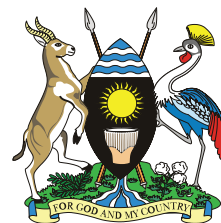




Uganda Cancer Institute



THE REPUBLIC OF UGANDA

CHILDHOOD CANCER

Information Booklet for Health Workers

First Edition

April 2018

Comprehensive Community Cancer
Programme (CCCP)

Research is our resource

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SECTION ONE:

UNDERSTANDING CANCER

What is Childhood Cancer?

Childhood Cancer refers to cancer that develops in children (people who are under the age of 18 years). In Uganda, patients with cancer who are 15 years and below are treated by the paediatric cancer care team. At Uganda Cancer Institute, these are treated in the Paediatric Oncology unit.

What is cancer?

Cancer is a disease that results from abnormal and uncontrolled growth of body cells. This can result into a lump (swelling) called a **tumour in some cancers or abnormality in number, structure and function of cells in other types of cancer such as blood cancer (Leukaemia)**. Any cell in any part of the body can develop into cancer, which can spread to other parts of the body.

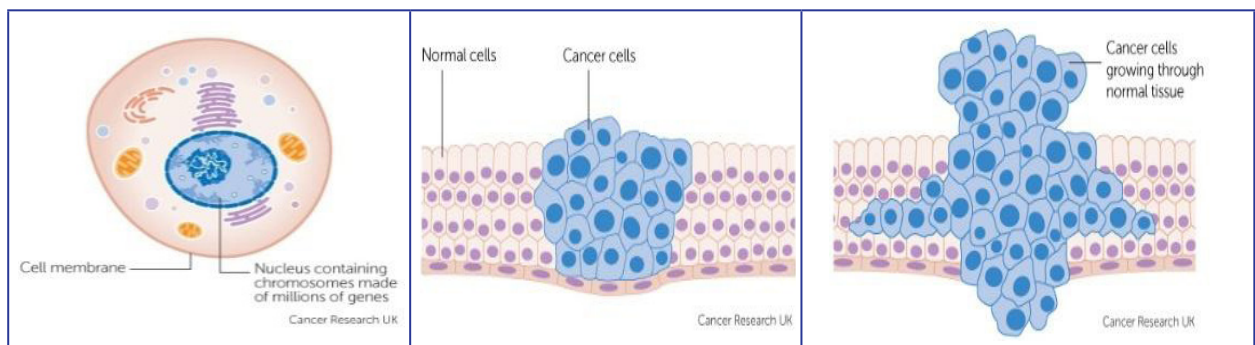
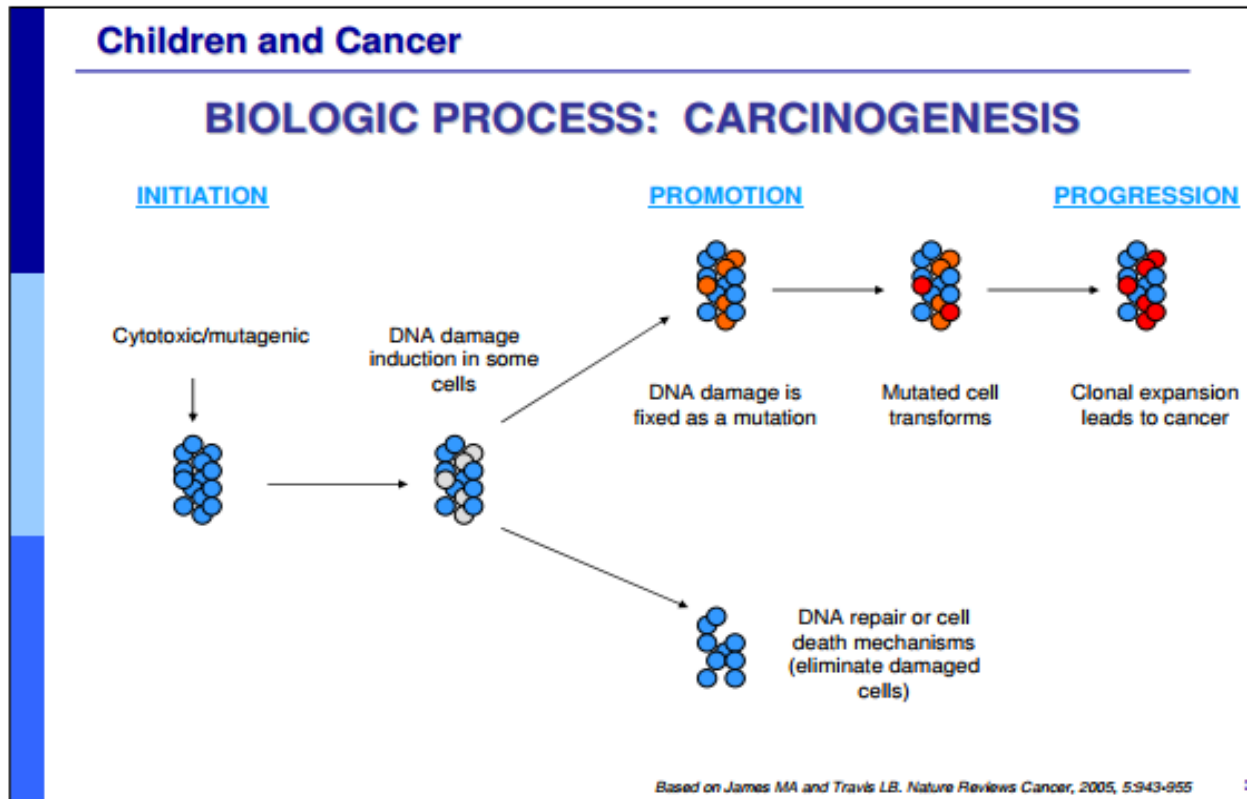


