

Immunology its Relationtionship to Neurological Disease

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Abstract

Immunology owes much to the work of Erlich and other research scientists, whose work contributed to the many advances in immunology. Today the development of improved vaccines, monoclonal antibodies, the ability to actually see and identify receptors, as well as the possibility, that maybe even simple molecules like cysteine for example, can activate CD8T cells, and subsequently result in “IL-22 releasing T cells, which are capable of healing the intestinal lining when injured”. Cypin may also be a “practical treatment” for neurodegenerative disease, and brain, where it is capable of tagging proteins in the synapse [7]. In the case of the POLG mutation, the PAL-A can help to restore the function of “mutated DNA polymerase [10]. With the use of atomic force microscopic methods, and the addition of artificial intelligence, surface changes can now be detected, as nano surface changes on cancer cells, which are not seen by traditional microscopic methods. The combination of niraparib with abiraterone acetate and prednisone, according to the researching “can delay the return of the cancer, and hopefully extend life [21]. In Parkinsons disease, it has been recognized that when SOD1 protein becomes faulty, it can cause clumping and injure brain cells [26]. According to the author, by regulating the entrance if pyruvate in mitochondria, in certain tumors (prostrate), may be way to starve off the cancer [29].

Keywords: Immunology; Neurological Disease; Parkinsons Disease; SOD1 Protein

Introduction

In the late 1800s, many emerging concepts have led to the development of immunology today. One researcher, Paul Ehrlich’s insights, set in motion a greater understanding, of the way our body recognizes foreign invaders, that can invade, and create the disease state. His research led to the concept of the side-chain theory, and the term antibodies and receptors, which can bind an antigen [1].

Much of our fundamental understanding of immunology occurred, because, of the efforts of Ehrlich, and other scientists, for many years. In the last few years, the ability to see receptors, will further the ability of researchers to recognize antigenic receptors, and how special molecules, which can be used to neutralize metabolites, that create harmful results [1,2].

Even today Scientists are still trying to understand how pneumonia causing microorganisms enter the blood stream, and setup a pathway, which allow them to overcome the immune system in the lungs, and some comely reach other organs. According to the author, Michigan Medicine., *et al.* infectious agents, spread in three phases. Infections first and initial site, for example the lungs, then most enter the bloodstream, and lastly seeks avoidance of filtration by the liver and spleen [3].

One of the most common infections we face today, is the “exposure to the microorganism *Campylobacter*, which can be antibiotic resistance. It has been estimated in the United States, that they are 1.4 million people, that are ill from this food borne microorganism each year. *Campylobacter* resistance to quinolone in a recent report, seems to be more prevalent in the age group from 20 - 39 years of age. Although the author implies that greater resistance could be due to the quinolone resistant strains. The use of quinolones for the patient treatment, could be responsible for promoting resistant strains. The author does recommend azithromycin as the “drug of choice” [4].

Nutrition

In a recent article from MI, their research helps to show the ingestion of cysteine, as a supplement. Their premise was the daily intake of cysteine could help to speed up the healing process, and particularly with the common side effects of chemotherapy or radiation treatment. They analyzed different diets of mice on the twenty amino acids. They found that cysteine can set off a chain reaction that activates CD8T cells. They also discovered CD8T cells are capable of producing IL-22, which plays a “key role in regulating intestinal stem cell regeneration”. Thus IL-22 releasing T cells, are capable of healing the intestinal lining, when injured [5]. The intake of the supplements Vitamin D, also according to the researcher, can be important in major ‘age related disease, such as heart disease, osteoarthritis, and cancer, since there seems to be a link with telomere shorting in these diseases. However no standardized dose has been established [6].

Immune response

During some periods of time the immune system may not function properly, and individuals can become more susceptible to infections, from various microorganisms. This can be the case with white blood cells, or monocytes which do not mature properly, function properly, after a “acute immune response”. The researcher noted, administering the interferon beta, which is used in the treatment of multiple sclerosis, also has the benefit of maturing monocytes, and improving function [7].

