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From Surgical Suite to Fresh Breath: The History of Listerine®

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Abstract

While the product Listerine has become ubiquitous with bad breath, this wasn't always the case. Its history is both a study of medicine and marketing that involves a long list of participants. Having its roots in the development of antiseptic surgery its success as a "health" product is an early example of a pharmaceutical company utilizing direct to consumer advertising. Even more astounding is how the Lambert Pharmaceutical Company created a condition more than they created a product.

In a paper presented to the surgical section of the British Medical Association in Dublin on August 9th, 1867 physician and surgeon Dr. Joseph Lister explained his principle of the germ theory and the use of carbolic acid. He stated that the chemicals "…appear to exercise a peculiarly destructive influence upon low forms of life, and hence is the most powerful antiseptic with which we are presently acquainted." Lister went on to explain in detail his methodology of first attempting to destroy microorganisms (referred to as germs) that may have been introduced into the wound at the time of injury as well as postoperatively.

While Lister would eventually go on to become regarded as the father of antiseptic surgery it would take many years for the profession of medicine to fully accept his ideas, this was especially true in the United States. In one of his attempts to enlighten US surgeons, Lister made a presentation at the Philadelphia Exposition in 1876. Among those in attendance, that day was Dr. Joseph Joshua Lawrence, a surgeon and Robert Johnson a pharmacist. Both men would go on to revolutionize the market for antiseptic oral hygiene in the United States.

"But when it has been shown by the researches of Pasteur that the septic property of the atmosphere depended not on the oxygen or any gaseous constituent, but on minute organisms suspended in it, which owed their energy to their vitality, it occurred to me that decomposition in the injured part might be avoided without excluding the air, by applying as a dressing some material capable of destroying the life of the floating particles. Upon this principle, I have based a practice." Joseph Lister, address to the British Medical Association in Dublin in 1887: [1]

Introduction

While not intended to be a biographical sketch of Joseph Lister a brief history of this most remarkable man and his significance in the history of medicine, more specifically his advancement of antiseptic surgery is required. While August 12th, 1865, is the day history records Lister's first use of the application of carbolic acid to a compound fracture it would be almost 2-years, on March 16th, 1867, after additionally refining his methods that Lister revealed his theory and method of antiseptic surgery to the world. The Lancet, in a series of four articles, published the surgeon's methods and theories which ignited a firestorm among the practitioners of the art [2].

Born on April 5th, 1827, in West Ham, England, he was one of the seven children Joseph Jackson Lister, and his wife Isabella Harris raised. Reports indicate that "even as a young child Lister was both bright and curious, studying both fish and small animals [3]." As a student in addition to his studies in natural science, hego on to develop an interest in languages and became fluent in both German and French. During this same period, Joseph senior would go on to developed achromatic object lenses for the compound microscope, something that young Joseph Lister would greatly benefit from in later years.

In 1844 he entered University College in London earning a Bachelor of Arts degree in 1847. He would graduate from the same institution in 1852 with a Bachelor of Medicine with honors, and would become a fellow of the Royal College of Surgeons and house surgeon at University College Hospital. The following year while in Edinburgh, Scotland, he became acquainted with the leading European surgeon as well as a surgical instructor of the time, James Syme. In 1854 Lister was selected as an assistant to Syme at the University of Edinburgh, Edinburgh Royal Infirmary, and in 1856 he was appointed a surgeon at the infirmary. In 1860 he would be named a full professor of surgery at the Royal Infirmary in Glasgow [3].

This was an era where any type of surgery was risky. Even if the actual surgery was successful there was a high likelihood that the patient would develop an infection and die. The prevailing thought on

the cause of post-surgical infections was miasma or a cloud of vapor or mist that was believed to carry disease. It was believed that these miasmas occurred from things that smelled bad like rotten food or sewage, or filthy places and the hospitals of the 1800's were just such places [4].

In 1864, the French chemist, Louis Pasteur, published the results of his work that demonstrated fermentation and food spoilage could be caused by the presence of micro-organisms. Pasteur also gave three possible methods of eliminating micro-organisms-filtration, exposure to heat, or exposure to chemical solutions. Having read the paper Lister was both enthused as well as skeptical, but after conducting his own experiments and confirming Pasteur's findings, he was convinced that Pasteur was correct and thus launching Listers quest to develop "antiseptic" techniques for wounds [5].

