The Historical Evolution of the Perceived Liver as Evident in the Bible, Talmud, and Rabbinic Literature

By **Tehilla Berger**

Since the times of Tanakh, the liver has been credited as one of the most essential mammalian organs. Although the term 'כבד,' liver,' only appears 14 times in the Bible, with the first 11 referencing sacrificial offerings, the liver takes on a fascinating and multifaceted connotation. The very word, כבד, literally defined as heavy, identifies the organ as the largest one in the body. While we classify skin as an organ, and thus, it surpasses the liver as the largest, the liver remains the biggest internal organ, which, in the average adult, amounts to three pounds. The three scriptures that reference the liver outside the context of offerings seem to indicate that liver's essential role is in its residence's emotional and cognitive behaviors. Interestingly, the leading scientific theory as depicted by Galen in the first century CE identified the liver in a synonymous nature to the modern-day symbolism of the heart—delicate, indispensable, and the location from which love stems [1].

The first reference chronologically is in *Mishlei* 7:23, written by King Solomon at the outset of the first Temple period. King Solomon illustrates the capacity of a seductress to seduce, and the negative, catastrophic consequences that their illicit relationship will ensue, namely tormenting heartbreak, and ultimately, death. The euphemism used to highlight this is that of an arrow splitting a liver, which is paramount to a bird scurrying into a trap that will take its life. The liver here connotes the center of emotion, which can torment its host to the extent that it may cost it its life.

כבד is next mentioned toward the end of the first Temple period, entrenched in the poetic prophesies of *Yechezkel*. In *perek* 21, *pasuk* 26, the scripture foretells the destruction, in which the Babylonian King *Nebvuchadnezzar* debates whether to attack the Jerusalemites or the Ammonians. As he stands, metaphorically, at the head of a pronged road, he turns to magic to help discern the more successful pathway by asking his idols to help him 'see in the liver.' In Mesopotamia, pagans often employed the sorcerous means of inspecting an animal's liver as a means of divination. The liver, therefore, represented the will of God, and thus, by extension, connotes the cognitive ability of mankind [2].

The last mention of כבד in the Bible can be found in *Eicha* (2:12), whose authorship is often attributed to the prophet *Yirmiyahu*, which depicts the torment of the individual who experienced the destruction of the First Temple in 422 BCE. In doing so, it describes an individual whose eyes can bear no more tears, as he senses his liver pouring to the ground and suffers the horrors destruction that has befallen his nation. Here, the liver is synonymous to the colloquial use of the heart, and is the home of emotion.

As we progress in history to year 500 CE, we find a depiction of the liver in the Talmud, whose scientific nature is remarkably congruous to that of present day science. *Bechorot* 55a states that the liver is the source of the blood. At first glance, it appears that the *Tannaim* mistook the liver for the heart, but upon further investigation, it seems that the Torah scholars of the Sixth Century CE had a deep insight into human anatomy. One of the primary functions of the liver is its ability to break down red blood cells. As a result, at any given moment, the liver holds over thirteen percent of the body's blood supply. Over a pint of blood passes through the liver every minute [3].

One of the unique, miraculous characteristics of the liver is its ability to regenerate itself. This remarkable quality was first confirmed in 1894 by German scientists, who discovered that even when close to ninety percent of the liver has been removed, it could still metamorphize back into its original size, form, and function [4]. This quickly morphed into the lifesaving hepatectomy procedure, which allows a partial removal of the liver to instigate a complete recovery in a patient. This procedure circumvents many of the medical and pragmatic difficulties which organ donation poses, and was thus revolutionary. Astonishingly, this procedure was not popularized until as recent as the late 1950's [5]. Remarkably, the Talmudic sources seemed to have ascertained a phenomenal comprehension of the liver's ability so regenerate over a millennium and a half prior to this discovery. Equally astonishing, our Talmudic scholars had a very accurate understanding of the anatomy of the liver itself, as well as its placement amongst the other bodily organs. The liver is situated underneath the diaphragm, as well as in close proximity to the stomach, duodenum, and right kidney. Significantly, the liver has ligaments connecting it to the diaphragm, as well as bile ducts connecting it to the duodenum [1].