A key brain protein discovery may provide clues to “practical treatments for neurodegenerative diseases, and brain injury”. The brain protein cypin is capable of “tagging proteins” in the synapse. Is also able to bind and interact with the proteasome, as well as slow the protein breakdown process by, binding to the proteasome. Cypin can also increase the activity of the protein called UBEA, which also helps the tagging process. Cypin effects on “synaptic proteins” is due in part to its influence on UBE4A. This discovery could lead to better neurological treatments in the future [8].

Our immune system, T-cells are of key importance in the recognition of foreign organisms, and must be activated with the specificity by the process called T-cell priming. This priming is not a single phase but occurs in two phases. The first phase of priming begins with the activation of a “broad range,” of specific T-cells, whereas the second phase, T-cells are desensitized, and “re-cluster with dendritic cells, and reactivated again, which improves their proliferation and specialization. This activation occurs in the lymph nodes areas, and of CXCR3 expression on CD8 t-cells without IL-2 from CD 4 helper cells, CD8 T-cells cannot proliferate. There stage two is selective and selectivity expansion of t-cells that can recognize pathogens [9].

One of a number of serious genetic defects that can affect children, and can result in life-threatening disease, is a defect in mitochondrial function. It is caused by a POLG mutation. In which there is a defect in the DNA polymerase gamma. An enzyme important in the copying of mitochondrial DNA. As a result the mitochondria can not perform properly, and are unable to produce energy needed for the cell. The researchers have discovered a promising molecule, called PAL-A, which can help restore the function of “mutated DNA polymerase. This is significant, since the sited research may be applicable to other related mitochondrial diseases, where there may be other simple molecules, that could be discovered that function, in similar neurogenerative diseases [10]. It seems also that lipid metabolism may play a part in a possible role in blood cancers, and may contribute to treatments of cancer, Genes such as the CD79B gene and other B-cell genes mutate or abnormally activated in “lymphoma or multiple myeloma. Targeting the “ELOVL2 activity”, could improve immune function [11].

Immune progress for memory

In a research paper by Cedars Sina, patients were infused with immune stem cells, and mice that showed signs of aging and Alzheimer's disease. Show improvement in brain function, after treatment with young mononuclear phagocytes. In addition, they showed healthier microglia, and "clearing damaged tissue. These treatment is encouraging and offers promising for those demonstrating "Alzheimer's disease-related cognitive decline" [12]. A new special therapy using chimeric antigen receptor T cell therapy, may provide possible therapy for lupus, systemic sclerosis, myositis and RA, without receptor T cell therapy, may provide possible therapy for lupus, systemic sclerosis, myositis and RA, without "chemotherapy-induced immune suppression. The use of antigen receptor T cell and IND, as in autoimmune patients [13].

Degenerative diseases and various cancers

In the case of Wet age-related macular degeneration and in which formation of blood vessels in "advanced sage, the author suggests that such patients may be treated by the removal of abnormal blood vessels, treated with transplantation of stem cell-derived retinal cells. They suggest that the complete removal of "blood vessel patches" can eliminate inflammation, and a great situation for transplant survival [14]. In regards to early detection of oral cancer, researchers from the University of Otago, have detected nano changes in the surfaces of cancer cells, by atomic force microscopic methods with the addition artificial intelligence. Theses surface changes are not detectable, with "traditional microscopic methods. They describe this microscopic method, that may "pave the way to a new cancer therapy [15].

In a recent study of acute myeloid leukemia (AML), it has been found that the combination of MCL-1 inhibitors affectively block the function of MCL-1, and limit the ability of AML cells to survive. However, this treatment can "trigger" the buildup of MCL-1 in leukemia cells. Its hope that SRC inhibitors/MC-1 may offer a solution to this problem, since this combination "effectively" killed primary AML cells" [16]. Another recent use of the monoclonal antibody KG2032 seems also promising since it binds to the HLA-DRB1 molecule which is found on acute myeloid leukemia cells. Thus these specific anti-AML deploys a strong affinity for these cancer cells, without "signs of toxicity" [17]. It is also pertinent that a recent study has showed that the subtypes of gycans can help in the reorganization subtypes of pancreatic cancer differing in their "different composition of glycans [18]. Scientists at Wistar Institute have discovered a mechanism how cancers avoid the immune system. They discovered how cancer can reprogram the immune cells by hypoxic CD 71 neutrophils. They cause an increase in excess lactate, cause histone lactylation, and a ARG expression, which leads to immune suppression. Their research did show by isosafrole treatment, this resistance to reprogramming could help slow down tumor progression [19]. The drug niraparib and with abiraterone acetate and prednisone, (standard treatment for prostate cancer), according to the researcher, can delay the return of the cancer and hopefully extend life [20]. With ALS, kaempferol which found in various fruits and vegetable, may help, be zeroing on an important pathway in energy production and "protein management" It is capable in "targeting both the endoplasmic reticulum, and mitochondria simultaneously". Can still be affective after symptoms start. Kaempferol can be administered by encapsulation within "lipid-based nonparticles," that are readily absorbed by neuron [21].