A frequent reader of the literature, Lister stumbled across a paper about a chemical called carbolic acid and how it was being used in the treatment of sewage, with the ultimate result in a reduction in diseases among the people of Carlisle, England. This reduction in disease extended to the cattle that would graze on sewage-treated fields. Experimenting, Lister developed a technique of treating surgical instruments prior to surgery with carbolic acid.

In August 1865 he became the treating surgeon assigned to a seven-year-old boy with a severe leg wound. In an era before informed consent Lister applied the solution of to the wound. During the six weeks, it took the wound to heal no infection developed. Lister would publish his results in 'The Lancet' in a series of six articles [6]. In addition to washing instruments in the solution prior to surgery, and using it directly on wounds, Lister stressed the importance of the surgeon washing their hands thoroughly before and after each surgery, a recommendation that did not go over well with most practicing surgeons of the era, who wore blood-soaked smocks as badges of honor, the bloodier a smock the more senior the surgeon. The mere suggestion that it was the surgeon who was responsible for causing post-surgical infection was considered preposterous.

Lister not only bathed his instruments in the carbolic acid mixture but also developed a system to keep the operating theater free of microorganisms by using a carbolic acid steam atomizer. The sprayer would produce a thick, sweet-smelling cloud of atomized carbolic acid that would soak everything in the theater including the surgeon. Before this technique, about 40% of amputations resulted in death from infection.

Eventually because of its caustic nature, with many of the surgeons using the spray experiencing sore lungs as they breathed in large quantities of the vapors as well as bleached and numb skin, cracked nails, use of the carbolic mist fell out of favor. (These effects of Carbolic acid led Johns Hopkins surgeon William Halsted, with the help of the Goodyear Company to develop the first rubber gloves used in surgery) [8]. In 1886, the first steam sterilizer was introduced in Germany and further hastened the abandonment of carbolic spray in surgery. The Johnson & Johnson Company later helped pioneer dry-heat and steam and pressure sterilization [9].

While Lister's germ theory and antiseptic surgical technique was slow to gain traction among practicing surgeons, with many deriding his methods as quackery, while others stated that they could not replicate his results, (mainly because they failed to follow Lister's instructions exactly as outlined) it was the eminent surgeon James Paget's 1869 declaration in The Lancet that Lister's system was "no good" that was the most damaging. Even with all of this against him the technique and his germ theory were making progress, at least in Europe. However, in the United States acceptance of the theory and technique was slow, while most hospitals allowed surgeons to use the procedure at their discretion some hospitals such as the Massachusetts General Hospital totally banned the procedure [4].

In September 1876 Lister attended the Fifth International Congress of Medicine that was being held at the Philadelphia Centennial Exhibition. The speaking engagement came at the invitation of Samuel D. Gross, MD, one of the United States most prominent surgeons, and a non-believer in the germ theory who hoped to discredit Lister. On the appointed day Lister delivered two and one half -hour address on antisepsis. Far from discrediting Lister, the audience was enthralled with what he had to say, even remaining an additional hour in the stifling hot room to hear Lister answer questions. One of those attendees was the physician Dr. Joseph Joshua Lawrence.

Joseph Joshua Lawrence, MD

Born January 28th, 1836 to Bennett and Martha Ann Lawrence in the area of North Carolina now known as Rocky Mount. The elder Lawrence apparently made attempts as a farmer and businessman, both of which ended in failure, and had it not been for his wealth father in law Jesse C. Knight, would have ended up in bankruptcy. Knight would also establish a lifetime estate that would pass on to all the Lawrence grandchildren including Joseph Joshua.

While it is known that Joseph attended a local private school for his primary education, the dates and places for his undergraduate work, as well as the institution granting him his medical degree, remain unknown. There is a record of his obtaining an honorary degree from Bethany College in Western Virginia. By 1858 he had opened his first private medical practice in Wilson, North Carolina. Three years later he would relocate to the town of Goldsboro where he assisted his brother in law Richard Blount in editing the Daily Rough Notes, a publication that his Blount had recently purchased. It was here that his love for publishing began.