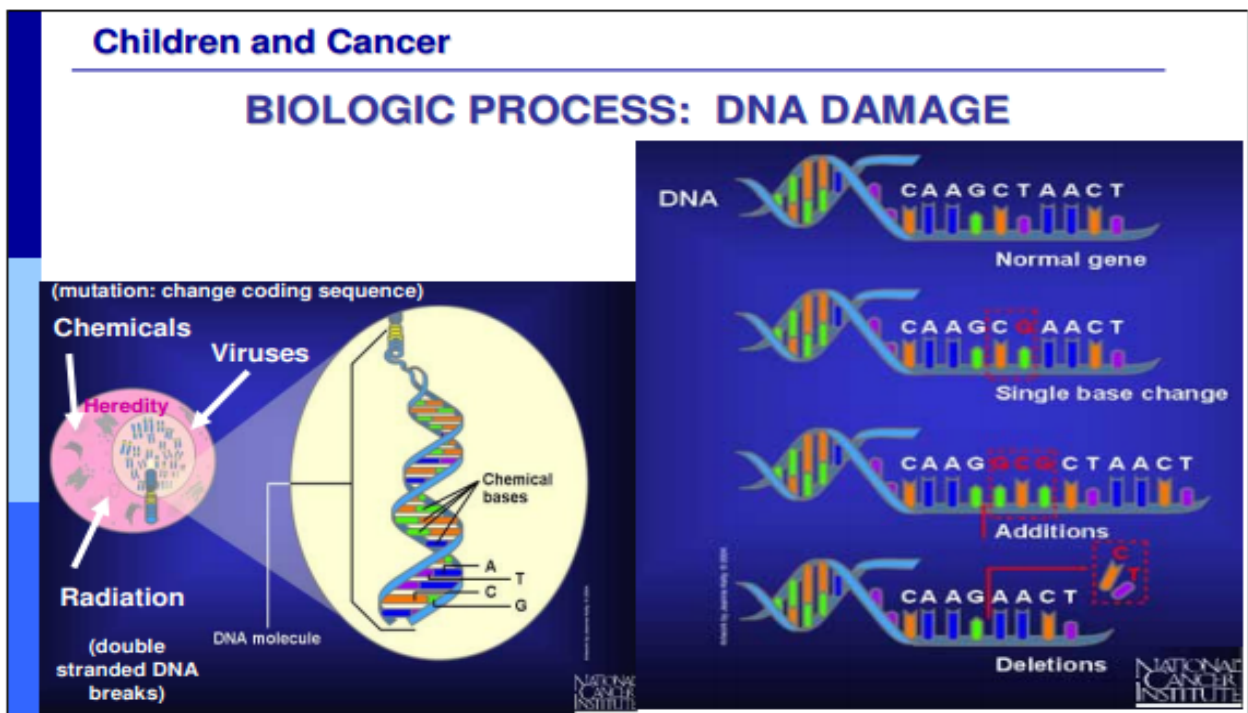
Figure: Cancer growth process (www.cancerresearchuk.org)

For any cell to become a cancer cell, there must be a change in its genetic (DNA) structure and function (mutation). This can be due to an inherited abnormality or because of environmental agents such as chemicals, infection, radiation etc. Further genetic damage (mutation) leads to loss of the body's normal regulatory process on cell growth, thus allowing the cancer to go into the progression phase resulting into tumor growth and metastasis.

The change in DNA therefore, causes the cell to be able to sustain the proliferation signal, evade growth suppression, resist cell death, enable repeatative replication, induce growth of blood vessels, invasion of neighbouring tissues and spread to other parts of the body.



