

What is Cancer?  
What Causes Cancer?

World AIDS Day  
2012

Ipoh Echo's  
Eye Health

Botswana's Premier Health Journal

# Diagnos**t**ics

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ISSUE No. 4 Fourth Quarter 2012

**WORLD AIDS DAYS**  
**"GETTING TO ZERO"**



## Cancer

What is Cancer?  
What Causes Cancer?

Eye Health:  
World Sight Day 2012



# A Taste of the Good Life

**A partnership between Ministry of Local Government, the Department of Social Services and SmartSwitch Botswana is making food grants much more effective in grassroots communities. Here's how.**

We all know what technology is supposed to do. Liberate our society. Improve our standards of living. Drive us forward. Make things easier in a world of difficulty and stress.

That is, of course, if you're one of the privileged few who can afford the luxury of technology.

For the rest of society here in Botswana, the grassroots population living out their lives in villages and remote areas, technology has been, up until recently, an abstract concept with limited relevance. In such severe circumstances, such hardship and scarcity and despair, where the main concern of the day is just to put a meal on the table come dinner time, high-tech solutions seem out of place. Right?

Wrong.

A public-private sector partnership between Ministry of Local Government, Department of Social Services and SmartSwitch Botswana has changed all of that.

## THE FOOD GRANT

'Many people, especially the privileged, have no idea how many households in Botswana survive solely on the Government-funded Food Grant,' says SmartSwitch Botswana Chief Executive Officer, Kevin Duke.

'We're talking about at least 50 000 beneficiaries, receiving a total of P25 million in food aid a month,' says Duke.

The Food Grant is not a new institution. The Ministry of Local Government and the Department of Social Services have been in charge of feeding Botswana's most destitute citizens for many years now. But the old system (the 'Food Basket' scheme) had many flaws.

That's now ancient history. With the help of new technology, Government can now ensure that the allocation of resources goes directly to those who need it most.

## THE FOOD COUPON PROJECT

'We equip people living in destitute conditions, the unemployed, the disabled, home-based care patients, orphans and vulnerable children with their own, personally-identifiable smart cards. It's a coupon system that helps them to get the most out of the Food Grant,' Duke explains.

'We call it the Food Coupon Project.'

So, why is this smart-card technology such a leap forward for these people?

## ADVANTAGES

Poverty, as a social condition, is not just about being poor, then. It's about feeling poor.

'The new system – which we've pioneered along with our visionary partners at Ministry of Local Government and Department of Social Services – fundamentally changes the way grassroots communities live and see themselves,' he says.

Duke continues, 'In the past, the food basket system helped. But it didn't work as well as it could have, not by a long way. Beneficiaries didn't have any choice as to which foods they could enjoy. They could only pick up their baskets at month-end. They had to travel, sometimes long distances, then queue in the sun, then carry heavy baskets back home. They had to eat all the meat and dairy products straight away, before they went rancid.'

Vendors had no incentive to give any decent customer service, and were known to supply over-priced goods that had passed the expiry date. Plus, of course, the tender-based system was wide open to corruption.

Now that all of the Food Grant beneficiaries have their very own smart card – which looks and functions just like an ATM card, onto which their monthly funds are stored safely – all the problems which plagued the old Food Basket system have gone away.

Food Grant beneficiaries now get treated like customers. They can choose where they want to shop (over 1000 countrywide outlets have been equipped with the necessary technology to swipe the



## 4 fast facts about the Food Coupon project

The new system is not only a game-changer for the impoverished communities who rely on it. It's good news for the whole country. Here's why.

### It's all about transparency

The new Food Coupon system immediately uncovered about twenty thousand 'ghost beneficiaries': people who were claiming food every month even though they had no legitimate right to do so.

### Empowering grassroots entrepreneurs

Only citizen-owned, small scale food stores may be equipped with a smart card reader. Supermarket chains are not included in the project. This means that the money stays in the community.

### Massive countrywide spread

At the moment, the Food Coupon system is running efficiently in 232 villages and over 1 000 stores all over Botswana.

### Financial services for the unbanked

The smart cards give people their first taste of real-world financial service, thus helping rural to overcome fear and suspicion of the banks.

cards) and they can choose what food they want to purchase – just like anyone else. And they can choose how: if they want smaller quantities to ensure freshness and quality, they can.

## SAVING GOVERNMENT RESOURCES

Do more with less is the public sector battle-cry at the moment. And rightly so.

'It's very important that the Food Coupon System saves money for the Government,' emphasises Duke.

'The initial investment made on the cards, the card readers and the management of the whole system – all that has been made back many times over. The old Food Basket system was not just inefficient and insensitive. It was also abused. And those abuses cost the Government tens of millions over the years. Thankfully, that's all in the past now,' he explains.

## REAL SOCIAL WORK

Social workers out in the rural areas have become a lot more effective now that the new Food Coupon Project is up and running. It takes the cumbersome administrative weight off their shoulders as they no longer have to spend the bulk of their time pushing Food Grant paperwork.

Instead, social workers can now focus on their professional duties, such as spending quality time with the destitute, home based care patients, orphans, vulnerable children – and giving them the psychosocial support they so desperately need.

'The foundation on which this project is built can be summarised in one word: dignity. We want to help restore dignity to the beneficiaries of the Food Grant. That's really the driving force of everything we do here,' he concludes with a smile.

## Testimonial – Boi (Oodi)

*I remember the food trucks. They would come to the main kgotla in Oodi once a month. We would all queue up there, with empty wheelbarrows, waiting in the sun. People of all ages, we all gathered patiently. The trucks were not reliable. I remember that quite often we would wait two or three days for food.*

*I remember other villagers, the ones with jobs, would pass by. I could hear them remark sometimes, or see them whispering to each other. They knew we had to depend on the government to feed us. For me, it was a constant reminder that my parents had passed away. There were so many of us receiving food baskets, but I always felt alone in that line.*

*When the trucks came, I remember carrying all that food back home. We didn't have a refrigerator, so I had to ask the neighbours to use theirs. In return, they expected a cut from our rations. We also had to be careful of thieves, because they knew we had food in the house.*

*Often the meat was not good. Too many bones, and slightly sour from the heat. The vegetables would spoil too soon. I very quickly learned how to ration the food and make it last for a month, as best we could. Important lessons for a teenage girl.*

*And then things changed. We were told to report to the council, and each of us was given a card. The card, we were told, would allow us to visit the local stores and buy the food we wanted, when we wanted.*

*I immediately felt an improvement in the quality of my life. With my card, I could shop like a normal person. I chose the brands I wanted, and I could buy a bag at a time, without having to worry about the heavy load home, our storage problem – or the thieves. Everything we ate from that point on was fresh. I couldn't believe how much choice we had.*

*As an orphan, the food coupon system completely changed my views of the world. Suddenly, I felt like I belonged in the community. I could concentrate better at school. No longer was I self-conscious. Nobody was teasing me.*

*Having that sense of hope and optimism and faith helped to set me up for the bright future that I now experience and take for granted today. I'm moving forward in my life and career – and I'm not sure if things would have worked out this well if not for the food coupon system.*

## Getting the most out of the food grant

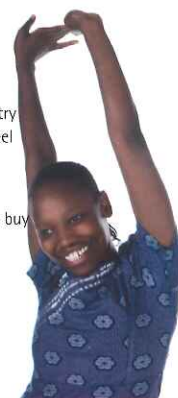
Everyone is singing the praises of the new Food Coupon system.

