

The Living Stone: The Talmudic Paradox of the Seventh Month
Gestational Viability vs. the Eighth Month Non-Viability

Presented to the S. Daniel Abraham Honors Program

in Partial Fulfillment of the

Requirements for Completion of the Program

Stern College for Women

Yeshiva University

December 9, 2020

Miriyam A. Goldman

Mentor: Rabbi Dr. Richard Weiss, Biology

Table of Contents

Abstract.....	3
Introduction	4
Background to Pregnancy	5
Talmudic Sources on the Dilemma	6
<i>Meforshim</i> on the Dilemma	9
Secular Sources of the Dilemma	11
The Significance of Hair and Nails in Terms of Viability.....	14
The Definition of <i>Nefel's</i> Impact on Viability	17
History of Premature Survival	18
Statistics on Prematurity	19
Developmental Differences Between Seventh and Eighth Months	20
Contemporary Talmudic Balance of the Dilemma.....	22
Contemporary Secular Balance of the Dilemma	24
Evaluation of Talmudic Accreditation	25
Interviews with Rabbi Eitan Mayer, Rabbi Daniel Stein, and Rabbi Dr. Richard Weiss	27
Conclusion	29
References.....	34

Abstract

This paper reviews the viability of premature infants, specifically the *halachic* status of those born in the eighth month. There are several Talmudic verses stating that a seven-month old newborn is viable whereas an eighth month old newborn is not viable. This seems to contradict modern medical science. The fetus continuously develops from the first trimester through the third, with increasing maturation of the organ systems. It would seem logical that deliveries occurring later in gestation, such as in the eighth month, would have greater potential for viability than deliveries in the seventh month. However, there are certain rationalizations for this disparity including the possible miscalculation of the onset of pregnancy, statements about the possibility of two gestational periods, one at seven months and one at nine months, as well as certain features that indicate maturity, including hair and nails. Modern day *halacha* makes an effort to resolve this dilemma by accounting for the use of incubators and the neonatal intensive care unit (NICU) which maximize the survivorship of every birth regardless of the month in which the infant is born. This paper begins by introducing pregnancy and defining prematurity. The Talmudic and secular sources that expound on this are presented in detail. Statistics on survival rates of preemies are introduced to support why such an obvious quandary exists. The history of premature survival and key developmental differences of premature infants born at different months are then discussed followed by modern sources that attempt to integrate the Talmudic sources with current knowledge of fetal development. Concluding the paper are interviews with Rabbi Eitan Mayer, Rabbi Daniel Stein and Rabbi Dr. Richard Weiss regarding their understanding of this topic and how they interpret this dilemma today.

Introduction

According to current biological understanding there is no doubt that the longer a fetus remains in utero the greater the chances of survival. Thus, a baby born in the eighth month would naturally have a greater chance of viability than one born in the seventh month (“Viability of Extremely Premature Babies”). In the Talmud however, there are many sources that regard the eighth month old infant to be less viable than the seventh month old infant, simply because it was born in the eighth month of gestation. These sources include *Gemara Shabbos*, *Bava Basra*, *Gemara Yevamot*, *Hilchot Milah* and several others, each postulating the same concept. Most of these sources speak about this topic in terms of the infant’s circumcision. If the newborn is considered viable, then the Sabbath may be desecrated to perform a circumcision, however, if the newborn is not considered viable, it is regarded “as a stone and one may not desecrate the Sabbath by picking it up”. Additionally, its circumcision would occur on the ninth day after delivery, rather than the eighth day if the eighth day falls on the Sabbath. Many of these sources define viability in terms of the newborn being “fully developed”, but do not go into detail as to what would qualify the infant as fully formed. There are *midrashim* which state that the development of hair and nails render an infant fully developed. Another term found often in this discussion is *nefel*, defined as either stillborn or one that does not survive past 30 days. Since surviving the first 30 days declares that the infant has survived the dangers of childbirth, it is treated as a viable entity. However, there is no *shiva*, seven-day period of mourning, for a *nefel*, an infant who survives less than 30 days. Thus, even if an eighth month infant lived to the seventh day, because its chances of survival to 30 days was considered unlikely, it was termed a *nefel*, and therefore one could not violate the Sabbath for its circumcision. This paper addresses each of these sources in detail and identifies differences between them. Secular sources such

Hippocrates, Aristotle, Solon and others validate this theory. Evidently, it was a common understanding, held by many contemporary experts both at the time of the Talmud and around the fifth century BC. Sources attribute this concept to astrological, mathematical and other reasons. This “superstition” is even addressed in an article in the well-known journal, *Obstetrics & Gynecology*. In the exceptionally advanced medical era of the 21st century, however, premature infants, as early as 24 weeks, are able to survive (“Viability of Extremely Premature Babies”). Thus, there is controversy between ancient and Talmudic sources and the current biological understanding of fetal development. There are possible solutions to this dilemma, offered by a variety of sources, and most attempt to resolve this conflict. Due to medical advances such as the incubator and the NICU, modern medicine now attempts to save a newborn’s life regardless of its gestational age at delivery, thus modern Jewish Rabbinic authorities agree that there is no question that the Sabbath may be desecrated to save the life of such a newborn (Neuwirth, 584).

Background to Pregnancy

To better understand this controversy, it is important to have a deeper understanding of fetal development and the issues regarding a premature infant, and to do so, it is crucial to understand what happens throughout pregnancy (Kugelman and Colin). Pregnancy consists of three distinct stages, or trimesters. The first trimester ranges from the first through the 13th week and the first 91 days of gestation. During this trimester, the body structure, organ systems, and nails of the fetus begin to develop. Most miscarriages occur during this period (“Miscarriage”). This is often due to chromosomal abnormalities, which prevent the fetus from developing

properly, and thus results in a miscarriage. The second trimester spans from the 13th through the 27th week and days 92-189 of gestation. During this time organs develop further; the fetus is able to hear and swallow and small hairs are visible on ultrasound. Finally, the third trimester lasts from the 27th week or day 190 of gestation through birth. Delivery typically occurs between weeks 37-42 or days 259-294 of gestation. During the third trimester, the fetus continues to grow in size and weight and all organ systems mature to face birth and early life. The lungs, brain and kidneys continue to develop (“Pregnancy Week by Week”). A pregnancy is considered full-term if the delivery takes place anywhere between 37 - 42 weeks. Thus, it is evident that the development and changes that occur during each trimester are essential to the growth of a healthy fetus, and therefore, if born prematurely, an infant may be ill-prepared to survive without difficulties (“Premature Birth”).

Talmudic Sources on the Dilemma

Based on the information about premature infants, it is clear that the longer a fetus remains in utero, the more likely it is to survive independently without major medical issues. However, there is a contradictory idea found throughout several Talmudic sources and contemporary secular studies. These sources which seem to suggest that an infant born in the seventh month can survive and is considered viable, whereas, an infant born in the eighth month is not considered viable. However, in the ninth month, the infant is again considered viable. The first source for this is *Gemara Shabbat* (135a:4-5), which says:

It comes to include that which the Sages taught: To circumcise a child born after seven months of pregnancy, one desecrates Shabbat, as it will likely live. However, to circumcise a child born after eight months of pregnancy, with regard to whom the presumption was that he

would not survive, one may not desecrate Shabbat. And even for the circumcision of a child with regard to whom there is uncertainty whether the child was born after seven months and uncertainty whether the child was born after eight months, one may not desecrate Shabbat. And the Sages taught: A child born after eight months is like a stone with regard to the halakhot of set-aside [muktze], and it is prohibited to move him. However, his mother may bend over the child and nurse him due to the danger that failure to nurse will cause her to fall ill.

