The age at which we go grey is determined by genetics, and stress cannot cause hair to suddenly lose pigmentation [2]. Even if stress did stimulate the production of grey hair, the effect of the stress on hair color would not be seen immediately. Hair grows in a cycle. This cycle starts with the production of follicles, which surround the root of a hair. Thereafter, the cells that produce keratin and melanin are gathered from stem cells. Stress hormones may cause the destruction of melanocyte stem cells. However, since it takes time for hair to fall out and new hair to grow in, the hair that would lack melanin would not be immediately visible [3]. Additionally, there is no conclusive evidence linking stress hormones to a reduction in melanocyte stem cells. Dr. Robert Lefkowitz, the 2012 recipient of the Nobel Prize for Chemistry, along with other scientists, suggested that the

production of “flight or flight” hormones caused by stress decreases the supply of protein p53. This can cause chromosomal rearrangements leading to DNA damage. The damaged DNA may cause grey hair to grow [4].

While stress is not proven to cause graying, a medical condition called alopecia areata may cause someone to appear to have grayed overnight. This condition causes hair loss. For some unknown reason grey hairs that are already present on a person who has alopecia areata do not fall out. Rather, only pigmented hairs are affected. The loss of pigmented hair causes the grey hair to become more noticeable. Alopecia areata is a reversible condition. However, the hair of someone with alopecia areata may initially grow back grey or white. This is usually temporary and eventually the hair will regain its original color [5].

Another condition called vitiligo is also associated with hair greying. Vitiligo causes the cells that produce melanin either to die or to stop producing melanin. The lack of melanin causes white patches to appear on a vitiligo patient’s skin and their hair to turn grey. Vitiligo, which has no cure [6], was a relatively unknown medical condition until 1993, when superstar Michael Jackson went on the *Oprah Winfrey Show* and gave an interview in which he attributed his lightening skin tone to vitiligo. Jackson was diagnosed with vitiligo in the mid-1980s [7].

The Gemara (Taanis 5b) recorded a case of early hair greying. When Shaul’s reign was almost over, Shmuel HaNavi asked that he not live to see Shaul’s demise. Shaul was Shmuel’s student, and Shmuel could not bear to witness his precious student’s downfall. Hashem “debated” how to honor Shmuel’s request. Surely Shmuel would not want to see Shaul die, but as Shmuel was only fifty-two years old, it would be a disgrace for him to die so young. Therefore, “*kafzā zikna*”, “old age” sprang upon him. Rashi explains that Shmuel’s hair became prematurely grey [1]. The stress that Shmuel went through as a leader could have contributed to his hair’s early graying. Alternatively, Shmuel may have suffered from some form of alopecia areata, which would have eliminated his pigmented hairs and thus make his grey hair more noticeable. Vitiligo is another possible explanation. Vitiligo, a related condition, causes loss of pigmentation in hair *and* skin. Shmuel’s skin did not lose pigmentation—only his hair. While the Navi does not state how Shmuel died, at least one study shows a correlation

between grey hair and heart attacks. In this study, it was found that men with grey hair had a greater chance of suffering a heart attack than men who were not grey. However, there was no significant difference in the instances of heart attacks suffered by women with grey hair as compared to women without grey hair [8].

Perhaps the most famous case of hair graying in Jewish history is the saga of Rabbi Elazar ben Azarya. The Talmud related that when the second Rav Gamaliel was disposed as head of the Sanhedrin, Rabbi Elazar was chosen to be his replacement. Rabbi Elazar was only eighteen years old. His wife thought that no one would accept a mere teenager as their leader and that he would not be able to garner the respect of the people. She let him know her feelings by pointing out to him that “you have no white hair.” The next morning, however, Rabbi Elazar woke up with eighteen rows of white hair on his beard. Rabbi Elazar and his wife took this as a sign that he was destined to take the position he was offered (Brachos 27b-28a).

The Rambam (Pirush Mishnayus, Brachos 1:5) explained that Rabbi Elazar must have exerted himself so much when he was learning that his hair turned white from stress. As discussed above, scientifically this explanation is unlikely. Perhaps Rabbi Elazar had been strenuously studying for years and over time the stress hormones caused his hair to lose pigmentation. However, the Talmud notes that the grey hairs suddenly appeared, so this explanation does not seem to fit. Alternatively, Rabbi Elazar’s graying hair could have been caused by alopecia areata. However, this condition is characterized by hair loss, and there is no mention here that Rabbi Elazar experienced any loss of hair. Vitiligo is a better explanation. However, if Rabbi Elazar suffered from vitiligo, he would have most likely also seen light splotches on his skin. Again, there is no mention in the Talmud of this occurring. Perhaps the simplest and most likely explanation for Rabbi Elazar’s sudden hoariness is Rashi’s contention. Rashi states that Hashem wanted to give a message to Rabbi Elazar to show that he was worthy and needed for the job. Thus, Hashem made a miracle and turned his hair white. Hashem was giving him and his wife the message that it is wisdom and righteousness, not age, which renders someone worthy of obtaining respect. ■

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REFERENCES

- [1] Saladin, K. S. (2001). *Anatomy & Physiology*, 2nd edition. McGraw Hill, Boston, MA.
- [2] Green, Jack. (2008). <http://www.abc.net.au/health/talkinghealth/factbuster/stories/2008/07/09/2290688.htm#.UP2Mnqn3Cb9> (retrieved January 21, 2013).
- [3] Ballantyne, C. (2007). <http://www.scientificamerican.com/article.cfm?id=fact-or-fiction-stress-causes-gray-hair> (retrieved January 21, 2013).
- [4] How Stress Causes DNA Damage (2011). <http://www.kurzweilai.net/how-stress-causes-dna-damage> (retrieved January 21, 2013).
- [5] Alopecia areata (2012). <http://www.dermnetnz.org/hair-nails-sweat/alopecia-areata.html> (retrieved January 21, 2013).
- [6] Mayo Clinic Staff (2011). <http://www.mayoclinic.com/health/vitiligo/DS00586> (retrieved January 21, 2013).
- [7] Michael Jackson’s Health and Appearance (2013). http://en.wikipedia.org/wiki/Michael_Jackson%27s_health_and_appearance (retrieved January 21, 2013).
- [8] Schnohr, P., Lange, P., Nyboe, J., Appleyard, M., Jensen, G. (1996). Gray hair, baldness, and wrinkles in relation to myocardial infarction: the Copenhagen City Heart Study, *Am Heart J.* 130:1003-1010.

REMEDIES OF THE TALMUD: A SECOND LOOK AT THE MEDICAL BENEFITS OF HONEY

Melissa Kramer

The Talmud relates the story of Rabbi Gamliel, who while traveling, had to interrupt his journey upon the arrival of the Sabbath. Thus, he left his donkey loaded with spoiled honey over the entire Sabbath (*Shabbat* 154b). An argument between the Talmudic Rabbis ensued as to why Rabbi Gamliel did not unburden his donkey. The question arose: why was Rabbi Gamliel carrying spoiled honey in the first place? The answer was that honey was used to treat abrasions on a camel's back.

This is just one of several instances in the Talmud in which honey is described as having medicinal properties. This substance is described as a treatment for sores (*Shabbat* 76b), as a major ingredient in a remedy for bulimia (*Baba Kamma* 85a), and as a means to “enlighten the eyes of man” (*Yoma* 83b). However, the Talmud is not the only historical document to present ancient medical uses of honey. A translation of hieroglyphics in the Smith Papyrus, which dates back to between 2600 BCE and 2200 BCE, shows that a mixture of grease, honey, and fiber was used to treat wounds. Later, between 300 and 400 BCE, Hippocrates recommended a mixture of honey and vinegar for pain remedy [1].

However, with the progression of modern science, many of these ancient treatments fell into disuse. They were considered ritualistic and primitive, especially within the Western conscientiousness. This belief became pronounced after 1910, when Paul Ehrlich developed the science of chemotherapy through his discovery of salvarsan to treat syphilis. Chemotherapy, a term coined by Ehrlich, is the use of chemical substances to kill pathogens without harming the host. While the older methods used herbal concoctions to treat general symptoms, doctors who employed chemotherapy sought to find specific natural or synthetic chemicals that had a precise effect on a given pathogen. This practice gave way to drugs as we now know them [2].

Currently, researchers seek to fuse the knowledge of the ancients with the science and technology of today. In part, this “resurrection” of ancient medicine is motivated by the realization of physicians that as bacteria become increasingly resistant to current drugs, researchers need to find new antibacterial agents. Thus far, several studies in which honey has been used to fight

bacteria have shown great success. In one such study, honey used in concentrations of 30% to 50% was more successful than widely used antibacterial agents such as ampicillin and cephaloridine at inhibiting the growth of nine types of bacteria that cause the symptoms associated with urinary tract infections. A study by Jeddar *et al.* showed that honey prevented the growth of bacteria, including *Salmonella shigella*, *Escherichia coli*, and *Vibrio cholera* [1]. These bacteria are some of the most common causes of fatal illnesses worldwide.

This is just one of several instances in the Talmud in which honey is described as having medicinal properties.

Other studies have also substantiated the claims made in the Talmud regarding the wound healing abilities of honey. Biglari *et al.* studied the effects of Medihoney™ dressings on 121 wounds of patients over two years in several hospitals throughout Germany and Austria. Their results showed that the wounds of these patients healed relatively quickly and showed less necrosis than wounds treated with conventional dressings [3]. Oladejo *et al.* found that when gauze soaked in honey was used on excisions in Wistar rat skin, after 10 days of treatment wound contraction was significantly greater than in rats in the control group [4]. Scientists believe that the positive effects of honey on wound healing are a result of its hygroscopicity and hypertonicity. Both qualities facilitate wound hydration, as hygroscopicity is the ability to attract water molecules, and hypertonicity is the state of having higher osmotic pressure than the surrounding body fluids, which leads to water absorption. Honey is also acidic and has other antibacterial properties that prevent infection [5]. Furthermore, honey contains the enzyme catalase, which is involved in separating slough and necrotic tissue [1] and may contain tissue growth factor [5].

A study in which epithelial corneal edema was treated with raw honey was performed by Dr. Ahmad M. Monsour specifically to determine if the Talmud's claims regarding the positive health effects of honey on the eyes were true. Corneal edema is the swelling of the cornea, the transparent dome above the iris that

occurs when injured cells cannot regenerate and fluid accumulates in the cornea. Monsour found that when a drop of honey was applied to the eyes of 16 patients with epithelial corneal edema, all of the patients' corneas cleared for approximately one hour, allowing greater visual acuity. These results were documented over multiple visits, and in some patients, the clearing allowed for better analysis of the eye's condition and even an opportunity for laser therapy [6]. Since one symptom of corneal edema is a visible clouding of the eye, it is possible that the Talmudists were witnessing similar treatments when they wrote, "honey enlightens the eyes" (*Yoma* 83b).

Despite the many advantages provided by honey, there are some minor risks involved in its medical use. Honey is known to cause infantile botulism, a condition in which spores of the bacteria *Clostridia botulinum* colonize the infant's large intestine and produce a toxin that causes weakness and loss of muscle tone.

Clostridia can survive in honey in the form of a spore, and the intestines of infants contain a growth factor that promotes its propagation. However, as this growth factor is not in the intestines of adults, honey is generally safe for adult patients to use orally and topically. Gamma-irradiation has been used to sterilize honey, thus completely eliminating the danger of *Clostridia* infection to infants [6].

Overall, the therapeutic benefits of honey far outweigh its risks. Several studies have shown its uses as an antibiotic, a treatment for wounds, and a potential remedy for disorders of the eye. While further research must be done to determine the ways in which honey can be utilized most effectively, many doctors are hopeful that it will eventually be incorporated into standard medical use. Perhaps, as they continue their research, scientists will reference the Talmud to uncover even more remedies in its pages. ■

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REFERENCES

- [1] Barsal, V., Medhi, B., and Pandhi, P. (2005). Honey – a remedy rediscovered and its therapeutic utility, *Kathmandu Univ. Med. J.* 3:305-309.
- [2] Black, J.G. (2005). *Microbiology Principles and Explorations*, 6th edition. John Wiley and Sons, Inc, New York, NY.
- [3] Biglari, B., Moghaddam, A., Santos, K., Blaser, G., Büchler, A., Jansen, G., Längler, A., Graf, N., Weiler, U., Licht, V., Strölin, A., Keck, B., Lauf, V., Bode, U., Swing, T., Hanano, R., Schwarz, N. T. and Simon, A. (2012), Multicentre prospective observational study on professional wound care using honey (Medihoney™). *Intern. Wound J.* [Epub ahead of print].
- [4] Oladejo, O.W., Imosemi, I.O., Osuagwu, F.C., Oyedele, O.O., Oluwadara, O.O., Ekpo, O.E., Aiku, A., Adewoyin, O. and Akang, E.E. (2003). A comparative study of the wound healing properties of honey and *ageratum conyzoides*. *Afr. J. Med. Med. Sci.* 32:193-196.
- [5] Al-Waili, N., Salom, K. and Al-Ghamdi, A.A (2011). Honey for wound healing, ulcers, and burns; data supporting its use in clinical practice. *Sci. World J.* 11:766-787.
- [6] Monsour, A.M. (2002). Epithelial corneal oedema treated with honey. *Clin.Exp. Ophthalmol.* 30:149-150

GENETIC SCREENING IN THE PERSIAN COMMUNITY: A CALL FOR CHANGE

Levana Massihsraelian

The history of Iranian Jewry, commonly referred to as Persian Jewry, started well over 2,000 years ago and continues into the present day. It is debated when and how exactly the first Jews came to this area. Most sources concluded that the beginnings of Iranian Jewry started when the Jews from Samaria were deported to the cities of Medea and Persia around 724 BCE. This occurred due to the siege of the Northern Kingdom of Israel by Assyria and King Shalmanezar V who dispersed the Jews, leading to the phrase, the “Ten Lost Tribes” [1]. However, most agree that one of the initial mass Jewish migrations to Persia occurred after the destruction of the First Temple by Nebuchadnezzar in 586 BCE. During this time, the Babylonians expelled large numbers of Jews from Judea into captivity [1, 2]. The Jews, forced to live in these Babylonian areas, mainly lived in their own communities, isolated from the rest of the population. After the Iranian Revolution in 1979, Jews began to emigrate in masses from Iran, most moving either to Israel or to America. Over the past half-decade, significant Persian Jewish communities have formed in both Los Angeles and New York.

