

In the high-tech and fast paced 21st century, medical breakthrough and scientific development constitute an exciting, invigorating and hopeful part of daily existence. Yet, studying ancient practice and technique serve as an impetus to ask if modern man truly deserves all the credit for the latest scientific advancement. The ancient oral tradition of the Talmud serves as the most central and intricate guiding force of the *halachic* (orthodox Jewish law), social, political, and dietary realms of daily Jewish life. It therefore should not be surprising that included among the many tractates are medicinal cures, remedies and general scientific theory. The extent of knowledge and scientific investigation of the scholars is astounding. Treatments of both mouth and foot diseases as recorded in the Talmud may help to shed light on the fascinating topic of the Sages' knowledge of modern medicine.

It should be noted that among the many scientific facts recorded in the Talmud, some have been proven contrary to modern scientific thought. Although beyond the scope of this article, there are two major approaches to dealing with this issue. One camp maintains that the Talmud contains absolute scientific truth, which has been seemingly contradicted but will in the future be re-proven correct. Yet, another camp reconciles these contradictions by suggesting that some biological and sociological phenomena in prior generations now have been altered and are not reflective of current scientific reality. Thus, what was true in the *Ta'anitic* era may not necessarily be factual today.

The Talmud (*Avodah Zara* 28a) records that the Sabbath may only be violated for an "internal affliction." It then proceeds to define 'internal' as "anything from the lips inward." Rabbi Eliezer inquires regarding the exact category in which an ailment of the gums and teeth would be included. Are the gums hard and thus external or are they soft and internally located in the mouth? In an attempt to answer this question, a story is told about Rabbi Yochanon who had *tzafдина* disease, which Rashi explains as a sickness of the teeth. If necessary, he was willing to have treatment on the Sabbath, thus proving that this disease is indeed internal. Yet, in typical Talmudic fashion, this proof is thrown out

when Rabbi Nachman explains that *tzafдина* is a disease in its own category because although it starts in the mouth, it "ends in the inner body," and therefore this malady cannot be used to make a general statement about teeth and gum disease. The Talmud then elucidates this pathology and notes that its symptoms include blood coming from between the teeth. The causative agents of *tzafдина* include eating cold wheat, hot barley, or fish left overnight. Interestingly, the two final cures recorded to sooth the malady are related to olives; either one must ingest a mixture with olive oil or must obtain unripe olive seeds, burn them, and place the olive ashes on one's teeth.

The symptoms, treatments and causes of both celiac disease and scurvy may underlie the Talmud's initially strange approach to the documentation of *tzafandia*.

This Talmudic passage raises many questions regarding medical treatment of *tzafдина* tooth/gum disease. It is imperative to understand scientifically the nature of the disease. Skepticism emerges with regard to its stated causes of wheat, barley and fish consumption. Also, an explanation is needed to understand this mouth ailment as affecting the inner body as well. Finally, it must be questioned whether science upholds some type of cure related to olives?

Engaging in today's modern research in mouth infection and tooth disease, celiac disease and scurvy are two major disorders which seem to explicate the Talmud's recording of cause, nature and cure of disease. Celiac (or, coeliac) disease is an autoimmune disorder of the small intestine, affecting more than 2 million people across the United States. Symptoms widely vary and include mouth sores, chronic diarrhea, fatigue and anemia in all genetically predisposed segments of the population. In general, the disorder is caused

by a reaction to gliadin, a gluten protein found in wheat and other related grains. When the body recognizes this protein, it is modified by the enzyme tissue transglutaminase, which causes a major inflammatory reaction in bowel tissue and flattens the lining of the inner intestine, a condition known as villous atrophy. This leads to further inability to absorb nutrients properly. Scurvy, a condition caused by the deficiency of ascorbic acid (vitamin C), leads to a spongy gums and bleeding from all mucous membranes as a result of the breakdown of collagen, involved in connective tissue. Symptoms include dark purple spots on skin, sunken eyes, tooth loss and bleeding gums [1].

