Microbiology

Mycelial forms of Candida release dozens of different toxic by-products that can inflict damage on specific tissues and organs thus determining which symptoms will occur. These toxins can also compete with hormone receptor sites and cause hypothyroidism, hypoestrogenism, as well as binding cortisone, progesterone and other hormones for its own use, resulting in endocrine deficiency states.

Scourge of the 21st century

SYSTEMIC CANDIDIASIS:

Part 1 of a two-part review

by Dr George Georgiou

NATUROPATHS always seek to identify the underlying causes of chronic diseases. In recent times it has become apparent that three major aetiological factors can explain many chronic diseases – heavy metals, parasites and fungal organisms. In addition, one can find an association between all three.
This two-part review focuses on the fungal causes of disease, with particular reference to Systemic Candidiasis.

What is Candida?
We all live in a virtual sea of microorganisms – bacteria, viruses, and fungi. Usually, these microorganisms do not cause illness, unless our resistance becomes lowered.
Candida albicans is a yeast that lives in the mouth, throat, intestines and genitourinary tract of most humans and is usually considered to be a normal part of the bowel flora.
It is a member of a broader classification of organisms known as fungi.
C. albicans is a diploid organism with eight sets of chromosome pairs. It is one of a few microorganisms that have a diploid gene controlling the same protein, which means that it is capable of pleomorphic activity; it is able to mutate from a budding form to a mycelial, pathogenic form.
There are 81 different types of Candida species, such as C. glabrata, krusei, lusitaniae, parapsilosis, and tropicalis. C. Albicans and C. glabrata are the two most common Candida species that cause systemic candidiasis.

Different types of Candida species
Traditionally, fungi are considered to be plants, but they contain no chlorophyll and cannot make their own food. Fungi tend to inhabit cool to tropical climates and are found in the air we breathe as well as in moist and shady soil, water, manure, dead leaves, fruit, leftover food, and in a wide variety of places and circumstances.
The problem begins when the normal, budding Candida species that we have in our gut, which 90 per cent of babies are born with, changes to the mycelial of hyphae form, which is pathogenic or disease-causing.
This only happens when the internal milieu of the gut and other tissues become more acidic, either through taking a variety of drugs that wipe out the lactobacillus species, or through eating very acidic foods, such as sugar and other refined products. It appears that this alteration in pH can trigger genes in the Candida to begin a pleomorphic change into a stealth organism that is very virulent – it can increase itself from 1 to 100 cells in 24 hours. These 100 cells can then produce 100 each in the next 24 hours, and so on – this is really explosive growth.

The parasitic role of Candida
Candida has two parasitic functions:
1. It gobbles up any putrefied food matter in our digestive system (mostly caused by improper digestion due to low stomach acid).
2. After we die, Candida acts to decompose the body, feeding off our corpse and returning us to Mother Earth.
When conditions are right, it transforms itself from the "bud" state into the mycelial state, where filament-like roots invade deep into the mucosa in search of nourishment.
The mycelia release phospholipase, an enzyme that attacks cell membranes of the mucosa, splitting fatty acids, generating free radicals, and causing inflammation in the intestine.
Wherever the yeast colonise they cause symptoms, whether an itchy anus or vagina, diarrhoea, heartburn or sore throat. The mycelial forms release 79 different toxic by-products that damage specific tissues and organs and will determine which symptoms will occur.
These toxins can also compete with hormone receptor sites, causing hypothyroidism, hypoestrogenism, as well as binding cortisone, progesterone and other hormones for its own use and causing endocrine deficiency states.

How do you get it?
Candida albicans prefers people. Candida enters newborn

infants during or shortly after birth. Usually, the growth of the yeast is kept in check by the infant's immune system and thus produces no overt symptoms. But, should the immune response weaken, the condition known as oral thrush can occur.

By the age of six months, 90 per cent of all babies test positive for Candida and by adulthood, virtually all humans play host to Candida albicans and are thus engaged in a life-long relationship with the yeast.

Candida coexists in our bodies with many species of bacteria in a competitive balance. Other bacteria keep Candida growth in check in our body ecology, unless that balance is upset.

When health is present, the immune system keeps Candida proliferation under control, but when the immune response is weakened, Candida growth can proceed unhindered. It is an "opportunistic organism," one which, when given the opportunity, will attempt to colonise all bodily tissues.

The uncontrolled growth of Candida is known as Candida overgrowth or Candidiasis.