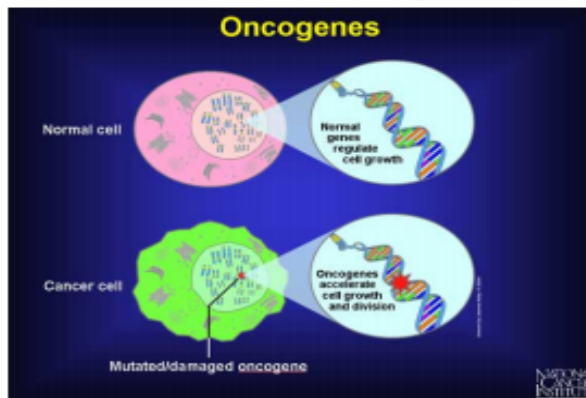
Source: James MA and Travis LB. Nature Reviews Cancer, 2005, 5:943-955, in *Children's Health and the Environment WHO -Training Package for the Health Sector*



Source: National Cancer Institute pictures (in *Children's Health and the Environment - WHO Training Package for the Health Sector*)

Children and Cancer

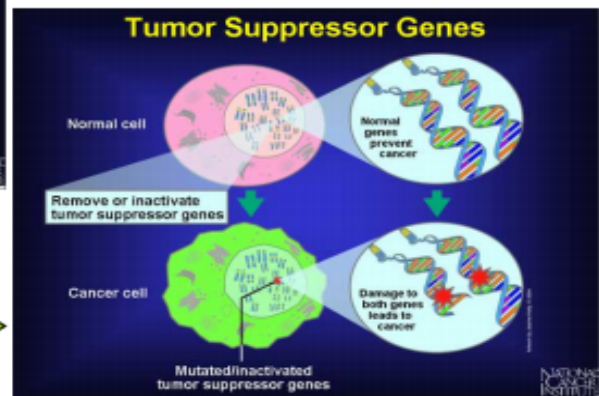
CANCER GENES



when activated:
transforms normal to cancer cells

when inactivated:
disregulation of normal cells

Based on National Cancer Institute pictures



Source: National Cancer Institute pictures (in *Children's Health and the Environment- WHO Training Package for the Health Sector*)

There are three main types of genes which can be activated or inactivated by mutation or loss, to lead to cancer.

Oncogenes: when activated, acquire the ability to transform normal cells to cancer cells which can grow indefinitely and undifferentiated.

Tumor suppressor genes: when inactivated, the cell loses its control function and leads to disregulation. The cells can divide and grow out of control, giving rise to malignant phenotypes.

The third type of genes implicated in cancer development (neoplastic) processes are **DNA-repair genes**: loss of function of these genes leads to subsequent accumulation of mutations. For example: in xeroderma pigmentosa syndrome, a DNA-repair gene is defective.

There are different factors that add up to cause such genetic changes. There is no one single cause for any one type of cancer unlike infectious diseases like malaria which we know is caused by the malaria parasite-plasmodium. *This means cancer is not contagious. Getting in contact with someone who has cancer does not increase ones danger of developing cancer. It is not like Chicken pox!*

What are the different types of Cancer?

Cancers are usually named based on the original or primary cells that develop into the cancer cells. For example, in bone cancer, it is the bone cells that develop into cancer cells, in brain cancer, it is the brain cells that develop into cancer etc.

Cancers also may be classified by the type of cells they start from, for example:

Carcinoma – cancer that begins in the skin or in tissues that line or cover body organs. There are a number of subtypes, including adenocarcinoma, basal cell carcinoma, squamous cell carcinoma, transitional cell carcinoma etc.

Sarcoma – cancer that begins in the connective or supportive tissues such as bone, cartilage, fat, muscle and blood vessels.

Leukaemia – cancer that begins in blood forming tissue such as the bone marrow and causes abnormal blood cells to be produced in the blood.

Lymphoma and myeloma – cancers that begin in the cells of the immune system e.g. Burkitt's Lymphoma.

Brain and spinal cord cancers – begin in the central nervous system cancers

Cancers can also be generally classified into two groups, that is, Solid cancers e.g. Bone, Kidney, Brain e.t.c. and Liquid cancers e.g. Leukaemia, Hodgkins lymphoma, Non-Hodgkins lymphoma, e.t.c.

SECTION TWO:

HOW DIFFERENT IS CANCER IN CHILDREN

Cancers in children;

- » progress faster
- » respond to treatment better
- » have a high potential of cure if treated properly compared to adults. More than 80% of children with cancer now survive 5 years or more in the developed countries.
- » are not life style related.
- » With some exceptions, childhood cancers tend to respond better to certain treatments. Children might do better with cancer treatments than adults because they usually do not have other health problems that can get worse with the cancer treatment. On the other hand, children (especially very young children) are more likely to be affected by radiation therapy if it is part of treatment. Chemotherapy, radiotherapy, and other cancer treatments can cause long-term side effects, so children who have had cancer treatment will need careful follow-up for the rest of their lives.

SECTION THREE:

SIGNS AND SYMPTOMS OF CANCER IN CHILDREN

Cancers in children can be difficult to recognize because their early symptoms are often like those caused by other common illnesses or injury such as fever, swellings e.t.c. If a child has any uncommon symptom or is poorly responding to treatment for common ailments, then the child should be checked for cancer.