Neurological diseases and recent research possibilities

In Alzheimer's disease, The University of Cologne has discovered a key protein, which is responsible for the toxicity neurons. They discovered a "specific form of tau protein" known as 1N4R, and contributes to the toxicity of protein clumps in our brain cells [22]. Researchers from Baylor College Medicine identified specific genes whose changes, increased the chances of Alzheimer's disease. In the test fruit flies. Their motor dysfunction improved, "restoring MTCH2 expression, by reducing tau accumulation, in human neural progenitor cells, during laboratory testing [23]. The small molecule NU-9 does seem to reduce the protein buildup, improves memory, and reduces inflammation associated with Alzheimer's cathepsin also B reduces protein clumps. NU-9 triggers the lysosomes, but how has not been determined [24]. In relationship to the circadian rhythm, the protein called REV-ERB α , which helps improve the NAD⁺ levels, and DNA repair, and lowers the levels, of tau, which is "linked to Alzheimer's pathology [25].

In Parkinson's patients the SOD1 protein, has been identified in the brains of patients diagnosed with Parkinson's disease. When this protein becomes faulty, it can cause clumping and injure brain cells. A clinical trial may help in understanding SOD1 proteins, and may help in developing a new therapy [26]. The combination of amyloid β and fibrinogen can also be important in creation of clots and cause inflammation in the brain with Alzheimer's disease [27]. RNA may also form droplet-condensates, which can serve to cluster essential molecules together. These droplets can serve as "transcriptional hubs, which may activate genes, and "promote tumor growth [28]. Being able to block mitochondrial pyruvate carriers can regulate the entrance of pyruvate in mitochondria, in certain tumors (like prostate), may off way to starve the cancer out [29]. A new material has made it possible for the development of a new smaller and faster microchip. The author says it's so small, it's not visible to the naked eye. This new chip could more greatly improve, electronic devices in cell phones, from home equipment to planes. This process can revolutionize the process how better chips can be made, and open the way, for how this technology can be used [30].

Summary

Early Researchers provided the fundamental foundation for the science of immunology as we know today, with the development of vaccines, monoclonal antibodies, and a greater understanding of the intricate function of the components (B-Cells, T-cells, and subtypes) of the immune system that must work in a cooperative function. CD8 T-cells when producing IL-22 may play a key role in intestinal healing. Cypin may lead to better neurological treatments in the future, whereas PAL-A could help restore mutated DNA polymerase. The ability to recognize nano surface changes on cancer cells, by atomic force microscopy with artificial intelligence, could help for early detection of cancer. Cancer can also cause immune suppression, by reprogramming immune cells by hypoxic CD 71 neutrophils. "Restoring MTCH2, expression, in human neural progenitor cells, NU-9 does seem to reducing tau accumulation, in human neural progenitor cells, during laboratory testing [23]. NU-9 does seem to reduce the protein buildup, improves memory, and reduces inflammation associated with Alzheimer's cathepsin, also B reduces protein clumps. SOD1 protein1 has been identified in the brains of Parkinson's patients. The combination of amyloid β and fibrinogen can be important in creation of clots and cause inflammation in the brain with Alzheimer's disease [27]. "Certain tumor cells rely on pyruvate metabolism, these cancers produce excess pyruvate transport carriers, could the starve the cancer, killing them [29].

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