Rashi (Rav Shlomo Yitzchaki, 1040-1105) explains this by stating that this infant is considered dead and therefore it would not be a mitzvah to circumcise the child. Furthermore, it would be considered desecrating the Sabbath to touch it. Interestingly, however, the Talmud also says that if the mother is in pain, from full breasts, she may lean over and nurse the infant without otherwise touching or lifting it and only for her own sake and to relieve her discomfort. A second source where this idea is mentioned is in *Bava Basra* (20a:12), “For it was taught in a *Braisa*. A baby born at eight months of gestation is treated like a stone”. *Rashi* explains that the baby is considered a stone and is therefore it is regarded as *muktzeh* on Shabbat. It therefore cannot be moved on Shabbat, since it is presumed that it is not viable at all. This idea is also found in *Gemara Yevamot* (42a:15) in the discussion of *haliza*, the case when *yibbum*, the commandment that a childless widow is required to marry her deceased husband’s brother, is not performed. The Talmud says, “since it is presumed that a baby born during its eighth month since conception is not viable but a baby born during its seventh or nine months is viable” essentially saying that an eight-month infant cannot survive. This idea is found again in a later chapter in *Yevamot* (80b:1) and is mentioned in the discussion of *yibbum*. The question posed here is whether if the mother gave birth to an eighth month infant, the brother-in-law would be required to perform *yibbum*. The Talmud says:

As it is taught in a baraita: Who is a baby born during the eighth month? It is anyone whose months of gestation have not been completed, i.e., a baby that was born

prematurely. Rabbi Yehuda HaNasi says: The signs that prove that the child falls into this category are that his hair and nails are not fully developed. Now, the reason is that they are not fully developed; but if his hair and nails are fully developed, we say that this fetus was fit to be born after seven months but for some reason was delayed in its mother's womb.

The answer seems to be that *yibbum* would need to be performed since the infant born at eight months is not considered viable, giving her the status of being childless. Yet this idea is found again in *Hilchot Milah* (1:11) where it says that an infant born in the eighth month of pregnancy is considered to be born “before his development was completed,” and therefore is considered a stillborn and will not live. For this reason, the halacha states that its circumcision would occur on the ninth day instead of the eighth day. This idea is found a second time in *Hilchot Milah* (1:13). It explains that if an infant was born in the eighth month and its hair and nails were fully formed, then it should have been born in the seventh month but its delivery was delayed. Thus an infant born in the eighth month who survives is reclassified as really being a seventh month newborn whose conception date was miscalculated so not to contradict the concept that eighth month newborn is not viable. Interestingly, the *halacha* says that since this infant should have been born in the seventh month, one may carry it and circumcise it on the Sabbath. The *halacha* then makes a further differentiation by stating that if this infant lacked hair and nails, then it is considered to be in its eighth month of development and its delivery should have occurred in the ninth month, and it was therefore considered a nine-month infant born prematurely. Since its status is now an “eighth month infant”, it is considered a stone and therefore cannot be moved or circumcised on the Sabbath, as its survivability is very slim. The ensuing *halacha* in *Hilchot Milah* (1:14), further expands on this idea by explaining why an infant born in the eighth month cannot be circumcised by comparing it to, “cutting meat, because he is like a stillborn.” Since in this case the infant is considered stillborn, the concept of *muktzeh* is in effect. This ruling would

only apply when there is no doubt regarding the period of gestation. If there is doubt, such that the infant was really a seventh month infant, then this prohibition is not enforced. It is apparent from these discussions that the belief was that a fetus could not be born healthy and viable in the eighth month, and many sources were seeking for an explanation as to how an infant born in the eighth month could have survived. These theories included the idea that the timing was miscalculated and it was not actually born in the eighth month. However, it is perplexing that an infant born in the seventh month would not be considered *muktzeh*, while an infant born in the eighth month would be considered *muktzeh*, or somehow *less* viable than a baby born at a later gestational age. A newborn delivered in the eighth month would seemingly be *further* developed than a seventh month premature infant. It is puzzling why an infant born later in gestation is categorized as though it cannot survive and considered a stone.

Meforshim on the Dilemma

There are several *midrashim* discussing the status of premature infants. Based on the Talmud in *Shabbos*, *Chazal* understood that a baby born at eight months of gestation could not survive, whereas one born at seven months could survive. One could not therefore violate the Sabbath to save an eighth month baby as it was considered *muktzeh*. *Shulchan Aruch* (chapter 330) states that when an infant is born on the Sabbath, all of its needs can be taken care of; it can be washed and warmed, and the umbilical cord may be cut. But this is further clarified by stating that this only applies to a viable newborn, defined as one born in either the seventh month or ninth month of pregnancy. If the infant was born in the eighth month, the Sabbath should not be desecrated for it. According to this source, if the eighth month infant were to survive, it can only

be because it had completed its development in the seventh month and its emergence was delayed. Therefore, even though it was technically born in the eighth month, it is really a seventh month baby and can be treated accordingly.

There are also sources which indirectly address this topic. One such source is Exodus (2:2), which relays the story of *Moshe Rabbeinu*'s birth. The *pasuk* writes that *Yocheved* gave birth to a son and when she saw that he was "*ki tov*" ("because he was good"), she was able to hide him for three months. Many *meforshim* comment on the "*ki tov*" aspect of the *pasuk*. They question what the term "*ki tov*" means and why his "being good" would impact his mother's ability to hide him for three months. *Chizkuni* suggests that *Moshe* was in fact born prematurely, likely in the seventh month, and for that reason he was able to survive. He further explains that *Moshe* was born early and his fingernails and toenails were fully formed "just like those of a baby after a nine-month pregnancy" and *Yocheved* realized that he would be able to survive. Furthermore, since *Moshe* was born three months early, the Egyptians did not come looking for him, as they expected his delivery three months later and his mother was able to hide him. *Daat Zkenim* has a similar approach to this *pasuk*, and writes that even though *Moshe* was born prematurely, he appeared fully developed. Another commentary on this *pasuk*, *Or HaChaim*, writes that *Yocheved* gave birth to *Moshe* six months and one day, technically seven months, after he was conceived. He continues by stating that usually infants born after six months of pregnancy have slight chances of survival, whereas those born in the seventh month have "excellent" chances of developing normally. Therefore, when *Yocheved* saw *Moshe* she saw that he was "*tov*", meaning that he was healthy and would survive.

Secular Sources on the Dilemma

There are several secular sources which discuss an infant born in the eighth month as being less viable than one born in the seventh or ninth month as being a superstition not medical fact. A current reference is found in the journal, *Obstetrics & Gynecology*, volume 72 issue 2, in an article entitled, *The Eighth Month Fetus: Classical Sources for a Modern Superstition*.