With the outbreak of the American Civil War Joseph enlisted in the Confederate cause August 1861 and was elected Captain of Company F of the 14th, North Carolina Regiment. By the end of November of that same year, poor health had caused him to resign his commission. Having apparently recovered from this unknown illness he would reenlist in April 1862 describing himself on his reenlistment as an editor and not a surgeon, he was given command of a volunteer regiment known as the Wilson Partisan Rangers.

While he would resign his commission in October of that year it is reported that he voluntarily attended patients at the Wilson Confederate Hospital. At this same time, he opened a pharmacy in partnership with Jesse Mercer Battle and his brother Cullen. He would serve as county coroner in 1864 and 1865. In 1866 he would resume the practice of medicine [10].

The Chemist, the publisher, and the entrepreneur

In late 1867 or early 1868 Lawrence would again relocate, this time to Baltimore Maryland where he would establish the Joseph J. Lawrence Chemical Laboratory at 224 W. Baltimore Street. It is here that he would begin his compounding of and marketing of various nostrums for medicinal purposes. His first commercial product was "Lawrence's Compound Extract of Rosadalis." Marketed to the public with the tagline; "Recommended by Scientific Men Everywhere, as the Best Remedy yet discovered for Diseases of the Blood, Liver, Kidneys, and as a General Health Restorer" and making the claim that it; "Purifies the Blood, Improves the Appetite, Aids Digestion, Corrects

the Secretions and Imparts Tone, Strength and Vivacity to the Whole System, so the persons using it feel that they enjoy an Entire New Life [11]." Other products would soon follow, including Dr. Lawrence's Celebrated Women's friend" and following the opening of an "organic" chemist shop in Norfolk, Virginia in 1867 he would launch "Dr. Lawrence's Compound Extract of KOSKOO. Marketed as; "For the Cure of Obstinate and Long Standing or Chronic Disease of the Blood, Liver, Kidneys, Nervous System" The label would continue with a list of maladies that the product was good for, emphasizing poor blood as the cause of most disease; "diseases arising from "IMPURITIES OR POVERTY OF THE BLOOD." One source describes the product as a syrup. The formula is as follows: -Koskoo Mexicana (Mexican Ivy), Scrofularia Nodosa (Figwort), Alnus Serrulata (Tag Alder), Leptandra Virginia (Black Root], Ptelia Trifoliata (Wafer Ash) equal parts [12].

An advertisement for the product appearing in the Macon Beacon in Macon Mississippi on May 21st, 1870 reads as follows [11];

KOSKOO!

THE GREAT REPUTATION
Which Koskoo has attained in all parts of the country
As a Great and Good Medicine
AS A BLOOD PURIFIER, IT HAS NOT EQUAL
BEING POSITIVELY
The Most Powerful Vegetable Alternative
YET DISCOVERED
KOSKOO AS A LIVER INVIGORATOR STANDS UNRIVALLED
KOSKOO Meets with GREAT SUCCESS in the CURE of
Diseases of the Nervous System.
The Best and Most Popular Medicine in Use.
PREPARED ONLY BY J. J. LAWRENCE, M.D.
ORGANIC CHEMIST
Laboratory and Office, No. 6 Main Street, NORFOLK, VA.
Price, ONE DOLLAR Per Bottle.

Many of the advertisements included testimonials from medical professionals as well as consumers; the validity of these testimonials is as questionable as the curative claims made. Unsubstantiated claims like these were commonplace and went unchecked prior to the passage of the 1906 Pure Food and Drugs Act.

While his product did gain some popular, Lawrence was in a very competitive business. With the lack of any controls, claims for cures without regard to effectiveness made the patent medicine business a free for all. With the job of persuading ailing citizens to buy a particular brand from among the hundreds offered, it was a business that not unlike today favored those having the money to spend on advertising. This would eventually force Lawrence out of the patent medicine business and cause him significant financial hardship and in 1869 had defaulted on a promissory note to his brother in law and failing to pay him half of the $35,000 he had received from the sale of his Extract of Rosadalis product, he declared bankruptcy. In 1870 he would again return to his roots in Wilson.