### Food Basket system (before)

- Had no choice of food at all
- Rotting food was commonplace
- Collection of food was fixed at given locations and dates. No flexibility
- Problems with corruption in tender processes
- 'Ghost' beneficiaries all over the country
- Quickly made Food Grant recipients feel inferior

### Food Coupon project (after)

- Beneficiaries can now choose what to buy
- Much more freshness and quality
- Had no choice of food at all
- Can shop at any time of the month
- Transparent process – no more loopholes
- Optimal allocation of Government resources





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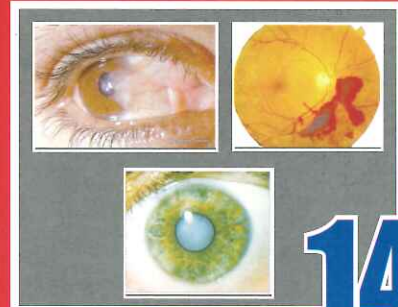
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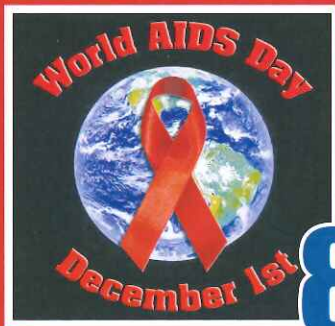
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Diagnofirm Now Offering TB LAM Antigen Testing:  
An Effective Rule-In Test For TB/HIV Co-Infection



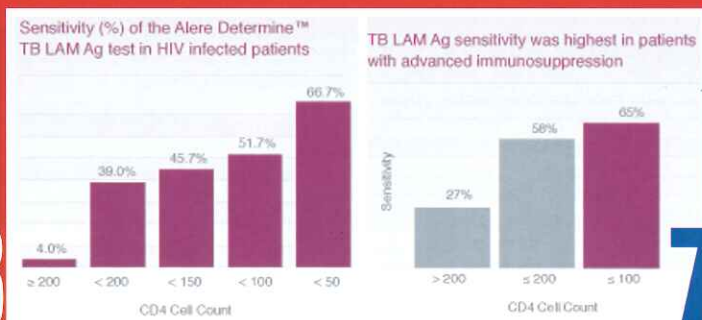
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Food Coupon Project is a Relief for Social Workers

## Dear Readers

Diagnostics has taken some interesting stories showing how decisions in the health field can impact health in unexpected ways, though blood tests are usually not indicated, unless the health-care provider has concerns about the diagnosis.

For instance, Cancer harms the body when damaged cells divide uncontrollably to form lumps or masses of tissue called tumors (except

in the case of leukemia where cancer prohibits normal blood function by abnormal cell division in the blood stream).

Some cancer prevention is based on systematic screening in order to detect small irregularities or tumors as early as possible even if there are no clear symptoms present. Breast self-examination, mammograms, testicular self-examination, and Pap smears are common screening methods for various cancers.

In this issue we take a deep look on cancer awareness and how it's treated and managed.

As we take this festive break of year 2012 and welcoming 2013, we at Diagnostics, wish all our esteemed readers the very best during this season.

Merry Christmas & Happy New Year.

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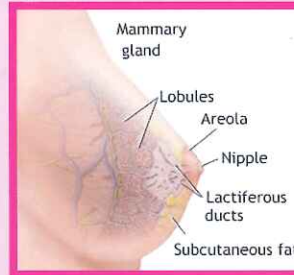


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# What is Cancer?

## What Causes Cancer?



Cancer is a class of diseases characterized by out-of-control cell growth. There are over 100 different types of cancer, and each is classified by the type of cell that is initially affected. Cancer harms the body when damaged cells divide uncontrollably to form lumps or masses of tissue called tumors (except in the case of leukemia where cancer prohibits normal blood function by abnormal cell division in the blood stream). Tumors can grow and interfere with the digestive, nervous, and circulatory systems, and they can release hormones that alter body function. Tumors that stay in one spot and demonstrate limited growth are generally considered to be benign.

More dangerous, or malignant, tumors form when two things occur:

- a cancerous cell manages to move throughout the body using the blood or lymph systems, destroying healthy tissue in a process called invasion

- that cell manages to divide and grow, making new blood vessels to feed itself in a process called angiogenesis.

When a tumor successfully spreads to other parts of the body and grows, invading and destroying other healthy tissues, it is said to have metastasized. This process itself is called metastasis, and the result is a serious condition that is very difficult to treat.

### How cancer spreads

It has something to do with their adhesion (stickiness) properties. Certain molecular interactions between cells and the scaffolding that holds them in place (extracellular matrix) cause them to become unstuck at the original tumor site, they become dislodged, move on and then reattach themselves at a new site. This discovery is important because cancer mortality is mainly due to metastatic tumors, those that grow from cells that have traveled from their original site to another part of the body.

Finding a way to stop cancer cells from sticking to new sites could interfere with metastatic disease, and halt the growth of secondary tumors.

### What causes cancer?

Cancer is ultimately the result of cells that uncontrollably grow and do not die. Normal cells in the body follow an orderly path of growth, division, and death. Programmed cell death is called apoptosis, and when this process breaks down, cancer begins to form. Unlike regular cells, cancer cells do not experience programmatic death and instead continue to grow and divide. This leads to a mass of abnormal cells that grows out of control.

### Genes - the DNA type

Cells can experience uncontrolled growth if there are damages or mutations to DNA, and therefore, damage to the genes involved in cell division.

Four key types of gene are responsible for the cell division process: oncogenes tell cells when to divide, tumor suppressor genes tell cells when not to divide, suicide genes control apoptosis and tell the cell to kill itself if something goes wrong, and DNA-repair genes instruct a cell to repair damaged DNA. Cancer occurs when a cell's gene mutations make the cell unable to correct DNA damage and unable to commit suicide. Similarly, cancer is a result of mutations that inhibit oncogene and tumor suppressor gene function, leading to uncontrollable cell growth.

Carcinogens  
Carcinogens are a class of substances that are directly responsible for damaging DNA, promoting or aiding cancer. Tobacco, asbestos, arsenic, radiation such as gamma and x-rays, the sun, and compounds in car exhaust fumes are all examples of carcinogens. When our bodies are exposed to carcinogens, free radicals are formed that try to steal electrons from other molecules in the body. These free radicals damage cells and affect their ability to function normally.

### Genes - the family type

Cancer can be the result of a genetic predisposition that is inherited from family members. It is possible to be born with certain genetic mutations or a fault in a gene that makes one statistically more likely to develop cancer later in life.