Presented here are several ideas as to the origins of this theory. The article begins by describing a patient's fear of delivering her child in the eighth month of pregnancy because, "in our country they say that seventh-month babies survive but eighth month babies don't." (Reiss and Ash, 270) One source of this 'superstition', as it is termed in the article, is attributed to a Talmudic passage which allowed the desecration of the Sabbath for the purpose of saving the life of an infant born in the seventh month, but not for the infant born in the eighth month. Another passage from the Talmud is mentioned which states that if an infant were born in the eighth month and survived, it was really a seventh month baby whose delivery had been delayed. They attributed the original source of this misconception to ancient Greece. The earliest medical writing mentioning this discrepancy was written by Hippocrates, called *Peri Oktamenou*, which translates to *On the eighth-month fetus* (Reiss and Ash, 270). This treatise states that infants born at eight months of gestation are not viable, whereas those born in the seventh or ninth month are viable. This idea is explained through the 40-day theory, which claims that both mother and fetus undergo 40 days of illness, during which the fetus moves to maintain sufficient nutritional needs, which displaces the umbilical cord and causes the mother pain. These 40 days occur primarily during the eighth month of gestation, therefore an infant born during that period cannot survive. This concept of a non-viable eighth month fetus, became a widespread belief beginning in the fifth century BC based on Greek and Roman physicians of the time which may have led to the prevailing concepts

cited in the Talmud centuries later. However, as it was difficult to attribute this belief to a physiologic condition, theories attributing this idea to numerological and astrological sources began to emerge.

A numerological theory was offered in chapter 19 of *Fleashes*, whose author believes that seven is a "lucky" number and any infant born in a month whose last day is divisible by seven is also "lucky" and will survive. According to the author's calculations, each month has exactly 30 days, therefore the seventh month concludes on the 210th day of gestation. The number 210 is evenly divisible by seven, and since the number seven is considered fortuitous, any infant born in this month is considered to be viable. Importantly, the seventh month of gestation is the first month that concludes on a number that is evenly divisible by seven, therefore luck is conferred upon any infant born within the month. The author states that while the 270th day of gestation technically concludes the ninth month; women often carry their pregnancies for longer than 270 days. This can be understood in a number of ways including a miscalculation of the original date of conception, leading to a slightly different gestational timeline. For this reason, 10 days are added onto the definition of the ninth month, conferring a total of 280 days of gestation instead of 270. The number 280 is also evenly divisible by seven, therefore the ninth month, with the additional 10 days is also considered a fortuitous time during which to deliver a viable infant. However, for an infant born within the eighth month which that ends on day 240, a number not evenly divisible by seven, the chances of viability are diminished (George, 208).

Sevens, a Hippocratic work, reflects on the appearance of the number seven throughout human physiology. Hippocrates also deemed seven to be a constant and lucky number stating that a man's life is broken into ten periods of seven (Cone, 971). One of the most extreme theories introduced by Proclus Lycaeus, a Greek Neoplatonist philosopher, states that humans

had two periods of gestation, one at month seven and one in the ninth month. He postulated that if an infant was born in the eighth month and survived, it must be because the newborn was, in fact really a seventh or ninth-month infant (Parker 522-524). These statements regarding viability of a seventh month fetus but not of an eighth month fetus seemed to have had an impact on the prevailing thoughts of viability and duration of gestation cited in the Talmud.

The astrological idea offered by John Sadler, in 1636, maintained that the chances of survival were based on the planet that dominated that month. In the eighth month, Saturn predominates, which is considered to be “cold and dry, and coldness being an enemy unto life, destroys the nature of the childe” (Sadler, 150). Hippocrates gave a different reason, saying that if a fetus is fully formed at seven months, “it will try to be delivered,” unless it is determined by nature that it will remain in the womb until the ninth month. But if this fetus tries to be delivered again in the eighth month, he cannot survive because the “day of his birth is either past or to come; for in the eighth month, sayeth Avicenna hee is weake and infirme, and therefore being then cast into cold ayre his spirits cannot be sinke” (Sadler, 151). This translates to mean that an infant born in the eighth month is considered to be born after its time, in the seventh month, or before its time, in the ninth month, since there are ‘bad spirits’ upon newborns born in the eighth month. Aristotle also wrote about the decreased viability of the ‘eighth month fetus’: “and indeed eight months' babies live, though less often than the others” (George, 206). He continued by saying that eighth month newborns could only survive in certain countries such as Italy and Egypt, but in Greece those survival rates were much lower (Preuss, 393). However, if an infant born in the eight-month survived, he writes, “the mother is apt to think that it was not an eight months' child after all, but that she had conceived at an earlier period without being aware of it” (Aristotle). He put also forth the theory that women suffer most in the eighth month, as well as

the fourth, and the added pain to the mother may be a reason for the lower survival rates. A source known as Pseudo-Philo takes a biblical approach. This theory attributes survival of the seventh month fetus to a “divine decree”, related to Isaac, one of the three patriarchs. Isaac was fully formed and delivered in the seventh month; therefore, it was decreed that all infants born at that time would survive (Farber, 22-23). Rabbi Abbahu, who comments in *Bereshis Rabbah* (24:2), was presented with a dilemma regarding the eighth month newborn. The question was how one can know that a newborn delivered in the seventh month is viable, whereas one born in the eighth month is not. He responded, “Live, seven - Go, eight”. This is based on the Greek terminology, in which the word for ‘live’ is “ziot” which has the letter *zeta* which has the numerical value of seven. Therefore, an infant born in the seventh month survives. However, “go”, a euphemism for death comes from the Greek word ‘it’, which is associated with the letter *eta*, has the numerical value of eight. Thus, an infant born in the eighth month is not viable and does not survive.

The Significance of Hair and Nails in Terms of Viability

Rambam (Moses ben Maimon, 1138-1204) in *Hilchos Milah* (1:13) writes that if an infant is born in the eighth month and its hair and nails are “finished”, then it is considered a viable seven-month baby who delayed a month. Several other sources also write about the idea that an infant being “fully formed” is significant for determining its *halachic* status. The definition of “fully formed” depends on the presence or absence of certain *simanim* (signs). If the newborn has these *simanim*, it is considered viable and if it does not have these *simanim*, is not fully formed, and is considered non-viable (Feldman). In *Yevamot* 80b, Rabbi Yehuda HaNasi states

that any infant born in the eighth month is identified as any infant that lacks hair and nails. The development of hair and nails is clearly very significant, as they are referred to as the signs of viability. There must be a reason why hair and nails were specifically chosen as these vital signs, rather than, for example, a heartbeat, which is *the* sign of life. Hair and nails are the most external features on a newborn. Upon delivery, it would be logical to check for the presence of four spontaneous moving limbs and breath sounds and the absence of any neurological deficits to determine viability. However, the presence of hair and nails is chosen over these more obvious signs. In *Gemara Niddah* (31a:9) it says “His father emits the white seed, from which the following body parts are formed: The bones, the sinews, the nails, the brain that is in its head, and the white of the eye. His mother emits red seed, from which are formed the skin, the flesh, the hair, and the black of the eye.” This describes the origin of each body part; the parts of a fetus that are white, including, bones, ligaments, nails and brain are all from the father, whereas the red parts to skin, blood, hair and the black of the eye are from the mother. It is clear that although hair and nails *seem* to be simple external features, they derive from the most internal place. Hair is an extension of the brain and therefore, its presence would be a crucial determinant of viability. Thus, it seems that if the nails and hair are developed and clearly visible, the other organs and body parts derived from the same source but not visible to the naked eye upon birth would be equally developed and mature enough for survival. Rabbi Shnuer Zalman offers an idea that hair is ‘*motrei motchim*’, an excess of the brain and nails are ‘*motrei middot*’, excess of *middot* (Zalman). In Judaism, *middot* are extremely important, there are countless *sefarim* which are dedicated to improving one’s *middot*. Therefore, since many sources attribute viability to the complete development of hair and nails, the presence or absence changes the status of the newborn on the Sabbath. One opinion which says if nails and hair are formed on an infant born