A number of hereditary genetic diseases have become prevalent within the community. This can possibly be attributed to the limited gene pool within the Persian Jewish community over an extended period of time. Just as genetic screening has been helpful in disease prevention and treatment in other subgroups, such as the Ashkenazic Jewish community, a similar screening process may prove to be beneficial for the Persian Jewish community as well [3]. Although screening for diseases in this particular subpopulation has yet to become widespread, a number of studies have analyzed the prevalence of certain genetic disorders within the Persian Jewish community.

A pilot study was done to assess the occurrence of specific genetic diseases unique to the Persian Jewish community [3], using members of the Los Angeles community as the prototype. The purpose of the study was to provide counseling and support for families who tested positive either as heterozygous (carriers) or as homozygous for certain diseases. Another goal was to demonstrate the necessity of genetic screening in this community, which would hopefully both decrease the prevalence of such diseases

and potentially begin a regulated process of screening, similar to that of the Ashkenazi Jewish community. This study screened for four diseases that were previously shown to be more common in members of Jewish Iranian ancestry.

Just as genetic screening has been helpful in disease prevention and treatment in other subgroups, such as the Ashkenazic Jewish community, a similar screening process may prove to be beneficial for the Persian Jewish community as well.

The first disease screened for was pseudocholinesterase deficiency (OMIM #177400), an autosomal recessive point mutation. Interestingly, 1 in 10 Persian Jews were found to be carriers, which means that 1 in 100 Iranian Jewish couples have a risk of having children with the mutation. A person with this disorder cannot degrade many different forms of anesthetics, causing these medications to remain in the body for an extended period of time. Clinically, this manifests itself as trouble with breathing and muscle weakness for a long period of time after being exposed to certain anesthetics. Specifically, the drug succinyl choline, a muscle relaxant, cannot be degraded, as well as other ester-based local anesthetics. However, prior knowledge of this hereditary disorder can eliminate these deleterious reactions, as other anesthetics may be used.

A second disorder existing within this community is known as congenital hypoaldosteronism type II (OMIM #124080). This recessive disorder manifests itself when one is homozygous for two point mutations, as there are two distinct mutated loci of the gene. People with this disorder have a deficiency in an enzyme, corticosterone methyl oxidase II. 1 in 30 Persian Jews were found to be heterozygous for this mutation, putting 1 in 900 Persian Jewish couples at risk of having a child with this disorder. This condition causes the body to lose more salt than normal, resulting in severe dehydration, poor weight gain, irregular blood pressure,

weakness, dizziness, and salt craving. The disease is typically manifested during the first 3 months of life and continues into adulthood. A normal lifespan and growth can be obtained with ongoing mineralocorticoid replacement therapy, which is a simple and an inexpensive treatment.

The third disorder that was tested for within this screening process was autoimmune polyendocrinopathy syndrome (OMIM #240300). This autosomal recessive condition involves a mutation in the gene, AIRE, or autoimmune regulatory element, which plays a role in recognition of the fetal thymus gland. The point mutation was found to be heterozygous in 1 in 50 Persian Jews, which puts 1 in 2,500 Persian Jewish couples at risk of having a child with the disorder. People with this disorder exhibit an array of symptoms that can include skin infections, fatigue, muscle weakness, loss of appetite, nausea, vomiting, painful muscle spasms, dehydration, depression, anxiety, hair loss, and infertility. The symptoms shown differ depending on specific hormonal deficiencies. Treatment for this disorder involves hormone replacement therapy, which differs for each individual and is based on the particular hormones affected.

The last condition screened in this study was hereditary inclusion body myopathy (OMIM #600737), an autosomal recessive disorder. 1 in 20 Persian Jews are carriers as they have a single point mutation in their GNE gene. This puts 1 in 400 Persian Jewish couples at risk of having a child with this condition. This disorder causes progressive muscle weakness in the arms and legs of affected individuals, starting in their 20s or 30s and manifests itself as difficulty walking. An individual with this disorder will become completely debilitated within a decade of onset.

Disorders within this particular community mainly came about due to inbreeding. The Persian Jewish community was isolated for a long time from other Jewish communities and was enclosed in a small area for an extended time period. This resulted in significant inbreeding over many generations. Certain conditions may have arisen through a founder effect, which is an establishment of a new population from a few original founders, which results in a decrease in genetic variation within that population. In other cases, certain conditions have been traced to a heterozygote advantage, which describes a case in which the heterozygote genotype has a greater survival rate due to fitness than either the dominant or recessive homozygote genotype.

Another study conducted in Israel [4] analyzed possible reasons as to why so many genetic disorders came about within the Persian Jewish population. Based on a sample of 164 Persian Jews with no relation to one another, 24.4% were found to have come from consanguineous marriages. In other words, a fairly large

percentage of Iranian Jews married close family relatives who shared a number of common genes. This degree of inbreeding is believed to be the main cause of the prevalence of a number of hereditary disorders within the Persian Jewish community.

This study examined three hereditary disorders specifically prevalent within the Persian Jewish community. The initial disorder, corticosterone methyl oxidase II deficiency (OMIM #203040), is similar and possibly parallel to congenital hypoaldosteronism type II that was described in an earlier article by these researchers. The symptoms are alike, including dehydration, growth retardation, short stature, salt craving, and if untreated, the child can die in infancy. The disorder is caused by a deficiency of the enzyme corticosterone methyl oxidase II, which leads to too much 18-hydroxycortisone, or aldosterone, in the blood.

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The second disorder mentioned is polyglandular deficiency syndrome (OMIM #263620), of which 1 in 40 Persian Jews are carriers. This disease parallels autoimmune polyendocrinopathy syndrome also noted in their previous study. Symptoms include hypoparathyroidism, which occurs when the parathyroid glands in the neck do not produce enough parathyroid hormone. This can cause tingling in the fingers and toes, muscle weakness, fatigue, and loss of appetite. This condition is an autoimmune disorder in which a mutation in AIRE, causes the body's own immune system to attack itself.

The third disorder analyzed in this study is rimmed vacuole myopathy. This disorder can be equated to hereditary inclusion body myopathy mentioned in the previous pilot study. Symptoms of muscle weakness begin to appear by the 30th year of life and although degeneration is gradual, most people with the disorder become disabled within a decade after onset.

A novel genetic disorder noted in this study is hereditary deafness. Types of deafness found within the Persian Jewish community include autosomal-recessive deafness, dominant deafness, and sensorineural deafness. In addition, they found 27 other rare autosomal recessive diseases within the community and discovered that 28 out of the 42 families who carried these disorders had parents who were consanguineous.

Yet another disease found to be especially prevalent in the Persian Jewish population is Wolman Disease (WD) (OMIM #278000), which is a rare disease caused by lysosomal acid lipase deficiency [5]. Infants with WD develop severe malnutrition within the first few months of life and rarely live longer than 1

year. This is caused by an accumulation of lipids in parts of the body, including the spleen and the liver. Although found in 1 out of 350,000 newborns worldwide, the study noted the rate of this condition in Persian Jews to be a staggering 1 out of every 4,200. A study on WD found 3 siblings with the disease with Persian Jewish parents who were cousins [6]. This may confirm that the inbreeding of Persian Jews was a major cause of the prevalence of many genetic diseases within the community.

The overarching question still remains of why it is that so many genetic disorders are found to be specific to a certain subgroup of people. One study found a founder effect combined with genetic drift to be the cause of many community-specific hereditary diseases [7]. It is generally a common mutation that causes the prevalence of a specific disorder, as seen with many of the disorders specific to Iranian Jewry. Another possible explanation could be that there is some heterozygotic advantage that favors the carriers of a certain disorder, which results in the transmission of the gene that causes the condition [4].

The theory that these genetic disorders arose due to a founder effect goes much deeper than simply looking at the population of Jews in Iran as an isolated community. The Jewish community of Iran, along with that of Iraq, is the oldest known non-Ashkenazi Jewish community to have formed, dating back to at least the 6th century BCE. A study examining mitochondrial DNA, which is passed down identically from mother to child, was conducted on non-Ashkenazi communities, including the Iranian Jewish community [8]. This study found that the mitochondrial DNA of Iranian Jewry could be traced back to just 6 founding women. This remarkable discovery concretizes the belief that the Iranian Jewish community is extremely inbred and has stayed that way through many generations. This reaffirmed the hypothesis that the constant inbreeding and consanguineous marriages could be the underlying cause of many of the genetic disorders within the Persian Jewish community.

It is clear from the few studies that have been discussed that the frequency of disorders specific to Iranian Jews is an issue that must be dealt with immediately. While there are a number of organizations that address diseases within the Ashkenazi Jewish

community through genetic screening programs, such as Dor Yeshorim [9], such an opportunity does not exist for Persian Jewry. Creating a genetic screening system specific for Persian Jewry can potentially decrease the occurrence of these genetic diseases, as was done with certain Ashkenazi disorders, such as Tay-Sachs[10]. Due to genetic screening within the Ashkenazi Jewish community, the occurrence of Tay-Sachs disorder within the community has overwhelmingly decreased. A need for genetic screening also exists within the Persian Jewish community.

Throughout the studies that have been done to analyze the nature and frequency of Persian Jewish genetic diseases, it has become evident that there is a need for an initiative to change the status quo. The overwhelming frequency of carriers of a number of genetic disorders within the population strongly suggests that something must be done to reduce the prevalence of these disorders, with the hopes of eventually eradicating them completely. To do this, it is important for there to be an economically feasible and efficient way for Persian Jews to be screened for the genetic disorders unique to this community. A plan needs to be implemented to establish a genetic screening program to decrease the frequency of these disorders, as well as to provide counseling and guidance for those who are carriers or already have suffered from these pathologies.

A number of theories were developed to explain the reasons behind the increased frequencies of these hereditary conditions. The most promising theory suggested that the majority of these disorders have become prevalent due to the high degree of inbreeding and consanguineous marriages within the population. Therefore, a proposition can be made not only to create a means for Iranian Jews to receive genetic screening, but also to educate the community on the dangers of marrying close family members, and to begin eliminating such customs to protect the overall health of the community. It is time to take the information that has been collected from the numerous studies on the matter and to put it into direct action- not only to protect individual members of the community, but also in order to protect the generations to come. ■

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REFERENCES

- [1] Lavy-Moheban, Mehran. (2002). Brief history of Jewish life in Persia. *Brief History of Jewish Life in Persia*. Web.
- [2] Afshani, Mojdeh S. (2012). Timeline: A history of Iranian Jews. *Jewish Journal News*. Web.

- [3] Kaback, M., Lopatequi, J., Portuges, A.R., Quindipan, C., Pariani, M., Salimpour-Davidov, N., Rimoïn, D.L. (2010). Genetic screening in the Persian Jewish community: a pilot study. *Genet Med* 12:628–633.
- [4] Zlotogora, J. (1995). Hereditary disorders among Iranian Jews. *Am J Med Genet* 58:32-37.
- [5] Valles-Ayoub, Y., Esfandiari-fard, S, No, D., Sinai, P., Khokher, Z., Kohan, M., Kahen, T., Darvish, D. (2011). Wolman Disease (LIPA P.G87V) genotype frequency in people of Iranian-Jewish ancestry. *Genetic Testing and Molecular Biomarkers* 15.6:395.
- [6] Wolman, M., Sterk, V.V., Gatt, S., *et al.* (1961). Primary familial xanthomatosis with involvement and calcification of the adrenals: report of two more cases in siblings of a previously described infant. *Pediatrics* 28:742-757.
- [7] Rotter, J.I. & Diamond, J.M. (1987). What maintains the frequencies of human genetic diseases? *Nature* 329:289-290.
- [8] Behar, D.M. and 14 others. (2008). Counting the Founders: the Matrilineal Genetic Ancestry of the Jewish Diaspora. *PLoS One* 3, e2062.
- [9] <http://www.modernlab.org/doryeshirum.html>
- [10] Gross, S.J., Pletcher, B.A., Monaghan, K.G. (2008). Carrier screening in individuals of Ashkenazi Jewish descent. *Genet Med* 10:54–56.

WATCH YOUR WORDS: THE POWER OF LANGUAGE ON THOUGHT

Sarina Miller

Speech in Judaism has the power to create new realities. Through words, an individual can make an oath so permanent that it requires a Jewish court to be annulled, dedicate an object to the Temple thereby prohibiting its use for any other purpose, sanctify the Shabbat each week through *kiddush*, and establish the Jewish calendar through the monthly announcement of the new moon. The severity of words and their ramifications are described in the laws of *shemirat balashon*, guarding one's tongue from speaking improperly about other people, and is a sin that receives a unique Biblical punishment of *tzaraat*. Clearly, Judaism does not see words as simply a convenient means of communication. The words' significance extends far beyond the fleeting moments we need to pronounce them.

Psychological studies have a lot to say about how speech affects the way we think. In many ways, our language creates our reality and affects how we experience and relate to the world. Depending on the structure and rules of a language, speech leads us to think about aspects of the world differently. In many ways, language creates a framework through which we see the world.

For example, in Spanish and German certain words are deemed feminine or masculine, much like as in Hebrew. Whether a word is feminine or masculine actually affects the perception of the words in those languages. In a study conducted in 2002, twenty-four English words that take different feminine or masculine forms in Spanish and German were asked to be described by German and Spanish native speakers who were proficient in English [1]. Across the board, the word for “key,” which is male in German, was described by native German speakers with adjectives like hard, heavy, jagged and metal, whereas native Spanish speakers—for whom the word “key” is feminine—described it as golden, intricate, little, and lovely [1]. This study concluded that the masculine or feminine categorization of the word led to associations that the speaker then applied to the object as a result of the constructs of the language.

In other research, anthropologist John Haviland and linguist Stephen Levinson described how the terms used conversationally for spatial direction have a real impact on experiencing the world [2]. While English language uses egocentric coordinates to

describe position relative to one's self with words like left, right, front, and back, languages like Guugu Yimithirr (an aboriginal Australian language from north Queensland) speak about space in terms of geographic location of north, south, east, and west. Because of their language, children who speak Guugu Yimithirr must be constantly aware of geographic direction from a young age, having mastered the skill by age seven or eight [2]. The construct of the language requiring geographic specification promotes attention to spatial detail that is not necessary for speakers

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of other languages. This results in direction becoming second nature to them. They could casually point out that there is an ant to the north of one's foot [2]. This is in contrast to Americans, for whom geographic direction is not of primary importance as it is not essential to their language or communication. A practical example of how this language framework would affect experience is that while two rooms of a hotel across a hallway may seem identical to an American, perhaps each containing a window on the wall furthest from the door, a lamp in the back right corner, and the bathroom situated to the left of the entrance, a native Guugu Yimithirr speaker would see the two rooms as entirely different, because geographically, each item in the room would be in the opposite location vis a vis north/south [2]. Language has the power to influence experience in a real way.