Upon his return to Wilson Lawrence established his medical practice and operated a "Drug Store" and in 1873 he would begin publication of "The Medical Brief", a monthly publication it would become extremely popular with Lawrence boasting that it was "the largest circulation and is financially the most prosperous medical publication in the World" a claim that was never verified. While it appears that the journal did, in fact, become highly successful this did not occur until Lawrence once again relocated in 1875, this time to St. Louis, Missouri.

Apparently, Lawrence did not relocate alone as it is reported that the Battle brothers sold the pharmacy in Wilson and moved to St Luis the same year where they would open Battle and Company Chemists' a pharmaceutical company. Lawrence's brother in law Richard Blount whose newspaper Lawrence had earlier helped edit was also part of this relocation as he would help in the operation of the new company and wherein 1884 he was selected to head up the company's expanding operations in England and France, whereby this time Lawrence had become a partner in the operation. The success of the company was tied to a product called "Bromidia" [13,14] (Figure 1).

Bromidia while sounding like a digestive aid was, in fact, an early cannabis containing medication that was marketed as a sedative, sleep aid and more. Available only by prescription it would become one of the many drugs that would come under scrutiny by the AMA for false and misleading claims [15]. It would, however, help to make the Battle brothers very wealthy. But not even this bestselling product could touch the success of Lawrence's next product.

Following Joseph Lister's lecture at the Philadelphia Exposition in 1876, where he was attempting to enlighten US surgeons as to the benefits of antiseptic surgery, a lecture at which Lawrence was in attendance the thought occurred to him that perhaps a reconstituted form of Lister's formula could be used in surgery and for wound cleaning. Lawrence's goal was to formulate a product that while effective was less irritating than carbolic acid. The original alcohol-based formula of lists the active ingredients as menthol (mint) 0.042%, thymol (thyme) 0.064%, methyl salicylate (wintergreen) 0.06%, and eucalyptol (eucalyptus) 0.092% [16]. In combination, all have an antiseptic effect and there is some thought that methyl salicylate may have an anti-inflammatory effect as well. Ethanol, which is toxic to bacteria at concentrations of 40%, is present in concentrations of 26.9% in the original gold Listerine Antiseptic [17] (Figure 2). At this concentration, the ethanol served to dissolve the active ingredients and was sold by prescription only.

Lawrence's attempts to market his new product for the use in cleaning cuts and abrasions, as well as an antidote to dandruff and athlete's foot and to relieve the sting of insect bites met with only limited success and in 1881 he would license his formula to the local

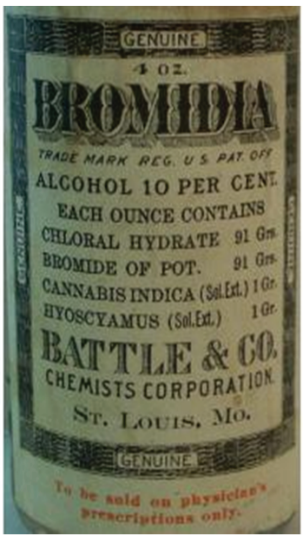

Figure 1: Bromidia.

Figure 2: Listerine Antiseptic.

drug store from where he purchased his ingredients. The proprietor of this drug store was a pharmacist named Jordan Wheat Lambert who subsequently started the Lambert Pharmacal Company. Morgenstern reported the details of the licensing arraignment thusly: "Lambert agreed to pay Lawrence and his heirs $20 for each gross of Listerine sold thereafter by Lambert or his heirs. Lawrence later agreed to reduce this to $6 per gross. In the ensuing years, the burgeoning profits from the sale of Listerine would earn millions of dollars in royalties for him and his heirs. JJ Lawrence died in 1909, at the age of 73… [18]" Lawrence obituary made no mention of his discovery of Listerine [19].