in the eighth month, then the status of *muktzeh* does not apply, it is only applicable when hair and nails are *not* formed. There is however one opinion, *Maggid Mishnah*, who considered the newborn viable if its organs are completely formed, even if its hair and nails are not formed. According to Kabbalah, *Adam HaRishon* was created with a hard-shiny membrane, nails, covering his entire body, however, this outer layer was lost when he ate from the forbidden tree. As a way to remind him of his sin, small portions of his protective layer remained on the tips of his fingers and toes (“Fingernails: Ask the Rabbi Response”). According to Rav Hai Gaon, as part of *havdalah*, the prayer said at the conclusion of the Sabbath, during the blessing of “*boreh me’orah ha’esh*”, one looks at his nails because they are a sign of blessing, since they never stop growing (Shurpin).

According to the *Encyclopedia of Jewish Medical Ethics*, three criteria must be met for a newborn to be considered viable. The first is that the infant is born at or after nine months. The second is that its hair and nails are fully formed, and the third is that it lives for 30 days. There are some opinions, including the *Maggid Mishnah*, who say the presence of any one of the three would negate the status of *nefel*. The *Tur* (Jacob ben Asher, 1269-1343) and *Beit Yoseph* (Rabbi Joseph Karo, 1488-1575), among others, require two out of the three criteria, specifically that its hair and nails are fully formed and that it lives for 30 days. The *Radbaz* (David ben Solomon ibn Zimra, 1479-1573) says that its delivery at or after nine months is enough to remove the status of *nefel*. In addition, *Tosfot* says that one does not mourn for a *nefel*, even if its hair and nails are developed (Steinberg, 742).

The Definition of *Nefel's* Impact on Viability

As stated above, an eighth month newborn was often referred to as a *nefel*. There are two possible definitions of *nefel*; an infant who was stillborn, and one who died within 30 days of birth. *Rashi* in *Sanhedrin* 84b, explains that such a newborn cannot survive thirty days because it has “major defects incompatible with life.” However, in *Shabbos* 135b when *Rashi* refers to *nefalim*, *nefel* in plural, he means nonviable fetuses, and does not specify *nefalim* as eight-month infants. His definition affects the *halacha* in question. The first definition of *nefel*, stillborn, would be consistent with the *halacha*, because if the newborn was born dead, then understandably, the commandment of a *bris milah* does not apply. The second definition, the infant dying within 30 days, warrants further exploration. It is only logical in relation to circumcision. The reason that the circumcision would be delayed if the eighth day were to fall out on Shabbat would be because the infant is not expected to live past 30 days and therefore one cannot desecrate Shabbat for it. Therefore, many *poskim* say that this definition of *nefel* applies to all babies born at any point. Newborns that die within 30 days have the status of *nefel*, and all the laws of a *nefel*, such as the inability to desecrate the Sabbath on its behalf, or perform an autopsy, and the laws of honoring the dead, like the Shiva mourning period, do not apply. In addition, *Tosfot* says that one does not mourn for a *nefel*, even if its hair and nails are developed. Rav Dovid Bloom, member of Kollel Iyun Hadaf, writes that if a newborn survives for thirty days it is not a *nefel*, despite the month in which it was delivered. The concept of 30 days would be relevant in terms of a newborn that was delivered in the eighth month that survived the first seven days, in which case he would be circumcised on the ninth day, because he is not expected to live past the 30 days.

History of Premature Survival

At the beginning of the 20th century, a baby born prematurely, before 38-40 weeks of gestation had only a slight chance of survival (“March of Dimes,” 61). In the 1880’s in France, French physicians first introduced the closed infant incubator as a response to the increase in the infant mortality rate. In 1901, Dr. Pierre Budin, a Parisian obstetrician, published the first major textbook on the care of premature infants in French which was translated into English in 1907. The textbook, *The Nursling: The Feeding and Hygiene of Premature and Full-Term Infants*, became *the* standard for health care professionals interested in premature babies. Based on observation and clinical studies, it was determined that there was a need for an individual approach to caring for premature infants because the addition of oxygen as a treatment for the respiratory distress became prevalent in treating these preemies. Later in the 20th century, the NICU was established (Payne). Through studying premature babies and the developmental differences between premature babies and full-term babies, it was clear that the shorter the gestational period, the more likely it would be for the infant to experience respiratory issues. In 1922 the first hospital unit for premature babies opened. By the 1930’s, it was determined that oxygen could treat the cyanosis and asphyxia associated with prematurity. In 1935, a section was included in the Social Security Act, Title V, which provided funds to help communities plan for specialized care for premature infants (“Care of Premature Infants”). Between 1960 and 1990, there were many advancements in the field of premature infant care. Neonatology became a pediatric subspecialty which requires at least a year of postgraduate training for physicians after completing a pediatric residency. By the mid 1980’s, infants born as early as 24 weeks were able to survive with the use of ventilators, warming beds, and individualized care. One major problem was that babies born between 24-32 weeks of gestation often lacked sufficient levels of

surfactant, a substance produced by the lungs to maintain their patency and stability. During the 1980's-1990's, artificial surfactant therapy was introduced which led to a significant decrease in the length of time premature infants required mechanical ventilation. This, as well as other treatments, led to a decrease in the frequency and severity of bronchopulmonary dysplasia (BPD), which is abnormal development of the lung tissue which causes scarring of the lungs and a decrease in lung function ("Neonatal Bronchopulmonary Dysplasia (BPD)"). In 1985, the federal government proposed the formation of a neonatal ethical committee to educate parents about procedures, options and decisions they would have to make while their child received care (Steinberg, 746). In the late 1980's and mid-1990's, studies from the National Institute of Child Health and Human Development (NICHD) Neonatal Research Network gave estimates for the survival of premature babies, stating that "18% at less than 23 weeks of gestation, 15% at 23 weeks, 54% at 24 weeks and 59% at 25 weeks" (Patel, 289). Along with other studies, the conclusion was that there are several important aspects of care which are crucial to the survival of those preemie babies, including "fluid administration, nutrition, cardiorespiratory support and prevention of intraventricular hemorrhage (IVH)" (Patel, 294). By the late 1990's, neonatal intensive care became available throughout the United States.

Statistics on Prematurity

Today, the leading cause of infant death is premature birth. About one in 10 babies is born preterm ("Premature Birth"). A premature birth is defined as a birth which occurs more than three weeks prior to the estimated due date; usually infants born before 37 weeks of gestation. Medically, the definition of viability is 23 weeks; this is the point at which medical interventions

will be permitted to save a newborn's life ("Perivable Birth"). However, infants born before this point often have many medical complications and require a long stay in a Neonatal Intensive Care Unit. According to Jodi Dolezel, RN,

babies born at 23 weeks have a 17 percent chance of survival, babies born at 24 weeks have a 39 percent chance of survival, babies born at 25 weeks have a 50 percent chance of survival, babies born at 26 weeks have an 80 percent chance of survival, babies born at 27 weeks have a 90 percent chance of survival, babies born between 28-31 weeks' gestation have a 90-95 percent chance of survival, babies born between 32-33 weeks have a 95 percent chance of survival. Most babies born 34 weeks or greater have the same likelihood of survival as a full-term infant.