In a similar fashion, a study by Caitlin Fausey at Stanford shows how language can shape memory [3]. English, Japanese, and Spanish speakers all watched video clips of people popping balloons, breaking eggs, and spilling drinks either accidentally or intentionally. Afterwards, the participants were asked to remember who performed the acts in the various scenarios. Interestingly enough, Spanish and Japanese do not articulate the agent in their speech for cases of unintentional action (they would say “the vase broke” as opposed to “he broke the vase”). As a result,

the Spanish and Japanese participants were not as successful at remembering who was the agent in the accidental cases in contrast to Americans who will always speak in terms of who “popped, broke, or spilled” regardless of their intention [3]. Americans thus remembered the agents in the video clips without any explicit request to take note of it. The structure of language seems to play a significant role in an individual’s memory when details of the experience are necessarily referred to and recognized by the language.

The impact of language can likely be tied to the concept of neuroplasticity. Studies have shown that thought can alter the physical structure of the brain’s neurons [4]. Increased practice and thought leads neural pathways to become more ingrained. If repetition strengthens a neural pathway, then it is logical that repetition of a thought through the construct of language would leave a lasting impact on how the brain is wired and relates to outside information. Language might not cause a difference in the number of thoughts we think, but will emphasize more prominently certain words that then serve as handy mnemonics, leading us to unconsciously remember something more saliently. For example, the Japanese were likely aware of the causative agents in the video clips while watching, but without the word construct that identified that detail, it was not maintained in their memory, or reinforced via the additional neural connections from language. A clear example of this concept, as demonstrated by MIT cognitive neuroscientist Michael Frank, involves those who lack words for individual numbers in Pirahã, the language of a small Amazonian community. When Pirahã speakers were asked to produce the same number of balloons as a number of spools of thread they had previously watched dropped one by one into a bucket, they often failed to get the exact number correct because they did not have a word to commit that number to memory [5]. It is not that the Pirahã speakers lack an understanding of what constitutes the same number; rather, they lacked the words that would serve as a mnemonic device to represent that thought [5]. If language accustoms individuals to think in terms of feminine vs. masculine, geographic direction, or whom to blame for an event, they will likely become set in their ways, because their words act as a memory tool solidifying the associations in their minds.

Judaism strongly perceives the effect that words have on consciousness. Rabbi Akiva Tatz in *The Thinking Jewish Teenager’s Guide to Life* points out that some English words are non-existent in Hebrew, because they reflect inventions of other societies. Biblical Hebrew does not have words for “romance,” “entertainment,” “etiquette,” “adventure,” or even “nature,” as these are not Jewish concepts in and of themselves [6]. He also explains a more

complex example, noting that Hebrew does not have words for “I have,” because Judaism does not base a person’s value off of one’s possessions. The Hebrew substitute is the phrase “*yesh li*” meaning literally “it is to me” -- everything is described in terms of its own independent existence, and then is expressed in terms of how it relates to me. The item and its owner have independent worth, and so the fact that one is not defined by what he owns is reflected in the Hebrew language [6].

Perhaps the greatest recognition of the power of words in Judaism is reflected in their creative ability. God chose to invent speech as the mechanism of creating the world, and we see that the Hebrew term for “speech” and “object” stem from the same root: “*davar*.” The similarity between the two is not a coincidence. Rather, Hebrew names are described as reflecting the essence of the object, and so the words for speech and tangible objects reflect a similar essence. In fact, the first verse of the Torah states “*Bereishit bara Elokim et*” according to which Rabbi Dov Ber, the Maggid of Mezritch explains that God’s first creation was “אָלֶף” representing the letters of the Hebrew alphabet from *aleph* to *tav* [7]. God specifically instituted the extra step of creating letters and speech before physical objects, and thereby established an intrinsic relationship between the two whereby speech became the causative agent of creation.

Man, the only creation made in the image of God -- “*betzelem Elokim*” (Genesis 1:27), can fittingly create through speech in a way that mirrors divine creation. Man is categorized in Kabbalistic thought as a “*medabber*,” a speaker (the most advanced over the other three categories of creations: *domem*/inanimate, *tzomeach*/growing, *chai*/animal). Targum Onkelos famously identifies man’s speech as what makes him uniquely human. Genesis 2:7 describes how man became a “living soul” (*nefesh chayah*) after God breathed into man’s nostrils the breath of life. Targum Onkelos translates the words of a “living soul” into a “spirit of speech” (*ruach memalela* in Aramaic) implying that the essence of our soul is our ability to speak. Rashi also interprets a “living soul” as power of speech, but adds that a living soul has an additional element of *da’at* -- intelligence. Based on the intrinsic connection between language and thought, perhaps Rashi’s association between man’s speech and intellect as defining man’s living soul is more profoundly connected than two separate qualities unique to man.

A fascinating example demonstrating the value that Judaism puts on language appears in the wording of the Torah itself. The *Gemara* in *Pesachim* 3a notes that there is a verse in the Torah that added eight extra letters so as not to speak negatively. (Tangentially, the fact that every extra letter in a verse seeks an explanation is itself very telling of the Torah perspective on the value of

language). The Torah uses extra words to describe a category of animals entering Noah's ark as הרהט הנניא רשא "not pure" (Genesis 7:2) instead of labeling them more succinctly but negatively as האמט "impure." The *Gemara* uses this example as a paradigm by which to teach mankind that he must refrain from speaking negatively and must instead measure his words to the same degree as is done by God Himself. Rabbeinu Bachyeh, in reference to a number of places where the Torah phrases laws in a way that differs from what may have been expected in order to speak

positively, quotes the verse: "מולש היתוביתנ לכו מעונ יכרד היכרד," that her ways are ways of pleasantness, and her paths are paths of peace (Proverbs 3:17).

Words are a powerful tool God gave us to encounter the world. Language frames our perspective, reinforcing the way we remember what goes on around us and sculpting the neural pathways of our brains. Appreciation of this power helps us use it toward our goals. We can take control of our words rather than letting our words take control of us. ■

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REFERENCES

- [1] Jackson, Steven B. (21 September, 2012). Masculine or Feminine? (And Why it Matters). Psychology Today. <http://www.psychologytoday.com/blog/culture-conscious/201209/masculine-or-feminine-and-why-it-matters> (retrieved March 4, 2013).
- [2] Deutscher, Guy. (26 August, 2010) Does Your Language Shape How You Think? The New York Times. <http://www.nytimes.com/2010/08/29/magazine/29language-t.html?pagewanted=all> (retrieved March 4, 2013).
- [3] Boroditsky, Lera. (23 July, 2010) Lost in Translation. The Wall Street Journal. <http://online.wsj.com/article/SB10001424052748703467304575383131592767868.html> (retrieved March 4, 2013).
- [4] Zugor, Abigail. (29 May, 2007) The Brain: Malleable, Capable, Vulnerable. The New York Times. http://www.nytimes.com/2007/05/29/health/29book.html?_r=0 (retrieved March 4, 2013).
- [5] Hartshorne, Joshua. (18 August, 2009). Does Language Shape What We Think? Scientific American. <http://www.scientificamerican.com/article.cfm?id=does-language-shape-what> (retrieved March 4, 2013).
- [6] Tatz, Akiva. (1992). The Thinking Jewish Teenager's Guide to Life. Targum Press Inc., Southfield, MI.
- [7] Munk, Rabbi Michael L. (1983). The Wisdom in the Hebrew Alphabet. Mesorah Publications, Ltd., Brooklyn, NY. p 19.

PRAYER AND FOCUS: A LESSON IN CONCENTRATION

Tova Miller

The *Shema* is one of the most well known Jewish prayers, and for good reason. The words “Hear O Israel, the Lord our G-d, the Lord is One” comprise a statement that affirms the core principle of Judaism, belief in G-d [1]. It is for this reason that individuals are urged to say the words clearly and with particular concentration [2]. The *Shulchan Aruch*, commonly known as *The Code of Jewish Law*, written by Rabbi Yosef Karo in the 1500s, currently serves as one of the most authoritative texts on Jewish religious laws and practices [3]. In regard to the *Shema* prayer, the *Shulchan Aruch* stresses the importance of proclaiming the words with full concentration on G-d’s absolute sovereignty [2]. In fact, the law states that if this concentration is absent, one may even be required to repeat the verse again, although quietly [4].

This proclamation of faith is so important that other steps are taken to encourage attentiveness during the prayer. In addition to saying the words out loud [5], the *Shulchan Aruch* describes that it is best to say *Shema* in a stationary position [6]. The *Mishneh Berurah*, a commentary on the *Shulchan Aruch*, explains that although one may technically recite the prayer while walking, standing or sitting is preferable, as it enables one to reach greater levels of concentration [7]. Additionally, in order to further eliminate distraction, the *Shulchan Aruch* describes the custom of covering one’s eyes while reciting the first verse [8].

The laws of the *Shema* prayer attempt to reduce external input, such as movement and visual stimuli, in order to maximize focus. This method of enhancing concentration is especially relevant to fields such as psychology and cognitive neuroscience, in which attention and focus are important topics of study.

During my research internship in the laboratory of Dr. Elyse Sussman, head of the Cognitive Neuroscience Laboratory at Albert Einstein College of Medicine, I evaluated how the brain processes additional input in the presence of attention. While people are constantly inundated by a vast array of sensory input, this study focused specifically on auditory input. Additionally, although the brain can distinguish between different sounds, this study focused on the brain’s ability to differentiate between properties of the sound features. Similar to an object that contains

visual features such as color, shape, and texture, a sound also consists of auditory features such as frequency and intensity that are perceived as pitch and loudness, respectively.

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In this study, subjects were tested in three conditions with the task of listening to a four-tone pattern and responding whenever a pattern reversal was detected in all three conditions. While the first condition only included patterns of sound frequency, the second and third conditions contained simultaneous patterns of sound duration or intensity. Despite these additions, subjects were instructed to concentrate only on frequency patterns, heard as changes in pitch, and to ignore any other feature patterns.

As expected, results indicated that subjects did not perform as well in the second and third conditions, when additional feature patterns were added. They did not detect pattern reversals as accurately as they did in the first condition, and it took longer for them to respond. Electroencephalography (EEG) recordings of subjects’ brain waves further supported this behavioral finding, demonstrating decreased wave amplitude, elicited by the task, in the presence of additional feature patterns. These results clearly demonstrate that additional feature patterns made the task harder and hindered the subjects’ performance ability.

Why did additional feature patterns detract from attention and performance? Further experimental data indicated that to some degree, the brain tried to keep track of the additional feature patterns as well. Specifically, every time a subject incorrectly identified a frequency pattern reversal, it was actually a response to changes in unattended duration or intensity patterns. Although subjects did not consciously pay attention to other features, these additional feature patterns still competed for the brain’s resources, which are limited. As such, in an attempt to process the unattended feature patterns, the brain had fewer resources to attend

to its given task.

This research, when applied to human functioning in a broader sense, may suggest limitations in the extent to which people are able to process and accomplish multiple things at once. Therefore, it would be particularly important to block any distractions in situations that require full concentration. Interestingly, the laws

of the *Shema* prayer reflect this fundamental understanding.

How gratifying it is to discover that the timeless nature of Torah recognized this truth long ago, and provided guidelines that maximized concentration in such a central prayer to Jewish faith! ■

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REFERENCES

- [1] Simmons, Shraga. "Shema Yisrael." *Aish.com*. June 2002. Aish HaTorah. Retrieved 28 January 2013 < <http://www.aish.com/jl/m/pb/48954656.html>>.
- [2] *Shulchan Aruch, Orach Chaim* 61:1
- [3] "Shulchan Aruch." Wikipedia. Retrieved 28 January 2013 <http://en.wikipedia.org/wiki/Shulchan_Aruch>.
- [4] *Shulchan Aruch, Orach Chaim* 63:4
- [5] *ibid.* 61:4
- [6] *ibid.* 63:3
- [7] *Mishneh Berurah* on O.C. 63:3
- [8] *Shulchan Aruch, Orach Chaim* 61:5

THE ORTHODOX MEDICAL DILEMMA

Chaya M. Pinson

There are many colorful customs and practices in the Orthodox world that set this community apart from the rest of the world. The modest dress-codes, learning Torah indoors for large spans of time, and praying with phylacteries, *Tefillin*, to name a few, are customs and religious laws, *halachot*, which characterize Orthodox Judaism; but are there risks associated with this law-abidance? Indeed, some of these practices can cause different forms of skin rashes, and vitamin deficiencies, yet on the other hand can also provide protection from some severe diseases, such as skin cancer.

The biblical directive, “You shall bind them for a sign upon your hand, and they shall be for frontlets between your eyes” (*Deuteronomy* 6:8) refers to the daily obligation of men placing *Tefillin* on their arm and forehead. This custom is practiced every morning aside from *Shabbos* and on Jewish holidays. The *Tefillin* are made up of two black leather boxes containing scrolls of parchment, which are inscribed with four passages from the Torah, including the *Shema*, the prayer in which Jews announce their unwavering faith in G-d. Although this practice is beautiful, there may also be health risks involved. There are various case reports on Orthodox Jewish men who had eczematous flare-ups that started on their left forearms, the *Tefillin* site that eventually spread to both forearms, hips and legs [1-2]. The biopsy results of the patients’ infected tissue, pointed to perivascular lymphocytic dermatitis, an inflammatory skin infection. After testing for allergen-sensitivity, one of these patients was shown to be allergic to potassium dichromate, which is, in fact, a key ingredient in the preparation of the leather *Tefillin* straps. Potassium dichromate is used during the leather-tanning process to preserve the *Tefillin*’s leather straps [3]. Although people are allergic to potassium dichromate, the “*Tefillin* allergy” is not too common because most people wear *Tefillin* for less than an hour at a time, so an allergic reaction does not have sufficient time to erupt [4]. In general, doctors are not mindful of religious customs when making a diagnosis, but according to Dr. Akiva Tratner, a doctor and researcher in Bellison Hospital, “... These customs should be considered as potential causes of skin ailments” as they could point to the source of the irritation. As for solutions to this poignant issue, some Rabbanic leaders have

authorized those allergic to the offending chemical in *Tefillin* to smear kosher oil onto the inside of the leather straps so there is no direct contact between the leather and skin [3]. Additionally, there are some *Tefillin* on the market that are made without potassium dichromate.