The *Mishna* in *Chullin* 46a deems which types of ailments would constitute an animal a *tereifah*, a classification of animals that are prohibited to consume because the animals are sick, and as a result of their illness or incapacity, will die within a determined period of time. Such animals, perhaps for health reasons, are forbidden to be consumed by Jewish Law. One such animal has an ailment such that it is missing

the entirety of its liver. The requisite of the totality of the liver removed implies that should any piece of the liver remain, the consumption of such an animal is permissible. Hypothetically, even a miniscule amount liver remaining would be enough to regenerate the entirety of the liver, and thus the animal would be Kosher for consumption, as it has a probable chance of survival. The *Gemara* then proceeds to challenge this statement, and provides a stricter classification as to how much of a liver must be present, and concludes that a *kezayit*, the size of an olive, must be present to render the animal permissible. *Rashi*, an eleventh century commentator, explains that it seems that the essential point of contention is how much of the liver must be present to induce its regeneration, immediately inferring this unique quality of the liver that scientists would only discover close to a century later. *Rashi* further explains that *Rabbi Shimon*, who did not require a *kezayit*, essentially believed that even a miniscule remainder of the liver can induce regeneration, while *Rabbi Chiyah* believed a more substantial amount would be necessary. The *Gemara* elaborates and gives credence to *Rabbi Chiyah* who required an olive size portion, a *kezayit*, in two locations: one in the place of the bile, and one in the place of the 'חיות-life.' This location is subjected to alternate explanations by the *Rishonim*. *Rashi* understands that the word choice implying source of life implies that we require a *kezayit* in the place the liver is attached to the body. He offers two hypotheses as to where this might be, the first being the kidney, and the second being the diaphragm, both of which have elements of truth to them. Interestingly, other medieval commentators, such as the *Rambam (Shicheta* 8:21), *Beit Yoseph (Yoreh Deah* 41:1*)*, *Tur (Yoreh Deah* 41:1), and the *Perusha (Shicheta* 8:21) pick up on the connection between the diaphragm and the liver, and point out that *Rashi*'s interpretation of the kidney is biologically false. The *Rambam* reiterates the necessity of the liver's connection to both the bile and the diaphragm, stating that even in an instance where the entirety of the liver is intact, besides for these two locations, the animal would be considered a *treifah*, thus prohibiting its consumption. Thus, both the *Gemara* and its interpretation by our Scholars highlight a truly remarkable discernment of the liver, especially in contrast to the ancient secular perception of the liver, which was depicted as feeble and delicate [1].

The third context in which early Rabbinic literature has fascinating insights into the anatomy of the liver is in reference to *Brit Milah,* in which, although it makes no direct reference to the liver itself, it relies heavily on modern day medicinal properties related to it. According to Jewish tradition, we perform a circumcision on the eighth day of a male child's life, symbolically marking his inclusion on the covenant between God and the Jewish people. Over the history of the Jewish people, and in particular in recent history, this custom has been subject to much scrutiny, particularly about the morality and safety of performing a small surgery on a child for religious purposes. Fascinatingly, the Rabbis were particularly concerned with the health of the child, and as such, even a small concern of an ailment would constitute enough of a reason to push off the *Milah*, until the child's health could be confirmed.

One such concern mentioned already in the Talmud is the color of the baby. Should the baby appear 'greenish,' presumably a condition of infant jaundice, the baby should not be circumcised (*Shabbat* 134a). Newborn jaundice is a condition in which infants appear yellow, due to abnormally high levels of bilirubin. Bilirubin is used when the body regenerates red blood cells, and is processed by the liver and subsequently emitted in stool. Because babies' livers are not completely developed, they may not be sufficiently processing the bilirubin, resulting in a yellow color of some babies' skin [6]. Should a baby display symptoms of this condition, the family must wait until the baby's countenance returned to a natural color, and only then should the circumcision be performed. Interestingly, the rationale proposed for jaundice is that the baby's blood had not yet 'fallen.' Here, the Rabbis illustrated a surreal insight into the origin of the disease, as the yellow color of jaundice is directly correlated to red blood cells. Interestingly, the *Rishonim* and *Acharonim* interpret the causation of the disease in a facet that diverts from the modern understanding of the liver more than the Talmud itself did. For instance, the most basic commentator on Talmud, *Rashi*, interprets the blood 'having yet to fall' as the blood having yet entered the infant, and as a result of a limited blood supply, the child would be weak and at high risk of death. While *Rashi* may have had an accurate understanding of the dependency of human life on adequate blood supply, his interpretation of jaundice seems to deviate from our modern day understanding of the disease. Similarly, the *Tur* (*Orach Chaim* 263:1) interprets the green appearance of the baby to be a result of the child's blood levels being abnormally high. The *Tur* here reiterates a fundamental *Halachik* principal in Judaism, that any form of skepticism which relates to human lives of human kind override any custom or tradition. While traditions, such as a *Brit Milah*, may be performed at a later point, a lost life can never be returned or replaced, and as such, is of superior significance to all else. It is thus essential that people take all precautions necessary, including pushing off a *Brit Milah* in a case of infant jaundice. In contrast, the *Rosh* understands the green color to be a manifestation of blood that has yet to be absorbed. Interestingly, he provides the same rationale for an infant that is unusually red, while other commentaries view a 'red' baby as one with the inverse condition of infant jaundice. The *Rosh,* a 13th Century *Rishon* from central Europe, *(Shabbat* 134a) relays a tragic incident, in which a woman lost two sons after circumcising them erroneously when they were ill. The third son had a greenish complexion, and the *Rosh* forbid him from being circumcised until his color had reverted to