Based on these statistics, the longer the fetus stays in utero, the higher the chances of survival; therefore, those born in the third trimester have the best chances of being delivered healthy.

Developmental Differences Between Seventh and Eighth Months of Gestation

During the seventh month of gestation, the infant's lungs are developing further (Bird). The fetus is able to inhale and exhale amniotic fluid and begins to sleep and wake at regular intervals. In addition, during this month the fetus begins to open and close its eyes. During the eighth month of gestation, further development and growth occurs, such as the appearance of eyelashes, fingernails and toenails. The fetus will gain up to three or four pounds in body fat. One of the major concerns that preemies face is lung failure due to lack of development. Some premature babies can develop respiratory distress syndrome; their lungs cannot expand or contract normally without oxygen therapy. Premature infants may also develop BPD, which cannot be treated. In an article published in the journal *Pediatrics* entitled *Late Preterm Infants: Near Term but Still in a Critical Developmental Time Period*, they write that in the last six weeks

of gestation there is critical growth of both the fetal brain and lungs (Kugelman and Colin). Every additional week, and more specifically, every additional day that a fetus remains in utero is critical for development. Common heart problems in premature babies include patent ductus arteriosus (PDA) and low blood pressure (hypotension). In addition, prematurity can have detrimental effects on brain development. The earlier the baby is born, the higher the risk of intraventricular hemorrhage; bleeding in the brain. Intraventricular hemorrhage occurs in about one in three babies born between weeks 24 to 26 (“Premature Birth”). This may be due to immature blood vessels that cannot tolerate changes in blood flow that occur during labor. This can cause complications later in the baby’s life such as mental retardation, cerebral palsy and learning difficulties.

There are several developmental differences between fetuses in utero and those born prematurely. There are various terms to differentiate the period in which the preemie was born, including, “extremely preterm” referring to those born at less than 28 weeks, “very preterm” for those born between 28 to 32 weeks and “moderate to late preterm” for infants born between 32 to 37 weeks. Infants born in the seventh month of pregnancy correlate to those born between weeks 25-28 of gestation. If an infant is born between weeks 25-26, it is referred to as a “micro-preemie.” Such a newborn weighs about 1 ½ to 2 pounds and is approximately 9 inches long. During this time, premature newborns’ lungs begin to develop alveoli, air sacs through which gas exchange occurs. This is also the point at which the startle reflex develops and the newborn will begin to startle at loud noises. If born at 27–28 weeks, a newborn is referred to a “very premature baby”. It weighs about 2 1/2 pounds and is about 16 inches long. Rapid eye development is occurring and babies develop more coordinated sleep/wake cycles and will have periods of REM sleep. Infants born in the eighth month of pregnancy, are those both between 28-

32 weeks of gestation. At 29 to 30 weeks, preemies weigh about 3 pounds and are approximately 17 inches long. They begin to lose their lanugo, the fine hair that covers their bodies. They can now blink their eyes. Their brain has a rapid period of growth and they begin to gain control of their body temperature. Their stomach and intestines are maturing and getting ready to digest milk. They are not yet ready to breast feed but can begin sucking on a pacifier to help develop their eating muscles. By 31 to 32 weeks, premature babies weigh between 3 1/2 and 4 pounds and are between 18 and 19 inches long. At this point, infants gain a lot of body fat, are able to use all five sense and maintain good body temperature. However, these preemies still require special care and usually spend several weeks in the NICU. Most infants born during this time, however, have few long-term effects of prematurity and are able to live full and healthy lives (Bird).

Contemporary Talmudic Balance of the Dilemma

It is clear that the statement made in the Talmud is not medically sound, therefore, to no surprise, modern Jewish sources have tried to meld the Talmudic sources with modern science, including advances to enable viable premature deliveries, without falsifying the Talmud. A well-known source, the *Chazon Ish* (Avraham Yeshaya Karelitz, 1878-1953) opined that since medical advances have been made, and because infants born at 36 weeks have as high as a 95% survival rate, obviously, one *must* desecrate the Sabbath to save the infant. He says that not only does this *halacha* apply to an eighth month fetus born with underdeveloped hair and nails, but even to an infant born as early as six months whose hair and nails are undeveloped. He explains that in the time of *Chazal* infants born this early could not survive, but in modern times, they

usually can. In *Minchat Yitzchak* (Yitzchak Weiss, 1902-1989) it states that this dilemma is solved by modern medical advances, such as incubators, which despite eight-month newborns being less viable than others, they now have a much higher chance of survival. Many modern *poskim* maintain the same opinion as *Shemirat Shabbat Kehilchata* (Rav Yehoshua Y. Neuwirth, 1927-2013), that the discrepancy between the Talmud and modern times is attributed to the invention of incubators, which have completely changed the chances of an infant's survival and therefore the *halacha* entirely. Similarly, Rav Shlomo Zalman Aurbach, zt"l (1910-1955), also attributes the resolution to modern medicine. When asked why premature babies survive, despite *Chazal* saying the opposite, he responded by saying, "Modern science has produced a device that stimulates the womb —an incubator". He said that *Chazal* had only recorded what was observed in the absence of an incubator; incubators have *completely* changed the *halacha* since, "a premature neonate in incubation could be compared to a fetus whose development was halted and then continued" (Eichenstein). An interesting *psak* which takes a different route is Mordecai Kornfeld, member of Kollel Iyun Hadaf. He writes that in *Yevamot* 80b, although it says that a "ben shemonah" is like a stone, it does not explicitly write that an infant born in the eighth month is *less* viable than one born in the seventh month. Rather, it is referring to a fetus born prior to the ninth month that had not fully formed in the womb. He says, that the terms "eighth month" and "seventh month" do not refer to those specific months, rather they are simply terms for premature infants. Thus a "seventh month baby" refers to any infant born early, whether in the seventh month, the eighth or even the beginning of the ninth month; as long as the infant is fully formed, it is considered a "seventh month baby". This understanding of terminology implies that that an infant termed an "eighth month baby" would refer to all premature infants who were not fully formed and therefore have only a slight chance of survival. Additionally,

Abraham Wasserstein, a professor of Greek at Hebrew University, explains that it is important to consider an entire passage as opposed to taking words out of context. For example, the question brought to Rabbi Abbahu was not why seventh month newborns are viable while eighth month newborns are not, rather the question was what is the basis for saying that seventh month newborns are viable.