The common symptoms and signs of cancer in children include:

- » An unusual lump or swelling
- » Unexplained paleness
- » Loss of energy or general weakness
- » Easy bruising
- » An ongoing pain in one area of the body
- » Limping
- » Unexplained fever or illness that doesn't go away
- » Frequent headaches, often with vomiting
- » Sudden eye or vision changes
- » Sudden unexplained weight loss
- » Loss of growth and development milestones

SECTION FOUR:

CANCERS THAT COMMONLY DEVELOP IN CHILDREN

The types of cancer that occur most often in children are different from those seen in adults. The most common cancers in children are:

- » Leukemia
- » Brain and spinal cord tumors
- » Neuroblastoma
- » Wilms tumor
- » Lymphoma (both Hodgkin and non-Hodgkin)
- » Rhabdomyosarcoma
- » Retinoblastoma
- » Bone cancer (including osteosarcoma and Ewing sarcoma)
- » Skin cancers

Other types of cancer are rare in children, however, in rare cases, children may develop cancers that are more common in adults.

Leukemia

Leukemias, which are cancers of the blood and bone marrow, are the most common types of cancer in children. Leukemias account for about 30% of all cancers in children globally.

The most common types of Leukemia in children are acute lymphocytic leukemia (ALL) and acute myelogenous leukemia (AML).

The common signs and symptoms of leukemias are;

- » Bone and joint pain
- » Fatigue
- » Weakness
- » Pale eyes and skin
- » Bleeding or bruising
- » Fever
- » Weight loss

Acute leukemias can grow quickly, so they need to be treated as soon as they are diagnosed.

Brain and spinal cord tumors

Brain and spinal cord tumors are the second most common cancers in children, contributing up to about 26% of childhood cancers globally. There are many types of brain tumours, and the treatment and prognosis for each type is different.

Most brain tumours in children start in the lower parts of the brain, such as the cerebellum or brain stem.

The common signs and symptoms of Brain and spinal cord tumors are;

- » Headaches
- » Nausea
- » Vomiting
- » Blurred or double vision
- » Dizziness
- » Seizures
- » Trouble walking or handling objects.

Adults are more likely to develop tumors in upper parts of the brain. Spinal cord tumors are less common than brain tumors in both children and adults.

Neuroblastoma

Neuroblastoma is a type of cancer which starts in early forms of nerve cells found in a developing embryo or fetus. About 6% of childhood cancers globally are neuroblastomas. This type of cancer develops in infants and young children. It is rarely found in children older than 10 years. The tumor can start anywhere but usually starts in the belly (abdomen) where it is noticed as swelling.

The common signs and symptoms of Neuroblastoma;

- » Bone pain
- » Fever.

Wilms tumor (*Nephroblastoma*)

Wilms tumor (also called *nephroblastoma*) starts in one, or rarely, both kidneys. It is most often found in children about 3 to 4 years old, and is uncommon in children older than 6 years of age. Wilms tumor accounts for about 5% of childhood cancers globally.

The common signs and symptoms of Wilms tumor (Nephroblastoma);

- » It shows as a swelling or lump in the abdomen.
- » Sometimes the child might have other symptoms, like fever, pain, nausea, or poor appetite.

Lymphomas

Lymphomas are types of cancer that start in immune system cells called lymphocytes. They most often start in lymph nodes and other lymph tissues, like the tonsils or thymus. These types of cancers can also affect the bone marrow and other organs.

The common signs and symptoms of Lymphomas;

These depend on where the lymphoma is and may include;

- » Weight loss
- » Fever
- » Sweats
- » Tiredness (fatigue)
- » Swollen lymph nodes in the neck, armpit, or groin or even just under the skin.

The two main types of lymphoma are Hodgkin lymphoma (sometimes called Hodgkin disease) and non-Hodgkin lymphoma. Both types occur in children and adults.

Hodgkin lymphoma accounts for about 3% of childhood cancers globally. It is more common, though, in early adulthood (age 15 to 40). Hodgkin lymphoma is rare in children younger than 5 years of age. This type of cancer is very similar in children and adults, including the types of treatment.

Non-Hodgkin lymphoma makes up about 5% of childhood cancers globally. It is more likely to occur in younger children than Hodgkin lymphoma, but it is still rare in children younger than 3 years of age. The most common types of non-Hodgkin lymphoma in children are different from those in adults. These cancers often grow quickly and require intensive treatment, but they also tend to respond better to treatment than most non-Hodgkin lymphomas in adults.

Burkitt lymphoma (BL)

Burkitt lymphoma is a type of non-Hodgkin lymphoma in which the cancer starts in the immune cells called B-cells. It is the fastest growing human tumor. It is associated with impaired immunity and is rapidly fatal if left untreated.

However, timely chemotherapy can achieve long-term survival in more than half the people who develop Burkitt lymphoma.

Burkitt lymphoma is named after a British surgeon Denis Burkitt, who first described this then unusual disease in 1956 in Mulago National referral hospital, in Kampala, Uganda. In Africa, Burkitt lymphoma is common in young children who have history of malaria and Epstein-Barr virus (EBV) infections. This is the virus that also causes infectious mononucleosis (glandular fever or the “the kissing disease”).

One mechanism of developing BL may be that malaria weakens the immune system’s response to Epstein-Barr, allowing it to change infected B-cells into cancerous cells. About 98% of African cases of BL are associated with Epstein-Barr virus infection. Burkitt lymphoma is also likely to develop in people infected with HIV, the virus that causes AIDS.