### Other medical factors

As we age, there is an increase in the number of possible cancer-causing mutations in our DNA. This makes age an important risk factor for cancer. Several viruses have also been linked to cancer such as: human papillomavirus (a cause of cervical cancer), hepatitis B and C (causes of liver cancer), and Epstein-Barr virus (a cause of some childhood cancers). Human immunodeficiency virus (HIV) - and anything else that suppresses or weakens the immune system - inhibits the body's ability to fight infections and increases the chance of developing cancer.

### What are the symptoms of cancer?

Cancer symptoms are quite varied and depend on where the cancer is located, where it has spread, and how big the tumor is. Some cancers can be felt or seen through the skin - a lump on the breast or testicle can be an indicator of cancer in those locations. Skin cancer (melanoma) is often noted by a change in a wart or mole on the skin. Some oral cancers present white patches inside the mouth or white spots on the tongue. Other cancers have symptoms that are less physically apparent. Some brain tumors tend to present symptoms early in the disease as they affect important cognitive functions.

Pancreas cancers are usually too small to cause symptoms until they cause pain by pushing against nearby nerves or interfere with liver function to cause a yellowing of the skin and eyes called jaundice. Symptoms also can be created as a tumor grows and pushes against organs and blood vessels. For example, colon cancers lead to symptoms such as constipation, diarrhea, and changes in stool size. Bladder or prostate cancers cause changes in bladder function such as more frequent or infrequent urination.

As cancer cells use the body's energy and interfere with normal hormone function, it is possible

to present symptoms such as fever, fatigue, excessive sweating, anemia, and unexplained weight loss. However, these symptoms are common in several other maladies as well. For example, coughing and hoarseness can point to lung or throat cancer as well as several other conditions. When cancer spreads, or metastasizes, additional symptoms can present themselves in the newly affected area. Swollen or enlarged lymph nodes are common and likely to be present early. If cancer spread to the brain, patients may experience vertigo, headaches, or seizures. Spreading to the lungs may cause coughing and shortness of breath. In addition, the liver may become enlarged and cause jaundice and bones can become painful, brittle, and break easily. Symptoms of metastasis ultimately depend on the location to which the cancer has spread.

### How is cancer classified?

There are five broad groups that are used to classify cancer.

- Carcinomas are characterized by cells that cover internal or external parts of the body such as lung, breast, and colon cancer.
- Sarcomas are characterized by cells that are located in bone, cartilage, fat, connective tissue, muscle, and other supportive tissues.
- Lymphomas are cancers that begin in the lymph nodes and immune system tissues.
- Leukemias are cancers that begin in the bone marrow and often accumulate in the bloodstream.
- Adenomas are cancers that arise in the thyroid, the pituitary gland, the adrenal gland, and other glandular tissues.

Cancers are often referred to by terms that contain a prefix related to the cell type in which the cancer originated and a suffix such as -sarcoma, -carcinoma, or just -oma. Common prefixes include:

Adeno- = gland  
Chondro- = cartilage

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# Diagnofirm Now Offering TB LAM Antigen Testing: An Effective Rule-In Test For TB/HIV Co-Infection



There is increasing concern over TB/HIV co-infection. Since the 1980s, the HIV epidemic has fuelled the resurgence of TB cases and deaths. An estimated one third of the 40 million people living with HIV/AIDS worldwide are co-infected with TB and without proper treatment, approximately 90% of those living with HIV die within months of contracting TB [1]. In 2010 there were 1.1 million new TB cases among HIV-infected people and 350,000 deaths from HIV-associated TB [2].

Low and middle-income countries bear the burden of this disease, with the countries of sub-Saharan Africa accounting for more than 80% of the world's TB/HIV co-infections [3].



## Diagnostic methods

TB is notoriously difficult to diagnose in HIV-infected people and the effective control of TB is impeded by a lack of rapid, accurate and affordable diagnostic methods.

Two diagnostic methods predominate in the routine diagnosis of active TB. Sputum smear microscopy is the most commonly used diagnostic testing method worldwide. It can detect the most infectious cases and is highly specific in high prevalence settings. Most importantly, smear microscopy is inexpensive. However, the method lacks sensitivity in those who are HIV positive, detecting less than half of TB/HIV co-infected cases [4]. It also often requires repeat patient visits (two to three) before diagnosis is reached.

Mycobacterial culture is the current, gold-standard method for diagnosis of active TB. It is more sensitive than smear microscopy, enables TB species to be identified and allows for drug susceptibility testing. However, the method is not rapid, taking two to six weeks, rather than days, to reach a result. Additionally it is not suitable for use in resource limited settings, as it requires specialist personnel, equipment, water and electricity.

In 2010 the WHO endorsed a novel rapid test for tuberculosis, the Xpert® MTB/RIF assay (Cepheid). Using sputum samples, this fully automated molecular assay simultaneously detects *Mycobacterium tuberculosis* and rifampicin resistance, providing results in < 2 hours. The WHO has recommended the test be used as a first line diagnostic for individuals with suspected TB/HIV co-infection. In this population studies have demonstrated sensitivity ranging from 44% to 75.9% from one sputum sample [5]. It is however, an expensive test suitable only for use at the district and sub-district level and requires certain operation conditions in order for successful implementation. These restrictions will inhibit widespread uptake of the technology, leaving diagnostic gaps for the most vulnerable populations.

The development of new diagnostic methods for the detection of active TB, particularly for populations in which HIV/TB co-infection is high, has proved challenging. However, new commercially available Lipoarabinomannan (LAM) antigen tests, such as the Alere Determine™ TB LAM Ag rapid test (Alere Inc.), have proved very useful as diagnostic tools for the detection of TB in those co-infected with HIV.

LAM is a major lipopolysaccharide constituent of the cell wall of *Mycobacterium tuberculosis*. During the degradation of bacterial cells, LAM antigen enters the bloodstream and is filtered out by the kidneys, passing into the urine. The detection of LAM in urine has the advantage of being able to provide a diagnostic result independent of the location of infection. A sputum based sample is only useful for the diagnosis of pulmonary TB, whereas urine-based LAM antigen testing may provide an indication of both pulmonary and extrapulmonary TB.

Researchers have sought to establish the effectiveness of the rapid TB LAM Ag diagnostic test in people suspected of having TB. Increasingly, studies have revealed that when used as a general screening tool, the rapid TB LAM Ag test sensitivity is significantly lower in subjects who are HIV negative when compared to HIV positive subjects. This is not surprising, given that levels of TB bacteria in subjects who are HIV positive are likely to be higher, resulting in an increase in LAM antigen in the urine.

In two recent publications, researchers have found that TB LAM Ag sensitivity increases with advanced immunosuppression [5,6]. CD4 cell count is commonly used as a method of monitoring the status of the immune system in HIV+ subjects. CD4 count decreases as HIV infection proceeds through the clinical stages towards AIDS.

When CD4 count reaches 200 cells/ $\mu$ L or fewer, the patient's immune response begins to fail resulting in an increased chance of contracting an opportunistic infection such as TB.