Rabbi Nachman Bar Yitchak's statement that "*Tzafndina* is different because it starts in the mouth and ends in the intestines" is remarkably proven as recent research has found that gliadin, the part of gluten that causes the most trouble for those with celiac disease, binds to the CXCR3 receptor in the intestine. This results in the release of zonulin, a human protein that lowers the intestinal barrier to make it more permeable. While this effect is temporary in most people, the barrier stays down for long periods of time in people with celiac disease, causing disruption in the body's system [5]. This permeability of the intestines allows the antigen to easily enter and begin the harmful immune response. Dr. Jabri, a physician and researcher at the University of Chicago Pritzker School of Medicine, similarly explains the underlying immunological mechanisms of celiac disease with a theory that lymphocytes may be involved in killing enterocytes, intestinal absorptive cells. Working *ex vivo*, with cells from active celiac disease patients, the group found that interleukin-15 (IL-15) over expression helps convert antigen-specific cytotoxic T lymphocytes (CTLs) into rogue lymphokine-activated killers (LAKs) via the CTL receptor NKG2D. The LAK cells provoke a more general immune response that destroys the intestinal lining and results in poor nutrient absorption, the root cause of the disease's myriad internal complications [2].

Likewise, if the disease recorded in the Talmud is more similar to scurvy, internal consequences are huge because ascorbic acid (vitamin C) is a cofactor for the enzyme procollagen proline hydroxylase. If ascorbic acid is not present, there is under-hydroxylation of procollagen and defective assembly of mature collagen triple helices. The defective collagen leads to impaired synthesis of basal lamina, media, and adventitia of blood vessels, resulting in a hemorrhagic diathesis and poor wound healing. Vitamin C is also involved in the metabolism of tyrosine and the synthesis of catecholamines. In addition to its antioxidant properties, vitamin C aids iron absorption from the small intestine and is

required for the disulfide bonding of hair [3]. New research even points to scurvy's vascular lesion's connection to heart complication. Research at Northwestern University has confirmed cardiac enlargement, ECG changes (reversible ST-segment and T-wave changes), hemopericardium, and sudden death as prominent physical symptoms of scurvy [4].

The proposed causes of *tzafndina* by wheat and barley seem to point directly to the gluten reaction from wheat and barley. Again, the protein in gluten, which celiac immune systems recognize as foreign, causes immune responses including mouth sores. The mechanism of formation is not fully known but can be attributed to an immune response. It is also known that strains of the bacteria, *Mycobacterium tuberculosis* and *Treponema pallidum*, can cause these sores which certainly may explain the Talmud's concern about eating fish which has stayed out all night [5]. Additionally, because vitamin C deficiency is essential to a working immune system, scurvy may cause a patient to be extremely susceptible to bacterial infection. Decreased levels of immunoglobulin A (IgA), IgM, and the C3 complement, which are three key members of the immune system, have been proven to be directly linked to decreased levels of vitamin C in the blood. [6]

Finally, recent research has shown that olive oil contains cyclooxygenase (COX), a chemical found in ibuprofen which serves as an anti-inflammatory agent. Like ibuprofen, oleocanthal (a tyrosol ester organic compound extracted from olive oil) inhibits activity of COX-1 and COX-2 enzymes. Because inhibition of COX activity is the known cause of the anti-inflammatory actions of ibuprofen and other non-steroidal anti-inflammatory drugs (NSAIDs), these new findings suggest that oleocanthal is a natural anti-inflammatory agent [7]. This property makes oleocanthal of great importance to offsetting the many inflammations caused by immune reactions. Inflammations of the small intestine are the cause of villous atrophy. Sores caused by the disease are also a form of inflammation: inflammations of the mucous membrane. Thus, the symptoms, treatments and causes of both celiac disease and scurvy may underlie the Talmud's initially strange approach to the documentation of *tzafndia*.

