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Cycloastragenol(Telomeres Activator) and its relation with Cancer: A Brief Review

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Research Article

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ABSTRACT

The main theme involved in this article is to show the effect of cycloastragenol compound in curing the cancer disease. Cycloastragenol is extracted from astragalus root which is available in fewer amounts. It is an herb which is mostly grown in northern part in Asia. Cycloastragenol helps in activating telomeres. Telomeres are the caps of the DNA which decreases in size all the time when cell replicates. It is the product which helps in activating the telomeres, so that the life span increases to some extent.

INTRODUCTION

Telomeres and Astragalus

Cycloastragenol is a drug derived from Chinese herb "Astragalus Membranaceous" which helps in restoring telomeres after cell division. Astragalus is a Chinese medicinal herb improves the functioning of immune system and boosts the immunotherapy for some types of cancers [1]. Cycloastragenol plays a vital role in telomere activation. It is promoted to kill cancer cells helps heal burns and also protects from all the heart diseases. It has the ability to stimulate the liver, circulatory system and urinary system. As there are many uses by using astragalus as a medicinal herb, there are also many flaws like dehydration, belly bloating and low blood pressure.

Normal human somatic cells have a limited life span to divide and replicate. According to Molecular Biology, all known living organisms have their development and functioning instructions written in the DNA all mammalian chromosome ends are capped by telomeres. Telomeres are ends of eukaryotic chromosomes which are biomarkers of aging. The length of telomere decreases with increased oxidative stress. Telomere length reflects the cumulative burden of oxidative stress and repeated cell replication. Telomerase and the control of telomere length are intimately linked to the process of tumorigenesis in humans. Telomeres are areas of heterochromatin composed of TTAGGG repeats located at the ends of linear chromosomes. They play a critical role in keeping genome stable and preventing premature aging diseases and the development of cancer. A family of enzymes called DNA-topoisomerases furnishes the nuclease activity involved in the regulation of DNA supercoiling They have been shown to inhibit chromosomes to form end-to-end fusions by preventing the cell from identifying telomeres as DNA-double strand breaks reported that Rsv moderately activates the human SIRT1 and TERT promoters inducing telomerase activity in HeLa-S3 cells The challenge ahead, of course, is to find out the function of these genes in telomere metabolism and their genetic organization. The high levels of morbidity and mortality of chronic non-communicable diseases (most of which highly associated

with aging) worldwide and of the possibility that short telomeres is not a universal feature of neural cancer stem cells.

Telomerase is an RNA-dependent DNA polymerase complex that contains a telomerase reverse transcriptase (TERT) and telomerase RNA [2]. Whenever the cell divides the length of telomeres shortens. After a few number of cell division cycles, the telomeres are steadily 'chipped away,' until they reach a critical length known as the Hay flick limit [3]. Telomeres are the repeats of the DNA sequences and associated protein at the ends of the chromosome. These telomeres act as protective caps of the chromosome. Telomeres protect the vital information of the DNA. As we age, telomeres get shortened but if a person smokes or stress, obesity and due to the lack of exercise and even diet; the telomeres get shortened [4-19].

Cycloastragenol is saponin derived from astragalus, a plant which has been used as Chinese traditional herb. It is used as the medicine for over 2,000 years. T cell proliferation increases by increasing the telomere activity. Cycloastragenol is a glycone which contains carbohydrates. This compound was first identified when screen the Astragalus Membranaceous extracts which have anti-aging properties [20-22].

Astragalus is a large genus which have nearly more than 3000 species. It is also called as huang qi or milk vetch. It is mostly grown in open places like valleys and plains especially on lime stone. The height of the plant is 30cms to 45 cms. Astragalus has anti-bacterial and anti-inflammatory characteristics, people sometimes use it for skin diseases. Medicinal uses of astragalus cure anemia, cold, diabetes, heart disease. The herb, astragalus is promoted to kill cancer cells, toxic effects of chemotherapy, heal burns and also helps to improve overall weakness. It is available in tea bags, dried slices and powder. In china, slices are mostly used in soups and mix with honey and take as medical tonic.