Contemporary Secular Balance of the Dilemma

One secular theory which takes an opinion similar to Mordecai Kornfeld, referring to the months as terms rather than the literal periods of gestation, is the theory offered by Charles King. In ancient times, there was no precise way to calculate the date of conception, which meant that the count of the gestational period might have been affected as well. His theory referred to an infant being small for gestational age (SGA), which can occur for reasons such as malnourishment. The weight of these infants usually fell below the 10th percentile for infants of the same gestational age. Therefore, King suggests that rather than the “seventh month baby” being a preemie, the infant was, in fact, a nine-month infant that was SGA. Thus, the infant termed “seventh month baby” that survived was in reality a ninth month infant that was smaller than the average nine-month infant. However, because in earlier times there was not a precise method of calculation, usually if there were two infants, the larger one would be considered older (King 286-287). Another source offers the idea that the normal gestational period is a full nine months, however there are instances where a fetus can be predisposed to develop on a ‘fast track’ and be born at seven months. Since this theory claims that one can be born in either the seventh or ninth month, it still renders the infant born in the eighth month premature because it was *not* a

‘fast track’ fetus and therefore was delivered before its due date. Those infants born at eight months were not considered less viable than those born at seven months, rather those born at seven months were ‘fast tracked’, fully developed and not considered premature. The eighth month newborn was, however, given the status of non-viable because it, indeed, was considered a premie and in the time of the Talmud, those premature newborns could not survive (Lampl et al.).

Evaluation of Talmudic Accreditation

This dilemma brings into question the knowledge of medicine and fetal development in ancient and biblical times. To most people, the concept of increased viability for an infant born in the seventh month and decreased viability for an infant born in the eighth month is inconsistent with clinical observation and biological facts. Thus, how could the Talmud could have been so far removed from the understanding of natural human development? In contradistinction, throughout the Talmud and Tanach there are many references to mathematical, astrological and other advancements only officially discovered in the 20th and 21st centuries. Regarding *bris milah*, in *Yevamot* (64b:9) it states, “If a woman circumcised her first son and he died as a result of the circumcision, and she circumcised her second son and he also died, she should not circumcise her third son, as the deaths of the first two produce a presumption that this woman’s sons die as a result of circumcision.” Later on in *Yevamot* (64b:19), the reason for this ruling is explained, “Granted with regard to circumcision a presumption of death due to circumcision can be established because there are families whose blood is thin and does not clot well, and there are families whose blood clots.” Therefore, it is clear that there was an

understanding of genetics, more specifically hemophilia, since the passage refers to sons born from the same mother (Eisenberg, 31-31).

Another example where a Talmudic discussion precedes the formal discovery of a scientific concept is in *Eruvin* (14a) where it is written that the ratio of a circle's circumference to its diameter, or pi, is three. *Tosfot* even commented that this value of three was rounded down, rather it is slightly more than three. An astrological phenomenon found in *Horayot* (10a:19) is a reference to Halley's comet, which only appeared in 1986. This source writes, "Rabbi Yehoshua said to Rabban Gamliel: There is one star that rises once in seventy years", *Rashi* comments on this by saying that there is one star which appears once in seventy years that is not fixed and moves across the world. Halley's comet is recorded to appear approximately every 70 years.

An incredible insight found in *Bava Metzia* (83b:12) is the concept of liposuction. The Talmud tells the story of a corpulent man, Rabbi Elazar, whose abdomen was cut open and from which was "removed buckets upon buckets of fat." The first reported liposuction procedure was performed in 1982. Another medical phenomenon found in *Tanach* is the first heart rhythm disturbance. In Genesis (45:27) it states Yaakov's heart skipped a beat when he heard that his son Joseph was alive (Goldman). It is unfathomable that the sages seemingly alluded to medical conditions and scientific phenomena that had not yet been formally discovered. It seems that there was substantial knowledge of science and genetics at the time, so it is difficult to simply conclude that the Talmud was incorrect.

Interviews

I proceeded to ask some *Rebbeim* their opinions on this matter. The first was Rabbi Eitan Mayer, the *Menahel Chinuchi* at Midreshet Moriah, which I attended in 2018. He explained that this theory was the widespread belief in the time of *Chazal* and believed by experts around the world at the time and the *halacha* was therefore created accordingly. However, since science has transformed the chances of premature baby survival, *halacha* has changed. Since in today's world in an advanced country any baby born is considered a baby that can live, it would, *halachically*, receive all the care and attention it required. Because current medical science is extremely advanced it is possible to save many more premature babies than had previously been the case, therefore the Sabbath can be violated for this newborn. The fact is that whenever a *halacha* is based on prevailing scientific thought subsequently proven the *halacha* changes. Another example of a practical approach to a contemporary dilemma is the issue of Hatzalah members driving home once they have escorted the patient to a hospital on the Sabbath. Rav Moshe Feinstein zt'l (1895-1986) ruled that since the concern of not being able to return home might cause the Hatzalah member to hesitate in taking the patient to the hospital thereby endangering the patient's life, he ruled that the Hatzalah member is able to drive himself home on the Sabbath (Igros Moshe).

The second Rabbi I approached was Rabbi Daniel Stein, Rosh Yeshiva, Director of the Norman and Johanne Sternthal 4th year Halakhah Lemaaseh Program, Perez and Frieda Friedberg Chair in Talmud at Yeshiva University who is also the Rabbi of my shul, Congregation Ahavath Chesed, also known as the Ridniker Shtibel. He began by saying that the general rule accepted by everyone today is that this no longer applies. In our time, sixth month newborns are being saved, so it is definitely not a question of whether this applies today. It must

have been that at that time there was an understanding of two gestational periods; one in the seventh month and one in the ninth month. Since the eighth month was in between these two gestational periods, any infant delivered born during this month is considered to be premature for the gestational period ending in the ninth month. He went on to describe the four possible approaches to understanding potential contradictions between science and the Talmud. The first is *Nishtanu ha'Teva'im*, the theory that nature has changed. In the time of the Talmud they understood in terms of what they observed; that the eighth month newborns survived less frequently than those born in the seventh month. The second is *Nishtanu ha'Refuot*, changes in medicine. Since the science and medicine of today are more advanced, the preemies that could not survive before can now survive. The third is that in the time of the Talmud, they made decisions and *halachot* based on how things were perceived. Although the situation that the Talmud describes is not medically accurate, it must have been more common for infants born in the seventh month to survive than those born in the eighth month. Consequently, any *halachot* dictating the status of an eighth month newborn were made based on this trend. The final approach is one that Rabbi Stein says is one that is least utilized. This approach states that Talmud's Rabbis were, understandably, not scientists, so if they made mistakes in terms of medical *halachot*, it is not significant and does not diminish their authority. This was the prevailing medical approach at the time and therefore it is what the *halachic* decision was based on.

Finally, I spoke my mentor, Rabbi Dr. Richard Weiss, Rabbi of Young Israel of Hillcrest and adjunct assistant professor of biology at Stern College for Women. He reiterated Rabbi Stein's theory. However, he finds the theory of *Nishtanu ha'Teva'im* difficult to comprehend because biologically that would not be consistent, rather it must have been that the observations

were based on erroneous assumptions of gestational age or false statements by the mothers. A woman who thought she was in the seventh month was, in fact, in the ninth month or later and that is why it survived. The records that they had at the time were likely accurate for the information they were provided but ultimately this is an issue of factual error.