Indeed, some of these practices can cause different forms of skin rashes, and vitamin deficiencies, yet on the other hand can also provide protection from some severe diseases.

In addition to the “*Tefillin* allergy”, there is also an ailment that affects those who dedicate a large portion of their days to learning *Torah* and *davening*, Yiddish for praying. Dubbed “*Davener*’s Dermatitis”, this skin rash is characterized by lesions of brown pigmentation that are distributed throughout bony parts of the body. In one study it was found that a group of thirteen men, all of whom were full-time Orthodox Jewish Talmud students, had hyperpigmentation on their lower spines, on top of the lower thoracic and upper lumbar vertebrae. Upon biopsy and analysis, the lesions were found to be non-cancerous and had resulted from prolonged exposure to friction, heat, rubbing, or scratching. Based on the students’ common background, the researchers focused on unveiling a common cause for the lesions. All of the students were Talmudic scholars who had been learning for eight hours a day for about the past eight years. Furthermore, as is typical of Talmudic students, they had sat in large study halls reading from texts of scripture and Talmud accompanied by heated discussions, all whilst constantly rocking back-and-forth [5]. The reason for their “*shuckeling*”, Yiddish for “rocking back-and-forth”, is not exactly known, but Rabbi Yehuda Ha’Levi of 12th century Spain explained that it was common for many people to share one volume of Torah or Talmud and they would take turns reading from the source and then sit back, thus leading to a repeated back-and-forth motion. This became a habitual part of studying, even when more books became available and sharing

was unnecessary [6]. In the 19th chapter of *Tanya*, Rabbi Shneur Zalman of Liadi explained that the swaying motion is symbolic of the soul's desire to leave the body and reunite with God, just as a flame flickers back and forth as if to sunder from the wick [7]. Apparently, the students' "*shuckeling*" caused the protruding bones of their lower backs to recurrently chafe against the hard backrests, thus leading to hyperpigmentation.

Aside from these skin rashes, another practice caused a shocking discovery. In Israel, a startling study showed that there was a high prevalence of vitamin D deficiency in elderly and pregnant women. In a sun-filled country such as Israel, no one should be vitamin D deficient, as this "sunshine vitamin" is synthesized in the body as a result of sun exposure. When the sun strikes the skin, cholesterol is converted into pre-vitamin D, which then slowly converts to vitamin D₃. This vitamin is responsible for the absorption of calcium and phosphate in the intestines, both essential chemicals for bone growth. So why would these women lack this important vitamin if they lived in a sun-rich country? The answer is found in one of the many directives given to Jewish women: *Tzniut*, or modesty. The quote "Walk discreetly with your God", is one of the principal sources for dressing modestly (*Mishnah* 6:8). In a comparative study performed between both pregnant Orthodox and non-Orthodox women, it was found that there was a higher presence of vitamin D deficiency and insufficiency among the orthodox women. Since both groups lived in the same area and they had the same dietary behaviors, the vitamin D deficiency was attributed to the orthodox women's modest dress code, which reduced the amount of skin exposed to sunlight, thus reduced the amount of vitamin D that was synthesized. In pregnant women, Vitamin D passes through the placenta during the last trimester of pregnancy and is the primary source of vitamin D for the newborn baby. Mothers who are vitamin D deficient can give birth to infants with rickets, a disease which causes softening of the bones that can lead to fractures and deformities [8].

Interestingly, young ultra-orthodox male students were also found to be vitamin D deficient. In a comparative study of ultra-

orthodox students who wore traditional clothing that covered more than 90% of their bodies and remained mostly indoors, and Orthodox students who were in a combined military and *Yeshiva*, or Orthodox seminary, program who were required to perform outdoor activities, it was found that 100% of the ultra-orthodox students and 51% of the religious students were vitamin D deficient [9]. A common thread between the pregnant orthodox women and the ultra-orthodox *Yeshiva* students seems to be that both groups' dress-codes are a preclusion to sun exposure and lead to vitamin D deficiency. Due to these research results, it has been suggested that these two groups should take vitamin D supplements to compensate for the lack of sunlight detected by their skin [8-9].

While it seems that orthodox Jews are faced with disadvantages due to the extensiveness of vitamin D deficiency, there are other studies that point out a great benefit: there is a much lower incidence of malignant melanoma among orthodox Jews, possibly due to their modest dress. In a study done comparing Bnei Brak, a largely ultra-Orthodox community in Jerusalem, to Givatayim, a mostly non-Orthodox community, there was found to be a lower incidence rate of melanoma in Bnei Brak. As ultra-Orthodox males wear dark clothing throughout the year, and cover their heads with wide-brimmed hats, and females don long-sleeved dresses, stockings, and a cover their heads upon marriage, these individuals are protected from the sun's UV rays that can cause malignant melanoma [10].

The Jewish faith is filled with an abundance of laws and customs, all which add to the cultural richness of the religion. Although some of these practices, when practiced in extremes, can have harmful consequences, such as skin lesions and vitamin deficiencies, supplements can be taken to make up for Vitamin D deficiencies, and alternate leather can be used for *Tefillin*, so in essence, there are no obstructions to leading a complete orthodox lifestyle. Even furthermore, research demonstrates that dressing modestly can prevent skin cancer, since the skin, which would ordinarily be exposed to the vicious UV rays, is hidden away. ■

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REFERENCES

- [1] Gilead, L., Vardy, D., and Schamroth, J. (1995). Tefillin Dermatitis (a Phylacteric Phenomenon). *Journal of the American Academy of Dermatology*. 32: 812-813.
- [2] Ross, B. and Brancaccio, R. (1994). Allergic Contact Dermatitis to Religious Articles. *American Journal of Contact Dermatitis*. 5: 160-161.
- [3] Hamodia Staff. Study: Some Skin Infections Could Be Linked to Certain Chemicals in Tefillin. *Hamodia*. 20 July 2005: 4.

- [4] Siegel-Itzkovich, J. (2011). Youngest Case of "Tefillin Allergy" Reported by IMA Journal. <http://www.jpost.com/NationalNews/Article.aspx?id=239107>. The Jerusalem Post. (retrieved September 23, 2011).
- [5] Naimer, S. (2000). Davener's Dermatitis: A Variant of Friction Hypermelanosis. *Journal of the American Academy of Dermatology*. 42.3: 442-45.
- [6] Conservative Responsa in Israel. <http://www.responsafortoday.com> (retrieved January 31, 2013).
- [7] Wineberg, Y. (1993) *Lessons in Tanya*. Kehot Publication Society. Brooklyn, NY.
- [8] Mukamel, M., Weisman, Y., Somech, R., Eisenberg, Z., Landman, J., Shapira, I., Spierer, Z. and Jurgenson, U. (2001). Vitamin D Deficiency and Insufficiency in Orthodox and Non-Orthodox Jewish Mothers in Israel. *The Israel Medical Association Journal*. 3: 419-421.
- [9] Tsur, A., Metzger, M. and Dresner-Pollak, R. (2011). Effect of Different Dress Style on Vitamin D Level in Healthy Young Orthodox and Ultra-Orthodox Students in Israel. *Osteoporosis International*. 22.11: 2895-898.
- [10] Vardi, G., Modan, B., Golan, R., Novikov, I. and Shafir, R. (1993). Orthodox Jews Have a Lower Incidence of Malignant Melanoma. A Note on the Potentially Protective Role of Traditional Clothing. *International Journal of Cancer*. 53.5: 771-773.

HEMOPHILIA: THE FIRST RECORDED GENETIC DISORDER

Michal Schechter

Centuries before hemophilia became a medically recognized blood disorder, the rabbis in the Talmudic era recognized its symptoms. The Talmud (*Yevamot* 64b) relates Rabbi Judah the Prince's ruling that if a woman's first two children died from blood loss after circumcision, the third son should not be circumcised. Rabbi Simeon ben Gamliel disagreed and ruled that the third son may be circumcised, but if this infant died then the fourth child should not be circumcised. These two Rabbis agreed that the abnormal bleeding was hereditary, but disagreed as to how many repetitive events were required to establish a pattern and therefore exempt a child from circumcision. While three events are usually required by Jewish law to establish a pattern, Rabbi Judah ruled that in matters of life and death, two repetitive events were enough to establish a trend.

The Talmud continues with another story about four sisters from *Tzippori*. It related that the first three sisters each had a son who died from circumcision, and when the fourth sister had her first son, she came before Rabbi Simeon ben Gamliel and asked him if she should circumcise her newborn. Rabbi Simeon ben Gamliel ruled that her son should not be circumcised. This ruling shows that Rabbi Simeon ben Gamliel thought the disease was passed down maternally. The Talmud goes on to state that some families have "*Rafei D'ma*" (loose blood), while others do not.

Since the cases discussed here involve sons with bleeding disorders, the Rabbis were probably talking about a recessive mutation transmitted on the X chromosome. Females have a much lower risk of being affected by disorders that are carried on the X chromosome, since a deficient gene with a recessive mutation on one X chromosome can be masked by the equivalent normal gene on their second X chromosome. However, males who have a deficient gene on an X chromosome are always affected, since they do not have a second X chromosome to compensate for the defect. The disease discussed in the Talmud, thus, was most likely a maternally-transmitted hereditary bleeding disorder.

Later codifiers of Jewish law based their rulings for circumcision of hemophiliacs on these Talmudic discussions. Rabbi Isaac Alfasi, an eleventh-century scholar, ruled that the law was in

accordance with Rabbi Judah the Prince. Moses Maimonides, a well-known scholar and physician who lived in the twelfth century, added to Rabbi Judah's ruling and stated that even if the first two sons who died after circumcision were from different husbands, the third son should not be circumcised. Instead, the surgical procedure should be postponed until the child matures and establishes his strength. Rabbi Yosef Karo, in his commentary on Maimonides, cited the above Talmud and stated that the disease being discussed involves loose blood and is hereditary.

This ruling shows that Rabbi Simeon ben Gamliel thought the disease was passed down maternally.

Although Maimonides believed that this bleeding disease was maternally transmitted and that an abnormal bleeding pattern could even be established in siblings who were only maternally related, other commentators held that the disorder could be transmitted by either parent. Rabbi Jacob Reischer, among others, ruled that if a man's first two sons died from loss of blood after circumcision, the third son should not be circumcised. Although there was some debate as to whether the bleeding disorder could be paternally inherited, everyone agreed that it could be passed on from the mother. Fred Rosner [1] has reviewed this in detail.

A simple reading of these sources indicates that the bleeding disorder being discussed is hemophilia. Hemophilia is a genetic bleeding disease which is caused by a deficiency in one or more protein clotting factors. Clotting factors work in a chain reaction, and each protein is needed in order to complete the reaction and cause the blood to clot. When there is a deficiency in at least one of the plasma clotting factors, the body's ability to control bleeding is impaired. The two most common forms of hemophilia are hemophilia A and hemophilia B. Hemophilia A is caused by a lack of clotting factor VIII, while hemophilia B is caused by a lack of clotting factor IX. Both of these forms are inherited as X-linked recessive genes, so most hemophiliacs are male and the gene is maternally inherited. The severity of the disease depends on the

individual. Although for some hemophiliacs scrapes and cuts can be life-threatening, others only experience complications during surgery and internal bleeding [2].

Although Maimonides believed that the bleeding disease was only passed down maternally, he was also of the opinion that the disorder would improve over time and that the child could undergo circumcision at a later age. Hemophilia generally does not improve over time. Additionally, in Maimonides's discussion of delaying the time of circumcision, he does not directly quote the passage of Talmud that discusses hemophilia. Instead, he brings a case where the circumcision "enfeebled his strength", and does not talk about a thinning of the blood. Therefore, it is possible that Maimonides was not referring to a blood disorder, but to a different disorder altogether.

As mentioned above, there was a disagreement among the Rabbis as to whether the faulty gene was only able to be transmitted from the mother or whether it could also be passed down from the father. It is possible that the Rabbis who believed the bleeding disorder could be passed down from the father were referring to a third type of hemophilia, known as hemophilia C. Hemophilia C, caused by a deficiency of clotting factor XI, is transmitted as an autosomal recessive and can therefore be passed down from either parent. Additionally, while it only makes up 2-3% of those affected with hemophilia, it predominantly occurs in Jews of Ashkenazi descent [2]. It is possible that the Rabbis referring to this blood disorder were in fact discussing hemophilia C.

While it can be suggested that the different rabbinic commentators were indeed referring to different blood disorders and not just hemophilia, the Talmud and Rabbi Isaac Alfasi's suggestions that the child should not be circumcised imply that even when they get older they should remain uncircumcised. Their answers, especially in comparison to Maimonides's ruling that circumcision should merely be pushed off, suggest that the bleeding disorder they were referring to was indeed hemophilia. When the first accurate description of hemophilia in medical literature was initially discussed in the nineteenth century, it served as a confirmation of what the rabbis noted and recorded in the Talmud many centuries ago [3].

In evaluating the rabbinic response to the various bleeding disorders, it must be remembered that these rabbinic figures only wrote about what they themselves came into contact with in their own communities. They did not have access to the scientific knowledge that we do today. Hemophiliacs and people with other blood disorders were diagnosed solely through their sibling history. Some believed that those affected by bleeding disorders could mature and become stronger, and therefore be fit to undergo cir-

cumcision at a later time. Others felt that individuals who were affected by blood coagulation diseases should at no point in their lives be circumcised. However, no rabbi would have stated that a known hemophiliac should ever be circumcised. Since the rabbis did not have a detailed understanding of hemophilia, it could have been possible that its symptoms were confused with those of neonatal morbidity. Thus, certain rabbis did not easily distinguish between these two disorders and ruled that circumcision should be performed once the child matured and grew stronger.

While hemophilia was once considered a dangerous, and even fatal disease, recent medical advances have led to greater control over its symptoms. Although there is still no cure for hemophilia, those affected by the disease can be treated with regular injections of a clotting factor replacement, depending on which form of hemophilia they exhibit [2].