There are many factors in our modern society that can upset the ecological balance of the body, weaken the immune system and thus allow the yeast to proliferate. Of these, the major risk factors, which may predispose one to an overgrowth of Candida, are:

Occupied territory...'oral thrush' is one of the more clinically obvious manifestations of Candida albicans

Steroid hormones, and immunosuppressant drugs, such as cortisone, which treat severe allergic problems by paralysing the immune system's ability to react; pregnancy, multiple pregnancies or birth control pills, which upset the body's hormonal balance; diets high in carbohydrate and sugar intake; yeast and yeast products, as well as moulds and fermented foods; and prolonged exposure to environmental moulds, antibiotics and sulphur drugs.

Probably the chief culprit of all, antibiotics kill all bacteria. They do not distinguish good bacteria from bad. Antibiotics kill the "good" flora which normally keeps Candida under control. This allows for the unchecked growth of Candida in the intestinal tract.

It is normally difficult to recover a yeast culture from bodily surfaces. However, after 48 hours of taking tetracycline, yeast can be cultured easily from anyone. The prevalence today of Candida may be most directly related to the widespread societal exposure to antibiotics – from prescriptions for colds, infections, acne, and from the additional consumption of antibiotic-treated foods such as meats, dairy, poultry and eggs.

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Indiscriminate and extensive use of antibiotics is not only considered to be a primary cause of Candida overgrowth, but has recently been found to be responsible for the unbridled development of super-bugs.

The rapid and direct proliferation of the yeast following antibiotic use strongly suggests that the problem of Candida is one which stems from an inner state of imbalance, rather than from an outside attack by a microbe or disease.

This is important to understand if one wishes to get rid of an overgrowth problem, as it suggests that Candida is not so much the problem as is the body's own failure to control it.

A serious problem

Once begun, if not recognised and treated appropriately, Candida overgrowth can result in a self-perpetuating, negative cycle. Large numbers of yeast germs can weaken the immune system, which normally protects the body from harmful invaders.

Even though Candida is part of the ecological balance in the body since birth, it is still recognised by the immune system as a foreign body that needs to be controlled. So, when overgrowth occurs, a chronic stimulation of the immune system is set up in an attempt to regain control. It is believed that this chronic process can exhaust the immune system, predisposing one to more serious degenerative processes.

It is hypothesised that a chronic demand on the immune system, such as Candida and parasites, can play a direct role in the development of cancer and AIDS. Seen in this light, Candida overgrowth should not be taken lightly.

Candida produces its effects by two routes. First, there is a direct route initially by invasion of the gut and the vagina; Candida is capable of spreading along the entire length of the gut. The presence of chronic vaginitis can often indicate widespread candidiasis.

Second, there can be indirect effects caused by spread of toxins through the bloodstream to other sites. In the gut Candida can alter its form from a simple yeast organism to a 'mycelial fungal form', a network of root-like fibres called rhizoids.

These can penetrate and damage the gut lining, allowing foreign food proteins to be absorbed into the bloodstream and to challenge the immune system so that multiple food allergies may result.

Toxic waste from Candida infestations can also be absorbed into the bloodstream causing "Yeast Toxin Hypersensitivity", leading to symptoms such as anxiety, depression and impaired intellectual functioning.

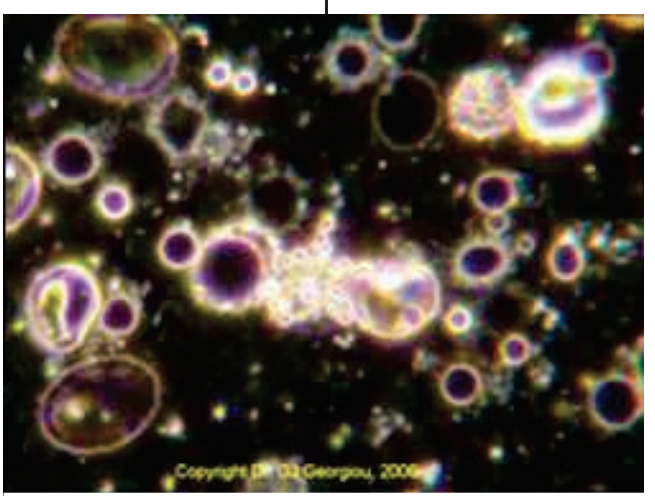
The main toxin implicated here is acetaldehyde, which is a normal by-product of metabolism, produced in small amounts and rendered harmless by the liver. If, however, there is excess production of this by Candida and a lack of the appropriate liver enzymes which tend to be deficient in about five per cent of the general population, the acetaldehyde will become bound strongly to human tissue. This may cause impaired neuro-transmission in the brain, resulting in anxiety, depression, defective memory and cloudy thinking.

