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Physiology and pathology of innate immune response against pathogens

Alireza Heidari, Elena Locci and Silvia Raymond

Abstract
This study has discovered a new mechanism that involves inhibiting the organelle, the lysosome, and dormant that cell. This opens the way for lysosomes to potentially be used as a therapeutic target. Tens of thousands of people around the world receive bone marrow transplants each year to help treat leukemia. High doses of chemotherapy are used to quickly kill cancer cells, but they also kill the stem cells needed to reproduce healthy blood. Stem cell transplantation is used to regenerate a patient's healing blood source, but finding the right donor can be challenging, especially in different ethnic communities where the donor list may not be extensive or non-existent. Stem cells in cord blood are of considerable value as additional donor sources, but the number of stem cells is often too small for an adult recipient. Understanding how stem cells are activated and proliferated in a controlled manner can greatly benefit cord blood. The ability to control stem cell activation may also be helpful in situations where stem cells are improperly activated due to disease, inflammation, or drug treatment, and help maintain sleep. Learning how to maintain blood stem cells is essential. If that stem cell is activated improperly, it can have serious consequences for the blood system, because stem cells are not renewable. You have to do everything you can to keep that cell asleep, and one way is to block signals from its surface. It can also be used to help fully understand leukemia stem cells, which mimic normal stem cells and are sometimes able to sleep and escape treatment. It is now interesting to look at these leukemia stem cells and see how this mechanism is regulated. We may notice differences and use them for treatment.

Keywords: Cancer, cells, tissues, tumors, prevention, prognosis, diagnosis, imaging, screening, treatment, management

1. Introduction
It is widely known that severe viral infections and cancer disrupt the immune system, including T cells, a process called "immune fatigue." Overcoming immune depletion is the main goal of developing new treatments for cancer or severe viral infections. The team had previously discovered that while some T cells lose their function and wear out within a few days, others, called Tpex cells, can maintain their function for long periods of time. The idea that you need to overcome burnout and heal T cells is at the heart of the immune system. While immunotherapy works really well, it only works for about 30% of people. By discovering a way to deliver T cells differently, they can function effectively in the long run, we can make immunotherapy more effective in more people. In their latest article on safety today, the team now identifies a mechanism that explains how Tpex cells can maintain their fitness for long periods of time. "The discovery has the potential to improve the success rate of immunotherapy," said Professor Callis. We found that the activity of mTOR, a nutrient sensor that regulates cell energy supply, was reduced in Tpex cells compared to cells that were destroyed. This means that Tpex cells were able to reduce their activity in order to maintain their function for a longer period of time; It's like running slower to run a marathon instead of two at full speed. The rapid movement of this system relative to the immune system is a balancing act. You do not want to be frustrated if you cannot get the right pitch so invest in a good capo. You do not want to be left out of the race. The next step was to find a mechanism that could do this. We found that Tpex cells were exposed to greater amounts of an immunosuppressive molecule, TGF-β, early in infection. This molecule acts primarily as a brake, reducing mTOR activity and thus the immune response. Interestingly, the researchers were able to use the discovery to improve the immune response to severe viral infections. When we treated mice early with mTOR inhibitors, this resulted in a better immune response in later stages of infection.

In addition, mice treated with the mTOR inhibitor responded better to checkpoint inhibition, a treatment widely used in cancer patients. The team will now examine this mechanism in preclinical cancer models [1-200].

2. Results and Discussion

When macrophages are activated by drugs, they produce inflammatory proteins. These in turn activate neutrophils, which carry out a toxic reaction. Pitt says this makes it possible to limit the side effects of immunotherapy by manipulating neutrophils. The team confirmed the discovery by studying the immune responses of mice whose cellular activity was modulated using genetic tools. They were able to identify an opening that could be used to eliminate these side effects. In fact, neutrophils produce some factors for the development of toxicity, including TNF-α, which can be a therapeutic target. TNF-α inhibitors are currently used to modulate the immune response in people with osteoarthritis and may be useful in cancerous conditions to inhibit the toxic effects of neutrophils during immunotherapy; In addition, inhibiting neutrophils can be a more effective way to fight cancer; In addition to triggering a toxic response, some of these cells also stimulate tumor growth; So by controlling them we can have a doubly beneficial effect: overcoming the toxicity in healthy tissues and the growth of cancer cells.

