

## *Candida*: The Fungus among Us

The causative agent of the Candidiasis disease is a fungus *Candida*, usually *Candida albicans*. *Candida* are thin-walled, small yeast (4 to 6 microns) that reproduce by budding and are one of the most common causes of opportunistic mycoses worldwide. *Candida* is a normal part of ordinary flora of skin, mouth, vagina, and stool. It is a pathogen and a colonizer; also found in the environment particularly on leaves, flowers, water, and soil. The genus *Candida* includes about 154 species. Six of them are more frequently isolated in human infections. The colonies of *Candida* are cream to yellowish in color. They grow rapidly and mature in 3 days. The texture of the colony may be pasty, smooth, dry, wrinkled and dull, depending on the species. *Candida* is unicellular yeast, though it can be a multicellular mold. Although this fungus reproduces sexually and asexually by formation of spores, yeast is reproduced via budding.

*Candida* is a ubiquitous fungi organism. It has been one of the many eukaryotic organisms that work in symbiotic existence with humankind for as long as we know; however, when the delicate balance of coexistence that keeps each one at bay is disrupted it becomes an opportunist by over populating. It soon creates havoc in its host. When this occurs, the diagnosis is Candidiasis. According to the 9<sup>th</sup> edition of McGraw-Hill Encyclopedia of Science and Technology, the majority of fungal infections are caused by yeast ( ). David Grubby, born in Austria in 1810, became a doctor and scientist in France at Hospital St. Louis and the Foundling Asylum. His works, published in the 1840s, were the first to describe yeast infections and the relation to fungi (712). During the 1940s, Candidiasis was almost unheard of, a rare medical occurrence but, the use of antibiotics was becoming more common (Knox). By the 1950s an epidemic of yeast infections occurred and the use of antibiotics was an epidemic of its own. The increase of Candidiasis infections was parallel to the increase of antibiotic use (Knox).

Candidiasis is the cause of **Thrush**, an infection in the mouth creating a whitish film on the palate, tongue, and inside cheeks. When thrush extends into the throat it causes **Esophagitis**. Candidiasis is also the cause of **Cutaneous Candidiasis**, commonly known as diaper rash, which can be problematic anywhere in the folds of the skin such as armpits, hands, groins, buttocks, and under breasts. Many other illness have been found to be related to the *Candida* organism such as acne, sinusitis, bronchitis, UTIs, ear infections, chronic fatigue syndrome, depression, athlete's foot, constipation, and diarrhea (Knox). Finally, the last and most common illness which is publicly known due to the explosion of advertisement in the past decade, promoted by pharmaceutical companies of their over-the-counter topical treatments, is **Vaginal Yeast Infection**. Even though Candidiasis is not known to be a sexually transmitted disease, it still has been one of the concerns for the Centers for Disease Control (CDC) and continues to be included in their STD guidelines due to the high rate of occurrences reported ( ).

*Candida* although it is a naturally occurring yeast that exists in our bodies as well as the environment it can also wreak havoc when given the opportunity. Overgrowth of *C. albicans* (the most common strain of *Candida*) is the culprit behind the majority of yeast infections (Candidiasis, CDC). This pathogen attacks the mucous membrane of the oral cavity, G.I. tract, vagina, and various other epithelium, nervous system and lymphatic system through toxins, as well the blood stream. Toxins like candidotoxin and

ethanol (produced during fermentation) creates not only a drunken like state but “interferes with our biochemical processes” (Ninazu), some of the toxins produced are also lethal to lymphocytes (Leicester). Acidic proteases and other metabolites disrupt our energy production cycle which then causes fatigue and also creates a better breeding ground for this pathogen. Although *Candida* is naturally inside our bodies the presence of escalated, or presence in areas of the body that *Candida* should not exist (i.e. the bloodstream), onset of the infection could begin in as few as 2 to 10 days.

Major symptoms and signs may include any of the following: White patches, or red lesions in oral cavity, pruritus, and vulval erythematic, curd-like discharge from vagina. Signs or more severe infections are: fever, chills, a drunken like state with out the presence of alcohol, not sensitive to antibacterial medications (CDC, Ninazu). Luckily most infections are treatable with antifungal medications and do not tend to persist longer than approximately 2 weeks after starting medication, in some cases lasting only 2 to 3 days. There should be no sequelae as long as appropriate treatment has been taken. Antifungals are among the most common treatment for Candidiasis but in cases of more severe infections, Amphotericin B can be given intravenously (CDC). These treatments slow down and interfere with *C. albicans* by altering the cell wall permeability and thereby slow its growth. If homeopathic treatment is desired, healthful living fermented foods such as kraut help reduce the amount of *C. albican* over population (Knox). Dr. Knox also states that a person should avoid high consumption amounts of animal by-products and increasing the amounts of raw vegetable matter; by doing this, a person increases the amount of beneficial bacteria in the body, which in turn limits the amount of *Candida* growth (. An alternative treatment to an antifungal medication, though medication is more convenient and less expensive, would be colonic irrigation. According to Dr. Knox, colonic irrigations (a.k.a. enemas) are slightly invasive procedures but effective in controlling the outbreak of Candidiasis. Colonic irrigations are not a quick fix. Treatment usually consists of two to three colonics per week for two weeks, if symptoms have not been relieved by this time, further diagnosis is suggested (Knox). The best preventative measures that can be taken are keeping skin clean and dry, take medications as directed and only as directed by a doctor, and living a healthy lifestyle.