Types of Burkitt lymphoma

The three types of Burkitt lymphoma are sporadic, endemic, and immunodeficiency-related. The types differ by geographic location and the parts of the body that are affected.

Sporadic Burkitt’s Lymphoma

Sporadic Burkitt’s lymphoma occurs outside of African region, but is still rare. It is sometimes associated with EBV. It tends to affect the lower abdomen, where the small intestine ends and the large intestine begins.

Endemic Burkitt’s Lymphoma

This type of Burkitt’s lymphoma is most often seen in Africa especially in the equatorial region, where it is associated with chronic malaria and EBV infection. The facial bones and jaw are most often affected. But the small intestines, kidneys, ovaries, and breasts may also be involved.

Immunodeficiency Related

This type of Burkitt’s lymphoma is associated with the use of immunosuppressive drugs like those used to prevent transplant rejection and HIV infection.

Signs and Symptoms of Burkitt’s Lymphoma?

Burkitt’s lymphoma can cause fever, weight loss, and night sweats. Other symptoms of Burkitt’s lymphoma vary according to type.

Sporadic Burkitt’s Lymphoma

The symptoms of sporadic Burkitt’s lymphoma include;

- » Abdominal swelling
- » Distortion of facial bones
- » Night sweats

- » Intestinal obstruction
- » An enlarged thyroid
- » Enlarged tonsils

Endemic Burkitt's Lymphoma

The symptoms of endemic Burkitt's lymphoma include;

- » Swelling and distortion of facial bones
- » Enlarged lymph nodes that are non-tender.
- » Tumors can grow extremely quickly, sometimes doubling their size within 18 hours.

Immunodeficiency Related

The symptoms of immunodeficiency related lymphoma are similar to those of the sporadic type.



Burkitt's Lymphoma

Rhabdomyosarcoma

Rhabdomyosarcoma starts in cells of skeletal muscles. This type of cancer can start nearly in any part of the body, including head and neck, groin, abdomen, pelvis, or in an arm or leg. This is the most common type of soft tissue sarcoma in children. It makes up about 3% of all childhood cancers globally.

The common signs and symptoms of Rhabdomyosarcoma are;

- » Pain,
- » Swelling (a lump)

Retinoblastoma

Retinoblastoma is cancer of the eye. It begins in the retina — the sensitive lining on the inside of the eye. Retinoblastoma most commonly affects young children, but can also occur in adults in rare cases. Retinoblastoma is the most common form of cancer that affects the eye in children. Retinoblastoma may occur in one or both eyes.

The common signs and symptoms of Retinoblastoma

- » A white color in the center circle of the eye (pupil) when light is shone in the eye, such as when taking a flash photograph
- » Eyes that appear to be looking in different directions
- » Eye redness
- » Eye swelling

Bone cancer (osteosarcoma and Ewing's sarcoma)

Osteosarcoma and Ewing's sarcoma are the two most common primary cancerous (malignant) bone tumors in children and account for approximately 6% of all childhood cancers (malignancies).

Osteosarcoma is the most common bone cancer. It starts in bone cells that make new bone tissue. It usually forms at the end of long bones, such as the leg bones, but can form in any bone. It is most common in teenagers and in adults older than 65 years.

Ewing's sarcoma includes several types of bone tumors. These tumors usually form in the hip bones, the ribs, or in the middle of long bones. The disease occurs most often in teenagers and young adults. Ewing tumors are most common in bone but can also form in soft tissue.

Signs and symptoms of osteosarcoma

- » Swelling over a bone or bony part of the body.
- » Pain in a bone or joint.
- » A bone that breaks for no known reason.

Signs and symptoms of Ewing sarcoma

- » Pain and/or swelling, usually in the arms, legs, chest, back, or pelvis.
- » A lump (which may feel soft and warm) in the arms, legs, chest, or pelvis.
- » Fever for no known reason.
- » A bone that breaks for no known reason.

SECTION FIVE:

BURDEN OF CHILDHOOD CANCER IN UGANDA

Globally, including in Uganda, cancer in children is threatening to overtake infections, as one of the highest causes of death in children. For example, currently in Uganda about 3,000 children are diagnosed with HIV infection every year while 7,000 children are estimated to develop cancer every year. The Uganda Cancer Institute received 512 referrals of children with cancer in 2017, up from 476 in 2016.

In developed countries, 80% of children with cancer are cured. At the Uganda Cancer Institute, the only dedicated treatment centre for children with cancer in Uganda, 55% of children are alive at 1 year after being diagnosed with cancer – most of these are ultimately cured. Whereas this cure rate still lags behind that in developed countries, it is one of the highest in sub-Saharan Africa and is rapidly improving.

SECTION SIX:

RISK FACTORS OF CANCER IN CHILDREN

What are the risk factors of cancer in children?

A risk factor is anything that affects the chance of getting a disease such as cancer. Different cancers have different risk factors.

There is no known exact cause of childhood cancer, and it occurs randomly across all ethnic groups. Some children are even born with cancer.

A few environmental factors, such as radiation exposure, have been linked with some types of childhood cancers. Some studies have also suggested that some parental exposures (such as smoking) might increase a child's risk of developing certain cancers, but more studies are needed to explore these and other possible risk factors. So far, most childhood cancers have not been shown to have environmental and life style risk factors.