The availability of treating a child affected by hemophilia with clotting factors before and after a surgical procedure led Rabbi Shlomo Zalman Auerbach to rule that according to Jewish law, circumcision should be performed on hemophiliacs. According to Rabbi Auerbach, the dearth of clotting factors is not reason enough to prohibit circumcision, since supplemental clotting factors may be injected and the person's blood clotting system will temporarily behave normally during and after the surgical procedure. Rabbi Yehoshua Neuwirth challenged this opinion, and stated that as long as there is no cure for hemophilia, temporary treatments should not be depended on and do not change the child's status as a hemophiliac. Rabbi Yechiel Yaakov Weinberg ruled that, in relation to an adult male convert candidate who is medically unable to safely undergo circumcision, the person cannot, according to Jewish Law, accept the risk and be circumcised. However, this judgment was given at a time when clotting treatments were not yet available. In his manuscript, Rabbi Dr. Richard Weiss concluded that since current treatments in surgery for hemophiliacs do exist, such an adult convert should undergo circumcision [4]. There is some thought of using laser technology for circumcision on hemophiliacs. The reader is directed to Dr. J. David Bleich's article on laser circumcision for more information on this subject [5].

Although the Talmudic rabbis prohibited circumcision from being performed on a known hemophiliac, today's medical advances should be taken into account when deciding whether an affected individual should undergo circumcision. Modern technological discoveries made in surgical procedures pertaining to hemophilia and other blood disorders can be applied to circumcision. Thus, it may be possible for affected individuals to undergo circumcision with special safeguards and precautions in place. ■

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REFERENCES

- [1] Rosner, F. (1994). Hemophilia in Classic Rabbinic Texts. *J. Hist. Med. Allied Sci.* 49:240-250.
- [2] New World Encyclopedia. <http://www.newworldencyclopedia.org/entry/Hemophilia> (retrieved January 19, 2013).
- [3] Otto, J.C. (1803). An Account of an Hemorrhagic Disposition Existing in Certain Families. *Med Repos.* 6:1-4
- [4] Weiss, R. (2012). Overcoming Medical Obstacles to Jewish Conversion. *TO-GO, a Journal of Torah from Yeshiva University.*
- [5] Bleich, J.D. (2010). Laser Circumcision. *Tradition.* 43: 89-109.

THE TRUE-BLUE TALE OF THE WORLD'S FAVORITE COLOR

Rose Snyder

Scholars and scientists alike have long been enchanted by the mystery of *tekhelet*. Often referred to as Biblical blue, it is a dye that was used to fulfill the commandment: “Let them attach a cord of *tekhelet* to the fringe at each corner” (Numbers 15:38). In ancient times, however, *tekhelet* also was used to color part of the garments of the high priest and in the coverings, cloth, and curtains of the tabernacle. Though ubiquitous in ancient Israel, *tekhelet* could not outlast the political unrest in Israel in the seventh century [1]. With the dying process forgotten and the secrets of *tekhelet* unknown, the Midrash proclaimed by the middle of the eighth century, “And now we have only white [fringes], for the *tekhelet* has been hidden” [2].

Centuries of analysis of Talmudic and scientific sources have led a journey to rediscover the true source of *tekhelet* and its dying process. Equally as mysterious over these centuries has been the universal affinity for the color blue. Since the Romantic period, blue has been consistently ranked as the world’s favorite color. Surveys taken since the mid-twentieth century indicate that more than half of people polled in the United States and Western Europe designated blue as their favorite color [3]. Fascination with the color and its prominent role both socially and psychologically seems to have crossed cultural lines and time periods. What about this color makes it so universally significant?

Tekhelet, according to tradition, comes from an animal known as the *chilazon*, a type of snail found along the Mediterranean [4]. Other traditional sources indicate that the *chilazon* has a shell; its dye had to be taken while it was still alive; and its color is similar to the sea [1]. In 1858 a French zoologist, Henri de Lacaze-Duthiers, discovered a Mediterranean mollusk, the *Murex trunculus*, which produced purple-blue dyes. He and other scientists and historians determined this species to be the source of *tekhelet* [2]. *M. trunculus* has a mantle - perhaps the shell of the *chilazon* as described by the Midrash - which contains the hypobranchial gland [5]. Within the gland are the substances needed to make the dye. The gland emits a clear liquid that, when exposed to air and sunlight in the presence of the enzyme, purpurase, turns to a purple-blue dye. Purpurase, also found within the gland, decomposes quickly, so the gland must be crushed soon after being removed from the

live snail. This process matches the Talmudic description that the *tekhelet* was taken from the *chilazon* while still alive [3].

Centuries of analysis of Talmudic and scientific sources have led a journey to rediscover the true source of tekhelet and its dying process.

The liquid dye is a mixture of indigo and a brominated derivative of indigo (dibromoindigo), known as Tyrian purple. When put into solution, these compounds bind tightly to wool [3]. While some sources indicated that *tekhelet* was probably a mixture of these two compounds [5], others believed *tekhelet* was the product of exposing dibromoindigo to ultraviolet light, which photoactivated dibromoindigo to indigo, making the dye less purple, more blue [3]. Even within traditional sources, the exact shade of blue that is *tekhelet* remains unclear. The *Midrash* compared *tekhelet* to sapphire, bright blue [2]. Maimonides used the metaphor of a “clear noon sky” to describe the color, which implied a pale blue. *Rashi*, on the other hand, described it as an “evening sky,” implying a green-blue [5]. Yet another source asserted unassumingly, “the simple tradition in all of Israel has been preserved ... in teaching school children ... *tekhelet* - sky blue” [1].

Understanding the precise shade of *tekhelet*, though tedious, is significant in understanding the purpose of the commandment of *tzitzit* (fringes). Jewish law requires attaching *tzitzit* to the corner of one’s garment. A thread of *tekhelet* is then added to the *tzitzit*; “And you shall see it and remember all the commandments of the Lord and observe them ... and you shall be holy to your God” (Numbers 15:39-40). The commandment of *tzitzit* and *tekhelet*, then, is unique in that it is representative of all other commandments. Maimonides, in his analysis of these verses, pointed out that the phrase “and you shall see it” uses a masculine form of the word “it.” The word *tzitzit* is in a feminine form; “thread of tekhelet” is a masculine phrase. The verse, therefore, assumes that the wearer is reminded of the commandments only when he looks at the thread of *tekhelet*, not at the *tzitzit*. Maimonides

explained why *tekebelet* plays such a significant role in observing the commandments, and its secret is hidden within its brilliant color: “*Tekhelet* is like the sea, and the sea is like the sky, and the sky is like the Divine throne” [1]. Or, as the Midrash related, *tekebelet*, because of its resemblance to sapphire, reminds its viewer of the tablets, also made of sapphire. The tablets, which contain the Ten Commandments, will - like the image of the Divine throne - serve as an inspiration to its viewer to observe the rest of the commandments.

Interestingly, Maimonides, in his explanation of the significance of *tekebelet*, adopted the language of another Midrash; “Rabbi Meir said, whoever keeps tzitzit it is as if he has greeted the Divine Presence, because *tekebelet* is like the sea, and the sea is like the sky, and the sky is like the divine throne” [2]. Blue represents the divine because it is the color of the sky, and traditionally God’s throne is thought to preside in heaven.

Another possible reason for the connection between color and commandment has to do with the concept of eternity. The sea and the sky seem endless to their viewer, as is God’s presence and dominion. According to French painter, Raoul Dufy, only blue stays blue in all its shades. “Darkened red looks brown and whitened red turns pink ... but blue can be brightened or dimmed ... and it will always stay blue” [6]. According to Maimonides, the beauty of *tekebelet* is that it was a permanent color that did not change with time [1]. Like the Divine throne, blue does not waiver but remains steadfast for eternity. On a similar note, in the natural world blue is known for its “sheer brazenness of being blue when most earthly forms opt for earthy raiments of beige, ruddy, or taupe” [6]. Blue remains forever blue even when other natural forms take on different tones. Commitment to the commandments requires patience and strength equally, a lifelong devotion that must not waiver with time or fear standing out.

Still other explanations for the enchantment of the color blue also touch upon its sea and sky symbolism. From a psychological perspective, blue’s basic emotional tone is open-endedness [6]. Rabbi J.B. Soloveitchik attributed the color white with clarity and straightforward logic. Blue, on the other hand, “resembles the sky and the sea which intimate distance and inapproachability, things that are beyond one’s reach and out of one’s control.” Blue represents the unknown and the unfamiliar. According to Rabbi Soloveitchik, man embodies both white and blue in his approach to the universe. While white allows man to advance scientifically and technologically, blue reminds him that there will always remain some mystery. Similarly, the *Hinukh* associated white with the physical and blue with the spiritual [1].

The openness of blue is also what makes it a particularly

calming and soothing color: “Blue is sea and sky, a pocket-size vacation.” This contrasts with red, which has an aggressive emotional tone [6]. While red has been shown to raise blood pressure, blue lowers it. Blue is known as a cool color, not particularly warm or physical. Interestingly, for this reason blue is often associated with the intellect. Angela Wright, a color psychologist, proposes that blue has become the world’s favorite color because, “Perhaps we unconsciously recognize the need for sweet reason and calm, logical thought in this mad world we live in?” [7]. This understanding contrasts sharply with Rabbi Soloveitchik’s understanding of the white and blue dichotomy, with blue representing mystery, the opposite of logic. To many in this world the mystery of the unknown can be frightening; people grapple to understand what they can and feel unsettled when they confront something they cannot. To Rabbi Soloveitchik, it seems, the unknown and the perplexity of the world were windows into the spiritual world, opportunities to connect with the Creator rather than shrink from the physical world. The openness and open-endedness of blue can be unsettling; but to the one who looks at the *tekebelet* and observes the commandments, the unknown does not breed fear, for it leads to the Creator, which can be the most calming path of all.

Most significant about the sea and sky symbolism is that sea and sky are only blue “in a reflective sense, as neither air nor water contains any color” [7]. How can the importance of *tekebelet*, as found in its brilliant color, be dependent on a mere reflection?

Substances have pigments that selectively absorb and reflect different wavelengths. A pigment absorbs some wavelengths and reflects the wavelength of the color that we see. Blue light is on the high energy end of the visible spectrum; “that blue can connote coolness and tranquility is one of nature’s little inside jokes.” Its high energy means it contains short wavelengths. The sun emits white light that gets scattered by oxygen and nitrogen molecules in the atmosphere. Because blue has the highest energy and shortest wavelength, it is most easily scattered. In turn, the sky appears blue [6].

Perhaps it is the reflective nature of the color blue - especially in the sky and the sea - that makes it such a prominent color. Blue is known psychologically to encourage reflection [7]. If blue is a color that reflects, it is a color that encourages individuals to see themselves in others or to see others in themselves. Its coolness and subtlety make it a color that “does not shock, offend, or disgust.” It is often used as a symbol of peace and understanding between people [3]. Its neutrality makes it an easy favorite, but perhaps deeper than this, individuals are drawn to the color blue because it is a color that reflects and, in turn, unites. And perhaps,

it is also a color that encourages the highest form of reflection: “And God created man in His image; in the image of God He created him; male and female He created them” (Genesis 1:27). To reflect the Divine and to seek the Godliness within each individual can unite people from across culture and time - just as the color blue has done so peacefully all these years. ■

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REFERENCES

- [1] Serman, B. (1999). The Meaning of Tekhelet, B'Or Ha'Torah, 2: 185-195.
- [2] P'til Tekhelet, Retrieved June 22, 1997, from <http://www.virtual.co.il/orgs/orgs/tekhelet/brochure.htm>
- [3] Pastoureau, M. (2001). Blue: The history of a color. Princeton, NJ: Princeton University Press.
- [4] Kaplan, A. (1984). A Thread of Blue, Tzitzith, A Thread of Light. New York, NY: National Congregation of Synagogue Youth/Union of Orthodox Jewish Congregations of America, 87-95.
- [5] Hoffmann, R. (1990). Blue as the Sea, Amer. Sci., 78: 308-309.
- [6] Angier N. (2012, 22 October). True Blue Stands Out in an Earthy Crowd. The New York Times. Retrieved October 23, 2012, from <http://www.nytimes.com>.
- [7] Wright, A. (1995). The Beginner's Guide to Colour Psychology. London, England: Kyle Cathie Limited.

OBESITY: A BIG FAT PROBLEM

Shana Wargon

The statistics are alarming. More than one-third of all adults and 17% of children in the United States are obese. Obesity-related health conditions account for 15.2% of total U.S. deaths each year and medical costs associated with obesity have been estimated at \$147 billion. In the last fifty years, the prevalence of obesity among adults has nearly tripled, increasing from 13.4 to 35.7%. The numbers are staggering; it is estimated that by the year 2030, 90% of the population will be overweight [1].

Public figures, like President Obama, the First Lady and New York City Mayor Michael Bloomberg, have recently joined in the fight against obesity in America by coming up with new and often controversial ways to curb fat consumption by the public. Some of these measures include displaying caloric content of food items on restaurant menus, rigid school lunch programs, and bans on sugary drinks. But while politicians are hard at work, it is essential that we, Torah-observant Jews, analyze the *halachic* outlook on obesity and its roots.

Is obesity antithetical to the Jewish way of life? Is it *assur*, forbidden? The obligation of a Jew to avoid danger is found in the well-known verse in *Devarim* (4:15) when God proclaimed, “*v’nishmartem m’ode l’nafshoseichem*,” “You shall greatly beware for your souls.” The Rambam explained that because of this commandment to refrain from any obstacle that endangers a person, the Sages forbade many acts that could jeopardize a Jewish life [2].

Not surprisingly, researchers and clinicians today emphatically assert that obesity increases one’s risk of morbidity. Obesity has been associated with strokes, type 2 diabetes, respiratory problems, and heart disease. A simple weight gain of 15 pounds was found to increase the risk of a heart attack by 25% [3]. In addition, a recent study has clearly established that obesity actually promotes the growth of certain tumors and cancer progression [4]. Clearly, one must contend that any action that directly causes obesity would constitute endangering oneself and would be a violation of “*v’nishmartem*,” as understood by the Rambam [5].