The immune system may concurrently be also adversely affected by poor nutrition, heavy exposure to moulds in the air, as well as an increasing number of chemicals in food, water and air, including petrochemicals, formaldehyde, perfumes, cleaning fluids, insecticides, tobacco and other indoor and outdoor pollutants. More than 10,000 chemicals have been added to our food supplies alone that were not there just 100 years ago.

We do not have the genetic recognition of these substances as foods or as useful additions to our bodies.

Specifically, yeast tend to secrete a toxin called Gliotoxin which can disrupt the immune system by inactivating enzyme systems, producing free radicals, interfere with the DNA of leucocyte, and is cytotoxic.

Resulting lowered resistance may not only cause an overall sense of ill health, but also may allow for the development of respiratory, digestive and other systemic symptoms. One may also become predisposed to developing sensitivities to foods and chemicals in the environment. Such "allergies" may in turn cause the membranes of the nose, throat, ear, bladder and intestinal tract to swell and develop infection.



The pathogenic, mycelial form of Candida growing on a slide under a darkfield microscope. It is only possible to see this if one leaves the slide with blood for longer than 12 hours so that the blood oxidises and becomes more acidic. This is why many practitioners purport not to be able to see candida growing under a darkfield microscope because they are viewing the blood immediately they take the blood when the blood pH is 7.2-7.4.

These conditions may lead the physician to prescribe a "broad spectrum" antibiotic, which may then further promote the overgrowth of Candida and strengthen the existing negative chain of events, leading to further stress on the immune system and increased Candida-related problems.

Heavy metals are also found in higher amounts when Candida is present as the Candida yeast stores the metals which are then released when treatment begins. Therefore, it is wise to begin a heavy metal chelating programme concomitantly with the Candida protocol (see www.detoxmetals.com for such a programme using natural chelating agents).

Toxic waste from Candida infestations can also be absorbed into the bloodstream causing "Yeast Toxin Hypersensitivity", leading to symptoms such as anxiety, depression and impaired intellectual functioning.

Occupational exposure studies have found that mercury impairs the body's ability to kill Candida albicans by impairment of the lytic activity of neutrophils and myeloperoxidase in workers whose mercury excretion levels are within current safety limits.

Such levels of mercury exposure were also found to inhibit cellular respiratory burst. A population of plant workers with average mercury excretion of 20ug/g creatinine was found to have long lasting impairment of neutrophil function. Immune Th1 cells inhibit candida by cytokine related activation of macrophages and neutrophils.

Development of Th2 type immune responses deactivates such defences. Mercury inhibits macrophage and neutrophil defence against candida by its effects on Th1 and Th2 cytokine effects. Candida overgrowth results in production of the highly toxic canditoxin and ethanol, which are known to cause fatigue, toxicity, and depressive symptoms.

Another study found such impairment of neutrophils decreases the body's ability to combat viruses such as those that cause heart damage, resulting in more inflammatory damage.

Signs of infection

The result of heightened Candida overgrowth is a list of adverse symptoms of considerable length. Basically, the characteristics of Candida overgrowth fall under three categories, those affecting:

1. Gastrointestinal and genitourinary tracts
2. Allergic responses, and
3. Mental/emotional manifestations.

Initially the signs will show near the sights of the original yeast

colonies. Most often the first signs are seen in conditions such as nasal congestion and discharge, nasal itching, blisters in the mouth, sore or dry throat, abdominal pain, belching, bloating, heartburn, constipation, diarrhoea, rectal burning or itching, vaginal discharge, vaginal itching or burning, increasingly worsening symptoms of PMS, prostatitis, impotence, frequent urination, burning on urination, bladder infections.

But, if the immune system remains weak long enough, Candida can spread to all parts of the body causing an additional plethora of problems such as fatigue, drowsiness, uncoordination, lack of concentration, mood swings, dizziness, headaches, bad breath, coughing, wheezing, joint swelling, arthritis, failing vision, spots in front of the eyes, ear pain, deafness, burning or tearing eyes, muscle aches, depression, irritability, sweet cravings, increasing food and chemical sensitivities, numbness and tingling, cold hands and feet, asthma, hay fever, multiple allergies, hives and rashes, eczema, psoriasis, chronic fungal infections like athlete's foot, ringworm and fingernail/ toenail infections.