Inherited versus acquired gene mutations

Some children inherit DNA changes (mutations) from a parent that increase their risk of developing certain types of cancer. These changes are present in every cell of the child's body, and can often be tested for in the DNA of blood cells or other body cells. Some of these DNA changes are associated only with an increased risk of cancer, while others can cause syndromes that also include other health or developmental problems.

However, most childhood cancers are not caused by inherited DNA changes. They are a result of DNA changes that happen early in the child's life, sometimes even before birth. Every time a cell divides into 2 new cells, it must copy its DNA. This process is not perfect, and errors sometimes occur, especially when the cells are growing quickly. This kind of gene mutation can happen at any time in life and is called an **acquired gene mutation**.

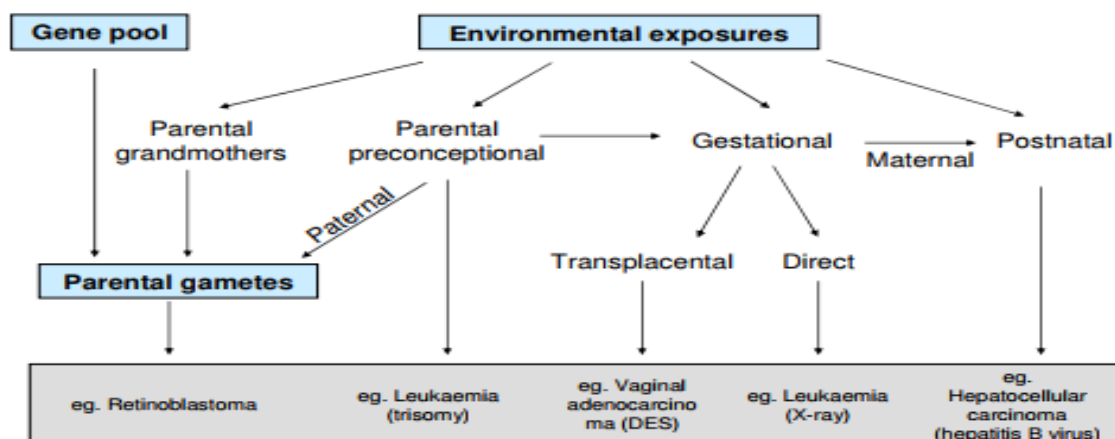
Acquired mutations start in one cell. That cell then passes the mutation on to all the cells that come from it. These acquired DNA changes are only in the person's cancer cells and will not be passed on to his or her children.

Sometimes the causes of gene changes in certain adult cancers are known (such as cancer-causing chemicals in cigarette smoke), but the reasons for DNA changes that cause most childhood cancers are not known. Some may have outside causes like radiation exposure, and others may have causes that have not yet been found. However, many are likely to be caused by random events that sometimes happen inside a cell, without having an outside cause.

There is no doubt that it is a combination of factors acting concurrently and sequentially that are involved with any individual case of childhood cancer. Therefore, the Cancers are assumed to be multivariate, multifactorial diseases that occur when a complex and prolonged process involving genetic and environmental factors interact in a multistage

Children and Cancer

MULTI-CAUSAL! - MULTI-GENERATIONAL?



Based on Anderson LM, Environ Health Perspect, 2000, 108(suppl 3):573-594

Source: Anderson LM et al. *Critical Windows of Exposure for Children's Health* (in *Children's Health and the Environment WHO Training Package for the Health Sector*)

Children's environmental risks exposure

Children's environmental risk exposure differs from that in adults (children are not little adults).

It is known that children, including the embryo, fetus, infant and children at all life stages until the completion of adolescence, are often at a different and increased risk from environmental hazards compared to that of adults, for reasons that can be divided into four major categories.

1. Children often have different, and sometimes unique, exposures to environmental hazards from those of adults.
2. Due to their dynamic developmental physiology, children are often subjected to higher exposures of pollutants found in air, water and food. These exposures may be handled differently by an immature set of systems in children compared to the way they are dealt with in adults. Furthermore, the developmental component of a child's physiology is changing: maturing, differentiating and growing in phases known as "developmental windows". These "critical windows of vulnerability" have no parallel in adult physiology and create unique risks for children exposed to hazards that can alter normal function and structure of their body cells.
3. Children have a longer life expectancy. Therefore, they have a longer time period to manifest a disease with a long latency period, and are likely to live longer with toxic damage.
4. Finally, children are politically, socially and economically powerless; they are defenseless. They have no standing of their own; they must rely on adults to protect them from toxic environmental agents.

SECTION SEVEN:

PREVENTION OF CANCER IN CHILDREN

How can cancer in children be prevented?

Unlike many cancers in adults, avoidable lifestyle-related risk factors like tobacco use, excess alcohol consumption don't influence the risk of developing childhood cancer.