Overeating, one noted cause of obesity, has long been discussed by countless *poskim* and has been strongly deemed inap-

propriate and *assur*. This can be gleaned from the verse in *Devarim* (32:15), which states, “*Yeshurin became fat and kicked. It thus deserted Hashem, its Maker.*” While the passage is often interpreted metaphorically, a literal translation is arguably just as accurate. Indulgence and overeating can pull us away from our Creator and the Torah life [6]. We can also see the Torah’s approach from the Jews’ wanderings in the desert after their redemption from Egypt. During those forty years, God caused delicious *manna* to rain down

The numbers are staggering; it is estimated that by the year 2030, 90% of the population will be overweight.

every day to nourish the nation. The *manna* provided all the nutrients that the people required. It did not contain any byproducts or extraneous matter (Sifrei on *Bamidbar* 11). However, the people, not satisfied with the *manna*, complained. God responded by sending fowl from the sky and the nation carnivorously overindulged. This gorging was considered inappropriate for the holy Jewish nation and the people were severely punished for their behavior (*Bamidbar* 11:31). While it is true that God placed us on this earth to enjoy its pleasures, there is a fine line between enjoying the food that He intended for us to have, and drowning ourselves in five-course Shabbat and holiday meals. Serious medical conditions are linked with gluttony, such as metabolic syndrome (also known as, insulin resistance syndrome), and are proof enough that a habit of overeating directly damages the body [7].

While eating in excess is clearly a causative factor of obesity, the consumption of trans-fats, another significant contributor, has been spoken about *ad nauseam* in the media. There has been relatively little *halachic* literature written on the subject. Trans-fatty acid, or “trans-fat,” is commercially produced in the making of margarines, baked goods, and packaged foods. It is estimated that the average person’s intake of trans-fat is about 3% of their total daily calories. Although it is not linked with as many diseases as obesity, research has found that trans-fats are strongly associated with cardiovascular health risks. The dangerous quality of

trans-fats is that they increase a person's LDL ("bad") cholesterol while simultaneously decreasing HDL ("good") cholesterol. This is significant because high LDL cholesterol levels are the primary cause of death by coronary heart disease [8]. In 2006, investigators found that people with a high level of trans-fat intake had 2.4 times the risk of having an acute heart attack as compared to those with lower intakes. The researchers claimed that by reducing trans-fat intake, an estimated 10-19 % of coronary heart disease cases in the U.S. could be prevented [9]. In that same year, the Food and Drug Administration (FDA) required that all foods indicate their trans-fat content on their product labels [13]. If the health risks posed by trans-fat consumption are so significant and widely recognized, should trans-fat be forbidden by today's *poskim*?

One way to approach this question is by analyzing a similar health issue discussed in contemporary *halacha*: smoking. Rav Moshe Feinstein famously wrote in 1964 and again in 1981 that smoking was permitted on the basis that "damage to health caused by smoking is only a small minority of cases" [10]. However, in light of the recent medical evidence regarding the inevitable detrimental effects of smoking, the more recent *gedolim* of our times, such as Rav Eliezer Waldenberg and Rav Avigdor Nebenzahl, have clearly forbid the use of cigarettes and smoking [11, 12]. In fact, the Rabbinical Council of America issued a ruling in 2006 asserting that given the increased knowledge of the risks of smoking, even Rav Moshe would have agreed that smoking is prohibited [13]. In the same way that new medical knowledge has led numerous modern-day *halachic* authorities to prohibit smoking, it is certainly conceivable that research being conducted regarding the dangers of trans-fat will inspire comparable prohibitions.

In order to make *assur* the consumption of trans-fats, *rab-*

banim would need to analyze and compare the many facets of obesity, trans-fat consumption, and smoking. One might argue that obesity and smoking are dissimilar. While both are dangerous, smoking is typically a voluntary action born out of a terrible habit. It is easy for *poskim* to prohibit the use of a cigarette, as there is no requirement or necessity for one to ever use such an item. However, food is an essential element of one's daily life. To forbid the consumption of all food in order to avoid obesity would be an impossible *psak*, or *halachic* conclusion. Another important consideration is that the effects of smoking are direct and toxic, whereas the harm caused by fattening food is delayed and indirect, requiring a number of biochemical steps to occur. In addition, there is a strong genetic component to obesity, since some individuals are more susceptible to the effects of their dietary intake. Therefore, if a *halachic* authority were to forbid obesity, the prohibition would need to be on the act of eating irresponsibly, not on the state of being overweight [13].

The consumption of trans-fats, on the other hand, is highly comparable to smoking. Like a cigarette, trans-fat is easily accessible and foods containing trans-fat can be so delectable that they create an emotional dependence or addiction for some people. However, this heavy ingredient is also remarkably avoidable, and stubborn trans-fat eaters may want to think hard before filling their pantries. Just as cigarettes are a choice, trans-fat is also a choice.

With all the known health risks associated with the consumption of trans-fat, *poskim* must quickly evaluate the matter in order to deliver a conclusive ruling. As the old adage says, "An ounce of prevention is worth a pound of cure." We must take action soon if we are to prevent or at least decelerate the obesity epidemic that is so rampant in our times. ■

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REFERENCES

- [1] Centers for Disease Control and Prevention. <http://www.cdc.gov/obesity/index.html> (retrieved December 20, 2012).
- [2] Maimonides, *Hilbot rotzeach v'shemirat nefesh* 11:4-5
- [3] National Institutes of Health. "Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults." <http://www.ncbi.nlm.nih.gov/books/NBK2003/> (retrieved January 20, 2013)
- [4] American Association for Cancer Research. Obesity Promotes Tumor Growth Regardless of Diet. <http://www.biosciencetechnology.com/news/2012/10/obesity-promotes-tumor-growth-regardless-diet> (retrieved October 16, 2012).
- [5] Abraham, A.S. (2004). *Nishmat Avraham: Even Haezer and Choshen Mishpat*. Siman 427: 2.
- [6] Nagel, R. (2008). Pediatric obesity: A challenge for the Orthodox Jewish community. *Jewish Action*. 68:14-18.
- [7] Zwickler, D. (2005). We eat to live. *The Jewish Observer*. 38:12-15.

- [8] Harvard: School of Public Health. "Shining the Spotlight on Trans Fats." <http://www.hsph.harvard.edu/nutritionsource/transfats/#1> (retrieved January 20, 2013).
- [9] Mozaffarian, D., Katan, M.B., Ascherio, A., Stampfer, M.J, and Willet, W.C. (2006). Trans fatty acids and cardiovascular disease. *NEJ M.* 354:1601-1613.
- [10] Feinstein, M. (1963). *Igros Moshe Yoreh Deab* 2:49 & Feinstein, M. (1981). *Igros Moshe Choshen Mishpat* 2:76.
- [11] Waldenberg, E. (1981). *Tzitz Eliezer*. 15:39.
- [12] Neventzal, A. *Ayab*. 5:261.
- [13] Hulkower, R. (2010). Can eating an unhealthy diet be halachically forbidden? Is trans-fat the new smoking? *Jewish Med. Ethics Halacha*, 7:48-57.

OY! OBESITY: A WEIGHTY ISSUE

Jennifer Wiseman

There are many Jews who believe that by eating only food that is *kosher*, they are following the strict letter of the law. However, even eating *kosher* food can contravene the spirit of the Torah. *Kashrut*, the set of Jewish dietary laws, is one of the most well-known facets of Judaism. Pork products are famously off-limits, time intervals between eating meat and dairy meals are standard, and extensive inspection of food, be it the *bedikah* stage of examining kosher meat or the checking of lettuce for insects, is routine. Abstaining from eating specific animals and killing permissible animals in the least painful manner, *schechita*, are among the many requirements set out in the *Torah* and explained by commentators.

According to Jewish belief, food is not simply a source of energy; rather, it is a means of connecting the *guf*, the body, to the *neschama*, the soul. Food has sacred potential and becomes elevated by the consumer when he or she recites the appropriate *beracha*. The Rama wrote as follows: “It is a *mitzvah* to bring salt to the table before one makes *hamotzi*, because the table is like an altar and eating is like consuming a *korban* [1]. Eating, in a sense, is parallel to making an offering. With regard to offerings in the *Beit Hamikdash*, the holy temple, there was a time and a place for these sacrifices. Aaron’s sons, Nadav and Avihu, were smitten because they brought an unauthorized offering. Unfortunately, many Jews today believe that if they follow strict adherence to *kashrut* and make a *beracha*, their eating is “authorized.” However, just because food is *kosher* does not mean it is healthy. Eating too much food, even if it is *kosher*, is deleterious to both the body and the soul, as the *Torah* states, “you will eat and you will be satisfied” (Deuteronomy 11:15), implying that one should not eat when they are already satisfied.

In Orthodox Jewish communities, there is a heavy emphasis on food. From *Shabbat* and holidays to *bar-mitzvah* celebrations and weddings (and all of the pre and post-events that go with them), no occasion is complete without an abundance of lavish entrees and desserts. The presence of a panoply of *kugels* and cookies, however, is not a green-light to sample everything. Regardless, these *simachot*, or celebrations, pose a great challenge to one’s self control and sadly many succumb to the temptation to

overindulge. The fact that someone else is paying makes the food even more enticing.

When it comes to overeating, Maimonides writes, “excessive eating is like a deadly poison to the body of any man, and it is a principal cause of all illnesses” [2]. If obesity negatively affects longevity [3], why is the *mitzvah* to “Guard your lives” not taken more seriously with regard to proper nutrition? Poor dietary choices, coupled with a sedentary lifestyle, are clearly not a recipe for good health. While weight gain has both genetic and environmental causes, one can, at least, better take care of one’s own body by monitoring food intake and energy expenditure (*i.e.*, calories “in” vs. calories “out”).

Even eating kosher food can contravene the spirit of the Torah.

Obesity, of course, is not limited to Jewish populations. According to the National Health and Nutrition Examination Survey (2009–2010) [4] more than 35% of adults and 17% of youths were obese. Obesity, the accumulation of excess body fat, results from consuming more calories than the body utilizes. This is exacerbated by lack of exercise and genetic predisposition. The diagnosis of obesity and its severity is widely defined by an individual’s Body Mass Index (BMI), calculated by the following formula: $BMI = \text{weight (kg)} / [\text{height (m)}]^2$. Individuals who have a BMI of less than 18.5 are considered to be underweight. Those with a BMI between 18.5 and 24.9 are considered average, between 25.0 and 29.9 are considered overweight, and above 30.0 are considered moderately obese. Those with a BMI higher than 40 are considered severely obese [5].

Obesity increases the risk of developing or exacerbating a variety of conditions. Coronary heart disease, high blood pressure, type 2 diabetes, joint stress, stroke, certain cancers (breast, uterine and ovarian for women; colon, rectum and prostate for men), and sleep apnea amongst others have all been linked to obesity. When untreated, obesity usually worsens. Physicians will recommend a reduction in calories consumed per day, in addition to starting or adapting an exercise regimen. Unfortunately, even

if an individual desires to begin an exercise regimen, lethargy and joint-pain brought about by obesity make it very difficult. In severe cases, gastric bypass surgery or vertical banded gastroplasty may be employed.

In contrast to present times in which the unfortunate trend is to live to eat, our ancestors' way of life was to eat to live. In the desert, G-d provided the Jewish people with *manna*, a miraculous food. Each morning, everyone would gather his or her allotted portion. Although some would take too much, others too little, G-d however added or subtracted from their harvest so each person would have exactly what they needed [6]. Essentially, this was Divine portion control. Additionally, those same people wandered in the desert for 40 years. These Jews were certainly health conscious, incorporating both portion control and exercise in their daily routine.

Glycemic Index (GI) is one demonstration of the relationship between energy from food and the extent of physical activity. GI measures the time it takes for a carbohydrate-containing food to raise an individual's blood sugar level. GI exclusively applies to carbohydrate-containing food because such food affects blood sugar levels more than others. This numerical index ranks foods as having a low (55 or less), a medium (56-69), or a high (70 and above) GI value, where glucose has a GI value of 100. In his medical writings (3:2), Maimonides provided his readership with advice on all aspects of daily life, including his suggestion to avoid sugary and deleterious foods, so that one can be healthy to serve G-d. With respect to eating habits, he suggested that:

[Man] should set his heart to eat and drink only to maintain the health of his body and limbs. Therefore, he should not consume all that the palate lusts for, like a dog or an ass, but should eat things that are beneficial to the body, whether they are bitter or sweet; and he should not eat things which are harmful to the body even though they may be sweet. [7]

With respect to sweet but potentially harmful foods, Maimonides was ahead of his time. Low GI foods have a slower and more steady release of glucose as compared to high GI foods which have a rapid release of glucose. A slower release allows for an individual to feel satisfied longer, making that person less likely to eat more. The quicker glucose release foods leave the individual unsatisfied.

Ludwig *et al.*, observed the effects that foods with varying GI values had on twelve obese teenage boys and found that consumption of high GI foods increased hunger while of low GI foods lessened hunger [8]. When individuals consume food with a low GI value, they have more time to burn energy because of the slow release of glucose. In contrast, food with a high GI surges

the bloodstream with sugar, which triggers the brain to signal the pancreas to release large quantities of insulin. This means that there is much less time to burn energy. Insulin, which regulates blood sugar, can more easily store excess glucose as fat than it can transport glucose to muscle cells, especially when there is a large quantity of glucose. When insulin removes large quantities of sugar, individuals feel fatigue, making them less inclined to exercise. Perhaps this is why Maimonides advised against the consumption of sweet food. A diet with foods low in GI can help lessen the occurrences of insulin-dumps, which otherwise increase body-fat and fatigue, and help to maintain healthy and controlled blood sugar levels throughout the day [9].

The aforementioned repercussions of consuming too many high-GI foods, are compounded in the modern convenience-driven society. Similar to *manna*, much food today is available and ready-to-eat. However, unlike *manna*, it is wrapped in plastic and often laden with unpronounceable chemicals and preservatives. An article discussing plastic food packaging's effect on obesity notes that, "Plastic is integral to being able to eat quickly and on the move with minimal mess—a recipe for overeating" [10]. Maimonides proposes self-control when he says, "A person should not eat until his stomach is replete but should diminish his intake by approximately one-fourth of satiation" [11]. These plastic-wrapped foods "incite us to consume more energy dense foods" by altering how an individual relates to the food they are eating since the consumer did not play a role in preparation [10]. Unfortunately, many ignore or are oblivious to the fact that a sedentary lifestyle requires fewer calories and eat as if this were not the case. When abused, these easily accessible snacks and meals can worsen an already precarious weight predicament, leading an individual to develop diabetes in conjunction with weight-gain.