For those subjects who are co-infected with TB/HIV, as CD4 count decreases, resulting in advanced immunosuppression and an increase in TB bacteria in the body, the potential for LAM concentration to meet detectable levels is increased.

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# What is Cancer? What Causes Cancer?

Erythro- = red blood cell  
Hemangio- = blood vessels  
Hepato- = liver

Lipo- = fat  
Lympho- = white blood cell  
Melano- = pigment cell  
Myelo- = bone marrow  
Myo- = muscle  
Osteo- = bone  
Uro- = bladder  
Retino- = eye  
Neuro- = brain

## How is cancer diagnosed and staged?

Early detection of cancer can greatly improve the odds of successful treatment and survival. Physicians use information from symptoms and several other procedures to diagnose cancer. Imaging techniques such as X-rays, CT scans, MRI scans, PET scans, and ultrasound scans are used regularly in order to detect where a tumor is located and what organs may be affected by it.

Doctors may also conduct an endoscopy, which is a procedure that uses a thin tube with a camera and light at one end, to look for abnormalities inside the body. Extracting cancer cells and looking at them under a microscope is the only absolute way to diagnose cancer. This procedure is called a biopsy. Other types of molecular diagnostic tests are frequently employed as well. Physicians will analyze your body's sugars, fats, proteins, and DNA at the molecular level. For example, cancerous prostate cells release a higher level of a chemical called PSA (prostate-specific antigen) into the bloodstream that can be detected by a blood test. Molecular diagnostics, biopsies, and imaging techniques are all used together to diagnose cancer.

After a diagnosis is made, doctors find out how far the cancer has spread and determine the stage of the cancer. The stage determines which choices will be available for treatment and informs prognoses. The most common cancer staging method is called the TNM system. T (1-4) indicates the size and direct extent of the primary tumor, N (0-3) indicates the degree to which the cancer has spread to nearby lymph nodes, and M (0-1) indicates whether the cancer has metastasized to other organs in the body. A small tumor that has not spread to lymph nodes or distant organs may be staged as (T1, N0, M0), for example.

TNM descriptions then lead to a simpler categorization of stages, from 0 to 4, where lower numbers indicate that the cancer has spread

less. While most Stage 1 tumors are curable, most Stage 4 tumors are inoperable or untreatable.

## How is cancer treated?

Cancer treatment depends on the type of cancer, the stage of the cancer (how much it has spread), age, health status, and additional personal characteristics. There is no single treatment for cancer, and patients often receive a combination of therapies and palliative care. Treatments usually fall into one of the following categories: surgery, radiation, chemotherapy, immunotherapy, hormone therapy, or gene therapy.

### Surgery

Surgery is the oldest known treatment for cancer. If a cancer has not metastasized, it is possible to completely cure a patient by surgically removing the cancer from the body.

This is often seen in the removal of the prostate or a breast or testicle. After the disease has spread, however, it is nearly impossible to remove all of the cancer cells. Surgery may also be instrumental in helping to control symptoms such as bowel obstruction or spinal cord compression.

### Radiation

Radiation treatment, also known as radiotherapy, destroys cancer by focusing high-energy rays on the cancer cells. This causes damage to the molecules that make up the cancer cells and leads them to commit suicide. Radiotherapy utilizes high-energy gamma-rays that are emitted from metals such as radium or high-energy x-rays that are created in a special machine. Early radiation treatments caused severe side-effects because the energy beams would damage normal, healthy tissue, but technologies have improved so that beams can be more accurately targeted. Radiotherapy is used as a standalone treatment to shrink a tumor or destroy cancer cells (including those associated with leukemia and lymphoma), and it is also used in combination with other cancer treatments.

### Chemotherapy

Chemotherapy utilizes chemicals that interfere with the cell division process - damaging proteins or DNA - so that cancer cells will commit suicide. These treatments target any rapidly dividing cells (not necessarily just cancer cells), but normal cells usually can recover from any chemical-induced damage while cancer cells cannot.

Chemotherapy is generally used to treat cancer that has spread or metastasized because the medicines travel throughout the entire body. It is a necessary treatment for some forms of leukemia and lymphoma. Chemotherapy treatment occurs in cycles so the body has time to heal between doses.

However, there are still common side effects such as hair loss, nausea, fatigue, and vomiting. Combination therapies often include multiple types of chemotherapy or chemotherapy combined with other treatment options.

### Immunotherapy

Immunotherapy aims to get the body's immune system to fight the tumor. Local immunotherapy injects a treatment into an affected area, for example, to cause inflammation that causes a tumor to shrink. Systemic immunotherapy treats the whole body by administering an agent such as the protein interferon alpha that can shrink tumors. Immunotherapy can also be considered non-specific if it improves cancer-fighting abilities by stimulating the entire immune system, and it can be considered targeted if the treatment specifically tells the immune system to destroy cancer cells.

These therapies are relatively young, but have had success with treatments that introduce antibodies to the body that inhibit the growth of breast cancer cells.

Bone marrow transplantation (hematopoietic stem cell transplantation) can also be considered immunotherapy because the donor's immune cells will often attack the tumor or cancer cells that are present in the host.

### Hormone therapy

Several cancers have been linked to some types of hormones, most notably breast and prostate cancer. Hormone therapy is designed to alter hormone production in the body so that cancer cells stop growing or are killed completely. Breast cancer hormone therapies often focus on reducing estrogen levels (a common drug for this is tamoxifen) and prostate cancer hormone therapies often focus on reducing testosterone levels. In addition, some leukemia and lymphoma cases can be treated with the hormone cortisone.

### Gene therapy

The goal of gene therapy is to replace damaged genes with ones that work to address a root cause



of cancer: damage to DNA. For example, trying to replace the damaged gene that signals cells to stop dividing (the p53 gene) with a copy of a working gene.

Other gene-based therapies focus on further damaging cancer cell DNA to the point where the cell commits suicide. Gene therapy is a very young field and has not yet resulted in any successful treatments.

## How can cancer be prevented?

Cancers that are closely linked to certain behaviors are the easiest to prevent. For example, choosing not to smoke tobacco or drink alcohol significantly lower the risk of several types of cancer - most notably lung, throat, mouth, and liver cancer. Even if you are a current tobacco user, quitting can still greatly reduce your chances of getting cancer.

Skin cancer can be prevented by staying in the shade, protecting yourself with a hat and shirt when in the sun, and using sunscreen. Diet is also an important part of cancer prevention since what we eat has been linked to the disease. Physicians recommend diets that are low in fat and rich in fresh fruits and vegetables and whole grains.