Some sources continue to incorrectly list Lambert as "inventing" Listerine [20-22], while others including Lamberts son Gerard gives only passing credit to Lawrence saying, "My father, with the aid of Dr. Lawrence, developed a formula for an antiseptic [23]." Looking at the history of Lawrence's development of other products and the reports of Lawrence being present in Philadelphia at Lister's lecture with no mention of Lambert's attendance it would be safe to assume that these co-development claims have no historical credibility and that the formula was the sole invention of Lawrence.

Another area of the Listerine story that remains unclear is if Dr. Lister ever gave permission for the use of the name to be associated with the product. In his autobiography Lamberts son goes to great lengths to explain in detail how his father traveled to London to personally seek Lister's permission; "He requested permission to use Lister's name for it. Something about him [Joseph Lambert] must have been impressive, for this permission was granted [23]." This account conflicts with other accounts that say; "Lister, however, did not want to be associated with their product and spent considerable amounts of money, to no avail, to suppress the unauthorized use of his name [24]." What is clear is that Lambert did undertake marketing Listerine following licensing the formula from Lawrence and it was him and his children, especially Gerard, who is responsible for its success.

In 1889, at age 38, Joseph Lambert died, thus never realizing the success the product would become. His company would continue to be operated by family trustees and in 1895 a new marketing effort began in earnest. The new target would be dentists with advertising that touted the product as being "Antiseptic, Prophylactic, Deodorant, Non-Toxic, Non-Irritant, Non-Escharotic, Absolutely Safe, Agreeable, Scientific and Strictly Professional [25]." It was also the first time that mouth odor was mentioned, however more in a pathological term than in a hygienic or social realm. One advertisement stated that "Listerine destroys promptly all odors emanating from diseased gums and teeth [26]," uses for which it was not initially intended. However, acceptance by the dental profession was less than overwhelming and it would take the next generation of Lambert's to make Listerine the success it was to become.

Gerard Barnes Lambert: "Father of Halitosis"

Born May 15th, 1886 in St. Louis, Mo. Gerard was one of Jordan Lamberts four sons. Growing up a Lambert was a life of money and luxury that included valets, chauffeurs, and governesses. At age 18 Gerard's brother Marion suggested that perhaps it was time for the younger Lambert to think about attending college, it his suggestion was to apply to Yale. Gerard's first impression of New Haven failed to impress. "What I saw in New Haven as I stepped off the trolley car…was a hot, dirty, and uninteresting commercial city," he recalls. "Strolling about" and failing to find "something better," he boarded a train and returned home to St. Luis [27]. A few days after returning a friend, assuring him that Princeton "looked like a university", suggested he go visit. This time when he got off at the Princeton railroad station then located "below the great flight of steps that leads to Blair Hall" he was sold. The one issue was Princeton's refusal to accept his Yale admission test, so after some prepping, he took the exam and was admitted [28].

Gerard would graduate from Princeton in 1908 with a diploma bearing the signature of the future President, Woodrow Wilson. Following graduation, he would continue to live a life of wealth until several successive business missteps left him on the verge of bankruptcy, among these was the American Rim Company.

Gerard had invented a tire rim that would make it easier to change the rubber tube tires than in use by automobiles in that era. He attempted to sell his patent but was told he wanted too much money and that tire manufactures would rather fight him than pay. Not deterred he stared the American Rim Company and would eventually sell the company. The sale included not only a lump sum payment but a $1.00 per sale residual. Unfortunately, a financial fraud at the company would force it to close without every paying any residuals to Gerard [29]. Following this a number of real estate ventures would cause him to spend his $300,000 inheritance (in excess of $4 million in today's currency) as well as go through his tax frees $30,000 a year (about $350,000 today) in dividend receipts [30]. Having joined the Army he would return to even greater debt, in excess of $700,000 he would be forced to return to the company his father started [31].

A cure for a Disease No One Knew They Had

The subject of bad breath has been the topic of both Greek and Roman authors as well as being discussed in detail in the Talmud [32]. Islamic teaching stresses the use of a special wooden stick, the miswak (or siwak), for cleaning the teeth and preventing bad breathe [33].

Among the treatments for bad breath has been mouth rinse. In about 2700, B.C.E. the Chinese developed one of the first recorded use of an oral rinse for treatment for gum disease, the recommendation was rinsing with the urine of a child. Urine was believed to be an effective cure for many diseases probably because its salt concentration is comparable to that of blood.