A *beracha* is not an immunization against obesity and associated health-issues, such as hypertension and type 2 diabetes. Religious populations are less physically active than their secular counterparts [12] and the former are more obese than the latter [13], especially when this lack of exercise is combined with poor eating habits. Unfortunately, there is not much enthusiasm in Orthodox Jewish circles for health and exercise. Even advice from Maimonides seems to go unheeded: "Anyone who lives a sedentary life and does not exercise...even if he eats good foods...all his days will be painful ones and his strengths will wane" [2]. Maimonides admonished as to the ramifications of failing to exercise, even if one does eat properly. An issue in Orthodox Jewish communities is the lack of enthusiasm towards exercise. A study found that religious Israeli women were 30% less likely to engage in physical exercise than their secular counterparts [13]. Many day

schools do not have sufficient physical education and/or health programming and the weekly walk to *shul* may be the only exercise an Orthodox Jewish person performs.

The famous question “Do we eat to live, or live to eat?” should be asked of the Torah-observant community. The *Torah* and its commentators suggested a healthy lifestyle and forbid gross overeating. Perhaps the Orthodox Jewish community should take greater heed to the guidelines and recalibrate using Maimonides’

suggestions as the standard for a healthy body and soul. Food is a blessing and should not be abused, just as the body should not be abused. And just like saying *beracha* before eating is a *mitzvah*, the obligation to guard one’s life is of the utmost importance, as well. It is often taught that the human body is a loan from G-d. The *Torah* taught that one should return an item in an even better condition than the condition in which it was lent. The body is no different. ■

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REFERENCES

- [1] Shulchan Aruch. Orach Chaim 167:5
- [2] Maimonides, M. (1990). Laws of Human Temperaments. 4:15. Moses Maimonides’ Three Treatises on Health. Rosner, F. (Translator). The Maimonides Research Institute, Haifa, Israel.
- [3] Rosner, F. (2010). Obesity shortens life in children and adults. Israel Med. Assoc. J. 1:47-48.
- [4] Ogden, C., Carroll, M., Kit, B., Flegal, K. (2012). Prevalence of obesity in the United States, 2009-2010. NCHS Data Brief. 82.
- [5] Centers for Disease Control and Prevention. (2011). Healthy Weight - it’s not a diet, it’s a lifestyle!. (Retrieved Feb 10, 2013).
- [6] Exodus. 16:18
- [7] Maimonides, M. (1990). Laws of Human Temperaments. 3:2. Moses Maimonides’ Three Treatises on Health. Rosner, F. (Translator). The Maimonides Research Institute, Haifa, Israel.
- [8] Ludwig, D., Majzoub, J.A., Al-Zahrani, A., Dallal, G.E., Blanco, I., Roberts, S.B. (1999). High glycemic index foods, overeating, and obesity. Pediatrics. 103:E26.
- [9] Morris, R. The Glycemic Index: how to use it to increase your energy and lose weight. <http://www.runningplanet.com/training/glycemic-index.html>. (Retrieved Jan 17, 2013).
- [10] Relton, C., Strong, M., Holdsworth, M. (2012). Plastic food packaging encourages obesity. Brit. Med. J., 344:e3824.
- [11] Maimonides, M. (1990). Laws of Human Temperaments. 4:2. Moses Maimonides’ Three Treatises on Health. Rosner, F. (Translator). The Maimonides Research Institute, Haifa, Israel
- [12] Baron-Epel, O., Haviv, A., Garty, N., Tamir, D., Green, M. (2005). Who are the sedentary people in Israel? A public health indicator. Israel Med. Assoc. J. 7:694-699.
- [13] Shmueli, A., Tamir, D. (2007). Health behavior and religiosity among Israeli Jews. Israel Med. Assoc. J. 9:703-707.

SMALL FISH, WATERMELON, CUCUMBER, LEEK, ONION, AND GARLIC

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Food availability was a complaint of *B'nei Yisrael* when traveling through the desert. “We remember the fish that we ate in Egypt free of charge; the cucumbers and the melons (Rashi: watermelons), the leeks, the onions, and the garlic” (Bamidbar 11:5). Interestingly, thousands of years later, Rabbi Ovadiah of Bartenura (*i.e.*, the “Jewish Marco Polo”) arrived in Cairo and noted, “The only inexpensive foods I saw in Cairo were fish from the Nile, onions, leeks, cucumbers, melons, and vegetables” [1]. Apparently, the Egyptian agricultural economy remained stagnant from when *B'nei Yisrael* was enslaved in Egypt to Bartenura’s visit in 1490.

That *B'nei Yisrael* missed fish was obvious, as they were in the midst of a desert and were far from rivers and the ocean. When in Egypt, fish were plentiful and easily available. The Nile River overflowed and small fish were carried within the floodwaters. Subsequently, these waters receded and the small fish, entrapped in the vegetation, were readily available (Toldos Yitzchak). Ancient Egyptians fished from papyrus boats on the Nile River. To catch fish they used nets, traps, and pens, made from woven willow branches, as well as harpoons. *B'nei Yisrael* worked on these Egyptian fishing boats and pulled in the nets loaded with ensnared fish. *B'nei Yisrael* was given the smaller, worthless fish (Ramban). A third fish source is mentioned in the Talmud that discusses Jewish women who drew water from the Nile River to bring to their husbands who were working in the fields under the hot sun. When drawing water from the river, small fish were drawn with the water into the jugs. The women cooked the small fish and brought them, along with drinking water, to sustain their husbands working in the fields (Yoma 75a). Rabbenu Bechaye suggested that the focus of the complaints of *B'nei Yisrael* was to denigrate the *manna*, rather than an actual longing for their favorite food items. The Egyptians gave *B'nei Yisrael* rotten, four-to-five day old fish and the agricultural products mentioned were the cheapest and least tasty, as the Egyptians kept the best produce for themselves.

As the specific type of small fish was not defined in the *chumash*, perhaps they were not one specific species. Over 800 different species of freshwater fish live in the Nile River. Tilapia (*Oreochromis niloticus*), a kosher fish, is abundant in the Nile River.

Other species include mullet, puffer fish, moonfish, mullets, carp, eel, elephant fish, and catfish. If so, care was needed to discern kosher, from nonkosher, species of fish. Only kosher fish have fins and scales (Vayikra 11:9).

Health benefits resulting from the consumption of small fish were noted in the Talmud.

Health benefits resulting from the consumption of small fish were noted in the Talmud. Those who regularly eat small fish do not suffer from intestinal disorders. Fish consumption strengthens the entire body (Berachos 20a), serves as an aphrodisiac (Berachos 40a), and facilitates a patient’s recovery from an illness (Berachos 57b; Sanhedrin 98a). Health benefits from fish consumption were recognized by the American Heart Association, which recommended eating fish at least two times per week. Fish are high in protein and low in fat, are rich in calcium, phosphorus, minerals, such as iron, zinc, iodine, potassium, and magnesium, vitamins D and B₂, and omega-3 fatty acids. The omega-3 fatty acids, eicosapentaenoic acid and docosahexaenoic acid, are particularly beneficial, as they lower blood pressure and help reduce the risk of a heart attack, of abnormal heart rhythms, and of a stroke. In addition, these fatty acids promote healthy brain function, may decrease the risk of depression, attention-deficit/hyperactivity disorder, Alzheimer’s disease, dementia, and diabetes, and may prevent inflammation, thereby reducing the risk of arthritis [2].

HaShem provided daily sustenance through the *manna*, which took on the taste of whatever food the person desired to eat (Rashi, Bamidbar 11:7). The physical appearance of *manna* was unchanging and the complaint of *B'nei Yisrael* to Moshe may have been based on the monotony of always visualizing the same food (Sifrei 89). *B'nei Yisrael* were tired of visualizing *manna* and craved brightly colorful watermelons with their green exterior and bright red interior and green cucumbers with their white or yellow interior. In addition, *B'nei Yisrael* were traveling through a desert and the thought of munching juicy, thirst quenching watermelons

and cucumbers was very appealing and tempting. Watermelons and cucumbers were often eaten as deserts (Chizkuni) and leeks, onions, and garlic were used to add zest to foods. Perhaps these foods reminded *B'nei Yisroel* of their varied home-cooked meals when in Egypt. Although *manna* had the potential to assume any taste, there were five exceptions. As cucumbers, watermelons, leeks, garlic, and onions were considered harmful to fetuses and to nursing infants, their tastes were excluded from the *manna* (Sifrei 87; Yoma 75a).

Mention of watermelons (*Citrullus vulgaris*) and cucumbers (*Cucumis sativus*) is peppered throughout the Talmud. Both are subject to tithes (Maasros 1:4) and *terumah* (Terumos 1:3) and care must be taken that the individual did not inadvertently designate bitter cucumbers or spoiled watermelon, both inedible, as *terumah* (Terumos 1:3). Differential health effects were attributed to the consumption of small, as compared to large, cucumbers. The consumption of large cucumbers was said “to return a sick person to his sickness,” with the recalcitrant illness being more severe. Rav Yishmael taught, “why are (large) cucumbers called “*kishuim*”?, because they are as severe (*kashim*) to the body as are swords. Conversely, the presence of small cucumbers at the dinner table was lauded. In describing the wealth of Antoninus and Rebbi (Rabbi Yehudah the Prince), it was noted that both individuals had lavish amounts of food, including small cucumbers, to serve guests at their table. Their extreme wealth was exemplified by affording seasonal produce, such as cucumbers, all year around (Maharsha). Cucumbers cause the intestines to expand, thereby facilitating digestive processes (Avodah Zarah 11a; Berachos 57b). The Rambam wrote that cucumbers are easily digested, relaxed the stomach, and promoted the easy intestinal elimination of metabolic wastes [3], probably attributed to their high fiber content. A reduced risk of gastric cancer was associated with the ingestion of vegetables, cucumbers in particular [4].

In Talmudic times, care was taken to avoid watermelons and cucumbers that were left uncovered, as a snake may have bitten into them and deposited venom inside these vegetables (Avodah Zarah 30b). A similar rationale applied to cucumbers and watermelons with tiny external holes, as it has been suggested that these punctures were made by a venomous snake (Chullin 94a). The problem of the consumption of bugs in vegetables is not a recent *halachic* issue and concern. The prohibition of consuming *sheratzim* directed consumers to carefully check cucumbers, even those still attached to soil, from contamination with worms (Chullin 58b).

Watermelon and cucumber are botanically related, as both belong to the family, Curcubitaceae. Both vegetables have many

health benefits. Watermelon, in addition to being a source of vitamin C and iron, is rich in lycopene, an antioxidant with a strong capacity to scavenge reactive oxygen species (ROS) which cause cellular oxidative stress [5]. ROS are the causative agents of many chronic diseases, including cancer, arthritis, cardiovascular disease, and aging. Shortly after consumption of watermelon juice, the blood plasma concentration of lycopene was shown to be elevated, indicating it was quickly absorbed [6]. Epidemiological studies have correlated diets with high consumption of lycopene-containing fruits and vegetables with reduced incidence of coronary heart disease and of types of kidney and prostate cancers [7]. Watermelon [8] and cucumber [5] are rich in the amino acid, citrulline, a strong antioxidant scavenger of hydroxyl free radicals and a precursor in the synthesis of arginine, another amino acid. Arginine has important biochemical roles in the proper functioning of the reproductive, pulmonary, renal, gastrointestinal, hepatic, and immune systems and facilitates the healing of wounds [5].

Cucumbers are a valuable source of vitamin C and beta-carotene and are rich in the flavonoid antioxidants, quercetin, apigenin, luteolin, and kaempferol, which scavenge ROS. Fresh cucumber extracts have anti-inflammatory properties. Cucumbers are rich in cucurbitacin triterpenes and in lignans, both of which have anticancer properties [9]. Studies with healthy rabbits showed cucumbers had anti-hyperglycemic activity, suggesting their inclusion in the menu for the control and prevention of diabetes mellitus [10].

As noted with the botanical similarity between watermelon and cucumber, *B'nei Yisroel's* cravings were directed to other vegetables within the same botanical family. Leeks (*Allium ampeloprasum* var. *porrum* (L.)), onions (*Allium cepa*), and garlic (*Allium sativum*) are botanically related (Nedarim 58b), and belong to the family Amaryllidaceae, subfamily Allioideae [11]. However, as garlic and onions can be stored, they are subject to the obligation of *pe'ab*. Leeks, and other such vegetables that cannot be stored, are not subject to *pe'ab* (Rashi, Shabbos 68a). A commonality in these three species is that they promote good health (Eruvin 56a), related, in part, to their large quantities of organosulfur molecules. Thus, many of the health benefits of one species are applicable to the others. In order of the sequence of scientific research, more studies have been conducted with garlic than with onions, and with onions more than with leeks.

Five health benefits resulting from the consumption of garlic were enumerated in the Talmud (Bava Kamma 82a): garlic (a) satiates, (b) keeps the body warm, (c) brightens the face, (d) increases semen, and (e) kills intestinal parasites. Thereafter, a sixth benefit was noted: (f) garlic has aphrodisiac effects, it instills love,

and eliminates jealousy (Bava Kamma 82a) [or it instills love and brings out desire (Yerushalmi Megillah 5:1)]. Ezra ordained garlic to be eaten on Fridays (Nedarim 31a, 63b). Many of the health benefits noted in the Talmud may refer to the overall positive health effects of garlic on the cardiovascular system, on preventing inflammation, and on controlling weight gain. “Garlic satiates” may refer to garlic inducing signals of satiation to the brain, thereby reducing the desire to eat. “Garlic keeps the body warm” may refer to garlic’s ability to increase the metabolic rate; the enhanced burning of calories keeps the body warm [12].

Much research has focused on the positive health effects of the consumption of garlic, related primarily to the organosulfur molecules, allicin and ajoene.