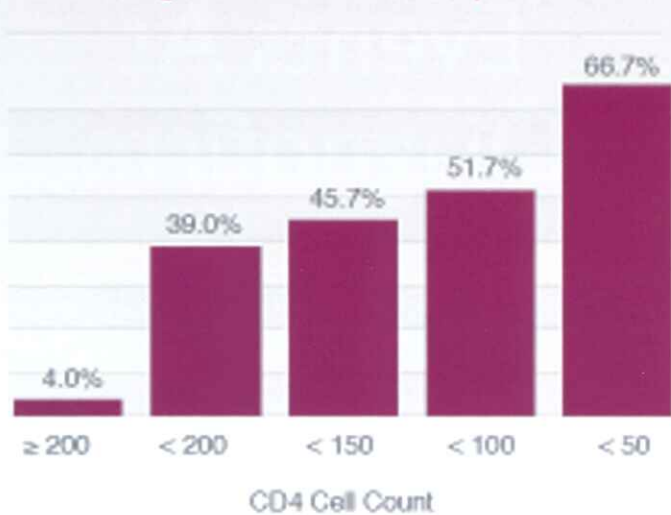
Certain vaccinations have been associated with the prevention of some cancers. For example, many women receive a vaccination for the human papillomavirus because of the virus's relationship with cervical cancer. Hepatitis B vaccines prevent the hepatitis B virus, which can cause liver cancer.

Some cancer prevention is based on systematic screening in order to detect small irregularities or tumors as early as possible even if there are no clear symptoms present. Breast self-examination, mammograms, testicular self-examination, and Pap smears are common screening methods for various cancers.



# Diagnofirm Now Offering TB LAM Antigen Testing: An Effective Rule-In Test For TB/HIV Co-Infection

Sensitivity (%) of the Alere Determine™ TB LAM Ag test in HIV infected patients



When TB LAM Ag sensitivity was stratified by CD4 cell count both Lawn et al [5] and Peter et al [6] demonstrated optimal sensitivity in HIV positive patients with advanced immunosuppression.

In addition, both studies demonstrated TB LAM Ag to be highly specific and to have sensitivity substantially superior to sputum smear microscopy in patients with CD4 cell counts < 100 cells/ $\mu$ L.

While TB LAM Ag testing does offer clinical utility in its own right, enhanced power comes through combination with methods such as sputum smear microscopy or the Xpert® MTB/RIF test. This additive effect was demonstrated by Lawn et al [5] showing an increase in sensitivity when results from the TB LAM Ag test were combined with sputum smear microscopy. Using this method, they were effectively able to rule-in 72.2% of TB suspects with a CD4 cell count less than 50.

A similar result was demonstrated by Peter et al [6] whereby they were able to rule-in 71% of M.tb culture positive patients with this diagnostic combination.

The addition of TB LAM Ag to the Xpert® MTB/RIF test also demonstrated an increase in sensitivity up to 83.3% in patients with CD4 cell count less than 50, and could help to identify more TB positive patients.

## Summary

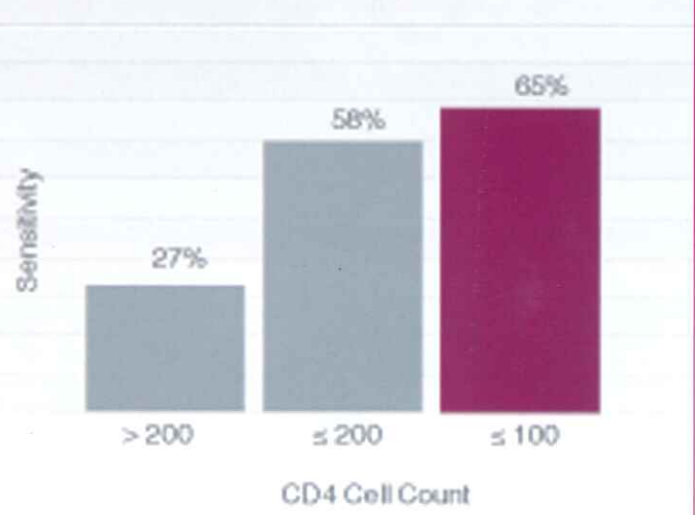
Based on these findings, the true utility of LAM antigen diagnostics is becoming clear, that is, the use of LAM antigen testing for TB suspects who present a smear negative microscopy result and who are HIV+ with a CD4 count < 200 cells/ $\mu$ L.

It is often in this very population of TB/HIV co-infected cases that conventional TB diagnostics often fail to yield a result, and in which hospitalisation rates and mortality are highest.

Current LAM antigen tests such as the Alere Determine™ TB LAM Ag test can provide results in < 25 minutes, enabling rapid follow up and treatment.

Meeting a need in HIV prevalent and resource limited settings, the assay could be an additional test to be carried out on hospitalised HIV infected patients or those accessing ART for the first time.

TB LAM Ag sensitivity was highest in patients with advanced immunosuppression



For HIV+ TB suspects with low CD4 counts, LAM testing may be better than sputum smear microscopy.

However, a combination of sputum smear and LAM testing provides good overall sensitivity.

Enhanced sensitivity has also been demonstrated through the combination of TB LAM with Xpert® MTB/RIF testing. Thus, LAM appears to be a good rule-in test in HIV-infected patients suspected of having TB who have low CD4 cell counts.

For more information on the TB LAM Ag test contact Diagnofirm at 3950007 or lab@diagnofirm.co.bw

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# Events At Diagnofirm



1.



2.



3.



4.



5.



6.



7.

1. Mr. John helping a client @ the Diabetes day

certificate of appreciation from Mr and Mrs Chand

2. Mr. Sibanda showing students cytology slides on the teaching microscope.

5. Mr. Bozo, Mr. Sibanda & Mr. John offering glucose testing to the public @ the Diabetes day.

3. Mr. Mugari (far left) explaining the processes in biochemistry department to some students from the UB medical school.

6. Itumeleng showing off his certificate of appreciation

4. Mma Mudenda receiving a

7. Manyanya receiving her certificate of appreciation from Mr Chand





# Pathology

# Update:

## Human papillomavirus E6/E7 mRNA testing

Screening for cervical cancer or cancer precursors using cytology (Papanicolaou staining or "Pap smear") was introduced in 1943 and is considered the most successful cancer screening program to date, but still have several limitations.

Human errors in sampling and interpretation contribute to the low sensitivity and poor reproducibility of cytology (30% to 80%).

This translates to a large number of false-negative results and the need for frequent screening which requires a high level of medical infrastructure and patient compliance.

The latest international and South African private sector guidelines propose the incorporation of molecular testing for HPV in screening and patient management.

Infection with the high risk types of HPV (hrHPV) is now a well-established cause of cervical cancer. HPV is the most common sexually transmitted infection worldwide.

Fortunately, more than 80% of genital HPV infections in women will be cleared by the host immune system within 24 to 36 months and will not result in cancer, because the viral DNA remains separate from the host DNA.

In the small subset of women with persistent infection integration may take place, where some viral genes become part of the host DNA. If these genes include the viral oncogenes E6 and E7 uncontrolled proliferation of the cell may lead to the development of pre-malignant cervical lesions (LSIL or HSIL) and eventually to cervical cancer.

Molecular tests for HPV infection are, like a Pap

smear, performed on a sample of exfoliated cervical cells, which can be obtained from liquid based cytology specimens or via a cervical brush which are placed in manufacturer specific transport mediums.