A Mishnah in tractate *Shabbat* (6:6) discusses the medical parameters of what one is permitted to do on the Sabbath and concludes that one can "go out with a silver coin on the bottom of the foot." The Talmud (*Shabbat* 65a) explains that this refers to a wound cured with the silver coin. The first proposal that the coin functions to cure by merely applying pressure on a wound is rejected because if

that were the case, “a shard of pottery (or anything)” could have been used. The Talmud, assuming the healing quality comes from the silver itself, then inquires why it must be a coin and not simply a sheet of silver. If the embossed nature of the coin is what is beneficial, then it seems an embossed piece of wood could have also been use. The Sages therefore conclude that there is something inherent in all three parameters - the metal silver, the embossed coin, and the pressure – of the silver coin that make it effective. The Talmud’s questioning may be better understood in the context of the research of silver’s major antiseptic qualities. Interestingly, in today’s age, as science is encountering an increase in antibiotic resistant bacteria, research points to revert back to the ancient practice of using silver to kill bacteria on open wounds.

In a recent article, Jørgensen conducted a study to investigate the effect of an ibuprofen-releasing foam (Biatain-Ibu, Coloplast A/S) combined with an ionized silver-releasing wound contact layer (Physiotulle Ag, Coloplast A/S) on painful, infected venous leg ulcers. He observed 24 patients

with painful, exuding, locally infected, and stalled venous leg ulcers. The study monitored persistent pain and pain at dressing using an 11-point numerical box scale (NBS). The study produced conclusive results that persistent wound pain decreased from a mean of 6.3 +/- 2.2 to 3.0 +/- 1.7 after 12 hours and remained low thereafter. Additionally, pain at dressing change also decreased and remained low. After 31 days, the relative wound area had reduced by 42%, with an associated decrease in fibrin and an increase in granulation tissue [8]. This experiment proves that silver can help to act as a healing agent on wounds.

Although there is no way to prove the Sages knowledge of today’s medical knowledge, the details, scientific investigations, and observations recorded with regard to oral and foot diseases certainly point to worldly and astute medical information. It is only through delving into the fascinating world of scientific discovery of medicinal symptoms and cures, that the brilliance and accuracy of the Talmud can be recognized and appreciated.

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REFERENCES

- [1] Encyclopedia. *Scurvy* <http://en.wikipedia.org/wiki/Scurvy> (retrieved October 4, 2008).
- [2] Meresse, B. *et al.* (2004). Coordinated induction by IL15 of a TCR- independent NKG2D signaling pathway converts CTL into lymphokine-activated killer cells in celiac disease. *Immun. J.* 21:357–366.
- [3] Frey, J.L., and Shehan, J.M. (2008). Unknown: lower extremity papules associated with easy bruising. *Dermatol. Online J.* 14:19
<<http://dermatology.cdlib.org/146/unknown/cutaneous/shehan2.html>> (retrieved October 5, 2008).
- [4] Laumann, A. (2006). *Scurvy*. <http://www.emedicine.com/derm/TOPI521.HTM> (retrieved October 4).
- [5] Porter, S.R. *et al.* (2005) Review article: oral ulcers and its relevance to systemic disorders. *Aliment Pharmacol. Ther.* J. 21: 295–306. <<http://faculty.ksu.edu.sa/Asmaa%20Faden/341%20MDS/Porter%20oral%20ulcer.pdf>>.
- [6] Vitamin C and the immune system <profiles.nlm.nih.gov/MM/B/B/R/N/_/mmbbrn.pdf>
- [7] Monell Chemical Senses Center. Olive Oil Contains Natural Anti-inflammatory Agent. *Science Daily* 6 September 2005. <<http://www.sciencedaily.com/releases/2005/09/050906075427.htm>>. (retrieved October 4, 2008).
- [8] Jørgensen, B. *et al.* (2008). Combined use of an ibuprofen-releasing foam dressing and silver dressing on infected leg ulcers. *J. Wound Care*, 5: 210-4.