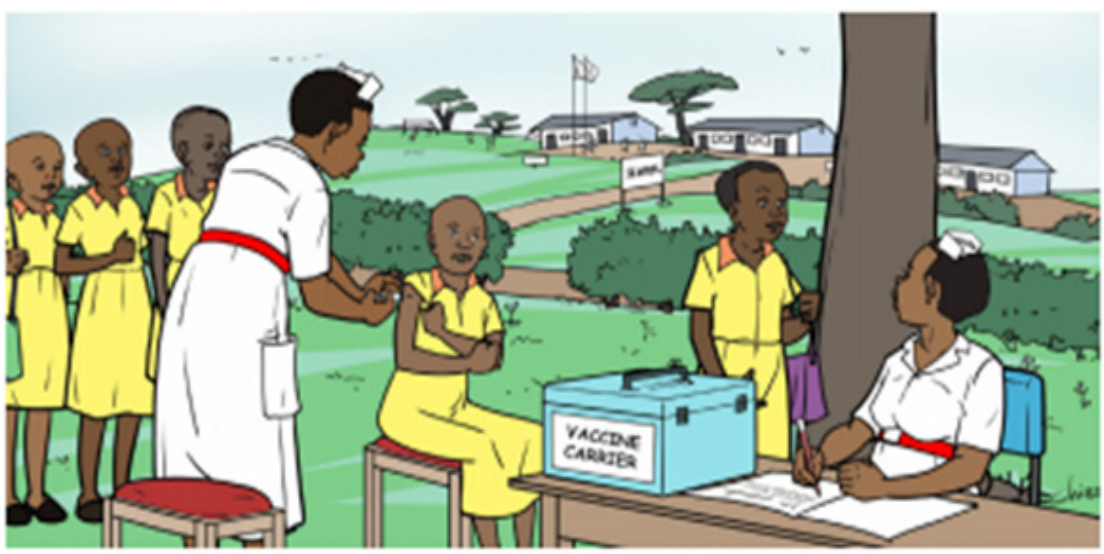
However, some environmental factors like radiation exposure, have been linked with childhood cancer risk. But, in many cases exposure to radiation might be unavoidable, such as if the child needs radiation therapy to treat another cancer. If a child develops cancer, it is important to know that it is very unlikely there is anything the parent or the child could have done to prevent it.

In some circumstances, though very rare, a child might inherit gene changes that make them very likely to develop a certain type of cancer e.g. in some types of leukaemia.

However, future cancer risk (when the children become adults) can be reduced through the following:

- » **Avoiding infections** like HIV, Human Papilloma Virus (HPV), Hepatitis B e.t.c.
- » **Vaccination against** HPV, Hepatitis B infection e.t.c.

All children should complete their immunization schedules as recommended.



- » **Taking children to health facilities for prompt care when they are sick.** This helps also to identify other health conditions including cancer early.
- » **Avoiding use of tobacco.** Reject tobacco, and if you smoke, consider seeking help to quit and avoid staying near someone who is smoking.

- » **Maintaining a healthy weight.** Balancing the amount of food you eat with daily exercise will help maintain a healthy weight and reduce the risk of cancer. Maintaining a healthy weight also reduces risk for other chronic diseases such as diabetes and heart disease.
- » **Being active. Children should be encouraged to participate in physical education (PE) at school and contribute in domestic chores to be physically active.** Every individual should get at least 30 minutes of physical activity each day. This can be as simple as a brisk walk 15 minutes twice a day. Any amount of physical activity is better than none.
- » **Avoiding alcohol consumption.** Choose non-alcoholic beverages like juice, water) and seek professional help to limit alcohol (if needed).
- » **Eat healthy diet-** eat enough fruits and vegetables, avoid eating too many foods that are high in saturated fats (fried foods, red meat).



Finding Cancer early in Children: Screening for cancer in children

Screening is testing for a disease such as cancer in people who are not feeling sick. Childhood cancers are rare, and there are no recommended screening tests for them.

Some children have a higher chance of developing a specific type of cancer because of certain abnormal genes they inherit. Such children may need careful, regular medical check-ups that include special tests to look for early signs of cancer. An example is children with albinism who are at a higher risk of developing skin cancer.

SECTION EIGHT:

DIAGNOSIS OF CANCER IN CHILDREN

Signs and symptoms of cancer in children depend on the type of cancer, where the cancer is and how advanced it is. If symptoms and signs are suggestive of cancer, more examinations and tests need to be done to confirm or exclude the presence of the cancer.