In addition, 79 different toxic products are released by Candida, which in itself places a considerable burden on the immune system. These get into the bloodstream and travel to all parts of the body where they may give rise to a host of adverse symptoms. Yeasts in the body produce a by-product called acetaldehyde, a toxic substance resulting in several health consequences. In fact, acetaldehyde is the compound that produces the symptoms in an alcohol "hang-over."

Molybdenum plays a role as a cofactor in helping break down acetaldehyde to a form that actually provides the body with energy.* Molybdenum plays a large role in the detoxification pathway for acetaldehyde in the human body. There are dozens of known toxins released be yeast in the body. This damages and overworks both the liver and the immune system as the body tries to detoxify these poisons.

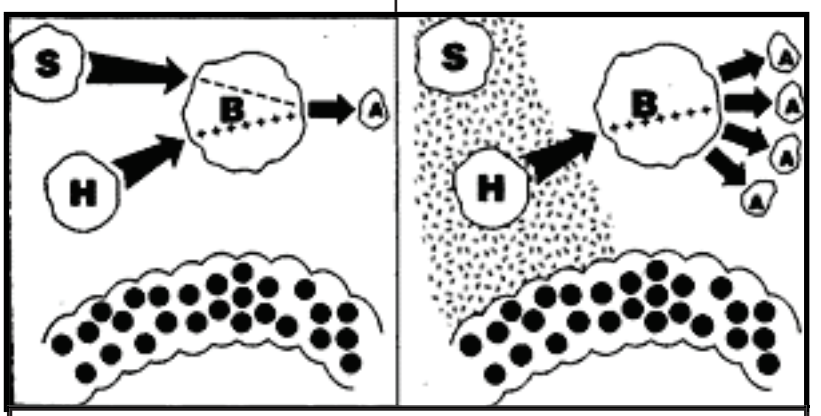
In Candida overgrowth, the yeast colonies can dig deep into intestinal walls, damaging the bowel wall in their colonization. The invasive Candida filaments produce disease affecting the entire body in a number of ways:

Destruction of the intestinal membrane, allowing for:

• Severe leaks of toxins from activity of undesirable micro-organisms within the layers of encrusted faecal matter into the bloodstream causing a variety of symptoms and aggravating many pre-existing conditions.

Under the anaerobic conditions of the colon, Candida itself will produce a number of toxins by fermenting sugars.

• Absorption of incompletely digested dietary proteins. These are extremely allergenic and may produce a large spectrum of allergic reactions. Food allergies are very common with Candidiasis, as is environmental hypersensitivity (to smoke, auto exhaust, natural gas, perfumes, air pollutants), probably due to Candida filaments infiltrating lung and sinus membranes.



How Yeast Toxins Injure the Immune System

S = Suppressor cell; H = Helper cell; B = B-cell

First diagram (above left): Yeast and intestinal lactobacilli bacteria in balance = normal immune function. A balance between intestinal lactobacilli bacteria and yeast allow for normal immune lymphocyte function: helper cells stimulate the B-cells to make antibodies, whereas suppressor cells appropriately oppose B-cell antibody production. Antibody production is in balance.

Second diagram (above right): Overgrowth of intestinal yeast, release of toxins into the bloodstream, and altered immune function. Intestinal yeast overgrowth and yeast toxins released into the bloodstream inhibit suppressor cell function. Stimulation of antibody production by helper cells is now unopposed, and inappropriate antibody production occurs. Here we have a heightened state of allergy, as well as an increased susceptibility to autoimmune conditions.

• Migration of Candida itself into the bloodstream. Once in the blood, it has access to all body tissues and may cause various gland or organ dysfunctions, weakening the entire system and further lowering resistance to other diseases

Candida can also attack the immune system, causing suppressor cell disease, in which the immune system produces antibodies to everything at the slightest provocation, resulting in extreme sensitivities.

Finally, Candida overgrowth can be dangerous if not controlled. The persistent, constant challenge to the immune system by an ever-increasing, long-term overgrowth of Candida can eventually serve to wear down the immune system and cause a seriously weakened capacity for resistance to disease.

Women are more likely to get Candida overgrowth than are men. This is related to the female sex hormone progesterone which is elevated in the last half of the menstrual cycle. Progesterone increases the amount of glycogen (animal starch, easily converted to sugar) in the vaginal tissues which provide an ideal growth medium for Candida. Progesterone levels also elevate during pregnancy. Men are affected less frequently but are by no means invulnerable.

The second part of this article will appear in the next issue and will focus on treatment and case histories.

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