Other concoctions have included a mixture of salt, alum, and vinegar a mixture recommended by Hippocrates. Mixtures of honey, oil and beer and a combination of dill, anise seed, myrrh and pure white wine were also popular, especially among the upper class in the Roman period. "Therapeutic rinsing" with urine was a popular oral hygiene method in Europe until the early 18th century. Urine was considered as an effective aid in curing many diseased parts of the body because its salt concentration is comparable to that of blood, failing to recognize the therapeutic value of urea and ammonia [34].

While a common problem in the 17th and 18th centuries, it was viewed as a medical condition that was discussed among physicians and dentists but avoided in the social arena, no one dares mention to a friend or neighbor that their breath was offensive. However, it wasn't, as some contend, an issue that was ignored or accepted and not dealt with. This can be seen in the publication in 1874 of; ***The breath, and the diseases which give it a fetid odor.*** With directions for treatment, by Joseph Howe, MD. Howe was a professor of surgery at Bellevue Hospital in New York City. The text was so popular it would go on to be published in four editions, yet the open discussion of bad breath among the lay public would be decades away [35].

Gerard Lamberts return to the company his father founded and now being operated by his brothers was less than welcoming. On his first day of work, he did not even have an office and hijacked a vacant desk and chair. This would soon change as his involvement in the company grew. He was concerned about costs and one of his first successful attempts was to try to convince the government to stop taxing the alcohol purchased to make Listerine. Alcohol used in the manufacturing of Listerine cost the company about $4.60 a gallon, this was because it was taxed at the same rate as all consumable alcohol. Gerard argued that the alcohol used in Listerine was not potable and thus should not be taxed at the same rate, much to his brother's astonishment he was successful, thus greatly enhancing the profitability of every bottle of product sold. This success would be a minor accomplishment compared to what would become Gerard Lambert's legacy, convincing people they needed help for the dreaded ailment of "Halitosis".

Historic advertisements show that Listerine was marketed as a remedy for dandruff as well as a cure for diseases ranging from dysentery to gonorrhea. Lambert felt that this jack of all trades approach while profitable was not image the product should have. In a brainstorming meeting with his brother Marion the two tried to come up with what would be the primary selling point for the product. After raising the idea of bad breath, the company's chemist left the meeting to return a short time later. In his autobiography, Lambert tells the story thusly; "… "he excused himself for a moment and came back with a big book of newspaper clippings. He sat in a chair and I stood looking over his shoulder. He thumbed through the immense book…" Here it is, Gerard. It says in this clipping from the British Lancet that in cases of halitosis . . ." I interrupted, "What is halitosis?" "Oh," he said, "that is the medical term for bad breathe [36]." This statement is historically significant since many books and periodicals have stated that it was Gerrard who invented the term [37], with some going so far as to explain, incorrectly, how he supposedly came up with it; "…They adopted the word halitosis from halitus, the Latin word for breath, and "oasis," which sounded medical [39]."

From a marketing standpoint the timing couldn't have been better, Handwerk notes "the American public was more consumed than ever with the fear of 'germs 'helping to lead to the success of both disposable paper cups and Kleenex® [39]." It wasn't long before people all over America were suffering from halitosis, and now thanks to Lambert Pharmaceuticals and Listerine there was a cure for this awful condition caused by "germs".

Dossey has stated accurately; "The trick was to inflate a common, everyday condition to the level of pathology, which, if not attended to, could blight one's prospects for happiness and success [40]." According to advertising historian James Twitchell, because of its supposed ability to cure the scourge of disease halitosis, the company's revenues rose from $115,000 to more than $8 million in just seven years, (1922-1929) [41] (Figure 3).

Controversies: But Does it Work?

Early advertisements for Listerine touted a multitude of uses, including as a treatment for Gonorrhea. Claims for cure were common in Listerine's early years, with regulation limiting such claims almost non-existent, so it would be easy to dismiss such claims today as hyperbole. That is until a 2017 article in JAMA stated that; "The mouthwash Listerine may inhibit the growth of Neisseria gonorrhoeae, according to an in vitro study and a small randomized trial of men who have sex with men recently published in Sexually Transmitted Diseases [42]." Earlier studies of Listerine found similar results [43].