3. Conclusions

Lung cancer in its early stages has no symptoms that can be seen or felt, and in later stages, it often causes coughing, wheezing, and chest pain. But other lesser-known symptoms may appear in parts of the body that you do not expect, especially since they are not just lung cancer. This report introduces some of these signs and symptoms: 1- The appearance of fat around the fingers some lung tumors produce hormone-like chemicals in the body, one of which causes more blood and fluid to be pumped into the tissues around the fingertips and around the fingers, making them appear thicker or larger than usual. In this case, the skin around the nails looks shiny, or the nails may become more curved than usual when viewed from the side. Although these are not common symptoms, they are closely related to lung cancer, with about 80% of lung cancer patients having swollen fingers. 2- Hypercalcemia About 20% of cancer patients have high calcium levels, a condition called hypercalcemia, which can cause abdominal pain with nausea or constipation, loss of appetite and severe thirst. Cancer causes a hormone-like chemical made by some tumors to damage the kidneys, causing constipation and nausea. 3- Mental health problems In a Danish study, people who had mental health problems ranging from stress to depression and dementia a year earlier were more likely to develop lung cancer. This could be the result of how cancer affects the immune system or hormones. Cancer-related high calcium levels can also cause confusion, misguided thinking, and depression. 4- Back or shoulder pain pancreatic tumor is a type of lung cancer that grows in the upper part of the lung and spreads to the ribs, vertebrae, nerves and blood vessels. Because these tumors grow, they rarely affect the respiratory system and are more likely to cause shoulder, upper back, and arm pain. 5- Fatigue Low red blood cell count or anemia is a very common effect of lung cancer. Anemia can make a patient tired because his or her body tissues do not receive enough oxygen. In general, cancer cells need to be nourished with the nutrients needed to produce energy throughout the day, which fluctuates the patient's physical condition. 6- Imbalance and stability Lung cancer tells the immune system to attack the nervous system and may affect muscle function. Standing becomes more difficult than sitting, or the patient may feel unstable. If the tumor is in the right upper lung, it may be due to anemia or due to narrowing of the superior vena cava (the large vein that carries blood from the head to the heart). 7- Change in body weight Some people with lung cancer develop Cushing's syndrome, in which cancer cells in the body produce a hormone called ACTH, which raises cortisol levels. This leads to fluid retention and weight gain, which can be accompanied by bruising and drowsiness. On the other hand, hypercalcemia and SIADH (a hormonal problem that affects the kidneys) cause the patient to lose their appetite, so they can start losing weight for no apparent reason. 8- Eye problems pancreatic tumors can also affect the nerves in the eye and part of the face, called Horner's syndrome. Symptoms include a small pupil in one eye and drooping eyelids in the other. The patient loses the ability to sweat on the same side of the face. Lung cancer, which triggers the immune system against the nervous system, can appear as a vision problem. 9- Gynecomastia for men Lung cancer is a rare cause of breast swelling in men, but it cannot be completely ruled out. Lung cancer can upset the patient's hormonal balance and cause soft and swollen breast tissue. 10- Headache Depending on its location, the tumor can compress the superior vena cava, making it difficult for blood to pass through, resulting in headaches and high calcium levels causing intermittent headaches. Therefore, tests should be performed to detect any new, unusual headaches or to change the pattern of headache attacks. 11- Heart problems Hypercalcemia and anemia can cause symptoms such as a fast or irregular heartbeat. If heart problems are caused by hypercalcemia, they are likely to be severe, and a patient with lung cancer may have a heart attack or coma. Severe anemia can also cause chest pain and shortness of breath. 12- Swelling of the face, neck or arms when the superior vena cava suffocates due to pressure from the cancerous tumor, blood flows slowly from the upper body, causing the neck, arms, and face to swell due to the accumulation of excess fluid waiting to be expelled. This may cause reddish-brown spots on the chest. 13- Weakness and pain As lung cancer spreads throughout the body, cells often travel through the bloodstream to the bones, forming new tumors or lesions. These tumors often damage the bones, making them more fragile and painful. The patient may have a mineral imbalance, in addition to hypercalcemia or SIADH leading to general weakness and pain in the body. If the cancer affects the nervous system, it may lead to muscle weakness that can cause speech or swallowing problems. 14. Blood clots A patient with lung cancer is more likely to clot.

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