Much research has focused on the positive health effects of the consumption of garlic, related primarily to the organosulfur molecules, allicin and ajoene. Diseases related to atherosclerosis, such as peripheral arterial diseases, stroke, and heart disease, are associated with elevated levels of oxidized low density lipoproteins (LDL) (“bad” cholesterol) in blood serum. Allicin has a cholesterol lowering effect, apparently by inhibiting the enzymes involved in the biosynthesis of cholesterol [13, 14]. Garlic, especially when consumed raw rather than cooked, is a potent inhibitor of abnormal aggregation of platelets, thereby, inhibiting the formation of blood clots [13]. The antiplatelet molecule in garlic is ajoene [15]. Garlic-derived organosulfur molecules are converted by red blood cells into hydrogen sulfide, which relaxes vascular smooth muscle, induces vasodilation of blood vessels, and reduces blood pressure. Garlic stimulates the generation of nitric oxide by endothelial cells comprising the walls of blood; nitric oxide induces the relaxation of the blood vessels and lowers blood pressure [16]. Garlic’s effect on the cardiovascular system to increase blood flow throughout the body may explain the Talmudic statement, garlic “brightens the face” [17].

Garlic has a positive effect on male semen (Bava Kamma 82a) and may induce a seminal emission (Yoma 18a). In one study, laboratory male mice were administered garlic extract in their drinking water for 3 months exhibited an increase in weight of their seminal vesicles and epididymides and a highly elevated sperm count [18]. In another study, rats were fed diets with differing protein levels and with or without garlic supplementation. After 28 days of feeding, the testosterone contents in the testis were higher in rats who were fed diets with garlic powder than

in those who were fed the same diet but not supplemented with garlic powder. In a further experiment, rats were administered diallyldisulfide (an organosulfur molecule in garlic) and the secretion of luteinizing hormone (LH) from the pituitary gland was analyzed; LH regulates testosterone production in the testis. The data showed the blood plasma levels of LH increased in response to increased administration of diallyldisulfide [19].

A fifth health effect noted in the Talmud (Bava Kamma 82a) was that garlic was lethal to intestinal parasites. This was confirmed in numerous scientific studies. Garlic extract was toxic to intestinal parasitic worms, including the tapeworm, *Taenia taeniaeformis*, and the intestinal fluke (*Echinostoma caproni*) [20]. Administration of garlic extract was an efficient and effective treatment for children infected with the parasitic intestinal protozoan, *Giardia lamblia*, or with the intestinal tapeworm, *Hymenolepis nana* [21]. Allicin is the active component in garlic extract that exerts toxicity to intestinal parasites [22].

Garlic has antimutagenic and anticarcinogenic activities, again related to the organosulfur molecules. Several modes of chemoprevention are suggested and include the effects of garlic on inducing detoxification enzymes, on scavenging free radicals, on inhibiting tumor cell growth by blocking cell cycle progression, on inducing apoptosis, and on stimulation the immune system to destroyed transformed cells [23, 24]. An epidemiological analysis of breast cancer in women in Eastern China showed that consumption of garlic was correlated with a reduced cancer risk [25].

Almost as an afterthought, the Talmud (Bava Kamma 82a) noted a sixth effect of garlic, that it has aphrodisiac effects. The positive health benefits of garlic include its antioxidant properties, anti-atherosclerotic and cholesterol- and lipid-lowering effects, antithrombotic activity, antihypertensive effects, anticarcinogenic properties, immunomodulatory activity, antimicrobial activity, and hypoglycemic effects [26]. As compared to individuals with health issues, it is not surprising that individuals in good health, attributable, perhaps, in part, to their consumption of garlic, would be primed to be exceedingly affectionate and passionate.

As garlic hinders clotting, it can be problematic for pregnant women [12]. This may explain the Talmudic statement that garlic, onion, and leeks are harmful to fetuses and to nursing infants (Yoma 75a). There is no scientific research on the effects of garlic on human fetuses. Mennella *et al.* [27] conducted a study of 10 healthy, pregnant women undergoing routine amniocentesis; 45 minutes prior to the procedure, five women were given a garlic extract-containing capsule and five were given a placebo-containing capsule. The odorous sulfur components of garlic were noted

in the amniotic fluid of those women administered the garlic extract, as compared to the controls. The effects of *in utero* exposure to garlic odors are unknown and may have an impact on the child's subsequent taste and flavor preferences. For example, infants whose mothers were randomly assigned to drink carrot juice during the last trimester of pregnancy enjoyed carrot-flavored cereals more than infants whose mother did not drink carrot juice or eat carrots [28].

Earlier research by Mennella and Beauchamp [29] evaluated garlic ingestion by nursing women and its effects on the baby. After one hour of ingestion of garlic, the intensity of milk odor increased, peaking after 2 hours of ingestion. These changes in the mother's milk were detected by the nursing, as these infants nursed longer and ingested more milk when the mother's milk smelled like garlic. In a follow-up study, Mennella and Beauchamp [30] compared infants who had no prior exposure to garlic volatiles in their mothers' milk with infants whose mothers repeatedly consumed garlic during the experimental period. The nursing response by the nursing was lessened if the mother had prior repeated ingestion of garlic, *i.e.* the novelty of a new flavor wore off.

Garlic consumption with the resulting bad breath was noted in an incident in the Talmud (*e.g.*, Berachos 51a). Rebbe, apparently very sensitive to the odor of garlic, detected the odor during a *shiyur* that he was presenting. He announced, "Whoever ate garlic, leave." Rav Chiya arose and left, to be followed by all the students. The next day, Rebbe's son, Rav Shimon, met Rav Chiya and inquired whether he was the one who irritated his father with his garlic-smelling, bad breath. Rav Chiya replied that it was not him. However, he left, knowing that all the students would follow him, thereby avoiding embarrassing the student who ate the garlic (Sanhedrin 11a). Garlic-breath is due to its organosulfur compounds.

The Talmudic uses the consumption of onions, a food staple (Pesachim 114a), as the example to lead a simple, not extravagant life style. The phrase, "eat onions and dwell in the protection of one's house (Pesachim 114a) means that one should not overspend on purchasing expensive foods, but rather should eat simpler food items so as to be able to afford one's house. Onion peels and garlic were applied to wounds (Tosefta Shabbos 6:3). In the medical literature a note is made that topical application of

onion extract depressed cutaneous inflammation and edema and that onion extract was particularly toxic to Gram positive bacteria and dermatophytic fungi [15]. A gel with onion extract was used to reduce the appearance of post-operative scars [31].

Although there was some dispute regarding its health effects, the conclusion apparently was that onions were good for the heart (Nedarim 26b, 66a). Onions, as with garlic, are rich in organosulfur compounds which account for much of their positive cardiovascular health effects. Studies with rats administered onion extract have shown prolonged bleed times, related to the inhibition of platelet aggregation [15]. This would explain the recommendation not to eat onions after bloodletting (Avodah Zarah 29a). In some women, onion or garlic consumption can induce menstrual bleeding. Apparently, some women have established a specific day of their monthly cycle in which their body reaction to consumption of these sharp vegetables is a menstrual emission (Niddah 63b). Burger [32], citing the 2004th edition of the Physicians Desk Reference, noted that many women throughout the 20th and into the 21st century ate onions to bring about the onset of menstruation. The idea that onion consumption stimulated profuse salivation (Yevamos 106a) may be related to its exacerbation of an already-existing condition of acid reflux [33].

Dried specimens of leeks were discovered in archaeological sites dating to ancient Egypt, as well as noted in wall carvings and drawings, indicating that leeks were part of the ancient Egyptian diet [11]. Leeks, which are abundant and grow speedily, are eaten on Rosh Hashanah as a symbol of fertility and prosperity (Horayos 12a; Kerisos 6a) and are recommended for patients with chronic fever (Gittin 67b). A molecule with anti-inflammatory property [34], immunologic-stimulating activity [35], and antimicrobial activity [36] was identified in leek bulbs and leaves. These biomedical properties of leek may explain the Talmudic recommendation of leek consumption to treat chronic fever, especially due to microbial infections.

The choice of food items that *B'nei Yisrael* longed for is most interesting. Watermelon and cucumbers are botanically related as are garlic, onions, and leeks. Little variety is seen in these foods and neither botanical group would serve as the main course of a dinner. Similarly, I doubt if anyone would long for small fish, such as sardines. These specific food items, apparently, were itemized only to denigrate the *manna*. ■

REFERENCES

- [1] Shulman, Y.D. (translator), 1992, Pathway to Jerusalem. The Travel Letters of Rabbi Ovadiah of Bartenura, CIS Publishers, NY, NY.
- [2] Washington State Department of Health, www.doh.wa.gov/.../Food/Fish/HealthBenefits.aspx, retrieved, July 20, 2012.
- [3] Shaouli, M.C. and Fisher, Y., 1999, Nature's Wealth, Feldheim Publ., NY, NY.
- [4] Graham, S. *et al.*, 1990, Diet in the epidemiology of gastric cancer, *Nutr. Cancer* 13:19-34.

- [5] Tarazona-Diaz, M.P. *et al.*, 2010, Bioactive compounds from flesh and by-product of fresh-cut watermelon cultivars, *J. Sci. Food Agric.*, 91:805-812.
- [6] Edwards, A.J. *et al.*, 2003, Consumption of watermelon juice increases plasma concentrations of lycopene and β -carotene in humans, *J. Nutr.*, 133; 1043-1050
- [7] Fraser, P.D. and Bramley, P.M., 2004, The biosynthesis and nutritional uses of carotenoids, *Prog. Lipid Res.*, 43: 228-265.
- [8] Collins, J.K., *et al.*, 2007, Watermelon consumption increases plasma arginine concentrations in adults, *Nutrition* 23:261-266.
- [9] WH Foods, Cucumbers, www.whfoods.com/genpage.php?tname=foodspice&dbid=42, retrieved July 20, 2012.
- [10] Roman-Ramos, R. *et al.*, 1995, Anti-hyperglycemic effect of some edible plants, *J. Ethnopharmacol.*, 48:25-32.
- [11] Wikipedia.Leeks, en.wikipedia.org/wiki/Leek, retrieved July 20, 2012.
- [12] Rayment, W.J., 2012, In Depth Info on Garlic, <http://www.indepthinfo.com/garlic/health-benefits.htm>
- [13] Ali, M., Thompson, M., and Afzal, M., 2000, Garlic and onions: their effect on eicosanoid metabolism and its clinical relevance, *Prost. Leuk. Essen. Fatty Acids* 62:55-73.
- [14] Gebhardt, R., Beck, H., and Wagner, K.G., 1994, Inhibition of cholesterol biosynthesis by allicin and ajoene in rat hepatocytes and HepG2 cells, *Biochim. Biophys. Acta*, 1213:57-62.
- [15] Griffiths, G. *et al.*, 2002, Onions - a global benefit to health, *Phytother. Res.*, 16:603-615.
- [16] Ginter, E. and Simko, V., 2010. Garlic (*Allium sativum* L.) and cardiovascular diseases, *Bratisl. Lek. Listy*, 111:452-456.
- [17] Rosenblum, T.A., 1998, Garlic: "al shum mah?" *Derech HaTeva. J. Torah Sci.* 2: 11-15.
- [18] al-Bekairi, A.M., Shah, A.H., and Qureshi, S., 1990, Effect of *Allium sativum* on epididymal spermatozoa, estradiol-treated mice, and general toxicity, *J. Ethnopharmacol.*, 29:117-125.
- [19] Oi, Y. *et al.*, 2001, Gastric supplementation increases testicular testosterone and decreases plasma corticosterone in rats fed a high protein diet, *J. Nutr.*, 131:2150-2156.
- [20] Abdel-Ghaffar, F. *et al.*, 2011, The effects of different plant extracts on intestinal cestodes and on trematodes, *Parasitol. Res.*, 108:979-984.
- [21] Soffar, S.A. and Mokhtar, G.M., 1991, Evaluation of the antiparasitic effect of aqueous garlic (*Allium sativum*) extract in hymenolepiasis nana and giardiasis, *J. Egypt. Soc. Parasitol.*, 21:497-502.
- [22] Anthony, J.P. *et al.*, 2005, Plant active components – a resource for antiparasitic agents? *Trends Parasitol.*, 21:462-468.
- [23] Butt, M.S. *et al.*, 2009, Garlic: nature's protection against physiological threats, *Crit. Rev. Food Sci. Nutr.*, 49:538-551.
- [24] Izzo, A.A., Capasso, R., and Capasso, F., 2004, Eating garlic and onion: a matter of life or death, *Br. J. Cancer*, 91:194.
- [25] Yu, Z.G., *et al.*, 2012, The prevalence and correlates of breast cancer among women in Eastern China, *PLoS One*, 7:e37784.
- [26] Barnes, J., Anderson, L.A., and Phillipson, J.D., 2009, *Herbal Medicines*, 3rd edition, Pharmaceutical Press, Chicago, IL.
- [27] Mennella, J.A. *et al.*, 1995, Garlic ingestion by pregnant women alters the odor of amniotic fluid, *Chem. Senses* 20:207-209.
- [28] Beauchamp, J.A. and Mennella, G.K., 2011, Flavor perception in human infants: development and functional significance, *Digestion*, 83 (Suppl. 1):1–6.
- [29] Mennella, J.A. and Beauchamp, G.K., 1991, Maternal diet alters the sensory qualities of human milk and the nursling's behavior, *Pediatrics* 88:737-744.
- [30] Mennella, J.A. and Beauchamp, G.K., 1993, The effects of repeated exposure to garlic-flavored milk in the nursling's behavior, *Pediatr. Res.*, 34:805-808.
- [31] Draelos, Z.D., 2008, The ability of onion extract gel to improve the cosmetic appearance of postsurgical scars, *J. Cosmet. Dermatol.*, 7:101-104.
- [32] Burger, R., 2009, Onions, *Derech HaTeva. J. Torah Sci.*, 13:23-24
- [33] Allen, M.L. *et al.*, 1990, The effect of raw onions on acid reflux and reflux symptoms, *Amer. J. Gastroenterol.*, 85:377-380.
- [34] Adao, C.R., da Silva, B.P., and Parente, J.P., 2011, A new steroidal saponin with anti-inflammatory and antiulcerogenic properties from the bulbs of *Allium ampeloprasum* var. *porrum*, *Fitoterapia*, 82: 1175-1180.
- [35] Adao, C.R. *et al.*, 2012, Haemolytic activity and immunological adjuvant effect of a new steroidal saponin from *Allium ampeloprasum* var. *porrum*, *Chem. Biodivers.*, 9: 58-67.
- [36] Alamri, S.A. and Moustafa, M.F., 2012, Antimicrobial properties of 3 medicinal plants from Saudi Arabia against some clinical isolates of bacteria, *Saudi Med. J.*, 33:272-277.



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