The scientific evidence behind astragalus root which enhance the immune system and fights against immune system. Research at The university of Texas, Anderson cancer center found that astragalus boost the immune system. The patients who take astragalus supplements have experienced a faster recovery and the survival rate has increased. Patients with breast cancer were given with a combination of astragalus and other compounds. This results in decline in mortality of 50% to 10%. They discovered that the group which receives pure astragalus extracts has a lot of improvements. In fact, the people who use astragalus will double their chances of survival.

Chinese research shows that the people who take astragalus improve the quality and conditions of the cancer patients who undergo chemotherapy. The astragalus root is stimulated for the production of interferon. Interferon is the group of proteins which are released by host cell which fights against the bacteria, viruses as such. Interferon is effective in fighting against the mutated cells and development of cancer.

Based on the research conducted at the University of Houston, astragalus root has the ability to enhance T-cells and Natural-killer cells which activate interleukin-2 which kills cancer cells and helps to relieve side effects for the people who use chemotherapy such as immunosuppression, fatigue, nausea, weight loss and many more.

In japan, the Hiroshima School of Medicine, astragalus was shown directly increase B-cells and T-cells, interleukins and antibody production. Astragalus helps in identification viral, bacterial and many other mischievous cells.

Astragalus Benefits

1. Wound healing.
2. Slow signs of aging.
3. Prevention of heart diseases.
4. Blood levels normal.

Cancer

Astragalus root is used fairly to robust at healing sickness. It has been used to treat ulcers and many other diseases. It also serves as input in cancer treatment. When cancer develops, this orderly process breaks down. As cells become more and more abnormal, cells survives even after they damage and new cells form when they are not needed. These extra cells can divide continuously and may form lump called tumor. Cancer is a tumor. Tumor is of two types: Benign tumor and malignant tumor. Benign tumor does not invade to its surrounding tissue or spreads throughout the body. Malignant tumor is that may invades to its surrounding tissue and spreads throughout the body.

Stages of Cancer

Cancer begins in one part of the body and spreads throughout the body. There are four different stages of cancer. The stage of cancer is very important for prognosis.

1. Stage 0: In situ
2. Stage 1: Localized cancer
3. Stage 2 and 3: Regional spread.
4. Distant spread.

In stage 0, the cell become cancerous cell but it can produce the tumor in that tissue. It produces in way that there is no threat to life. In the next stage, the cell gains the ability which can grow in nearby cell. In stage 2&3, cancer is larger in size and deeply grown into the cells. In stage 4, cancer spreads to other organs or parts of body. It is called metastasis. There are over 200 types of cancers.

There are few characteristics of cancer which have been proposed:

1. Evasion of apoptosis.
2. Limitless replication.
3. Anti-growth signaling.
4. Activation of metastasis.
5. Invasion of tissue and spread throughout the body.

Cancer is a name given to a group of diseases which are related with each other. In each and every type of cancer the cell divides continuously where no end point to it and spreads to surrounding tissues. Cancer cells differ from the normal cells in many ways. When compared with normal cell grows, become old and they die. New cell takes the place of the old one but cancer cells don't have death. They are immortal. One of the most important differences between normal cell and cancer cell is normal cell is more specialized than cancer cell i.e. normal cells mature into a very specific cell type and function. Cancer cell have a capability to ignore the cell signaling that normally passes a signals to stop dividing, it is known as programmed cell death or apoptosis [21-22].

Cancer cells have the ability in influencing the normal cell to form blood vessels for the supply of nutrients and oxygen for the tumor cells for which they need to grow. There are some specific categories of cancer that begins with specific cell type like carcinoma that begins with epithelial cell, lymphoma that begins with lymphocytes like B-cells and T-cells; sarcoma begins with soft tissue like muscles, leukemia that begins with blood forming tissue of bone marrow and there are many other categories like myeloma, brain and spinal cord tumor, germ cell, neuroendocrine and carcinoid tumor.