Because *Candida albicans* is a naturally occurring organism in the intestinal tract of the human body, Candidiasis occurs everywhere. It is estimated that Candidiasis infects more than 30% of the world population, especially females over the age of twelve (Clinkscale). The infections caused by the *Candida* organism have been considered a health crisis since the 1980s and occurs in at least one-third of the North American population including those with cancer, HIV/AIDS, and severe allergies (Knox, Clinkscale). Candidiasis is most prevalent in the industrialized areas of the world where the use of antibiotics is easily accessible and sold to the farms where animal by-products are mass produced and then consumed by the people. The rate of new infections is unknown due to the frequency of misdiagnosis and the constant consumption of antifungal/antibacterial products. As long as people consume meat, animal by-products, alcohol, antibiotics, birth control pills, and any other yeast containing product, continual cases of Candidiasis will occur with the increasing rate it has for decades. Although Candidiasis has been considered more of a chronic illness and easily cured, a 50% death rate occurs if the infection reaches the blood stream before diagnosis ( ). These cases are

more commonly found in undeveloped parts of the world where up-to-date medical treatment is not readily available rather than the heavily populated developed areas (Clinkscale).

*Candida* is stored in the intestinal tract and then is transmitted throughout the body once an abundance of the *C. albican* fungus develops. The over development of *C. albican* most commonly occurs after an illness was treated with antibiotics. Usually within two weeks of the antibiotic treatment several of the bacteria in the G.I. tract are killed off and *C. albican* has room to grow. Once the over population of *Candida* fills the empty spaces of the intestinal tract, the immune system shuts off its defense to the flora and spreads to the other mucous membrane areas of the body (Knox). Candidiasis can be transmitted sexually, through the food we eat or from poor hygiene, but most commonly it is developed after taking an antibiotic.

When the topic was first assigned to the group, everyone was in dismay, as well as many of our peers that were approached, on what Candidiasis is. However, if you ask any mother, “What is a diaper rash?” or any female, “What is a yeast infection?” the conversations begin to flow. There would be a variety of responses, personal accounts and stories. Traditionally, this was the subject of talk between patients and doctors, or mothers and daughters but society has evolved to become more open and aware of illness with the help of the media, advertisement and the sexual revolution. Pharmaceutical companies have become very profitable businesses by informing the public of symptoms and then suggesting a treatment or medication. The public can basically walk into a doctor’s office and request the medication advertised. Many forms of medication have made way into the general market place. One of the major concerns and controversy has been with the mismanagement of antibiotics. We see antibiotics in our soap, mouthwash, toothpaste, hand sanitizers, and many female hygiene products in an attempt to promote a preventative maintenance mentality. If we cut down the microorganisms, then we will cut down on potential illnesses. As Gordon Sauer states in the Manual of Skin Diseases, 6<sup>th</sup> Ed., avoid excessive washing and the use of antibacterial soap (224). Unfortunately, we are seeing fungal infections on the rise due to the imbalance being created in that fragile natural relationship created between these microorganisms and the assistance in evolution of more severe and resistant strains. Don’t be fooled that this is only a woman’s issue. Candidiasis is a non-discriminate and men can be infected as well. We need to promote awareness in the over use of antibiotics, educate the potential causes of Candidiasis, and understand the importance of incorporating preventative measures into our lives.

Many of the preventative measures for Candidiasis are reasonably easy to learn and keep in good practice. A person who develops Candidiasis or has chronic symptoms of the infection should adjust their diet and avoid foods which are known to assist in the growth of fungi; these foods usually contain large amounts of sugar, dairy, yeast, wheat, and caffeine. Eating yogurt, which contains *Lactobacillus acidophilus*, a bacterium that helps control *Candida albican*, is also beneficial. Consuming living (raw) vegetable matter and krauts will help repopulate beneficial bacteria and help control *C. albicans* (Knox). Clothing is another important factor in the prevention of Candidiasis. Some key things to remember are: keep clothing loose to allow ventilation and dryness; avoid tight pants during hot and humid weather; wear loose, natural-fiber clothing and undergarments with a cotton crotch; and be sure to change out of wet clothes such as bathing suits as

soon as possible. The most important prevention method for Candidiasis, and many other types of infections, is personal hygiene. A person should practice oral hygiene daily and bathe on a regular basis drying well when done. Use gentle soaps on the body, and avoid using fragrant soaps or body washes, which can cause irritations, especially in the genital areas. Scented tampons and feminine sprays should also be avoided. Another key to prevention is trying to reduce exposure of the hands to chemical soaps and water by wearing gloves while cleaning. Most of all, educating oneself on the infection at hand is the best way to prevent a reoccurrence.

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