Other studies have validated Listerine's claims of it being a powerful adjunct in the fight against odor-causing oral bacteria. A study from the Tokyo Dental College said that; "Listerine exhibited a potent bactericidal effect on bacteria in saliva and dental plaque [44]." A more recent study indicated that; "Evidence is accumulating that Listerine® is effective in improving oral health, but the absence of systematic toxicological studies means that an accurate safety assessment cannot be made." The question of toxicity is an issue that continues to plague the mouthwash industry even today [45].

Some experts have raised concern that the use of alcohol-containing mouthwash such as Listerine may increase the risk of

Figure 3: Listerine Advertisement.

developing oral cancer. In 2010 Le Vecchia reviewed published data on the subject and found 7 meta-analyses have found no connection between alcohol-containing mouthwashes and oral cancer, and 3 of which noted an increased risk. The authors opined; "Thus, critical review of published data revealed that a link between mouthwash use, specifically alcohol-containing mouthwash, and oral cancers are not supported by epidemiological evidence [46]" At this point, the best that one can conclude is that the link between mouthwash and cancer remains unclear.

Unlike the early years where claims for cure were common among consumer health-related products, this is no longer the case. On August 2nd, 1977 after a lengthy legal battle that spanned 5 years the US Court of Appeals ruled in favor of the Federal Trade Commission (FTC) findings that Listerine will not help prevent colds or sore throats or lessen their severity. The ruled that the Warner-Lambert Company shall [47];

(1) Cease and desist from representing that Listerine will cure colds or sore throats prevent colds or sore throats, or that users of Listerine will have fewer colds than non-users;

(2) Cease and desist from representing that Listerine is a treatment for, or will lessen the severity of, colds or sore throats; that it will have any significant beneficial effect on the symptoms of sore throats or any beneficial effect on symptoms of colds; or that the ability of Listerine to kill germs is of medical significance in the treatment of colds or sore throats or their symptoms;

(3) Cease and desist from disseminating any advertisement for Listerine unless it is clearly and conspicuously disclosed in each such advertisement, in the exact language below, that: "Contrary to prior advertising, Listerine will not help prevent colds or sore throats or lessen their severity." This requirement extends only to the next ten million dollars of Listerine advertising.

Future Implications

Claims of Listerine's anti-microbial efficacy have been tested in numerous studies, these studies were performed with the alcohol-containing Listerine [48], however, due to the oral cancer scare, an alcohol-free version, Listerine Zero, is now available. While some question its efficacy, when compared to the original formula studies, have shown no difference [49]. In all likelihood, the clinical utilization of this product will continue to expand, such as a recently published study in the Journal of Sexually Transmitted Infections.

Among the early therapeutic claims made by the developers of Listerine was its ability to cure gonorrhea. In an era when no federal regulations existed to halt the promotion of unsubstantiated claims, it was easy to see how this claim could be made without fear of consequences. While the claim was dismissed by the medical community as another product claiming to be a cure-all it turns out there was truth in the statement. Almost 140 years after its discovery researchers have determined that Listerine does indeed kill gonorrhea bacteria, both in Petri dishes and in people's throats.

In the first-ever randomized control study testing the efficacy of Listerine against the bacteria responsible for Gonorrhea Eric Chow, a research fellow at the Melbourne Sexual Health Centre in Australia, found significant effectiveness of Listerine when compared to a placebo, this was especially true in gay and bisexual men who tested positive for gonorrhea in their throats. The researchers also calculated that the Listerine users had 80 percent lower odds of testing positive for gonorrhea than the men who gargled with salt water [50].

While no studies testing the other early claims by the developers of the product such as curing dandruff there is increasing antidotal evidence that Listerine may, in fact, be effective in treating the embarrassing condition. While no controlled trials about dandruff or for that matter the claims of curing baldness have been undertaken we may yet find that perhaps these claims were not the exaggerated inventions of marketers [51].

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