Protocols for testing on patient collected tampon specimens are in development.

Testing for HPV DNA focuses on detection of the cause of cervical cancer and can detect HPV-infected cells before they become cytologically abnormal.

It is thus far more sensitive than cytology and able to detect small numbers of HPV genomes. Unfortunately this excellent analytical sensitivity of HPV DNA testing makes it much less clinically specific.

DNA testing will also pick up those women who are infected with HPV but do not have severe dysplasia and thus have an 80% chance to clear the infection without treatment. HrHPV DNA positive women will require follow up and substantially more women will be referred for

colposcopy and biopsy, resulting in increased costs as well as unnecessary anxiety among these women. This potential for over diagnosis of lesions that would have regressed spontaneously complicates the proper place of DNA testing in screening algorithms.

The biggest advantages of DNA testing are the superior sensitivity for high-grade lesions over that of cytology alone and its very good negative predictive value. A woman who tests negative for hrHPV will not need cervical cancer screening for at least the next 6 years.

This approach works well in developing

countries with a low HPV infection prevalence (usually less than 10%). Unfortunately the prevalence of HPV infection in South Africa has increased dramatically over the last decade due to the HIV associated immune compromise in an increasing subset of women.

At least 21% of women in the general South African population are estimated to harbour cervical hrHPV infection, but the prevalence may be as high as 60% in certain high risk populations and 85% in women infected with HIV.

Thus, too many women in South Africa will require follow up to make this assay an affordable and feasible option.

Several assays have been designed to detect messenger RNA (mRNA) of the E6/E7 oncogenes. Expression of E6/E7 mRNA increases with the severity of the lesion.

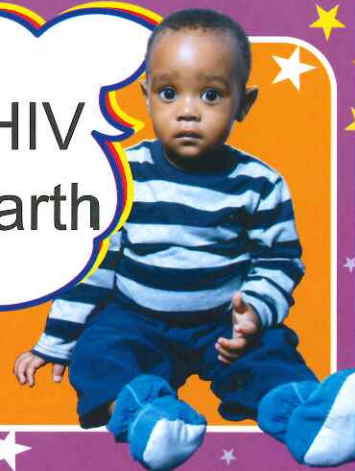
In HSIL and cervical carcinoma high level expression is present due to the associated integration of these genes into the host's DNA. Expression in LSIL lesions is low.

These tests have high clinical specificity for detecting disease and may also predict which women with LSIL or ASCUS has the potential to progress to cancer. The lower number of women testing positive with the mRNA test compared to DNA test results in fewer women who will need follow up.

There is now enough scientific evidence to recommend replacing cytological screening with tests for markers of HPV infection associated with disease progression i.e. HPV E6/E7 mRNA.

Source: Toqa Molecular Biology Laboratory

Protect your baby, get them tested for HIV early. Early diagnosis puts them on a path to life saving Treatment.



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# World AIDS Day 2012

The United Nations' (UN) World AIDS Day

is held on December 1 each year to honor AIDS victims. It also focuses on issues surrounding HIV (human immunodeficiency virus) and AIDS (acquired immune deficiency syndrome).

## What do people do?

World AIDS Day is the focal point of the World AIDS Campaign, which is active all year round. On December 1, there are many health education campaigns that promote the day. Anti-discrimination activities are also launched on or around this date.

Many people hold events on World AIDS Day to remember people died of AIDS-related conditions.

## Public life

World AIDS Day is a global observance and not a public holiday.

## Background

AIDS stands for "acquired immune

deficiency syndrome" or "acquired immunodeficiency syndrome" and denotes a condition, which results from the damage done by HIV (human immunodeficiency virus) to the immune system. The condition was first identified in 1981 and the name "AIDS" was first introduced on July 27, 1982.

HIV can only be transmitted between people through direct contact of a mucous membrane or the blood stream with a bodily fluid. Hence, there has been a lot of stigma around the spread of HIV and people living with HIV and AIDS.

## Symbols

A simple red ribbon is one of the most widely recognized symbols of HIV and AIDS and the people who live with these conditions. The symbol was presented by the Visual AIDS Artists Caucus in 1991.

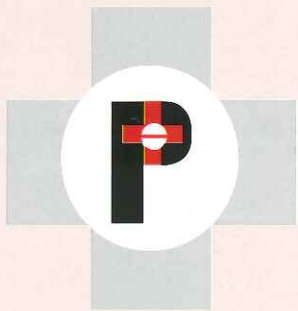
The individuals in this group wished to remain anonymous, keep the image copyright free and create a symbol to raise consciousness of HIV and AIDS. The red ribbon was originally intended

to be worn as a badge, but is now used in a wide variety of ways.

The symbol of UNAIDS, the Joint United Nations Programme on HIV/AIDS consists of the word "UNAIDS". The letters "U" and "N" are in black and the rest of letters are in red. To the left of the word 'UNAIDS' is a red ribbon superimposed on the symbol of the United Nations. This symbol is shown in black and consists of a projection of the globe centered on the North Pole surrounded by olive branches.

The symbol of the World AIDS Campaign consists of a sketched image of a red ribbon and the words "world aids campaign". The words "world" and "campaign" are in black and the word "aids" is in red. The ends of the ribbon merge into splashes of green, blue, purple and orange.

The splashes of color can be interpreted in a variety of ways, and often indicate the diversity of people living with HIV and AIDS.



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# Food Coupon Project Sparks Economic Growth

**A partnership between Ministry of Local Government, the Department of Social Services and SmartSwitch Botswana makes the Food Coupon System a powerful tool for local empowerment.**

Did you know that about *fifty thousand* Batswana can now feed themselves thanks to the Government-sponsored Food Coupon Project?

That's a vast number of people who would – if not for the intervention of the Food Coupons – be living in conditions of starvation.

The Batswana who come from privileged, middle class backgrounds have no idea how many people are currently benefitting from this initiative.

And that's a good thing. You see, the system protects the anonymity of its beneficiaries – many of whom are home-based care patients, orphans and destitutes.

All they need is a simple smart card – it looks just like an ATM card – which they can swipe to buy food at over 1 000 merchant locations in 232 villages all over Botswana. They can now wander the aisles, take their time and choose their favourite brands just like



## IS SHE ON THE FOOD COUPON PROJECT? (YOU'LL NEVER KNOW)

Technology pioneered by SmartSwitch Botswana means that she can buy food just like any normal shopper. It gives Food Coupon shoppers more dignity and anonymity.

She can also:

- Shop at different stores to take advantage of special offers
- Choose her family's favourite brands
- Shop daily, weekly or monthly. It's her choice
- Enjoy fresh meat, fruit, veg and dairy products
- Protect the value stored on her card from theft, because of the fingerprint recognition technology the system uses.