Symptoms

When cancer begins, there are no symptoms. We can find symptoms when mass continue to grow. Some of the symptoms that we can find like headache, changes in testicles, cough, jaundice, body pains, indigestion, constant fatigue, unwanted weight loss, fever and abnormal lump. Causes of cancer are based on the environmental factors, genetic disorders, chemicals, Diet, exercise, radiation, hormones and physical agents. Anything that causes damage to DNA, chemicals, nuclear radiation is one of the best known examples which causes DNA damage and ultra-violet radiations which is present in sunlight, also cause DNA damage.

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Treatments

Most common types of treatments for cancer such as surgery, blood transfusion, photo dynamic treatment, cell transplantation, hyperthermia, laser treatment, immuno therapy, radiation therapy, chemo therapy and targeted therapy.

Surgery: Surgery is used to treat, diagnose and prevention of cancer. It is one of the best chances to cure, especially if cancer has not spread to other parts of the body.

Blood transfusion: Transfusion of the blood temporarily replaces the part of the blood when it cannot be done on his own. Blood transfusion is not a permanent solution.

Photo dynamic therapy: Photo dynamic therapy is a specialized treatment which used drugs along with light to kill cancer cells. The drug which is injected activates only after certain light falls on the drug.

Cell Transplantation: Cell transplantation is used to restore the stem cells when bone marrow has been destroyed by some diseases.

Hyperthermia: Hyperthermia means more than the normal body temperature. Normally higher body temperature is cause due to the illness but when compared to hyperthermia it refers to heat treatment. The very temperature can destroy the small area of the cells, which is tumor.

Laser treatment: Laser can be used to in two ways

1. To shrink or to destroy the tumor.
2. To activate chemical known as photosensitizing agent which only kills cancer cells.

Immunotherapy: Immunotherapy is a treatment that uses own body's immune system to treat cancer. Immunotherapy boosts the immune system in a specific way or it trains the immune system to attack only cancer cells [20,50,51].

Chemotherapy: Chemotherapy is a treatment which uses medicines or drug. It is one of the best treatment by which a person can have control over the cancer treatment [23-30].

Radiation therapy: Radiation therapy is one of the most common techniques used to treat cancer. It uses high energy particles to destroy the cancer cells [32-49].

Targeted therapy: Targeted drug therapy is considered as the chemotherapy, but targeted drug therapy doesn't work as chemotherapy. It takes the advantage of small difference between normal cell and cancer cell. These drugs have different side effects.

Relation with Cycloastragenol

Cycloastragenol is produced in very low level. There are few methods to purify and injected in the body which in turns activate the telomerase. Telomerase is an enzyme mainly involved maintaining or lengthening telomeres. The replication of cancer cells might stops in the presence of telomerase activity in the normal cells and tissue has important implication for the use of telomerase assay in cancer diagnosis and for the use of anti-telomerase inhibitors in cancer treatment. hTERT is a catalytic sub unit of the enzyme telomerase usually turned OFF in adult cells except in immune, egg, sperm and mainly in malignant forming cells [52-79].

CONCLUSION

The evidence for using astragalus for any health condition is limited. High-quality clinical trials (studies in people) are generally lacking. Measuring telomerase is a new way to detect the cancer cells in our body. If scientist tries to know how to stop telomerase enzyme, they might able to fight against cancer by making cells age and die. Almost 90% of cancer cells have been found to have enhanced telomerase activity.

William Andrews one of scientists who worked on telomeres, he states that "taking telomeres inducers is safer than driving a car to work but he also acknowledges that there are some risks by taking the Cycloastragenol extract. For example, the cell which stops aging or become immortal is due to the telomerase enzyme, so there is a chance that Cycloastragenol could keep alive cancer cells that would otherwise die. The telomeres which have been linked at the ends of the DNA, gets shorter each time when they replicate. Ultimately, if they become too short, the DNA begins to diminish and cells lose their function. This is why these telomeres are known as 'the ageing clock in every cell'.

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