Conclusion

There seem to be five basic approaches to rationalize this conundrum: timing, the term *nefel*, terminology, *Nishtanu ha'Teva'im* and the development of hair and nails. Within the category of timing there are two theories, the first is miscalculation, and the second is SGA theory. The miscalculation theory explains why seventh month infants would survive but does not explain why the Talmud explicitly wrote that the eighth month newborn is less viable than a seventh month newborn. Miscalculation of gestational age was often attributed to the mother's error and not when the fetus was conceived. Therefore, her perception of the progression of pregnancy was inaccurate. However, nowadays, when a woman's due date is calculated by her physician, she is given a range of two weeks, between 38-40 in which she will likely deliver. These two weeks are not random, they represent two distinct ages of the fetus; gestational age and fertilization age (Engle, 1362-1364). Gestational age is calculated based on the first day of the woman's last normal menstrual period (LNMP), while fertilization age is calculated from the date of conception. Therefore, gestational age will be two weeks ahead of fertilization age. Since it is not clear which age was being calculated, it is possible that in the time of the Talmud they were counting from the wrong initial date. The SGA theory would be biologically accurate, since it writes that the seventh month infants that had survived were not literally born in their seventh

month of gestation, rather they were born in the ninth month but appeared smaller than normal. Therefore, according to the SGA theory, preemies would not survive unless they were born in the ninth month. The concept that seventh month newborns had a better survival than eighth month was only posited because it was thought that these infants were premature, but, in fact, they were full term, just appeared as smaller than most other infants born at that gestational period.

Next is the theory based on the term *nefel*, which depending on the definition, can resolve this disparity or add more confusion. Considering there are two definitions, stillborn or not living past 30 days, there is room for interpretation. If the *halacha* is based on the first definition, then, despite the science, it is accurate. If the infant was stillborn, then logically it would not be circumcised on the Sabbath because the commandment for a *bris milah* does not apply to a deceased newborn. Therefore, since at the time there must have been an overwhelming number of women who delivered stillborn infants in the eighth month, but not in the seventh or ninth, the *halacha* was made to reflect that. However, the second definition is difficult to apply to this specific case. If they perceived that eighth month infants frequently did not survive the 30 days, the Talmudic scholars proscribed against an eighth day circumcision which falls on the Sabbath to avoid violating the Sabbath for a soon to be *nefel*.

The next approach to resolve the Talmudical /biological conflict is “*terminology*” which claims that terms used in the Talmud have a broader, general definition. Examples of this theory are the terms “seventh month infant” and “eighth month infant”. One source stated that rather than representing those specific months, the terms represent concepts. The “seventh month infant” refers to a premature fully developed newborn and the “eighth month infant” refers to a premature newborn that is not fully developed and has a poor chance of survival. Therefore, any

infant born prematurely who was fully formed was called “seventh month infant”, and any infant not fully formed was called “eighth month infant”. This interpretation allows for the resolution of timing but does not justify why the ones that were not fully formed were titled, “eighth month infants”.

Another approach is *Nishtanu ha'Teva'im* a concept which is used to resolve many disputes between modern science and the Talmud. In this case, *Nishtanu ha'Teva'im* is used to explain how in the time of the Talmud eighth month newborns were less viable than seventh month newborns but in modern times that is not the case. This theory is not scientifically sound because it does not make sense that fetal biological development progressed one way in the past and now progresses differently. This theory allows for resolution of both questions, why eighth month was specified and why seventh month newborns survived more often than eighth month newborns. However, biologically, this answer is unsatisfying, because logically, it does not make sense that the progression of development changed.

Many explanations referred to viability in terms of whether or not “fully developed” is a relative term, which most define as having both hair and nails. These sources write that an eighth month newborn could not survive because it was not fully formed and did not have hair or nails. However, if an eighth month newborn did have hair and nails, they would claim that this infant was, in fact, either supposed to be a seventh month infant whose delivery was delayed, or it was a ninth month baby that was born prematurely. This theory must have been made on the basis of the fact that the majority of infants born in the eighth month were lacking hair and nails, therefore if an infant was born *with* hair and nails, it was attributed to a timing issue. This explanation is puzzling because it is not understandable why a newborn delivered in the seventh

month would be expected to have hair and nails while an eighth month is assumed to not have hair or nails.

Regardless of which explanation one chooses to accept, it is obvious that the *halacha* has changed, accounting for the invention of the NICU, incubators and other medical advancements. However, there is one theory that I had not seen in relation to this topic. There is an idea in Judaism that the number seven has significance and that seven represents the natural world at its fullest. There are seven days in a week, seven colors, seven continents, seven wonders of the world, etc. However, eight is beyond the natural world. Hanukah is celebrated for eight days because the oil lasted longer than it should have, due to supernatural circumstances. Circumcision occurs on the eighth day due to the super-normal relationship between man and his Creator. The number seven fits with the natural world, which is why it makes sense that an infant born in seventh month can survive. However, the eighth month seems to have a supernatural connotation, and most infants born during this supernatural time frame do not survive. Therefore, if an eighth month infant does survive it is considered a miracle.

The many attempts to align the 1600 year old Talmud text with modern science hinge on several concepts on which I have elaborated: the terms seven and eight as generic for viable and nonviable premature births; miscalculation of date of conception; hair and nails as signs for maturation and important markers of viability; and understanding that the Talmudic concepts regarding viability must be interpreted in the context of modern day medical advances for premature infants.

The explanation that I find most satisfying is the combination of the SGA theory and the theory that *halachot* were made based on current observations of the time. According to the SGA theory the “seventh month” newborn was really a full-term infant that appeared to be the size of

a seventh month infant. Therefore, *halachot* regarding the status of an infant born in the seventh month were made based on the observation that these newborns, which were thought to be seventh month infants, were surviving more often than infants born in the eighth month. This concept is still somewhat difficult to rationalize, however, since the *halachot* were established based on the observation that the surviving infants were born in the seventh month, when it is more likely that they were in fact born full term but were small for their gestational age.

Regardless of which explanation one chooses to accept, there is still a discrepancy surrounding the specific terms “seventh month” and “eighth month”. However, modern Jewish practice accommodates scientific progress, especially when concerning life and death. Therefore, it is reasonable to understand that the *halachot* regarding care for a premature infant have been modified to endorse any method of promoting survival of the premature infant, regardless of length of gestation. Modern authorities recognize that scientific progress supersedes Talmudic dictums, which is one of the core explanations for why Judaism is unique and has continued to not only survive but thrive: specific *halachot* or customs can evolve and change with contemporary discoveries without fear that all prohibitions will fall as well. Modern rabbinical scholars find logical explanations for statements made 1600 years ago and synthesize them with evolution and modern science: the story of creation does not conflict with the big bang theory or the existence of dinosaurs, and while direct manipulation of electricity, the modern form of kindling a flame, is prohibited on the Sabbath, conveniences such as hot plates, lights and electric timers may be used if programmed beforehand.

Though seemingly illogical, the seventh- and eighth-month gestation conundrum has led me to appreciate the unique ability of Judaism to evolve and still remain true to the Torah principles; in this case, saving a life even if its premature birth would have doomed it in the past.

References

Aristotle. *The History of Animals*. Translated by D'Arcy Wentworth Thompson. Book 7, Chapter 4, John Bell, 1907.

Bava Basra 20a.

Bava Metzia 83b.

Bereshis Rabbah 24:2

Bird, Cheryl. "A Weekly Look at Premature Babies and Complications." *Verywell Family*, 17 June 2020, <https://www.verywellfamily.com/premature-babies-week-by-week-2748606>. Accessed August 19, 2020.