that of a healthy infant, and thus assumedly saved the child's life.

The *Bach,* a 17th century *Acharon* famous for his commentary on the *Shulchan Aruch,* differentiates between infant jaundice and other life threatening ailments. Should the green color disappear by day eight, the *Bach* claims that even the *Rambam (Milah* 1:17) would require that the *Milah* be given on that day. He understands that infant jaundice, while being a serious enough condition to push off a positive commandment if present and visible, is only a temporary ailment, and thus, once the symptoms disappear, the danger has been alleviated. However, in a situation where the infant suffered from a more serious ailment, a grace period of seven days is required before the *Brit Milah* is allowed to be performed. The *Bach* here, while perhaps not giving a sound reason for the green color, depicts an accurate representation of the severity of infant jaundice, noting that once there is no visible evidence of it, the danger has passed. The *Beit Yosef* reiterates this phenomenon, stating that as long as the child is green, a *Brit Milah* should not be performed, implying that as soon as the symptoms are no longer observed, one should not push off the positive commandment.

The *Peirusha (Rambam Milah* 1:17), a Polish *Acharon* in the late 16th century, gives a plausible explanation as to how 'the blood has yet to fall' translates into a greenish condition that would classify as jaundice. He explains that the pale, lack of color is due to a blood deficiency, as the blood has yet to 'gather' on both the insides and outsides of the body. He explains the foil condition, that of an unnaturally red baby, is a situation in which the blood of the baby is in the external layers of the skin, and cannot permeate into the body. True, this explanation may fail to recognize the function of the circulatory system with the heart at its center, but it is noteworthy that this essential medicinal breakthrough only formally discovered by William Harvey in the second quarter of the 17th century. Despite this, however, the *Peirusha*, like so many of our Torah scholars, manages to propose reasoning that, with the lack of knowledge of basic scientific principals and anatomy, far surpasses its era [7].

Acknowledgements

I would like to profusely express my gratitude to Dr. Babich for his inexplicable help in the writing of this article, as well as to my parents, for their unwavering support.

References

[1] Steinberg, A. (2003). Encyclopedia of Jewish Medical Ethics, Volume II. Feldheim Publishers, New York, NY.

[2] Lieber, E. (1988). "He Looked in the Liver" (Ezekiel 21:26): The Medical Origins of Liver Divination. Korot. 9 (Spec Issue):235-245.

[3] University of Rochester Medical Center. Health Encyclopedia. The Liver: Anatomy and Functions. https://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=85&ContentID=P00676. (Retrieved January 29, 2017)

[4] Lach, Y.D. (2003). Chullin Illuminated. Hamesivta Publications, Brooklyn NY.

[5] Felekouras E.S., Kaparelos D.C., and Papalambros E. (2010). The History of Liver Surgery, Hepatectomy and Haemostasis. Hellenic Journal of Surgery. 82:280-296.

[6] National Library of Medicine. Medical Encyclopedia. https://medlineplus.gov/ency/article/001559.htm. (Retrieved January 31, 2017)

[7] Gregory, A. (2009) Brittanica. An Online Encyclopedia. https://www.britannica.com/biography/William-Harvey. (Retrieved January 29, 2017)