The following are some of the tests that may need to be done for a child to exclude some cancers;

1. **Laboratory tests:** Blood and urine tests can be done to exclude the possibility a child having some types of cancer e.g Complete Blood Count (CBC) can be used to exclude the possibility the child having leukaemia.
2. **Ultrasound scan:** This can be done to exclude the possibility of presence of some cancers such as Wilms tumor (Nephroblastoma) in a child with a swollen abdomen.
3. **X-rays:** This can be done to exclude bone cancer for example in child with a suspicious swollen limb
4. **Computerised Tomography (CT) scan:** This test can be done to exclude cancer for example in a child with progressive worsening headache suspected to have brain cancer.
5. **Magnetic Resonance Imaging (MRI) scan:** uses radio waves and strong magnets instead of x-rays to make detailed pictures of the inside of the child's body to show tumors which may be suspected to be cancer.
6. **Endoscopy:** This is a procedure during which a thin tube with a light source is introduced into the child's body to look at what is inside. The tube may be put in through a small cut in the skin or through a natural opening, like the mouth. The tube enables the health worker to look at the tumor and other nearby body parts.
7. **Biopsy:** This is a procedure in which a small piece of the lump or tissue is removed to check it for cancer cells. A biopsy is often the only way to confirm if a person has cancer. There are many ways to do a biopsy. The type used will depend on the size of the lump and where it is in the body.
8. **Bone marrow aspiration and biopsy:** This is a procedure during which a hollow needle is put into the center of a bone (most often the back of the hip) to take collect a sample of the bone marrow. For example the bone marrow can be tested for blood cancer.

Note: Like all cancers, diagnosis of cancer in children is confirmed by examining tissue biopsy from the swelling or body part suspected to have cancer.

SECTION NINE:

TREATMENT OF CANCER IN CHILDREN

Treatment for childhood cancer is based mainly on the type and stage (extent) of the cancer. The main types of treatment used for childhood cancer are:

Surgery- The most common form of cancer treatment is surgery. This involves removing the cancer tumor and reconstruction of the affected area.

Chemotherapy- Chemotherapy is a cancer treatment method that uses a combination of drugs to either destroy cancer cells or slow down the growth of cancer cells. Some types of childhood cancers might be treated with high-dose chemotherapy followed by a stem cell transplant. Newer types of treatment, such as targeted therapy and immunotherapy can be used in treating some childhood cancers. Often more than one type of treatment is used.

Cancers in children usually respond well to chemotherapy because they tend to be cancers that grow fast. (Most forms of chemotherapy affect cells that are growing quickly.) Children's bodies are also generally better able to recover from higher doses of chemotherapy than are adults' bodies.

Radiation Therapy- Radiation therapy (also called radiotherapy) uses high-energy rays to kill cancer cells. It affects the nearby skin or cells only in the part of the body that is treated with the radiation.

Follow-Up Care- The patient needs regular medical check-ups after cancer treatment. This helps ensure that any side effects of cancer treatment are properly treated and any cancer reoccurrences or new cancer occurrences are diagnosed and treated early.

Challenges in treating cancer in children

- 1) Delayed referral of children with cancer from lower level health centers and hospitals to children's cancer specialists. This is commonly because cancers in children are easily confused with other common illnesses.
- 2) Expensive cancer drugs and other treatment techniques.
- 3) Limited access to cancer treatment for children.
- 4) High cost of travel to from home to access specialized cancer care for children
- 5) High living costs while receiving care in the cancer treatment centre.

SECTION TEN:

EFFECTS OF CANCER TREATMENT ON CHILDREN AND FAMILY

Effects of Childhood Cancer on the child and the family

Many adult cancer patients endure no more than a year of treatment.

On the other hand, the average length of treatment for children, from initial diagnosis to cure or remission, is three years.

If the child experiences a relapse, the treatment time could possibly be extended over many years with a potentially lowered chance of survival.

In most cases diagnosis of cancer in children is delayed until the disease is very advanced and has spread to other parts of the body.

Childhood cancers tend to be more aggressive than adult cancers, therefore, late diagnosis of cancer in a child means poor survival for the child.

Because children's bodies are still developing, toxic therapies damage more than just the cancer cells. Childhood cancer survivors may live the remainder of their lives with the side-effects of the cancer treatment.

Some of these side effects may include:

- » Delayed/ Disrupted cognitive development
- » Stunted Growth
- » Impaired speech and/or hearing
- » Infertility and Endocrine Dysfunction
- » Learning Disabilities
- » Physical Handicaps due to nerve damage or amputation.
- » Increased probability of developing a secondary cancer.

Other effects of cancer treatment on the child and the family include:

- » Chemotherapy and radiation make children feel sick and weak. They also make hair fall out. This can be very scary and makes children with cancer feel different from their peers. Often, these children are also coping with major trust issues, since the world no longer feels safe for them. They often feel that their parents and other adults can no longer protect them, since each new adult is usually associated with a painful procedure.

- » The child's entire family is affected - Because cancer usually strikes children at a young age, their families are often very young as well. There may also be other small children at home to look after.
- » Sometimes, one or both parents must stop working in order to care for the sick child.
- » Siblings are often put to the wayside. Some may be constantly shuttled around and may have problems maintaining a normal schedule. They are worried, resentful, and feel abandoned.
- » These children may develop behavioral problems, anxiety, or depression. They may also begin to have trouble in school.
- » Studies have even shown that mothers of a child with cancer may exhibit symptoms similar to those of Post-Traumatic Stress Disorder.
- » The effects on parents are almost always long term. If the child dies, parents deal with difficult and long-lasting grief. If the child lives, parents may still have to care for a child who has mild, moderate or severe physical or emotional late effects. They may spend the rest of their lives helping their child deal with those issues.
- » Counselling specifically for siblings and the parents is often necessary.

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