## TESTIMONIALS: MAKING BUSINESS SENSE FOR MERCHANTS



*'I prefer the SmartSwitch way over the old food basket tender system because under the old arrangement you could not win the tender for reasons you would never know about.'*

*The SmartSwitch method has levelled the playing field for us as business people. The coupon system has gone a long way in reducing the stereotype of an African businessperson being seen as a tenderpreneur.'*

**Ms MODIAGANE**

Nikomi General Dealer, Gabane

*'The service gets better every year. If our swiping devices need repairing, they are always quick to respond so that we minimize the loss of sales – and inconvenience to customers.'*

*We get excellent service from SmartSwitch, who has now become a valuable partner in growing our business.'*

**Ms ABDULLAH**

Abdulla's General Dealer, Gabane

*'Under the food basket system it took me three months to receive payments for food parcels sold. Compare that with the 48 hours under the current system. Much better.'*

*SmartSwitch has also helped me to become a very competitive entrepreneur. I have to actively negotiate for better prices and quality of goods from my suppliers which I can pass over to all my customers, food coupon and cash customers alike.'*

**Ms OTISITSWE**

Boikhutso General Dealer, Mogoditshane

*'The coupon system has given me an additional customer base resulting in positive growth for my business.'*

*Although there are many SmartSwitch POS devices in this area, I still realise meaningful income from the coupon system.'*

**Ms MODULE**

Modusa General Dealer, Gabane

any normal customer paying with cash.

'The system is at work even in Botswana's most remote villages. Gone are the days when men, women and children would have to queue for hours to collect a pile of rations to last the whole month. No more waiting. No more social stigma. And no more rotten food,' says SmartSwitch Botswana CEO, Kevin Duke.

### A TOOL FOR ECONOMIC EMPOWERMENT

The old system also forced food merchants to enter into laborious and corruption-riddled tender processes. That's all ancient history now.

'With tenders out the window, we've managed to eliminate the fraud, bribery and dishonest practices that were part and parcel of the old food basket system,' says Duke proudly.

The result is a more *efficient* allocation of government resources.

'We're now feeding more people with less money because we've closed all the loopholes,' says Duke.

About P25 million a month flows into the grassroots economy as a direct result of the Food Coupon Project. And the trilateral partners who spearhead and manage the system are determined that the benefits should go to Batswana who need them the most.

'Not any kind of merchant can sign up and start selling goods to Food Coupon beneficiaries,' says Duke.

'We have to protect the integrity of this social support mechanism. We want to help create wealth for small-scale, local merchants. Our focus is on general dealers who operate in rural or peri-urban areas. This is a serious priority for the Government.'

Duke explains, 'We do this so that local businesses can compete and grow. By exposing them to a customer base of fifty thousand Food Coupon beneficiaries countrywide, it's an excellent opportunity for small stores to sharpen their skills and compete.'

**SmartSwitch**  
SWITCH TO BE SMART



# World Sight Day Commemorations

12 October, 2011

GABORONE - Botswana will tomorrow join the rest of the world in commemorating World sight day.

The event will be held in Mahalapye with the local commemorations targeting cataract.

The National Prevention of Blindness coordinator, Ms Alice Lehaswa explained that the commemoration seeks to create public awareness about eye diseases. There would also be a launch of the cataract project campaign on the day.

The overall aim she said is to focus attention on global issues of avoidable blindness and visual impairment.

She said it is also intended to sensitize the community about the vision 2020 initiative which Botswana has signed to adopt.

Ms Lehaswa said they started cataract operations on October 7 in Mahalapye, conducted by India Ophthalmologists Sankara Nethralayer hospital.

The project is funded by India Botswana Chamber of Commerce Industry, a group of Indian business people based in Botswana working jointly with the government.

The group raised up to P1 million to source the ophthalmologists from Sankara Nethralayer and the government is providing the consumables such as equipment, and medication, while India is assisting with the technical knowhow.

Ms Lehaswa explained that the project whose aim is to operate at least 2 000 will be carried out until October 15. She said it will be continued in Maun, Molepolole and Serowe. She stated that they have already operated about 68 people.

One of the patients Ms Polokelo Motsumi 71, who has been blind for almost two years, proudly testified that the project has indeed made a significant impact in her life, saying she can now see after undergoing an operation last week Friday. BOPA

News Source: All local news stories were supplied by the Botswana Press Agency (BOPA)

# Alternative Approaches to Health

Homeopathy falls under the alternative approaches to medicine/health. In the Western culture, alternative approaches are classified as non-conventional mainly because they are not based on evidence gathered using scientific methods. However, there is a growing following and many people are beginning to turn to alternative medicine in order to complement their Western medical approaches.

According to Dr K. R. Renjith (Bachelor of Homeopathic Medicine and Surgery), "Alternative health systems are the second most used in the world after conventional medicine." Alternative approaches vary in their foundations and may incorporate or be derived from traditional medicine, folklore, spiritual beliefs, or newly conceived healing.

Examples of these approaches include herbalism, naturopathy, chiropractic medicine, traditional medicine, Ayurveda, meditation, yoga, biofeedback, hypnosis, homeopathy, acupuncture, nutritional-based therapies and other practices.

The list is endless as there is no culture that does not have healing methods that date back to humanity's early days. Alternative strategies can be classified into - biology-based practices, whole medical systems, mind-body medicine, manipulative and energy therapies.

Biology-based practices use substances found in nature such as herbs, foods, vitamins, and other natural substances. These are derivatives of traditional medicine have been used traditionally and are presently widely used in Botswana and Africa as a whole.

It is not uncommon for people to consult herbalists when they feel unwell. The presence of herbalist in most public spaces such as shopping malls and bus terminals is perhaps indicative of people's wish and need to explore all avenues in that ultimate search for remedies to ailments. Other traditional medicine includes Chinese, Siddha and Ayurveda.

Whole medical systems examples include Traditional Chinese medicine, Naturopathy, Homeopathy, and Ayurveda which originated in India. A strategy that takes a holistic approach to health that explores the interconnection between the mind, body, and spirit is the Mind-body medicine. Its major premise is that the state of the mind affects bodily functions.

Manipulative and body-based practices are characterised by manipulation of body parts, such as is common in osteopathic and chiropractic manipulation

Energy medicine: is a field that deals with supposed and demonstrable energy fields. These energy therapies include therapies which are believed to influence energy fields that are supposedly, surround and penetrate the body.

Some of these strategies include spirituality and are common practised in most African Independent Churches (AICs) and some Pentecostal churches where supposedly gifted people with healing powers administer remedies through the 'laying of hands' and rid the body of negative energy and 'evil spirits'. In some cases, the said-healers are famed for removing 'evil' objects from the body.

Many methods of alternative health practice are now considered 'complementary medicine' because they are now used alongside conventional medical practices. The use of aromatherapy, the inhaling of essential oils and acupuncture and Chinese medicine are some of the alternative remedies that are being used as complementary medicine. Some African traditional medical practitioners even advise their patients to also consult conventional medicine practitioners.

According to Dr R. K. Renjith alternative systems such as biology-based are safe to take and are less harmful since they are natural. They are mostly painless, non-invasive (free to consume), free of pharmaceuticals (have no harmful substances so they have little or no side effects), and patient-friendly.