Bloom, Dovid. "Status of a 'Nefel' 8-Month-Old Baby That Was Not Expected to Live." *Discuss the Daf - Shabbos 135*, https://dafyomi.co.il/discuss_daf.php?gid=2&sid=20&daf=135&n=4. Accessed September 1, 2020.

Chazon Ish, Yoreh Deah, Hilchot Milah 155:4

Chizkuni, Exodus 2:2, on the *dibur hamatchil*, "Ki tov"

Cone, T. E., Jr. Hippocrates on the seven divisions of a man's life. *Pediatrics*. 51:971, 1973.

Daat Zkenim, Exodus 2:2, on the *dibur hamatchil*, "Ki tov"

Dolezel, Jodi. "Premature Birth Facts and Statistics." *Verywell Family*, 24 June 2019, <https://www.verywellfamily.com/premature-birth-facts-and-statistics-2748469>. Accessed August 21, 2020.

Eichenstein, Y. (2014). "Daf Yomi Digest" The Premature Infant. Ruben Shas Kollel Publication. Yevamos 80.

Eisenberg, Daniel. “Hemophilia and Circumcision: From Observation to Classification: Connecting a Talmudic Presumption to a Modern Diagnosis.” *Jewish Medical Ethics and Halacha*, VIII, no. 2, Oct. 2016, pp. 30–39.

Engle WA; American Academy of Pediatrics, Committee on Fetus and Newborn. Age terminology during the perinatal period. *Pediatrics*. 2004, 114 (5) pp. 1362–1364

Exodous 2:2

Farber, Zev. Pseudo-Philo and the Pharisees: A Look at the Prehistory of Rabbinic Judaism. “From Creation to Redemption: Progressive Approaches to Midrash”, edited by W. David Nelson and Rivka Ulmer. Gorgias Press, 2017, pp. 5-28.

Feldman, Pesach. “A Ben Shemoneh With Finished Simanim.” *Discuss the Daf - Yevamos 80* “Fingernails: Ask the Rabbi Response.” *Aish.com*, <https://dafyomi.co.il/yevamos/halachah/ye-hl-080.htm>. Accessed September 1, 2020.

Gemara Eruvin 14a

Gemara Horayot 10a

Gemara Niddah 31a

Gemara Sanhedrin 84b

Gemara Shabbat 135a

Gemara Yevamot 64b

Gemara Yevamot 80b

Genesis 45:27

George, Sarah. *Human Conception and Fetal Growth; A study in the development of Greek Thought From Presocrates through Aristotle*. (PhD Thesis, University of Pennsylvania, 1982).

Goldman, Miriyam. "His Heart Skipped a Beat: The First Abnormal Heart Rhythm in Tanach."

Derech HaTeva, vol. 23, 2018, pp. 37–38.

Hilchot Milah: Chapter 1

Igros Moshe, Orech Chaim, 158:80

King, Charles. The Eighth-month fetus: Classical sources for a modern superstition: Reply.

Obstetrics and Gynecology. Vol 72, Issue 2 August 1988

Kornfeld, Mordecai. "Eight-Month Babies and Modern Science." *Discuss the Daf - Shabbos*

135, https://dafyomi.co.il/discuss_daf.php?gid=2&sid=20&daf=135&n=6. Accessed

September 1, 2020.

Kugelman, Amir, and Andrew A Colin. "Late preterm infants: near term but still in a critical developmental time period." *Pediatrics*, vol. 132, no. 4, 2013, pp. 741-51.

Lampl, Michelle et al. "Early rapid growth, early birth: accelerated fetal growth and spontaneous late preterm birth." *American journal of human biology: the official journal of the Human Biology Council* vol. 21 no. 2, 2009, pp. 141-50.

March of Dimes, PMNCH, Save the Children, WHO. Born Too Soon: The Global Action Report on Preterm Birth. Eds CP Howson, MV Kinney, JE Lawn. World Health Organization. Geneva, 2012.

"Miscarriage." *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 16 July 2019, <https://www.mayoclinic.org/diseases-conditions/pregnancy-loss-miscarriage/symptoms-causes/syc-20354298>. Accessed September 2, 2020

"Neonatal Bronchopulmonary Dysplasia (BPD)." *Children's Hospital Colorado*, <https://www.childrenscolorado.org/conditions-and-advice/conditions-and->

symptoms/conditions/neonatal-bronchopulmonary-dysplasia/. Accessed September 5, 2020.

Neuwirth, Yehoshua Y. *Shemirat Shabbat Kehilchata*. Jerusalem/New York. Vol. 2, 36:12, 1989, pp. 584-590

Or HaChaim, Exodus 2:2, on the *dibur hamatchil*, “Ki tov”

Parker, Holt N. “Greek Embryological Calendars and a Fragment from the Lost Work of Damastes, on the Care of Pregnant Women and of Infants.” *The Classical Quarterly*, vol. 49, no. 2, 1999, pp. 515–534.

Patel, Ravi Mangal et al. “Survival of Infants Born at Perivable Gestational Ages.” *Clinics in perinatology* vol. 44, no. 2, 2017, pp. 287-303.

Payne, Elizabeth. “A Brief History of Advances in Neonatal Care.” *Neonatal Intensive Care Awareness Month*, 2016, <https://www.nicuawareness.org/blog/a-brief-history-of-advances-in-neonatal-care>. Accessed September 3, 2020

“Perivable Birth.” Obstetric Care Consensus. Number 6. October 2017. <https://www.acog.org/clinical/clinical-guidance/obstetric-care-consensus/articles/2017/10/perivable-birth#>. Accessed August 20, 202

“Pregnancy Week by Week.” *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 30 June 2020, <https://www.mayoclinic.org/healthy-lifestyle/pregnancy-week-by-week/basics/healthy-pregnancy/hlv-20049471>. Accessed August 25, 2020.

“Premature Birth.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 30 Oct. 2020, <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pretermbirth.htm>. Accessed August 26, 2020.

- Preuss, J. (1978) *Biblical and Talmudic Medicine*, transl. F. Rosner (New York, Sanhedrin Press).
- Rashi, Exodus 2:2, on the *dibur hamatchil*, “Ki tov”
- Reiss, R E, and A D Ash. “The eighth-month fetus: classical sources for a modern superstition.” *Obstetrics and gynecology* vol. 71, no. 2, 1988, pp. 270-3.
- Sadler, J. *The Sicke Womans Private Looking Glass*,1636
- Shulchan Aruch: Chapter 330
- Shurpin, Yehuda. “Why Look at Our Fingernails at Havdalah?” *Shabbat*, 11 Mar. 2007, https://www.chabad.org/library/article_cdo/aid/484254/jewish/Why-Look-at-Our-Fingernails-at-Havdalah.htm. Accessed September 10, 2020.
- Steinberg A. *Encyclopedia of Jewish medical ethics*. Volume II. Jerusalem: Fedheim Publishing, 2003:1046-88
- “Viability of Extremely Premature Babies.” *British Pregnancy Advisory Service (BPAS)*. <http://bpas.org/get-involved/campaigns/briefings/premature-babies/>. Accessed Aug. 19, 2020.
- Wasserstein, A. ‘Normal and Abnormal Gestation Periods in Humans: A Survey of ancient opinion (Greek, Roman and rabbinic)’, *Koroth*, vol. 9, no.1-2, 1985, pp. 221-29.
- Zalman, S. Sefer Likutei Torah. Parshat Tezseh, 36:3-37:2