Most alternative methods of health care such as homeopathy are preventative and focus upon a person as a whole being - mind and body. Thus it takes a holistic approach to healing and champions proactive lifestyles to maintaining health. As such homeopathy can be used as nutritional supplementation.

Homeopathy can also be used to help stimulate the body so that it can, on its own, fight 'invasion' by 'hostile' organisms.

For example the body is gradually desensitized to whatever it is that causes the allergic reaction by using a homeopathic preparation of the allergen (such as pollen, for example) used to stimulate the body and the immune system to become more tolerant of that allergen. This reinforces the body's natural self-healing process.

Herbs are the main ingredients in homeopathic remedies as they are believed to be gentler and safe. As a proactive remedy, homeopathy advocates for healthy lifestyle which includes eating healthy food.

On account of the uncertain nature of many alternative therapies and wide variety of claims different practitioners make, alternative medicine has been a source of controversy. The main reason is that health care practices should be classified based on scientific evidence.

However, some alternative health practices are growing in popularity such as homeopathy because of its pro-activity nature and that its component (herbs) has a time tested quality because they have been used for aeons.





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# Ipoh Echo's Eye Health

By Consultant Eye Surgeon Dr S.S. Gill talking to us about Pterygium.

## What are the causes of a pterygium?

A pterygium (pronounced with the "p" silent) is a wedge-shaped growth of thin tissue (conjunctiva) that covers the white outer surface of the eye (sclera). It may involve one or both eyes.

It may remain small or may grow large enough to interfere with vision. When someone has a pterygium, it will be clearly visible to others and seen as a fleshy, reddish growth commonly affecting the inner corner of the eye.

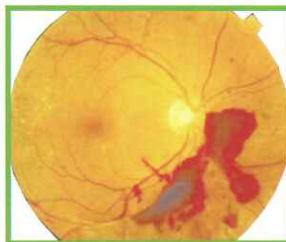
The cause is not really known but there are some observations. Pterygium occurs more often in people who are excessively exposed to sunlight and wind. It is due to the chronic exposure to high ultraviolet light.

It is also seen more in individuals who have eye irritation due to low humidity, dusty and smoky conditions. Patients who suffer from underlying dry eyes may also be more prone to developing a pterygium.

It is therefore seen more amongst farmers, fishermen, golfers and in those people living near the equator.

## What are the symptoms?

Pterygium often has no symptoms. A fleshy growth commonly on the inner aspect of the eye will be seen. It is painless



except when it becomes inflamed. When this happens, it becomes red and swollen due to the dilated blood vessels in the pterygium.

In some patients itchy of the eye or a dry sensation may occur. An increasing need to change spectacle power may also occur when the pterygium grows large because it has a tendency to induce astigmatism resulting in blurred vision.

In advanced cases the pterygium can grow over the clear part of the front of the eye (cornea). When this happens it obscures the optical centre of the clear part of the eye (cornea) resulting in significant loss of vision.

## Are there any tests that need to be done?

Testing of a person's eyesight will need to be done because a pterygium may induce astigmatism in the early stage. In the late stage, it may block a person's vision completely. The eye doctor will need to do a routine slit-lamp eye examination in order to determine the extent of eye involvement.

An assessment of the amount of tear production would be helpful in order to look for underlying associated Dry Eyes.

## What is the treatment?

In the early stages, no invasive treatment is needed. A person is usually advised to wear protective sunglasses whenever exposed to sunlight or windy conditions. Any underlying dry eyes will need to be treated properly in order to prevent progression of the pterygium.

In cases where the pterygium grows to the extent that it blocks vision or develops symptoms of inflammation that are hard to control, then it should be surgically removed and the outcome is usually good in most patients.

However, a pterygium may return after it is removed. Wearing protective sunglasses and a broad hat to prevent the exposure to sunlight is advised.

SOURCE: [www.ipohecho.com](http://www.ipohecho.com)

## Eye Health: World Sight Day 2012

In conjunction with WORLD SIGHT DAY on the October 11, 2012, Ipoh Echo talks to Consultant Ophthalmologist Dr S.S. GILL on the Top 3 causes of visual impairment.

Visual impairment is a term used to describe any kind of vision loss to the extent that even with conventional forms of correction or treatment, the person's vision remains poor. A visually impaired person usually requires some form of visual support such as a low vision aid and is usually unable to enjoy what most people would take for granted.

"Being visually impaired can be frightening, especially when it affects those who once had good vision," says Dr Gill. "In fact, just taking into cognizance the facts on visual impairment should send the message that we cannot take our eyes for granted".

### Top 3 Causes of Visual Impairment

- "Cataracts, or the clouding of the eye's lens preventing light from passing through to the retina, is the most common cause of. Says Dr Gill. "Because cataracts form slowly, causing gradual vision loss, it may not be noticeable to the patient until much later". That is why annual eye checks for people above 50 years old are important.

Symptoms of cataracts include double,

cloudy or blurry vision, difficulty seeing in poorly lit spaces, and colours that seem faded. Cataracts affect people in their 60s and 70s, but may sometimes appear earlier in people who are excessively exposed to sunlight. "Many younger patients who have cataracts early are golfers and sports people who are not in the habit of wearing sunglasses."

Treatment with surgery involves replacing the eye's cloudy lens with an artificial intraocular lens (IOL). Wearing sunglasses and a hat with a brim to block ultraviolet sunlight may help to delay cataracts.

- Glaucoma, a condition where an increase in pressure inside the eye impairs vision by damaging the optic nerve, is the second leading cause of visual impairment. "Any damage to the optic nerve is irreversible so it is important to find out if there is any history of glaucoma in your family as the condition is hereditary. Early detection and treatment is crucial or the vision will gradually deteriorate over time to a small tunnel vision, and then blindness can occur," emphasizes Dr Gill. Treatment for glaucoma usually includes prescription eye drops and/or surgery.

- Diabetic retinopathy, another leading

cause of visual impairment, is caused by diabetes. It is a condition where the tiny blood vessels in the retina (back of the eye) are damaged due to diabetes. It affects the vision of more than half of the people diagnosed with diabetes age 18 or older.

People with diabetes should have a complete eye exam through dilated pupils at least once a year. Diabetic retinopathy is treated with surgery or laser surgery. With timely treatment, adequate control of blood sugar, blood pressure, and cholesterol levels and regular follow ups, up to 90 per cent of all cases of blindness from diabetes can be prevented.

### Preventing Visual Impairment

Treatment methods for cataracts, glaucoma, diabetic retinopathy and even age related macular degeneration (another leading cause of visual impairment) have improved over the years and can help slow or even halt vision loss, especially for those who are diagnosed and treated early.

Some final words from Dr Gill: "Many people will have some type of visual problem at some point in their lives. It is important that if you have an underlying condition like diabetes, hypertension or glaucoma that you visit an ophthalmologist regularly and comply with prescription medication and eye drops to prevent further vision loss."





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